Appendix L

Final Birds Technical Support Document



MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Birds Technical Support Document: Existing Conditions & Effects Assessment

February 2026

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This limitations statement is considered an integral part of this report.

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Revision History

Report	Date	Revised By:	Revision Description
Draft	January 20, 2025	WSP Canada Inc.	Draft Report for inclusion with Draft EA / IS Report
Final	February 20, 2026	WSP Canada Inc.	Final Report for inclusion with Final EA / IS Report

Executive Summary

Section Purpose

This Report provides a comprehensive assessment of potential effects of the Marten Falls First Nation Community Access Road (the Project) on birds. The bird assessment used widely accepted scientific practices and incorporated Indigenous Knowledge.

Migratory and non-migratory bird Valued Components, including species at risk, were identified in Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020). For each bird Valued Component group, at least 1 representative species was selected as a proxy Valued Component based on habitat association and expected abundance or behaviour (i.e., diurnal or nocturnal). A total of 26 bird species represented Valued Components in the Environmental Assessment. The bird Valued Components and rationale for their selection are:

- Red-eyed vireo (Oji-Cree translation, *Misko-binechiinch gaanitaanigamoch*) (*Vireo olivaceus*) (proxy for species that use deciduous forests);
- Ovenbird (Oji-Cree translation, *binechiinch ganitanigamoch*) (*Seiurus aurocapillus*) (proxy for species that use mixed wood forests);
- Dark-eyed junco (Oji-Cree translation, *binechiinch gaanitaanigamoch*) (*Junco hyemalis*) (proxy for species that use coniferous and disturbed forests);
- Osprey (Oji-Cree translation, *saagwadamo*) (*Pandion haliaetus*) (proxy for diurnal raptors);
- Boreal owl (*Aegolius funereus*) (proxy for nocturnal raptors);
- Wilson's snipe (Oji-Cree translation, *nibiikaang gaa'ayaach binechiinch*) (*Gallinago delicata*) (proxy for shorebirds);
- Chimney swift (Oji-Cree translation, gondaaganaabikoong gaadashiiyayaach binechiinch) (Chaetura pelagica) (species at risk);
- Bank swallow (Oji-Cree translation, gaa'osaaw bebeshi aakiganech binechiinchechench) (Riparia riparia) (species at risk);
- Barn swallow (Oji-Cree translation, gaanawachwebamaach manichooshan binechiinch) (Hirundo rustica) (species at risk);
- Common nighthawk (Oji-Cree translation, dibiki binechii) (Chordeiles minor) (species at risk);
- Eastern whip-poor-will (Oji-Cree translation, gaamajaachimoch binechinch) (Antrostomus vociferus) (species at risk);
- Eastern wood-pewee (Oji-Cree translation, gaagigiweshkitwech

- Mallard (Oji-Cree translation, *ininiship*) (*Anas platyrhynchos*) (proxy for waterfowl and waterbirds);
- Palm warbler (Oji-Cree translation, *binechiinch gaanitaanigamoch*) (*Setophaga palmarum*) (proxy for species that use bogs);
- Common yellowthroat (Oji-Cree translation, *binechiinch gaanitaanigamoch*) (*Geothlypis trichas*) (proxy for species that use fens);
- Northern waterthrush (Oji-Cree translation, *nibiikaang gaa'ayaach binechiinch)* (*Parkesia noveboracensis*) (proxy for species that use swamps);
- Sora (Oji-Cree translation, *Gaagweshkoshiich binechiinch*) (*Porzana carolina*) (proxy for species that use marshes);
- Canada warbler (Oji-Cree translation, *gaamakatew bebeshisich binechiinch*) (*Cardellina canadensis*) (species at risk);
- Evening grosbeak (Oji-Cree translation, *gaa'onaagoshi nigamoch binechiinch*) (*Coccothraustes vespertinus)* (species at risk);
- Olive-sided flycatcher (Oji-Cree translation, Gaagweshkoshiich binechiinch) (Contopus cooperi) (species at risk);
- Bald eagle (Oji-Cree translation, *mikisi*) (*Haliaeetus leucocephalus*) (species at risk);
- Peregrine falcon (Oji-Cree translation, *gaagishiiyaashich migiziiw binechiinch*) (*Falco peregrinus*) (species at risk);
- Short-eared owl (Oji-Cree translation, *gaayaagaachitawaagech kookookohoo*) (*Asio flammeus*) (species at risk);
- Black tern (Oji-Cree translation, *gichisaga'iiganing gaadaashiyayaach binechiinch*) (*Chlidonias niger*) (species at risk);
- Lesser yellowlegs (Oji-Cree translation, *gaa'osaaw gaatech binechiinch*) (*Tringa flavipes*) (species at risk);
- Rusty blackbird (Oji-Cree translation, *makadew binechiinch*) (*Euphagus carolinus*) (species at risk); and
- Yellow rail (Oji-Cree translation, *egaawiikaa gaanagosich binechiinch*) (*Coturnicops noveboracensis*) (species at risk).

The assessment of potential effects on birds was informed by the assessments completed for vegetation, terrain, soils, hydrology, surface water quality, groundwater (Oji-Cree translation, *anamakamigwabo*) quality, and air quality. Alterations in abundance and distribution of birds can affect ecological services (e.g., availability of birds) for people that use these resources. As such, the bird assessment provided information that was used to support other Valued Component assessments such as Aboriginal and Treaty Rights and Interests; Social; Land and Resource Use; and Human Health and Community Safety.

Setting

At a regional scale, the Project would start approximately 57 kilometres (km) north of Nakina, Ontario and end at the Community of Marten Falls First Nation, approximately 175 km north of Nakina. The bird assessment used the same spatial boundaries as vegetation, which consist of an effects assessment Local Study Area of 148,858 hectares (ha) and an effects assessment Regional Study Area of 506,756 ha.

Existing Conditions

Existing conditions for birds were characterized based on results from field studies carried out between 2018 and 2022, Indigenous Knowledge, and other available data sources (e.g., literature).

Non Species at Risk

Suitable nesting habitat for non species at risk birds Valued Components (i.e., red-eyed vireo, ovenbird, dark-eyed junco, osprey, boreal owl, Wilson's snipe, mallard, palm warbler, common yellowthroat, northern waterthrush, and sora) was identified and mapped for existing conditions. Moderate and high suitability nesting habitats for non species at risk birds cover approximately 20% (osprey and sora) to 85% (mallard) of the effects assessment Regional Study Area at existing conditions.

Habitat types known to have the potential to support non species at risk birds were generally common and widespread in the Local Study Area. One exception is osprey habitat, which was concentrated around large waterbodies and watercourses. Existing anthropogenic disturbance is low in the effects assessment Regional Study Area, and it was assumed that existing linear features in the effects assessment Regional Study Area (i.e., winter roads and trails) do not functionally affect the movement and habitat connectivity of non species at risk birds at existing conditions.

Red-eyed vireo, ovenbird, dark-eyed junco, boreal owl, Wilson's snipe, mallard, palm warbler, common yellowthroat, and northern waterthrush were commonly detected during baseline surveys. Sora and osprey were rarely detected during baseline surveys, consistent with low density estimates for these species in Ontario Breeding Bird Atlas Regions 37 and 44 (≤0.2 individuals per square kilometre [km^2]). Additionally, species-specific surveys were not completed to target osprey.

At existing conditions, it was assumed that non species at risk bird survival and reproduction likely support stable populations in the effects assessment Regional Study Area given the availability of suitable nesting habitat, the abundance of these species in North America, the low levels of human disturbance, their levels of detection during the baseline surveys, and the fact that habitats in the effects assessment Regional Study Area are not at carrying capacity.

Species at Risk

Suitable nesting habitat for species at risk bird Valued Components (i.e., Canada warbler, evening grosbeak, chimney swift, bank swallow, barn swallow, common nighthawk, eastern whip-poor-will, eastern wood-pewee, olive-sided flycatcher, bald eagle, peregrine falcon, short-eared owl, black tern, lesser yellowlegs, rusty blackbird, and yellow rail) was identified and mapped for existing conditions. High and moderate suitability habitats for Canada warbler, common nighthawk, olive-sided flycatcher, short-eared owl, lesser yellowlegs, and rusty blackbird are common and widespread and cover approximately 30% to 60% of the effects assessment Regional Study Area at existing conditions. High and moderate suitability habitats for evening grosbeak, eastern whip-poor-will, eastern wood-pewee, bald eagle, and yellow rail cover approximately 5% to 20% of the effects assessment Regional Study Area, at existing conditions. Suitable habitats for chimney swift, bank swallow, barn swallow, peregrine falcon, and black tern are rare and cover <0.1% to 0.2% of the effects assessment Regional Study Area at existing conditions.

Existing anthropogenic disturbance is low in the effects assessment Regional Study Area, and it was assumed that existing linear features in the effects assessment Regional Study Area (i.e., winter roads and trails) do not functionally affect the movement and habitat connectivity of species at risk bird Valued Components at existing conditions.

Common nighthawk, bald eagle, olive-sided flycatcher, and rusty blackbird were commonly detected during baseline surveys. The remainder of species at risk Valued Components were rarely detected during baseline surveys, consistent with low density estimates for these species in Ontario Breeding Bird Atlas Regions 37 and 44. Estimates of species at risk Valued Component densities from the Ontario Breeding Bird Atlas for the effects assessment Regional Study Area are generally low (less than 1 individual per km^2). The one exception is olive-sided flycatcher, which has a density estimate of 1.1 to 1.4 nesting territories per km^2. Overall, it was assumed that species at risk bird Valued Component survival and reproduction likely support stable populations in the effects assessment Regional Study Area given the availability of suitable nesting habitat at existing conditions.

Potential Residual Effects and Proposed Mitigation and Enhancement Measures

An analysis was completed to evaluate Project components and activities and associated effects interactions that could potentially affect birds. Project activities that would have the potential to affect birds during the Project lifespan include:

- Mobilization of equipment and supplies;
- Temporary construction staging areas;

- Temporary access roads and trails;
- Temporary construction camps;
- Right-of-way clearing and grubbing;
- Pits and quarries;
- Temporary concrete batch plants;
- Drilling / blasting / aggregate production;
- Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching);
- Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls);
- Construction site restoration;
- Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*;
- Decommissioning of temporary camps, roads / trails and staging areas;
- Operation of the Preferred Route; and
- Maintenance of the Preferred Route.

As part of the interactions analysis, proposed mitigation and enhancement measures were considered to determine whether effects on bird Value Components could be avoided or reduced to negligible levels. A variety of environmental design features and mitigation measures were proposed to minimize the Project's effects on birds, including:

- Restricting access to the effects assessment Construction Disturbance Area to construction personnel and prohibiting firearms;
- Blocking winter roads and temporary access routes and trails that are no longer required;
- Avoiding high quality habitats and sensitive areas for migratory bird species at risk, where possible;
- Undertaking activities in the fall and winter where feasible to avoid nesting periods;
- Implementing wildlife policies and employee and contractor training programs;
- Implementing an Environmental Protection Plan;

- Completing wildlife sweeps prior to vegetation clearing in habitats that may support pileated woodpecker nest cavities; and
- Completing non-intrusive pre-clearing nest surveys to look for migratory bird nests if vegetation clearing is required during the migratory bird nesting season.

These mitigation measures have been used extensively within the road development sector and have been proven effective.

After mitigation measures were considered, many of the potential interactions from the Project to the environment were removed or had effects that were predicted to be of a negligible level. However, it was identified that the Project could have greater than negligible effects on birds from the following interactions:

- Habitat loss – the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction;
- Sensory disturbance – (e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction; and
- Increase in edge habitat – can increase nest predation of some bird species.

Residual Effects Assessment

A residual effects assessment was conducted to determine the potential effects on birds under two assessment cases: effects of the Project and combined effects of the Project and reasonably foreseeable developments. For birds, three measurement indicators were considered:

- Habitat availability;
- Habitat distribution; and
- Survival and reproduction.

The residual effects assessment followed a precautionary approach by using an effects assessment Construction Disturbance Area that is larger than the currently anticipated effects assessment Construction Disturbance Area.

All Bird Valued Components

The Project is expected to result in effects from habitat loss and sensory disturbance for most bird Valued Components during all Project phases. Exceptions are peregrine falcon and black tern for which there is no suitable habitat in the effects assessment Construction Disturbance Area or associated sensory disturbance buffers. Increased edge habitat due to the Project may result in small changes to survival and distribution for ground-nesting bird Valued Components, relative to existing conditions.

The magnitude of habitat loss from the Project would be less than 4.0% of suitable habitats in the effects assessment Regional Study Area for all bird Valued Components. Sensory disturbance is anticipated to affect up to 16.4% of suitable habitats in the effects assessment Regional Study Area for all bird Valued Components. Habitat distribution for all Value Components is expected to remain well connected throughout the effects assessment Regional Study Area after implementation of the Project. Although there is variability on effects for individual animals, overall, all bird Valued Component populations are expected to remain self-sustaining and ecologically effective after implementation of the Project.

Significance Determination

There are minimal disturbance and a large amount of available habitat in the Effects Study Area at existing conditions. Due to the large amount of habitat available, it is anticipated that habitats are not at carrying capacity and shifts in the distribution of nesting territories away from the Project can be accommodated. After implementation of the Project, the weight of evidence from the analysis predicts that changes to the availability, distribution, and survival and reproduction of bird Valued Components would be within the resilience and adaptability limits for these Valued Components in the effects assessment Regional Study Area. Therefore, the residual effects on bird Valued Components after implementation of the Project are predicted to be **not significant**.

Prediction Confidence and Uncertainty

Overall, there was a low to moderate uncertainty in the predictions related to the bird assessment. Uncertainty is low regarding effects from habitat loss and sensory disturbance; there is moderate uncertainty regarding the effects from increased edge habitat from the Project. Uncertainty was primarily and appropriately addressed by making assumptions that conservatively overestimated rather than underestimated potential effects (i.e., a precautionary assessment).

Cumulative Effects Assessment

The cumulative environmental effects that are likely to result from the Project in combination with the environmental effects of other physical activities that have been or will be carried out were considered in a cumulative effects assessment. Interactions were carried forward from the Project's residual effects assessment when they were assessed as possible or certain to occur with the addition of the Project.

As mandated by the Impact Assessment Agency of Canada, determination of significance was predicted for cumulative effects on Valued Components that are species designated as threatened or endangered under the *Species at Risk Act* (Government of Canada, 2002), and species of traditional / cultural importance to First Nations and as such are considered a part of Aboriginal Treaty Rights and Interests.

For all bird Valued Components, the cumulative effects assessment considered the effects of the three reasonably foreseeable developments in addition to the Project in the bird effects assessment Regional Study Area.

All Bird Valued Components

The addition of the Project and the other reasonably foreseeable developments is expected to result in effects on all bird Valued Components from habitat loss and alteration, sensory disturbance, dust deposition, and edge effects relative to existing conditions. The magnitude of effects for the interactions is predicted to range from negligible to low.

After implementation of the Project and the other reasonably foreseeable developments, the weight of evidence from the analysis predicts that the anticipated changes to bird Valued Components habitat availability, distribution, and population survival and reproduction are expected to remain within the resilience and adaptability limits of the regional populations in the birds effects assessment Regional Study Area. Overall, bird populations are expected to remain self-sustaining and ecologically effective in the birds effects assessment Regional Study Area after implementation of the Project and the other reasonably foreseeable developments. The uncertainty for the assessment of significance is considered **low to moderate.**

Significance Determination

There are minimal disturbance and a large amount of available habitat in the Cumulative Effects Study Area at existing conditions. Due to the large amount of habitat available, it is anticipated that habitats are not at carrying capacity and shifts in the distribution of nesting territories away from the Project and other reasonably foreseeable developments can be accommodated. After implementation of the Project and other reasonably foreseeable

developments, the weight of evidence from the analysis predicts that changes to the availability, distribution, and survival and reproduction of bird Valued Components would be within the resilience and adaptability limits for these Valued Components in the Cumulative Effects Assessment Regional Study Area. Therefore, the residual effects on bird Valued Components after implementation of the Project and other reasonably foreseeable developments are predicted to be **not significant**.

Monitoring and Follow Up

Monitoring programs for the pre-construction, construction, and operations components of the Project will be implemented to verify effects predictions and effectiveness of mitigation measures for birds, and apply adaptive management, if required. A Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) and will be implemented for the Project to provide a net positive increase in migratory bird habitat.

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List of Attachments

Attachment A – Draft and Final Study Plans and Regulator Comments
Attachment B – Birds Technical Support Document
Attachment C – Birds Habitat Modelling Report
Attachment D – Pre-Clearing Nest Sweep Protocol

1 Introduction

This Report presents the existing conditions and effects assessment for the birds discipline and is being prepared in support of the *Marten Falls First Nation Community Access Road Environmental Assessment / Impact Statement Report*.

Marten Falls First Nation (Oji-Cree translation, *Wegwajihwana*) is a remote First Nation community in northern Ontario, approximately 430 kilometres (km) from Thunder Bay, Ontario, located at the junction of the Albany (Oji-Cree translation, *Keshijih'wano Wih Ziibih*) and Ogoki (Oji-Cree translation, *Zakamosgwanih' Ziibih*) rivers. Marten Falls First Nation is proposing a multi-purpose Community Access Road (the Project) that will connect the community to the Ontario provincial highway network. The Project includes the construction and operation of the Community Access Road with the following key characteristics:

- Approximately 184 km (See **Section 6** for further details on the selection of the Preferred Route) of a two-lane gravel road on a new right-of-way;
- Approximately 100 m wide right-of-way cleared to a width of 60 m; and
- Proposed designated speed limit of 80 km per hour.

Marten Falls First Nation is currently accessible year-round by air transportation out of Thunder Bay, Ontario and Nakina, Ontario, and by a winter access road constructed on an annual basis, if winter conditions permit. Since the 1990s, Marten Falls First Nation has received provincial funding to maintain the 140 km of winter road to the community.

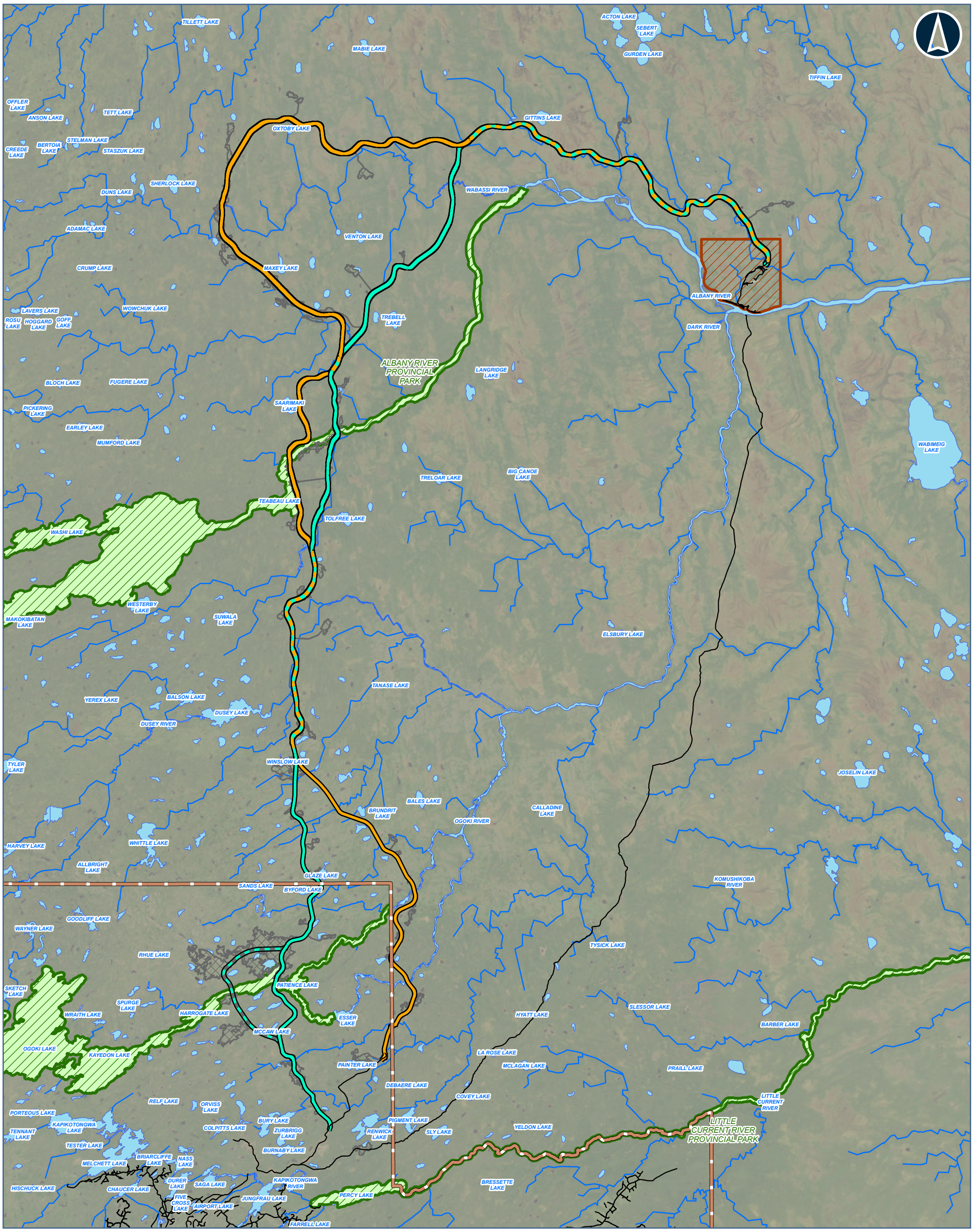
1.1 Project Overview

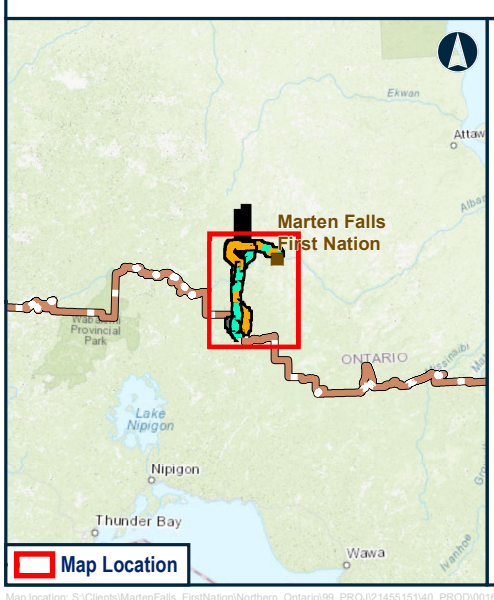
The Project consists of a Community Access Road from Painter Lake Road located approximately 57 km north of Nakina, Ontario to the Community of Marten Falls First Nation (**Figure 1-1**). The Project will serve community access and industrial supply needs for both the community (e.g., fuel, construction supplies, and water treatment supplies) and industrial proponents (e.g., mining and forestry). Therefore, to minimize infrastructure corridors in the Far North, the Project will be for a multi-purpose road built to meet industrial use specifications.

In April 2018, Marten Falls First Nation signed an agreement with the Ministry of the Environment, Conservation and Parks to prepare an environmental assessment under the Ontario *Environmental Assessment Act*, 1990 to support the development of the Community Access Road. A study under the Ontario *Environmental Assessment Act* was formally initiated by Marten Falls First Nation in March 2019 when the Notice of Commencement for a *Terms of Reference* for the Project was published.

All-season public roads that require 75 km or more of new right-of-way, as per Schedule 1 (51) of the Physical Activities Regulations under the *Impact Assessment Act*, may be subject to the Act (Government of Canada, 2019). After considering the detailed Project Description, the Agency determined that a federal impact assessment is required for the Community Access Road and an Impact Statement needs to be submitted to the Agency for review and approval. The Agency prepared and released the *Marten Falls Community Access Road Project: Tailored Impact Statement Guidelines* in February 2020 (Impact Assessment Agency of Canada, 2020) to outline the information and studies necessary to conduct the impact assessment.

The Federal and provincial governments are co-operating on the assessment of the Community Access Road, in accordance with the Cooperation Plan (Impact Assessment Agency of Canada, 2020b). The Cooperation Plan allows Marten Falls First Nation to prepare 1 single Environmental Assessment / Impact Statement submission to satisfy both the federal and provincial processes (Government of Canada).





Legend

- ROAD
- WATERBODY
- WATERCOURSE

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

PROJECT LOCATION

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:450,000 * when printed 11"x17"
Rev:0	

Figure 1-1

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2023), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

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1.2 Report Overview

This Report includes the following:

- A summary of the Project components and activities (**Section 2, Project Description**);
- A compilation of information shared by Indigenous Peoples and other interested persons related to birds (**Section 3, Information Shared by Indigenous Peoples and Other Interested Persons Which Informed This Report**);
- Study methods and assessment scope (**Section 4, Study Methods and Assessment Scope)**;
- A description of existing conditions for birds (**Section 5, Existing Conditions**);
- A summary of the selection of the Preferred Route as it relates to birds (**Section 6, Selection of the Preferred Route**);
- The residual effects assessment (**Section 7, Residual Effects Assessment**);
- The cumulative effects assessment (**Section 8, Cumulative Effects Assessment**);
- A summary of monitoring programs and future commitments related to birds (**Section 9, Monitoring Programs and Future Commitments**); and
- An overall summary and recommendations (**Section 10, Summary and Recommendations**).

As described in the *Environmental Assessment / Impact Statement Report* and in **Section 6** of this Report, the characterization of existing conditions for the Project was completed on two alternative routes (Alternative 1 and 4). The data collected through the characterization of existing conditions were used to inform the selection of the Preferred Route (**Section 6**). The residual (**Section 7**) and cumulative (**Section 8**) effects assessments were completed on the selected Preferred Route.

1.3 Qualifications of Individuals

A list of names and qualifications of the authors and technical reviewers of this Report is presented in **Table 1-1**.

Table 1-1: Qualifications of Individuals

Name	Title / Role	Years of Experience	Qualifications
Ken Burrell	Senior, Avian Biologist	14	M.E.S.
Lynnette Dagenais	Lead, Wildlife Biologist	16	M.Sc., R.P.Bio., P.Biol.
Kristine Sare	Senior Principal, Terrestrial Ecologist	18	M.Sc., P.Biol.
Erin Greenaway	Technical Director, Terrestrial Ecologist	26	B.Sc.

M.E.S. = Master of Environmental Studies; M.Sc. = Master of Science; R.P.Bio = Registered Professional Biologist; P. Biol. = Professional Biologist.

2 Project Description

For information on the Preferred Route, please refer to **Section 6**.

2.1 Project Components

2.1.1 Community Access Road

The Project consists of an approximately 184 km all-season road within a 100 m wide right-of-way, 60 m of which will be cleared of vegetation. The Community Access Road will be approximately 11 m in width to accommodate a two-lane gravel road with culverts and two-lane bridges at water crossing locations. Traffic levels for the Project have been estimated at 700 vehicles a day for the north-south section and 100 vehicles a day for the east-west section of the Marten Falls First Nation Community Access Road. These volumes are reflective of the anticipated peak traffic in 2046.

Road embankment design mitigations are being further considered in high-suitability habitat for caribou where feasible. Operational mitigations such as lower speed limits, signage about wildlife risks, roadside vegetation management, and snow berm height management will be further planned and implemented to facilitate safe wildlife crossing of the road.

The predominant building materials will be, blasted rockfill and composite excavation material capped with granular surface material. The majority of blasted rockfill will be obtained from rock outcrops within and / or adjacent to the right-of-way. Building materials will be primarily obtained through the pits and quarries (**Section 2.1.3**) developed specifically to support construction of the Project.

Early investigations on permafrost have shown the Project is located within the isolated patches permafrost zone (Heginbottom et al., 1995), with some possible locations identified in test holes and helicopter reconnaissance. Excavation within identified permafrost areas will be avoided, whenever possible, as cutting into surface vegetation can disturb the permafrost regime resulting in thaw and unstable ground. As a precaution, the design will primarily use fill to minimize any permafrost degradation and will follow the recommendations outlined in a Permafrost Management Plan.

The proposed approach to road construction through peatlands endeavours to keep peat in place while promoting natural water flow. A permeable embankment made of quarried rock or selected granular material will be placed over the peat, supported by heavy geogrid to prevent clogging and allow settlement. To preserve peatland hydrogeology, 900 mm equalization culverts will be installed at appropriate intervals, informed by additional field programs and studies (i.e. peatlands hydrogeological monitoring, water budget study, and a field program to develop a detailed map of peat thickness), to be carried out during subsequent design phases of the Project. For further information on the proposed

construction approach, please refer to *Appendix W* under the *Final Environmental Assessment / Impact Statement Report*.

2.1.2 Bridges and Culverts

Permanent bridges will be required for the various waterbodies to be crossed by the Community Access Road. Based on initial design and planning, the proposed waterbody crossing structure was initially determined based on bankfull width for each waterbody identified in the crossing list as follows.

- For waterbody crossings with bankfull widths less than 5 m, it was assumed that culverts would be used (requiring in-water work);
- For waterbody crossings with bankfull widths greater than 5 m and less than 30 m, it was assumed that clear span bridges would be used (no in-water work);
- For waterbody crossings greater than 30 m, it was assumed that bridges with piers and abutments would be used (requiring in-water work); and
- For waterbody crossings in flooded / impounded wetlands where wetted widths were greater than bankfull width at the time of the assessment, it was assumed that in-water work would be required.

The type of crossing structure for individual waterbodies may change during detailed design based on site-specific conditions.

The bridges will range in size from clear span to multi-span bridges and will accommodate two lanes of traffic with appropriate shoulder widths. The foundation supports for the bridge abutments are expected to consist of driven steel piles, drilled concrete piles or concrete spread footings. Bridges will be designed to meet the - in-100-year flood scenario design, fish passage requirements, and navigation requirements, as required, based on federal and provincial regulations. Where feasible, bridges will be installed above the high-water mark; however, abutments and / or reinforcement material may be installed below the high-water mark. Permanent bridges along the Community Access Road will be designed to accommodate increased flooding and rainfall under expected and anticipated climate change conditions.

For certain waterbody crossings, culverts will be constructed using either corrugated steel pipe culverts or box culverts with minimum culvert diameters (i.e., span) of 900 mm. The culverts will either be closed or open bottom depending on fisheries sensitivities and soil conditions. The culverts will be designed to accommodate fish passage, where appropriate. Permanent culverts along the Community Access Road will be designed to withstand expected and anticipated climate change conditions, such as increased rainfall, higher temperatures, frequent freeze-thaw cycles, and heightened flooding risks.

Equalization culverts will be installed at locations where it is determined that spring-melt or storm runoff needs to pass from one side of the Community Access Road to the other to prevent flooding and / or erosion. The purpose of equalization culverts is to maintain the existing surface water drainage patterns in the area. Culverts will be put in place as construction progresses along the Project.

Additional design measures and wildlife crossing mitigation options will be incorporated on select bridges and culverts located in high-suitability habitat for Species at Risk and road mortality vulnerable species (i.e. amphibians and reptiles). These measures will be further considered during detailed design and implemented during construction at prioritized locations to facilitate safe wildlife passage above or below the Community Access Road and reduce the risk of barriers to movement across the Project area during operations.

The type of crossing structure for individual waterbodies may change during detailed design based on site-specific conditions.

2.1.3 Pits and Quarries

Pits and quarries will be developed to provide crushed rock and granular materials for the construction of the Project. Most of the rock required for construction is expected to come from quarry sites adjacent to the Project. Temporary access roads will be established to connect the various Project components, as required, and will be limited in length to the extent feasible.

All materials will be subject to a geotechnical verification process to confirm they possess the desired physical properties for use in construction. The development and operation of all pits and quarries will be subject to the aggregate permitting process under the *Aggregate Resources Act* (Aggregate Resources of Ontario: Site Plan (2020) Standards and Technical Reports and Information (2023)). Permitted pits and quarries will follow the progressive and final rehabilitation requirements outlined in the approved site plans under the Act.

Only material that has been cleared through a geochemical verification process will be used for the road surface to avoid acid rock drainage or metal leaching. Monitoring of runoff will be conducted; further details about this specific type of monitoring will be available in the Surface Water Management Plan, of which the Owner will be responsible to follow all applicable Ontario permitting guidelines.

2.1.4 Temporary Infrastructure for Construction

The temporary infrastructure for the Project includes temporary access roads, staging areas, camps, and debris and / or timber stockpiles. Temporary access roads will be required to access the right-of-way during construction. The purpose of the temporary access roads is to facilitate emergency, equipment and personnel access, and to provide

access to and from pits and quarries, staging areas, camps, and debris and / or timber stockpiles. The temporary access roads will be cleared, but not grubbed, to approximately ten metres wide to accommodate equipment movement. The temporary access roads will be limited in length to the extent feasible. Temporary bridges and culverts will be required to cross the various waterbodies along the temporary access roads. Existing access roads will be used where possible; however, access is limited in the area.

Bridges and culverts will be required to cross the various waterbodies along the access roads. Based on initial design and planning, the proposed waterbody crossing structures for the *Environmental Assessment / Impact Statement Report* were initially determined based on bankfull width for each waterbody identified in the crossing list as follows:

- For waterbody crossings with bankfull widths less than 5 m, it was assumed that culverts would be used (requiring in-water work);
- For waterbody crossings with bankfull widths greater than 5 m and less than 30 m, it was assumed that clear span bridges would be used (no in-water work);
- For waterbody crossings greater than 30 m, it was assumed that bridges with piers and abutments would be used (requiring in-water work); and
- For waterbody crossings in flooded / impounded wetlands where wetted widths were greater than bankfull width at the time of the assessment, it was assumed that in-water work would be required.

Temporary access roads leading to temporary quarry areas will also be rehabilitated and surrendered in accordance with the *Aggregate Resources Act*. Temporary quarries not required for maintenance activities will be vegetated in accordance with the Rehabilitation Plan. Access roads to quarries maintained for operations will be blocked to discourage public use. Project Activities

The Project is planned to occur in two phases: Construction, and Operation and Maintenance. The following Project activities will occur in each phase, including:

- Construction Phase Project activities:
    - Clearing of the right-of-way for the Community Access Road and supporting access roads (e.g., remove and dispose of trees, shrubs, fallen timber, and surface litter, strip organic materials, grub);
    - Blasting rock (e.g., remove rock at quarries, and as required, at specific locations in association with road and bridge construction);
    - Constructing the Community Access Road (e.g., overburden excavation and removal, excavation of granular material at pits, remove unsuitable soil, place and compact rock and granular material, trim and shape the road, stockpiling of mineral

soil and leaf litter [organic material], and soil handling and replacement from stockpiles at decommissioning);

- Constructing bridges and installing culverts (e.g., surface water management and erosion control, dewatering of the watercourses to create ice bridges, alteration of natural drainage systems, and watercourse bank grading to improve approaches if required);
- Constructing and operating, temporary infrastructure (e.g., access roads, construction camps, laydown areas, and staging areas);
- Decommissioning temporary infrastructure (e.g., remove temporary culverts and bridges and remediate channels); and
- Mobilizing equipment, supplies, and personnel (e.g., haulage of materials, soil and liquid waste management, fuel storage, hazardous materials handling, sewage and effluent treatment and water storage and effluent monitoring for temporary construction camps).

- Operation and Maintenance Phase Project activities:
  - Operating the Preferred Route.
  - Maintaining the Preferred Route, including:
    - Excavation at pits, and excavations and / or blasting at quarry sites;
    - Dewatering within pits and quarry sites;
    - Grading road surface (e.g., washout repair, correct grade);
    - Conducting erosion control (e.g., apply native seed mix);
    - Conducting dust suppression (e.g., apply environmentally friendly dust products);
    - Clearing vegetation on road shoulders (e.g., mow grass, remove brush and small trees);
    - Removing snow (e.g., plow);
    - Conducting bridge and culvert maintenance (e.g., seasonal inspections debris removal);
    - Conducting ditch maintenance (e.g., maintain drainage to design standard by excavating, filling, trimming, and shaping ditches); and
    - Conducting road maintenance (e.g., fix settlement, break-up of road surface, slope failures).

3 Information Shared by Indigenous Peoples and Other Interested Persons Which Informed This Report

In the course of completing the description of existing conditions and effects assessment for this Report, information provided by Indigenous Knowledge holders, Indigenous community members, regulators and public stakeholders was used to develop the approach and assessment conducted for this study. This information and how it informed the development of this Report are described in the following section. This section does not detail all the information, comments or questions received related to the Project and is limited to the information that informed this Report. For a full description of all consultation and engagement related to the Project refer to the *Record of Consultation and Engagement* for the *Environmental Assessment / Impact Statement Report*. Information related to the Indigenous Knowledge Program can be found in the *Marten Falls First Nation Community Access Road: Aboriginal and / or Treaty Rights and Interests Existing Conditions Report* (Dillon, 2026a).

3.1 Indigenous Knowledge

Indigenous Knowledge refers to Indigenous systems of knowledge as well as cultural practices related to the production of knowledge based on traditional belief systems, relationships to the environment, and community practices. It is the accumulated and living knowledge built upon the historical experiences of Indigenous Peoples living on the land and adapting to social, economic, environmental, spiritual and political change (Chiefs of Ontario, n.d.) It includes knowledge about the natural environment (e.g., locations of bird seasonal use), the relationships between environmental changes and species or ecosystems, and how potential effects on the environment can be avoided or reduced.

Indigenous land and resource use refers to specific areas and resources used for traditional purposes when Indigenous Peoples learn and practice their Indigenous Knowledge (Garvin & Northern Forestry Centre (Canada), 2001). This includes the areas and sites used for hunting, trapping, fishing, and gathering and the resources harvested, as well as cultural sites, features and practices—sometimes referred to as Traditional Land Use.

In 2019, the Marten Falls First Nation Community Access Road Project Team launched a program to collect Indigenous Knowledge. The Indigenous Knowledge Program is a critical component of the information base upon which the assessments will rely. The information generated through the Indigenous Knowledge Program has been woven with scientific approaches, and both knowledge systems will be given equal consideration in forming the

foundation for existing conditions, predicting potential Project effects, and determining appropriate mitigation and monitoring methods.

The Indigenous Knowledge Program occurs in two concurrent phases:

1) Collecting existing Indigenous Knowledge and information on Indigenous land and resource use to help inform the early stages of the assessments; and

2) Completing Project-specific Indigenous Knowledge and lands and resource use studies.

The protection and confidentiality of Indigenous Knowledge and information on Indigenous land and resource use is of the utmost importance to the Project Team. To honour and respect this important information, Indigenous Knowledge Sharing Agreements were established with interested communities prior to the use of community information. The Sharing Agreement outlines how confidential and sensitive information will be woven into the Project's Environmental Assessment / Impact Assessment and design processes.

All Indigenous communities and groups identified by the Ministry of the Environment, Conservation and Parks and the Impact Assessment Agency of Canada through the *Indigenous Engagement and Partnership Plan* have had the opportunity to participate in the Indigenous Knowledge Program. The Indigenous Knowledge Program provides interested Indigenous communities an opportunity to: share existing Indigenous Knowledge and information on Indigenous land and resource use and cultural values that may be relevant to the Project, and / or complete Project-specific studies to collect and share Indigenous Knowledge and information on Indigenous land and resource use and cultural values. The Indigenous Knowledge Program included opportunities for Indigenous communities and groups to meet with the Proponent to discuss the program, ask questions, and share concerns and interests.

The Proponent strove to respectfully collaborate with Indigenous communities on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values were considered in reporting, and how potential impacts on Aboriginal and Treaty Rights and Interests were assessed. Measures to support this included but were not limited to:

- Engaging Indigenous communities to solicit information on Indigenous Knowledge and Indigenous land and resource use and cultural values, informing existing conditions;
- Providing Indigenous communities with draft sections of the *Environmental Assessment / Impact Statement Report*;
- Illustrating how Indigenous Knowledge and information on Indigenous land and resource use and cultural values has been integrated and confirming it has been presented appropriately; and

- Completing collaborative working sessions with Indigenous communities for the assessment of impacts on Aboriginal and Treaty Rights and Interests. Further information on how potential impacts on Indigenous Rights were assessed is provided in the *Aboriginal and Treaty Rights and Interests Study Plan* (Dillon, 2021).

Information provided by Indigenous Knowledge holders, recognized as such by their Indigenous community, has been obtained through literature review and shared directly by Indigenous nations in support of this Project through face-to-face meetings or receipt of Indigenous Knowledge reports. The information, some of which is confidential, that has been used to inform this reporting is described in **Table 3-1**.

Table 3-1: Indigenous Knowledge

Topic	Indigenous Community	Details	Section Reference
■ Observations related to species occurrences ■ Observations related to decline in bird numbers ■ Bird Habitat ■ Species at Risk birds ■ Waterfowl and waterbirds ■ Other bird Species	■ Marten Falls First Nation (Marten Falls First Nation, 2023; Marten Falls First Nation, n.d.)	■ Information shared by Marten Falls First Nation included observations of a number of species in the area of Washi Lake including nighthawks, mergansers, golden eyes, mallards, and loons. Additionally, duck habitat was noted within five kilometres of the proposed Project routes near the Albany River. ■ Community members from Marten Falls First Nation have noted a decline in the number of mergansers, golden eyes, mallards, and loons present in the area of Washi Lake. Information shared by the community also noted that seeing these specific species was becoming a rarer occurrence. ■ Indigenous Knowledge shared by Marten Falls First Nation noted that some community members have noted the presence of species at Washi Lake (Oji-Cree translation, *Obaashiwizaagaykaniing*) that were not observed in the past including cormorants. ■ Marten Falls First Nation noted the importance of maintaining bird populations for maintaining ecosystem balance. ■ Marten Falls First Nation also shared Indigenous Knowledge related to the distribution and habitat preferences of other bird species was shared by Marten Falls First Nation for species including Canada jay (whiskey jack) (Oji-Cree translation, *kwiikwiishih*), chickadee (Oji-Cree translation, *kijakaneshish*), ducks (Oji-Cree translation, *shesheebug*), geese (Oji-Cree translation, *nikah*), kingfisher, loons (Oji-Cree translation, *maang*), mallard, osprey, and ravens (Oji-Cree translation, *kakakihwug*). Observations / input included: ■ Geese go into peatlands, rivers, and lakes and tend to migrate towards the east. Additionally, migration patterns seem to be changing as there used to be many geese in early to mid April and now more appear in June. Geese appear to be not as plentiful in Thunder Bay as in Manitoba or on the eastern coast; ■ Loons, ducks, and geese nest along the Albany River; ■ Mallards tend to reside in wetland areas; ■ Species including Canada jay (whiskey jack), chickadee, and raven are common to the north;	■ Used to inform Valued Components and Indicators rationale in **Section 4.2.2** ■ Used to inform species list assessed in **Section 5** ■ **Section 5.2.1.2** ■ **Section 5.4** ■ **Section 5.4.1** ■ **Section 5.6.6.3** ■ **Section 5.6.7.1**

Topic	Indigenous Community	Details	Section Reference
		■ Canada jay (whiskey jack), bald eagles, and great blue herons (Oji-Cree translation, *moskaohshug*) was noted within Project study areas; and ■ Species including kingfisher and osprey are common where fish are present.	
■ Observations related to species occurrences ■ Raptors	■ Kingfisher Lake First Nation – Indigenous Knowledge (Ontario Parks, 2002)	■ Kingfisher Lake First Nation noted that Bald eagle is relatively abundant in Pipestone River Provincial Park.	■ **Section 5.6.7.1**
■ Cultural significance	■ Nibinamik First Nation (Dillon, 2024b)	■ Nibinamik First Nation noted the cultural importance of birds including grouse and duck for harvesting purposes.	■ **Section 5.4**
■ Observations related to decline in Waterfowl and Waterbird populations ■ Observations related to species occurrences ■ Cultural significance ■ Forest birds ■ Waterfowl and Waterbirds	■ Fort Albany First Nation (Firelight Research Inc., 2024) ■ Weenusk First Nation (MNP LPP, 2024b)	■ Fort Albany First Nation has noted that forestry activities have affected waterfowl (geese and duck) populations within the area of Patience Lake, as well as an area adjacent to the Anaconda Road, where clearcutting activities which occurred in the past have affected the ability of community members to harvest geese, with one community member noting the following after being questioned about whether they had concerns about how the proposed road development (and other types of development projects) result in effects: o *"Oh, yes, it will. Because from my experience, like the cutovers, like harvesting areas in our community here, so where we used to hunt, there's less ducks now in that area [Patience Lake], and moose, hardly any moose. Because I think that when the trees are harvested, especially the geese in the springtime, when they wait for the geese to come by, there's hardly any now, because I think they can not navigate on that land because of the trees [being gone] and all that. It's all cut over. Not as much as before it was cut down. It used to be, when we used to have blinds in the mouth of the river, geese used to land maybe every five minutes. You only have enough time to retrieve whatever you kill, but now sometimes you have to sit all day before one flock comes down."*	■ **Section 5.1** ■ **Section 5.4**

Topic	Indigenous Community	Details	Section Reference
		■ Another community member from Fort Albany First Nation echoed these sentiments, noting an observed connection between the effects of forestry impacts on duck and geese populations noting, o "*There are already less ducks and geese in the area. Likely impacted by forestry cuts - they can not navigate on the land without the trees. More developments will have a greater impact."* ■ Fort Albany First Nation highlighted the correspondence between each of the six seasons and changes in the environment. Members of the community have noted the life cycles of migratory birds and waterfowl corresponding to the Moulting Moon and the Flight Moon in the summer season. ■ Certain species, their behaviours, and locations these species are found in correspond to each of the six seasons and their moons. The early spring thaw is characterized by the return of migratory birds such as spring geese and snow geese that stop over multiple locations to feed. o *"[Spring Geese] they would be migrating from the south to come and stay. And they would stay in the coastal areas. They would moult in the coastal areas, and they would go as far as like Akimiski Island, which is Attawapiskat and goes north from there. The snow geese would do the same thing. They would migrate from the south and then stop for a while and — to feed, and then they would go north in the arctic."* ■ Additional community members from Fort Albany First Nation also shared observations relating to the Moulting Moon (July), and the fall season (September and October) describing moulting behaviours during the summertime and departure of the geese back south during the fall. o "*July would be the moulting season — Moulting moon. That's when all the geese and the ducks and the snow geese would drop their feathers, their prime feathers, and they would change. They would get new — new feathers in July. They can not fly. … And in August it's the Flight moon. That's when all the birds start*	

Topic	Indigenous Community	Details	Section Reference
		flying again. They become airborne in August. So, that's what we call summer." o *"…. In September, they would come there, and they would stop there for about a month or so. And then October is the Migrating moon. It's when all the birds — all the birds leave in October and go back south in October. So, that's the fall season."* ■ Fort Albany First Nation highlighted that rivers (including the Albany River) are a key feature of the Atlantic migration flight route, playing important roles as geographical markers which guide and orient the birds during their fall migration. ■ Fort Albany First Nation community noted key species that are traditionally harvested including ruffled grouse (partridge) and migratory geese and other waterfowl, as well as collection of bird eggs. ■ Several community members from Weenusk First Nation noted observations related to a decline in waterfowl / migratory birds including Canada geese, snow geese, and ducks.	
■ Observations related to species occurrences ■ Bird Habitat ■ Raptors ■ Waterfowl and waterbirds	■ Aroland First Nation (Shared Value Solutions, 2024)	■ Aroland First Nation provided details related to species occurrences, noting the presence of goose nesting areas within the area of Patience Lake. ■ Aroland First Nation also noted the presence of waterfowl species, as well as Ptarmigan within the area of Patience Lake, as well as the presence of bird/waterfowl habitat within the area of Ogoki Lake. ■ Waterfowl, eagle, eastern wood pee-wee habitat was noted in the area of Melchett Lake, Tennant Lake, Kapikotongwa Lake, Briarcliffe Lake, Nass Lake, and Durer Lake.	■ **Section 5.2** ■ **Section 5.4** ■ **Section 5.6.5.2**
■ Observations related to species occurrences ■ Harvesting areas ■ Forest birds ■ Waterfowl and waterbirds	■ Aroland First Nation (LeBlanc, 2014) ■ Constance Lake First Nation (Stantec, 2017a) ■ Fort Albany First Nation (Firelight Research Inc., 2024)	■ Indigenous communities provided information relating to the bird species harvested by community members. In particular: ■ Aroland First Nation noted that traditional food sources include goose and ruffed grouse (partridge) (Oji-Cree translation, *papashki*), although in recent years there has been a shift from local to processed food, as well as from harvested to purchased food. ■ Constance Lake First Nation noted that species harvested include duck and ruffed grouse (partridge) in the Kenogamisis Lake, Kenogamisis River, Goldfield Lake and nearby connecting waterbodies	■ Used to inform Valued Components and Indicators rationale in **Section 4.2.2** ■ Used to inform species list

Topic	Indigenous Community	Details	Section Reference
	■ Marten Falls First Nation (Dillon, 2024a; Marten Falls First Nation, 2023) ■ Kashechewan First Nation (MNP LPP, 2024a) Weenusk First Nation (MNP LPP, 2024b)	and downstream from the Kenogamisis Lake Dam to the discharge point of the Kenogamisis River to Long Lake at Crib Road and northeast to Kenogamisis Diversion Dam area. ■ Fort Albany First Nation highlighted site-specific values within the proposed Project's Regional Study Area including habitat and harvesting locations for various wildlife species including Canada geese, snow geese, ducks, and ruffled grouse (partridge). Fort Albany First Nation also notes that grouse are hunted in May and June during the spring break-up – and that this is also the time when the species perform their mating dances. ■ A member of Kashechewan First Nation highlighted the particular importance of geese and other waterfowl species within their community. Members of Kashechewan First Nation also identified a number of key bird species harvested within their traditional area including ducks (e.g., pintail), waterfowl, ruffled grouse (partridge), snipe, snow goose, godwit, and ptarmigan. ■ Marten Falls First Nation families hunted / hunt waterfowl for food, feathers, and cultural celebrations. This includes species such as geese, duck, and ruffed grouse (partridge). A cultural week break is taken each year (usually at the end of April), by children and most community members for these activities and celebrations. ■ Weenusk First Nation highlighted an overall cultural importance of geese. The community noted that they primarily hunt geese along the mouth of the Weenusk River on the Hudson's Bay during the spring after ice break-up.	assessed in S**ection 5** ■ **Section 5.1** ■ **Section 5.3** ■ **Section 5.4**
■ Changes to migration behaviour ■ Waterfowl and Waterbirds	■ Attawapiskat First Nation – Indigenous Knowledge obtained from Chief Ignace Gull (Human Rights Watch, 2020) ■ Fort Albany First Nation (Firelight Research Inc., 2024)	■ Indigenous Knowledge shared by Attawapiskat First Nation included observations related to changes to migratory birds in Attawapiskat, with one community member noting *"water is getting warmer, the ice melts early. Other things—what we see today are pelicans migrating North; cormorants, we see many of them."* ■ Fort Albany First Nation described observations relating to changes in migratory bird patterns due to anthropogenic stressors including climate change and infrastructure development (such as transmission lines) within their traditional territory and in the Moosonee and Attawapiskat area.	■ **Section 5.4**

Topic	Indigenous Community	Details	Section Reference
	■ Kashechewan First Nation (MNP LPP, 2024a) ■ Weenusk First Nation (MNP LPP, 2024b)	■ Fort Albany First Nation identified a decline in the quality of wild game, making specific reference to the taste of harvested migratory birds. Multiple Fort Albany First Nation community members have attributed this decline in the quality of wild game due to changes in feeding (including the muskeg and shoreline of James Bay). Within the community, there have also been reports of a goose found covered in oil. ■ Members of the Kashechewan First Nation community have noted declines in geese population numbers and changes to geese migration patterns due to earlier snowmelt timing, ■ Weenusk First Nation have noted previous experiences relating to how disturbance to migratory animals through construction have affected migration routes and the availability of harvested species in Weenusk's traditional territory. In particular, the community noted a decline in waterfowl and migratory birds such as Canada goose, snow geese, and ducks.	
Concerns related to: ■ Contamination ■ Increased ■ Traffic-related impacts ■ Dust / pollution ■ Logging ■ Increased harvesting pressure	■ Aroland First Nation (Shared Value Solutions, 2024) ■ Animbiigoo Zaagi'igan Anishinaabek First Nation (Stantec, 2017a) ■ Mushkegowuk Council (Nextbridge Infrastructure, 2018) ■ Kingfisher Lake First Nation (SNC Lavalin, 2020) ■ Marten Falls First Nation (Marten Falls First Nation, 2023) ■ Weenusk First Nation, (MNP LPP, 2024b)	■ Aroland First Nation noted concerns relating to how increased access to the region may make it easier for people to access harvesting areas, putting additional pressure on wildlife populations, with one community member noting, "The first thing I thought about was the wilderness, the animals would be disturbed. If the road goes through there, they're travelling routes would be disrupted. And also, their feeding might be disrupted. As for the fish, I think if they build bridges and all that, it's easier access for humans to go harvest. To me, that would be very destructive for the wildlife and fishery." ■ Aroland First Nation noted concerns relating to how increased dust and noise from the road may affect birds, including effects to goose nesting areas. ■ Animbiigoo Zaagi'igan Anishinaabek First Nation expressed interest in relation to effects on waterfowl and migratory birds and the potential for contamination of waterfowl. ■ Indigenous Knowledge shared by Mushkegowuk Council and Kingfisher Lake First Nation included concerns that increased vehicle emissions would lead to ingestion of contaminants by bird species at risk.	■ Used to inform ■ **Section 5.4** ■ **Section 7** ■ **Section 7.3.1.1.2** ■ **Section 7.3.1.1.3.1** ■ **Section 7.3.1.1.4** ■ **Section 7.3.1.1.5** ■ **Section 7.3.1.1.8.1** ■ Used to inform **Section 8**

Topic	Indigenous Community	Details	Section Reference
		■ Concerns shared by Marten Falls First Nation included the those related to dust effects on water, plants, and wildlife (including birds). This included: ■ Concerns relating to dust and pollution due to increased traffic / pollution in the area as a result of logging activities; ■ Concerns related to bird habitat and nesting places due to increased logging activities; and ■ Potential effects on bird food sources (i.e., fish) due to heightened fishing activities and other anthropogenic activities. ■ Weenusk First Nation also noted concerns specificly about: ■ The potential for effects related to air quality as a result of fugitive dust from movement and operations of construction equipment and vehicles; and ■ Effects to harvestable species within the community's traditional territory as a result of increased access.	

km = kilometre.

3.2 Indigenous Engagement

The content presented in **Section 3.2** reflects information that was available at the time the *Draft Environmental Assessment / Impact Statement Report* was prepared. No updates have been made to this section for the *Final Environmental Assessment / Impact Statement Report*. For the most up-to-date and comprehensive documentation of engagement, please refer to the *Appendix X - Record of Consultation and Engagement*, under the *Final Environmental Assessment / Impact Statement Report*, which serves as the source for all community-specific engagement input received during later phases of the Project.

In addition to the Indigenous Knowledge provided by Indigenous Knowledge holders, information was collected from all Indigenous community members with interests in this Project. The information that has been used to inform this Report is described in **Table 3-2.**

Table 3-2: Indigenous Engagement

Topic	Indigenous Community	Details	Section Reference
■ Cultural significance ■ Raptors ■ Species at Risk birds ■ Waterfowl and waterbirds	■ Fort Albany First Nation (Fort Albany First Nation, 2020)	■ Fort Albany First Nation noted the importance of bird species including Canada geese, snow geese, swans (Oji-Cree translation, *waabihssiig*), gyrfalcons, loons, and peregrine falcons.	■ Used to inform Valued Components and Indicators rationale in **Section 4.2.2** ■ Used to inform species list assessed in **Section 5** ■ **Section 5.4** ■ **Section 5.6.8.2**
■ Feedback on field programs ■ Waterfowl and Waterbirds ■ Technical Field Programs	■ Marten Falls First Nation (Marten Falls First Nation, 2022a; Marten Falls First Nation, 2022b)	■ Information obtained from Marten Falls First Nation was used to inform the assessment on waterfowl and waterbirds and technical field programs. The information obtained from the community included observations of various bird species and feedback on upcoming field studies (such as the Fall 2022 Waterfowl Aerial Surveys). ■ Community observations included a potential correlation between delayed migration and lower water levels. During 2022 field surveys, the first flock of waterfowl was not observed until August 14 and there was a delayed migration during the Fall 2022 Waterfowl Aerial Surveys (likely due to a delayed spring that year). It	■ Study area development and rationale detailed in **Section 4** ■ **Section 5.4.1.1**

Topic	Indigenous Community	Details	Section Reference
		was likely that due to the existing high-water levels, waterfowl had fewer areas to access for food and were not staying on the waterbodies near the community for extended periods. ■ The Project team took into consideration community observations, and it was thought that September 27-29 was a good time to target waterfowl surveys due to these observations (i.e., lower water levels having higher concentrations of birds). The observations from the community aligned with the results of the program as observations were lower than what was anticipated.	
Concerns related to: ■ Bird habitat ■ Climate change ■ All bird Valued Components	■ Marten Falls First Nation (Marten Falls First Nation, 2022b)	■ A number of concerns were provided by Marten Falls First Nation related to potential effects on bird species including general overall effects on bird habitat; effect on birds related to climate change; and observations of bird species not typically seen in the area.	■ **Section 5.4** ■ Informed potential effects and mitigation measures in **Section 7.3.1**
Concerns related to: ■ General effects on wildlife ■ Migration	■ Métis Nation of Ontario (Métis Nation of Ontario, 2023)	■ Métis Nation of Ontario noted concerns and considerations related to the Project during a meeting with the Project team including potential effects on wildlife migration and breeding grounds in the Regional Study Area.	■ Informed potential effects and mitigation measures in **Section 7.3.1**

3.3 Regulator and Public Stakeholder Input

In March 2025, the *Draft Environmental Assessment / Impact Statement Report* was submitted to Regulators, government experts and Indigenous communities for review as part of the Environmental Assessment / Impact Assessment process. All comments received during the review period were carefully evaluated by the Marten Falls First Nation Community Access Road Project Team, and the Report was updated where warranted.

The content presented in **Section 3.3** reflects information that was available at the time the *Draft Environmental Assessment / Impact Statement Report* was prepared. No updates have been made to this section for the *Final Environmental Assessment / Impact Statement Report*. For the most up-to-date and comprehensive documentation of regulator and public stakeholder input, please refer to *Appendix X - Record of Consultation and Engagement* under the *Final Environmental Assessment / Impact Statement Report*, which serves as the source for all comments received during later phases of the Project.

The Proponent engaged with Regulators and Public Stakeholders with technical knowledge related to the Valued Components to inform aspects of this Report. Throughout the Project, particularly during the initial study design, the Project Team (WSP Canada Inc. and AECOM Canada Ltd. [now AECOM Canada ULC]) developed a technical working group with the Canadian Wildlife Service technical staff. The goals of the working group were to take into consideration the species involved in the Project, specifically the birds Valued Components, while factoring in the complexities associated with the large study area and its remoteness to help to ensure that a robust and feasible study plan were able to be implemented. This was later rectified through the *Tailed Impact Study Guidelines*. This information and how it informed the development of this Report are outlined **Table 3-3**.

Table 3-3: Public, Agency, and Other Input

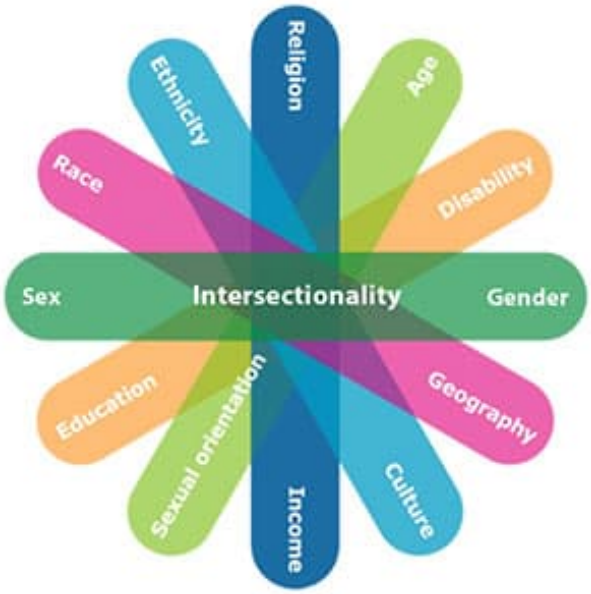
Topic	Provided By	Details	Section Reference
■ Feedback on study plans	■ Impact Assessment Agency of Canada (IAAC, 2022) ■ Ministry of the Environment, Conservation and Parks (MECP, 2022a)	■ The Impact Assessment Agency of Canada noted that any edits to the Birds Study Plan and the Birds Field Logistics Study Plan methodology as a result of agency comments should be reflected in the Environmental Assessment. ■ Deviations were anticipated to be required as the Project evolved due to challenges encountered in the field, alternative methodologies being developed, comments from regulators, and as updated guidance became available. These deviations are captured within the study methods and assessment scope.	■ **Section 4.1** ■ **Table 4-1**

3.4 Gender-Based Analysis Plus

The *Impact Assessment Act* of Canada (Government of Canada, 2019) requires Gender-Based Analysis Plus to be applied to Impact Assessments in Canada. Gender-Based Analysis Plus is not a specific set of methods for Impact Assessments, but rather an approach that is adapted to the Project and the communities potentially affected and / or being engaged.

Gender-Based Analysis Plus is an approach to assess the inequalities and effects of policies, programs and projects on diverse groups and identities. These identities could include (but are not limited to): gender, sexual orientation, age, race, ethnicity, class, religion, and mental or physical disability (Women and Gender Equality Canada, 2022). These identities can also intersect or overlap; for example, where an individual identifies as being both Indigenous and an Elder or youth. A schematic depiction of Gender-Based Analysis Plus intersecting identity factors are provided in **Figure 3-1**.

Figure 3-1: Gender-Based Analysis Plus Intersecting Identity Factors



Source: Canadian Institutes of Health Research (2022)

The Gender-Based Analysis Plus approach involves understanding how certain vulnerable groups such as Indigenous Peoples, women, Elders, youth, Two-Spirit, Lesbian, Gay, Bisexual, Transgender, Queer, Questioning, Intersex, and Asexual persons experience, and could be disproportionately affected by a project. Understanding how these groups could be affected by projects allow for more targeted, sensitive, and appropriate enhancement measures, mitigation measures, monitoring, and follow-up (Impact Assessment Agency of Canada, 2021b).

It is important to understand that vulnerability in Impact Assessment is understood primarily, but not solely, as a structural vulnerability. This means that in many cases it is the systems and power structures that make certain groups more vulnerable (Impact Assessment Agency of Canada, 2021a). For Indigenous Peoples this includes historical and ongoing colonialism, loss of lands and culture, intergenerational trauma, and the residential school system that have resulted in significant social, economic, and health and well-being disparities relative to the non-Indigenous Canadian population (Kim, 2019). Exceptions to this are where vulnerability may be associated with biological sex, pregnancy, or age in relation to environmental determinants of health and exposure to contaminants, for example.

For each discipline of the Impact Assessment, a Gender-Based Analysis Plus approach was employed. This approach and extent of its application also varied, however, depending on the type of study, and the relevance of Gender-Based Analysis Plus to that study. The details of the approach for the discipline are outlined in the following section.

3.4.1 Birds Gender-Based Analysis Plus Approach

The Gender-Based Analysis Plus approach for the birds study involved a more limited, but still important application of Gender-Based Analysis Plus. This approach varied from the Gender-Based Analysis Plus approach in other disciplines, for example, within the socio-economic disciplines, in that it primarily involved identifying how vulnerable groups that could be disproportionately affected by the Project informed the study which included:

- Weaving Project-specific Indigenous Knowledge from Indigenous Elders that has been provided, verified, and made available through the Indigenous Knowledge Program into the *Birds Technical Support Document: Existing Conditions and Effects Assessment* (see **Section 3.1**); and
- Identifying and including interests and concerns specific to this study through the Consultation and Engagement Program from groups who could be more vulnerable to, and disproportionately affected by the Project which include Indigenous communities (see **Sections 3.2** and **1.1**).

4 Study Methods and Assessment Scope

This section contains excerpts from the *Draft All Season Community Access Road: Birds Study Plan* (AECOM, 2021) and *Final All Season Community Access Road: Birds Study Plan* (Golder, 2021) prepared for the Impact Assessment Agency of Canada at the outset of this Project. The original Draft Study Plans, including comments from regulators can be found in **Attachment A – Draft Study Plan, Workplan and Regulator Comments.**

4.1 Study and Work Plan Purpose, Objectives and Deviations

As required by the *Impact Assessment Act* (Government of Canada, 2019) and referenced in the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), study plans and work plans were developed for disciplines as required. The purpose of the study plan is to explain:

- The existing conditions study methodology that will result in a comprehensive description of the existing environment potentially affected by the Project;
- The process for ensuring efficient and transparent data management and analysis was completed; and
- Developing the discipline specific effects assessment methodology.

Work plans included details on how to action the study plans, containing information such as location of sampling sites, scheduling, and sequencing.

As noted previously, the *Draft All Season Community Access Road: Birds Study Plan* (AECOM, 2021) and *All Season Community Access Road: Birds Field Logistics Study Plan* (Golder, 2021) can be found in **Attachment A**.

In some instances, through the execution of this study the approach deviated from what was described in the original Draft Study Plan; these deviations are outlined in **Table 4-1.** Deviations were required as the Project evolved due to challenges encountered in the field, alternative methodologies being developed, comments from regulators, and as updated guidance became available. General changes, such as changes to section headings, the organization of sections and subsections and the phrasing and tense have been made throughout and have not been documented in **Table 4-1.**

Table 4-1: Deviations from Draft Study Plan

This Report Section Reference	Description of Change	Rationale
Section 4.2.3	**Draft Study Plan** ■ Used the term *"Local Study Area"* to define the five kilometres corridor which is being studied in the Existing Conditions section, and within which the footprint of the Project will be further refined. **Description of Change** ■ This area has been retitled as *the "Project Study Area*."	This change eliminates confusion between the Project Study Area and the discipline specific Local Study Area.
Section 4.3.3	**Draft Study Plan** ■ The breeding bird plot selection study design described in **Section 4.3.3** was developed to avoid observer bias. **Description of Change** ■ An attempt was made to visit the pre-selected breeding bird point count plots; however, this was not possible for all sites.	■ Some plots were moved in the field, as needed, due to health and safety hazards related to landing the helicopter, unusually high-water levels in 2022, and rough terrain.
Section 4.3.3	**Draft Study Plan** The autonomous recording units will be programmed to collect data during two phases. Phase one will start at midnight and end 5 hours after sunrise; the schedule will be three minutes on and 12 minutes off during the phase one recording period. Phase two will start 30 minutes before sunset and continue until midnight; the schedule will be 3 minutes on and 12 minutes off during the phase two recording period. **Description of Change** ■ To extend battery life and data storage space, rather than recording continuously, autonomous recording units were set to collect data for 3 minutes every hour during the morning period (30 minutes before local sunrise to five hours after sunrise [for diurnal species]) and dusk / night period (from 30 minutes before local sunset until one hour before sunrise [for crepuscular and nocturnal species]).	■ Due to logistic challenges, settings for autonomous recording units were changed to establish adequate coverage. Temporal coverage is still adequate to meet requirements in the Environmental Assessment.

This Report Section Reference	Description of Change	Rationale
Section 4.3.3	**Draft Study Plan** Acoustic files collected by autonomous recording units will be randomly selected at each autonomous recording unit plot to get a total of 30 segments per plot during the spring migration period (15 in the morning period, and 15 in the dusk / night period). A total of 27 segments per plot (during the morning period only) will be randomly selected over the fall migration period. **Description of Change** ■ Acoustic files collected by autonomous recording units were randomly selected at each autonomous recording unit plot to get a total of 35 segments per plot during the spring migration period (15 in the morning period, and 20 in the dusk / night period). A total of 20 segments per plot (all during the morning period) were randomly selected over the fall migration period.	■ The number of dusk / night spring migration surveys were increased by five recordings per unit. ■ The number of fall migration recordings were decreased by seven recordings per unit due to data availability. The number of recordings were still adequate for rigorous data analysis.
Section 4.3.3	**Draft Study Plan** The sampling effort for yellow rail will record three, 1-minute segments at 2 a.m. **Description of Change** ■ The sampling effort for yellow rail was changed to record five, 3-minute segments from midnight until one hour before sunrise.	■ Requested by Environment and Climate Change Canada
Section 4.3.3	**Draft Study Plan** Marshbird call playback surveys will be repeated at survey plots identified by Zoetica Wildlife Research Services Inc. (2018) to complete two years of data collection. **Description of Change** In 2022, nine additional marshbird call playback survey plots were established at marshes identified through a desktop review in the Local Study Area. Three of the new plots established in 2022 were within 500 m of plots established in 2018 (distance range 160 to 320 m between plots). ■ Surveys were only conducted over a single round during each of the 2018 and 2022 breeding seasons.	■ Changes were made because of field logistics (e.g., field crew illness). Temporal and spatial coverages are still adequate to meet requirements in the Environmental Assessment.

This Report Section Reference	Description of Change	Rationale
Section 4.3.3	**Draft Study Plan** Two aerial surveys for waterfowl will be completed during three seasons: spring migration, breeding, and fall migration. **Description of Change** ■ Only one visit was completed during spring migration period.	■ The second spring migration survey could not be completed because of late ice-out conditions.
Section 4.3.3	**Draft Study Plan** Paired sampling data from breeding bird point counts and handheld recorders will be used to estimate statistical offsets for each species where there are sufficient data. **Description of Change** ■ Paired handheld recorder and breeding bird surveys were not completed for the Project.	■ An attempt was made to determine correction factors using unpaired breeding bird surveys and autonomous recording unit data following methods in Van Wilgenburg et al. (2017). However, the only bird Valued Component that met the availability assumption was dark-eyed junco. Therefore, the decision was made to use breeding bird surveys and autonomous recording unit data for habitat models. For passerines, breeding bird survey data were used to determine habitat models. For boreal owl, common nighthawk, and Wilson's snipe, more detections were made from autonomous recording units than breeding bird surveys. Therefore, models were determined using autonomous recording unit data.
Section 4.3.4	**Draft Study Plan** ■ Data will be backed up on a daily basis. **Description of Change** ■ This wording has been revised to state that data would be backed up on a "regular basis."	■ This change brings alignment with the Proponent's various data backup policies.

This Report Section Reference	Description of Change	Rationale
Section 4.3.4	**Draft Study Plan** No timeline was identified for delivery of datasets. **Description of Change** ■ Wording was updated to note that datasets from all survey sites will be provided upon report finalization.	■ The revision provides added clarity around when the data would be provided.
Section 4.4.2	**Draft Study Plan** Residual effects will be described in terms of the direction, magnitude, geographic extent, duration, frequency, likelihood, and whether effects are reversible or irreversible. In addition, Section 13.1 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) identifies additional effects characteristics for certain disciplines (e.g., wetlands, birds, terrestrial wildlife, species at risk) and requires that these additional effects characteristics will be described. **Description of Change** Project effects for birds were not classified using all criteria described in the *Tailored Impact Statement Guidelines*.	■ Most of the criteria outlined in the *Tailored Impact Statement Guidelines* are taken from *NatureServe Conservation Status Assessment: Factors for Evaluating Species and Ecosystem Risk* (NatureServe, 2012), which are useful for assessing and assigning the conservation status of species at risk from different threats. These criteria are less appropriate for characterizing residual effects in an Environmental Assessment. ■ Although the criteria and method of combining criteria (i.e., matrices) outlined in the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) were not explicitly applied in this report, the criteria are captured in the residual effects characterization for bird Valued Components. Additional details are described in **Section 4.4.2.**

This Report Section Reference	Description of Change	Rationale
Section 4.4.2.4	**Draft Study Plan** Residual effects will be described in terms of the direction, magnitude, geographic extent, duration, frequency, likelihood, and whether effects are reversible or irreversible. In addition, Section 13.1 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) identifies additional effects characteristics for certain disciplines (e.g., wetlands, birds, terrestrial wildlife, species at risk) and requires that these additional effects characteristics will be described. **Description of Change** ■ Project effects for birds were not classified using all criteria described in the *Tailored Impact Statement Guidelines*.	■ The criteria presented in the *Tailored Impact Statement Guidelines* are useful for assessing and assigning the conservation status of species at risk from different threats, these criteria are less appropriate for characterizing residual effects in an Environmental Assessment.
Section 5	**Draft Study Plan** Indigenous Knowledge and information on Indigenous land and resource use and cultural values was not available at the time when the birds field programs were designed and implemented. **Description of Change** ■ Indigenous Knowledge and Indigenous land and resource use data that have since become available have been considered in combination with the data collected from the baseline field investigations in the birds discipline of the Effects Assessment.	■ Indigenous Knowledge and information on Indigenous land and resource data were important to help inform species assessments within the study area.
Section 5	**Draft Study Plan** Indicators presented in **Table 9-2** include species presence, relative abundance (spatially), habitat distribution, and predatory-prey dynamics. **Description of Change** ■ Species presence, relative abundance (spatially) and habitat distribution are used as measures for the Distribution indicator in the Environmental Assessment (**Table 2-3**). Relative abundance (temporally) and predatory-prey dynamics are used as measures for the Abundance indicator in the Environmental Assessment (**Table 2-3**). ■ Habitat availability was an indicator in the Bird Study Plan and remains an indicator in the Environmental Assessment (**Table 2-3**).	■ Updated indicators were used to aid in assessments for Valued Components.

This Report Section Reference	Description of Change	Rationale
Section 5.6.11	■ Lesser yellowlegs was added as a proxy Valued Component for Species at Risk birds.	■ Species was uplisted as a Species at Risk during the course of the Project.

m = metre; km = kilometre.

4.2 Study Scoping

4.2.1 Temporal Boundaries

Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered. As indicated in **Section 2.2** the Project is planned to occur in two phases:

- **Construction Phase**—The time from start of construction, including site preparation activities, to the start of Operation and Maintenance of the Project. Decommissioning of construction works is included in the Construction Phase. The Construction Phase is anticipated to take approximately three to ten years to complete; and
- **Operation and Maintenance Phase**—The Operation and Maintenance Phase starts once construction activities are complete and lasts for the life of the Project. The Operation and Maintenance Phase of the Project is considered to be permanent based on the expected timeline for when major refurbishment of road components (e.g., bridges), is anticipated.

There are currently no plans to decommission the Community Access Road as there is no expected / known end date for its need. Therefore, future suspension, decommissioning, and eventual abandonment was not considered in this Report. It will be considered if and when a decommissioning or abandonment application is made for the road.

In determining the temporal boundaries, in particular the long duration of Operation and Maintenance Phase, consideration was given to the long-term effects on the well-being of present and future generations.

4.2.2 Valued Components and Indicators

The Impact Assessment Agency of Canada describes Valued Components as the environmental, health, social, economic, or additional elements or conditions of the natural and human environment that may be affected by a proposed project and area of concern or value to the public, Indigenous Peoples, federal authorities and interested parties (Impact Assessment Agency of Canada, 2021).

Indicators represent the resource, feature, or issue related to the Valued Component that, if changed, may demonstrate an effect on the environment. Indicators may be characterized quantitatively or qualitatively. For example, effects from changes to the availability and distribution of Valued Components are often expressed through quantitative assessment of direct vegetation removals as well as predicted indirect effects on retained vegetation.

For the Environmental Assessment / Impact Assessment, the indicators for birds and bird habitat are defined as follows:

- **Habitat availability** (i.e., habitat quantity and quality): changes to the amount of different quality habitats (e.g., hectares [ha]), and animal use of available habitat;
- **Distribution** (e.g., habitat arrangement and connectivity): changes to spatial configuration and connectivity of habitats and changes to spatial distribution and movement of animals; and
- **Survival and Reproduction**: changes to animal abundance from altering survival and / or recruitment.

Ideally, effect threshold values for adaptability and resilience limits of a Valued Component are known, and changes in indicators can be quantified accurately with a high degree of confidence to evaluate whether a threshold has been exceeded. However, ecological thresholds vary by species, landscape type, and spatial scale (Swift and Hannon, 2010; Environment Canada, 2013a,b). Consequently, a detailed and transparent account of predicted effects associated with estimated cumulative changes to each measurement indicator will be provided for each Valued Component using available scientific literature, publicly available data, data collected during the baseline program, and logical reasoning (i.e., a weight of evidence, or reasoned narrative approach).

The Valued Components of the birds discipline have been determined through consideration of the following factors:

- Valued Component presence in the study area:
- The extent to which the Valued Component is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous Peoples, and whether an Indigenous Group has requested the Valued Component;
- The extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the Valued Component;
- The extent to which the Valued Component may be under cumulative stress from other past, existing, or future undertakings in combination with other human activities and natural processes;
- The extent to which the Valued Component is linked to federal, provincial, territorial, or municipal government priorities (e.g., legislation, programs, policies); and
- The possibility that adverse or positive effects on the Valued Component would be of particular concern to Indigenous Groups, the public, or federal, provincial, territorial, municipal, or Indigenous governments.

Migratory and non-migratory bird Valued Components were identified in Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020). For each bird Valued Component group, at least one representative species was selected as a proxy Valued Component based on habitat association and expected abundance or behaviour (i.e., diurnal or nocturnal). The species at risk Valued Component includes the key habitats associated with each species at risk, and its critical habitat as appropriate.

The proxy Valued Components were selected as focal species that would be representative of the broader Valued Component groups and would occur in sufficient numbers within the Project study areas to support habitat model validation.

The Study Plan presented indicators and rationale for selection known to the Proponent at the time of drafting. The table and the factors that influenced it can be found in Section 9.2 of the *All Season Community Access Road: Birds Study Plan* (AECOM, 2021) in **Attachment A**.

An updated list of Bird Indicators can be found in **Table 4-2**.

Table 4-2: Bird Indicators

Valued Component	Proxy Valued Component	*Endangered Species Act* Status	*Species at Risk Act* (Schedule 1) Status	Rationale for Selection	Indicators	Measures
Forest Birds	**Red-Eyed Vireo** *(misko-binechiinch gaanitaanigamoch)*[a] (*Vireo olivaceus*) [b]	N/A	N/A	■ Representative of deciduous forest habitat types and functional role in ecosystem	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal) ■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Predation / hunting risk ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity
	Ovenbird *(binechiinch ganitanigamoch)* [a] (*Seiurus aurocapilla*) [b]	N/A	N/A	■ Representative of mixed forest habitat types and functional role in ecosystem		
	Dark-Eyed Junco *(binechiinch gaanitaanigamoch)* [a] (*Junco hyemalis*) [b]	N/A	N/A	■ Representative of coniferous and disturbed (i.e., forestry or fire) forest habitat types and functional role in ecosystem		
Raptors	**Osprey** *(saagwadamo)*[a] (*Pandion haliaetus*) [b]	N/A	N/A	■ Representative of diurnal raptors and functional role in ecosystem ■ Cultural and social significance	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal) ■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Predation / hunting risk ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity
	Boreal Owl *(kookookoo)*[a] (*Aegolius funereus*) [b]	Not at Risk	N/A	■ Representative of nocturnal raptors and functional role in ecosystem		
Shorebirds	**Wilson's Snipe** *(nibiikaang gaa'ayaach binechiinch)* [a] (*Gallinago delicata*) [b]	N/A	N/A	■ Representative of shorebird species and functional role in ecosystem	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal)

Valued Component	Proxy Valued Component	*Endangered Species Act* Status	*Species at Risk Act* (Schedule 1) Status	Rationale for Selection	Indicators	Measures
						■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Predation / hunting risk ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity
Waterfowl and Waterbirds	**Mallard** *(ininiship)*[a] (*Anas platyrhynchos*)[b]	N/A	N/A	■ Ecological, cultural, and socio-economic importance ■ Representative species for effects on other waterfowl that use wetlands and adjacent uplands for breeding ■ Representative of species identified as important by Indigenous communities including Canada goose, snow goose, and swans ■ Representative of species identified as food sources for Indigenous communities including Canada goose, snow goose, blue goose, brant, black duck, northern pintail, common loon, red-throated loon, and swan	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal) ■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Predation / hunting risk ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity

Valued Component	Proxy Valued Component	*Endangered Species Act* Status	*Species at Risk Act* (Schedule 1) Status	Rationale for Selection	Indicators	Measures
Bog / Fen Birds and Other Wetland Birds	**Palm Warbler** *(binechiinch gaanitaanigamoch)*[a] (*Setophaga palmarum*)[b]	N/A	N/A	■ Representative of bog habitat types and functional role in ecosystem	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal) ■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Predation / hunting risk ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity
	Common Yellowthroat *(binechiinch gaanitaanigamoch)*[a] (*Geothlypis trichas*)[b]	N/A	N/A	■ Representative of fen habitat types and functional role in ecosystem		
	Northern Waterthrush *(nibiikaang gaa'ayaach binechiinch)*[a] (*Parkesia noveboracensis*)[b]	N/A	N/A	■ Representative of swamp habitat types and functional role in ecosystem		
	Sora *(gaagweshkoshiich binechiinch)* [a] (*Porzana carolina*)[b]	N/A	N/A	■ Representative of marsh habitat types and functional role in ecosystem.		
Species at Risk Birds	**Canada Warbler** *(gaamakatew bebeshisich binechiinch)*[a] (*Cardellina canadensis*)[b]	Special concern	Threatened	■ Species at Risk	■ Habitat availability ■ Distribution ■ Abundance	■ Species presence and distribution of observations (spatial and temporal) ■ Relative abundance (spatial and temporal) ■ Population status ■ Amount of suitable habitat (spatial and temporal) ■ Distribution of suitable habitat and habitat fragmentation (spatial and temporal) ■ Movement capacity ■ Prey abundance and distribution ■ Other threats to bird survival (e.g., nest parasitism, collisions with human infrastructure) ■ Reproductive capacity
	Chimney Swift *(gondaaganaabikoong gaadashiiyayaach binechiinch)*[a] (*Chaetura pelagica*)[b]	Threatened	Threatened	■ Species at Risk		
	Common Nighthawk *(dibiki binechii)*[a] (*Chordeiles minor*)[b]	Special concern	Special concern	■ Species at Risk		
	Eastern Whip-poor-will *(gaamajaachimoch binechinch)*[a] (*Antrostomus vociferus*)[b]	Threatened	Threatened	■ Species at Risk		
	Eastern Wood-pewee *(gaagigiweshkitwech binechiinch)*[a] (*Contopus virens*)[b]	Special concern	Special concern	■ Species at Risk		
	Evening Grosbeak *(gaa'onaagoshi nigamoch binechiinch)*[a] (*Coccothraustes vespertinus*)[b]	Special concern	Special concern	■ Species at Risk		
	Olive-Sided Flycatcher *(gaagweshkoshiich binechiinch)*[a] (*Contopus cooperi*)[b]	Special concern	Special concern	■ Species at Risk		
	Bald Eagle *(mikisi)*[a] (*Haliaeetus leucocephalus*)[b]	Special concern	N/A	■ Species at Risk ■ Cultural and social significance		

Valued Component	Proxy Valued Component	*Endangered Species Act* Status	*Species at Risk Act* (Schedule 1) Status	Rationale for Selection	Indicators	Measures
	Peregrine Falcon *(gaagishiiyaashich migiziiw binechiinch)*[a] (*Falco peregrinus*)[b]	Special concern	N/A	■ Species at Risk ■ Cultural and social significance ■ Representative of gyrfalcon, a diurnal raptor identified as important by Indigenous communities		
	Short-Eared Owl *(gaayaagaachitawaagech kookookohoo)*[a] (*Asio flammeus*)[b]	Threatened	Special concern	■ Species at Risk		
	Bank Swallow *(gaa'osaaw bebeshi aakiganech binechiinchechench)* [a] (*Riparia riparia*) [b]	Threatened	Threatened	■ Species at Risk		
	Barn Swallow *(gaanawachwebamaach manichooshan binechiinch)* [a] (*Hirundo rustica*)[b]	Special concern	Threatened	■ Species at Risk		
	Black Tern *(gichisaga'iiganing gaadaashiyayaach binechiinch)*[a] (*Chlidonias niger*)[b]	Special concern	N/A	■ Species at Risk		
	Lesser Yellowlegs *(gaa'osaaw gaatech binechiinchlesser)* [a] (*Tringa flavipes*)[b]	Threatened	N/A	■ Species at Risk		
	Rusty Blackbird (*makadew binechiinch*)[a] (*Euphagus carolinus*)[b]	Special concern	Special concern	■ Species at Risk		
	Yellow Rail (*egaawiikaa gaanagosich binechiinch*)[a] (*Coturnicops noveboracensis*)[b]	Special concern	Special concern	■ Species at Risk		

Notes:
Oji-Cree name.
Local English language and scientific (latin) name.
N/*A = species not assessed.*

4.2.3 Spatial Boundaries

4.2.3.1 Project Study Areas

Study areas identify the geographic extents within which potential effects of the Project are likely to occur and will be considered in the *Environmental Assessment / Impact Statement Report*. General Project boundaries were established for scoping field programs and delineating study areas for discipline specific surveys. These general Project boundaries are described in **Table 4-3**.

Table 4-3: Project Study Areas Definition and Description

Study Area	Definition	Description
Construction Disturbance Area	■ Area of expected direct disturbance	■ 100 m wide Community Access Road right-of-way, temporary construction access roads, work areas, worker camps, and pits, quarries, and access roads
Project Study Area	■ Area where most of the direct effects of the Project are likely to occur.	■ Area within 2.5 km (total of five kilometres) of the centreline of the route alternatives

m = metre; km = kilometre.

4.2.3.2 Bird Study Areas

Discipline-specific Local Study Areas and Regional Study Areas have been defined for the Project. In defining these areas, the following were considered:

- Location and other characteristics of the discipline relative to the Project;
- The anticipated extent of the potential Project effects;
- Federal, provincial, regional, and local government administrative boundaries;
- Input from Indigenous Groups;
- Community knowledge and Indigenous Knowledge;
- Current or traditional land and resource use by Indigenous communities;
- Exercise of Aboriginal and Treaty Rights of Indigenous Peoples, including cultural and spiritual practices; and
- Physical, ecological, technical, social, health, economic and cultural considerations.

As described in the *Environmental Assessment / Impact Statement Report* and in **Section 6** of this Report, the characterization of existing conditions for the Project was completed on two alternative routes (Alternative 1 and 4), i.e., within the Existing Conditions Study Areas. The data collected through the characterization of existing conditions were used to inform the selection of the Preferred Route. The existing conditions Local and Regional Study Areas considered the two alternative routes (Alternative 1 and 4). As the residual and cumulative effects assessment was completed on just the selected Preferred Route, the Local and Regional Study Areas for the effects assessment only considered the one route.

4.2.3.2.1 Existing Conditions Study Areas

The existing conditions spatial boundaries for the birds discipline are defined by a Local Study Area and Regional Study Area. These spatial boundaries were applied to each alternative, considering the Project components within the Construction Disturbance Area. The existing condition study areas cover the extent to which readily available information suggests the Project may have noticeable effects on the environment. The size, nature and location of past, present and reasonably foreseeable projects will be taken into consideration in the development of the cumulative effects assessment study area(s) and are further discussed in **Section 4.3**.

The **Construction Disturbance Area** includes the effects assessment Construction Disturbance Area, which encompasses a 100 m wide right-of-way for each route alternative (i.e., Alternative 1 and Alternative 4). The right-of-way is only expected to be cleared to a width of 60 m for permanent use with the remaining 40 m to be temporarily cleared to accommodate activities such as the excavation of pits and quarries, construction of temporary laydown areas, and the implementation of debris and / or timber stockpiles. Alternative 1 includes approximately 226 km of new all-weather road, while Alternative 4 comprises approximately 194 km of new all-weather road. The Construction Disturbance Area was designed to capture the potential direct effects of the Project at the immediate local scale.

The **Local Study Area** for birds includes the Construction Disturbance Area and extends 3 km on either side of the right-of-way for the route alternatives. This study area allows for the characterization of existing conditions and prediction of potential environmental effects for the Project. The Local Study Area was designed to capture the local effects of the Project on birds and bird habitat that may extend beyond the Construction Disturbance Area with the understanding that the spatial extent of this Local Study Area is intended to account for the local area where effects of the Project are likely to be measurable.

The **Regional Study Area** for birds includes the Construction Disturbance Area and extends 11 km on either side of it. The Regional Study Area allows for the documentation of existing conditions and an assessment of indirect effects of the Project on individuals comprising the population of potentially affected birds. This Regional Study Area was

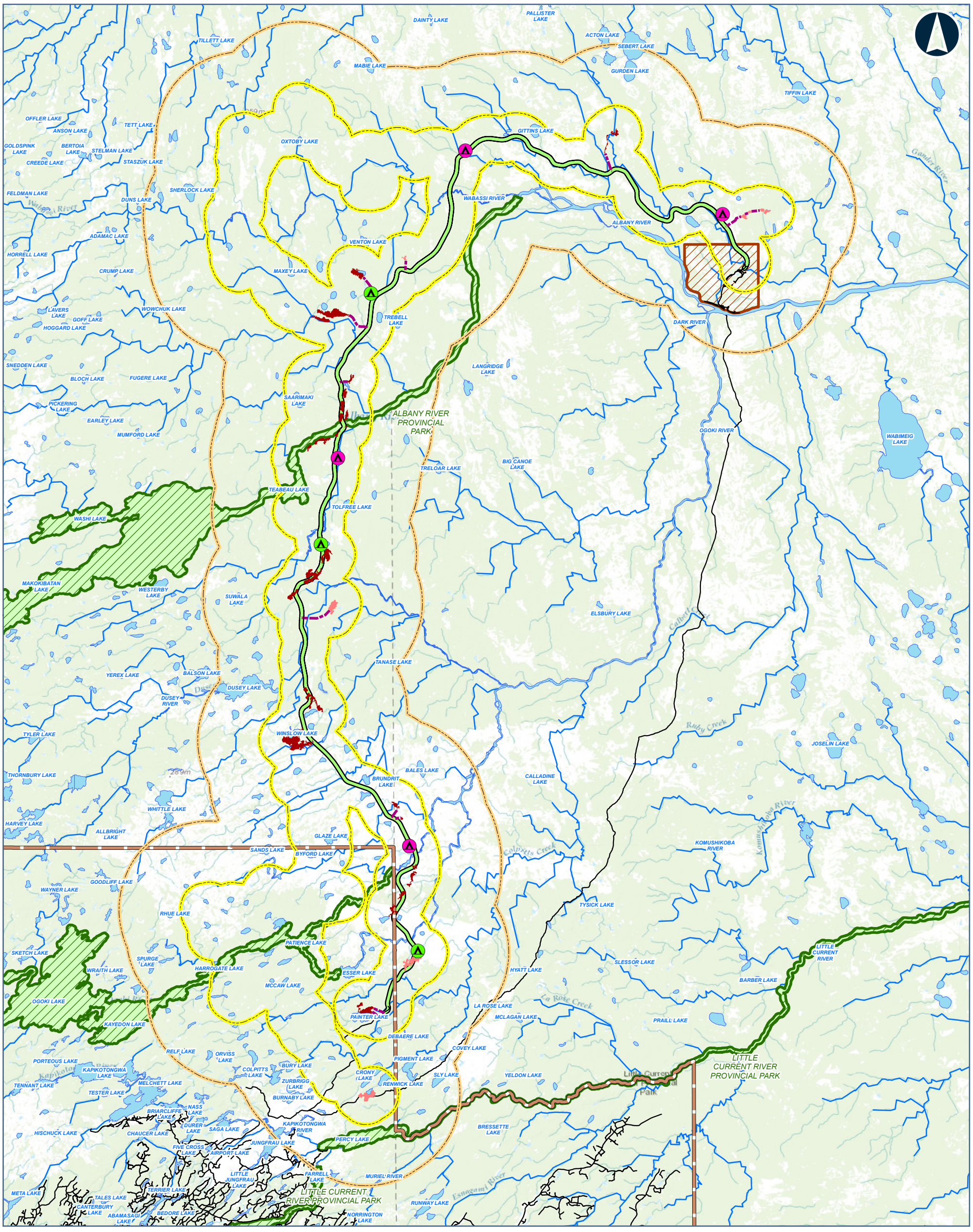
selected in consideration of the guidance in the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020).

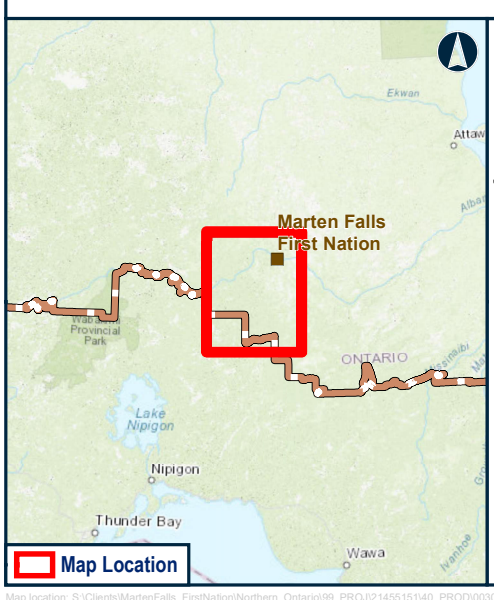
The existing conditions spatial boundaries of birds study areas are further described in **Table 4-4** and illustrated on **Figure 4-1**.

Table 4-4: Birds Existing Conditions Study Areas Description and Rationale

Study Area	Geographic Extent	Rationale	Area (ha)
Construction Disturbance Area	The area of direct disturbance of each alternative route, encompassing the 100 m wide Project right-of-way, temporary construction access roads, work areas, worker camps, and pits, quarries, and access roads.	■ This area of direct disturbance includes the area where bird and bird habitat is most likely to be directly affected by Project infrastructure and activities. ■ A buffer is applied to the effects assessment Construction Disturbance Area to allow for uncertainty in the effects assessment Construction Disturbance Area including road alignment shifts to avoid sensitive features.	12,665
Local Study Area	The Construction Disturbance Area plus a three kilometre buffer on either side.	■ This area captures local effects of the Project on birds that may extend beyond the Construction Disturbance Area (e.g., sensory disturbance). This area considers the range of land cover types in its spatial extent, the spatial distribution of these land cover types, and the rate of change in land cover composition with increasing distance from the Construction Disturbance Area. ■ Allows for the documentation of existing conditions and prediction of potential environmental effects for the Project to the Regional Study Area.	247,958
Regional Study Area	11 km buffer on either side of the Construction Disturbance Area	■ This area captures indirect effects of the Project on birds that may extend beyond the Local Study Area. This area considers the range of land cover types composed of both the Construction Disturbance Area and Local Study Area (especially rarer habitats) and represents a portion of the broader landscape matrix.	506,756

ha = hectare; m = metre; km = kilometre.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Notes:

None

Data Source:

Base Data: Provided by MNRF 2023; Contains Information licensed under the Open Government Licence Ontario.
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Birds Existing Conditions Local and Regional Study Areas

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 4-1

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0001_4-1.mxd
Date Saved: 2/11/2026 9:12:27 PM User Name: INBA08973

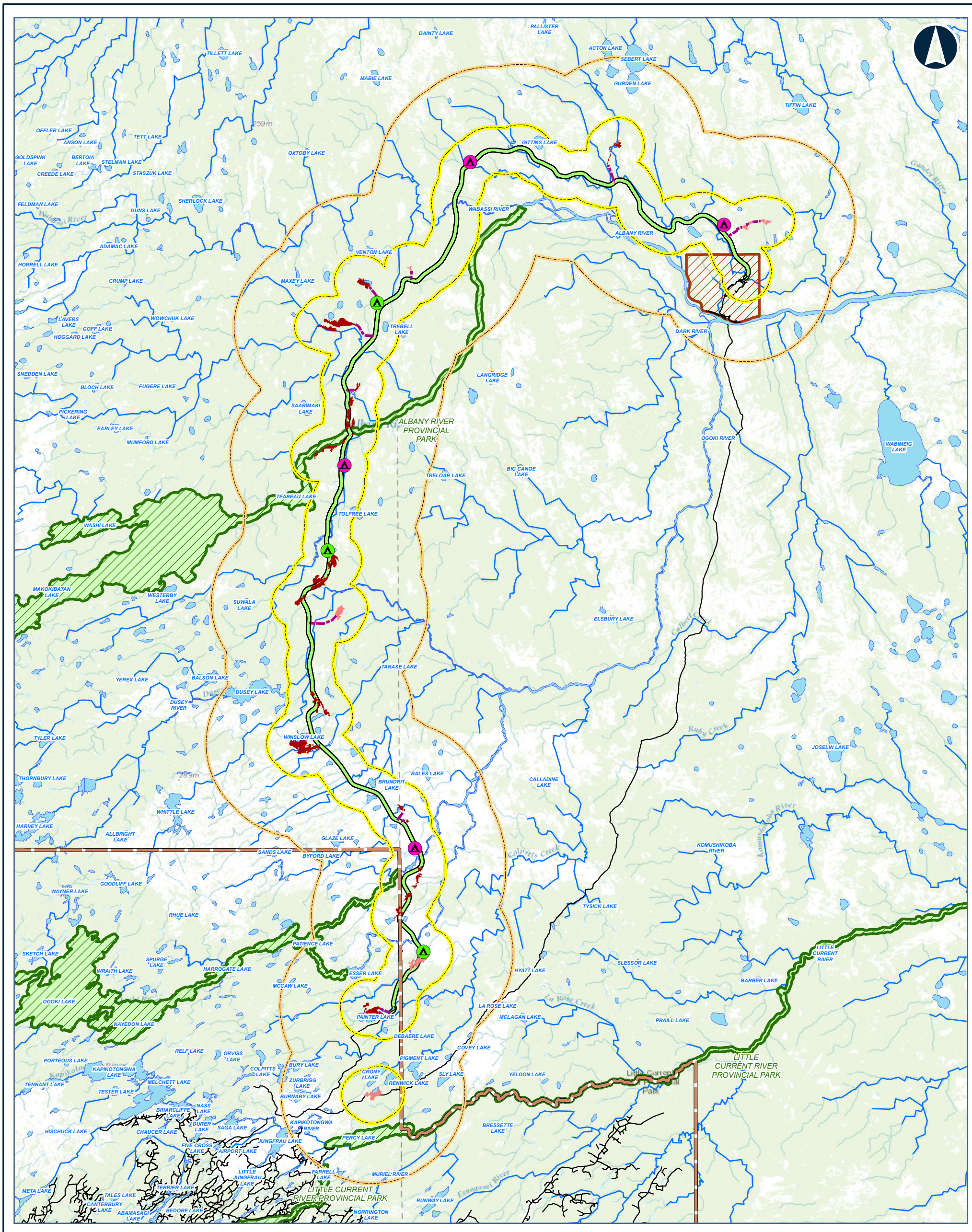
4.2.3.2.2 Effects Assessment Study Areas

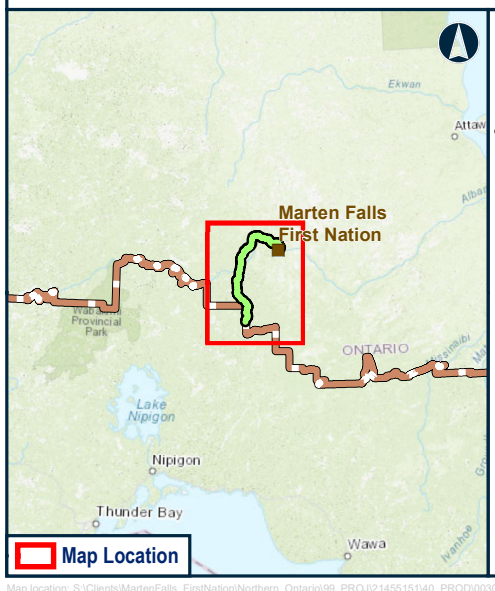
The selection of a Preferred Route resulted in refined study areas that represent the same geographic extents of the existing condition study areas; however, they are only applied to one route corridor instead of two. The revised study areas that will be used for the effects assessment are described in **Table 4-5** and **Figure 4-2**.

Table 4-5: Birds Effects Assessment Study Areas Description and Rationale

Study Area	Geographic Extent	Rationale	Area (ha)
Construction Disturbance Area	■ The area of direct disturbance, encompassing all Project components	■ N/A	■ 4,698
Local Study Area	■ 3 km buffer on either side of the centreline of the preferred Project route ■ 500 m buffer around areas of the Preferred Route associated infrastructure falling outside of the original Local Study Area defined in the Study Plan	■ This area captures local effects of the Project on birds that may extend beyond the Construction Disturbance Area (e.g., sensory disturbance). This area considers the range of land cover types in its spatial extent, the spatial distribution of these land cover types, and the rate of change in land cover composition with increasing distance from the Construction Disturbance Area.	■ 148,858
Regional Study Area	■ 11 km buffer on either side of the centreline of the preferred Project route	■ This area captures indirect effects of the Project on birds that may extend beyond the Local Study Area. This area considers the range of land cover types composed of both the Construction Disturbance Area and Local Study Area (especially rarer habitats) and represents a portion of the broader landscape matrix.	■ 506,756

ha = hectare; N/A = not applicable; km = kilometre; m = metre.





Legend

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:

Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Birds Effects Assessment Local and Regional Study Areas

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 4-2

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0002_4-2.mxd
Date Saved: 2/11/2026 9:18:54 PM User Name: INBA08973

4.3 Existing Conditions Study Design and Methods

Existing environmental conditions represents the expected conditions that exist in 2023, without the Project. The existing environmental conditions are the outcome of past and present activities and natural factors that cause environmental change.

Characterization of the existing environment for bird Valued Components was completed by undertaking a desktop review supplemented by field investigations, which were completed specifically for the Project from 2019 to 2023. The desktop review included a review of available existing information including previous surveys completed in the region, and Indigenous Knowledge received from Indigenous communities. Field investigations consisted of breeding bird point count surveys, autonomous recording unit surveys for songbirds and species at risk, marshbird call playback surveys, waterfowl, waterbird, and shorebird breeding aerial surveys, raptor stick nest aerial surveys, and species-specific species at risk surveys. The methods and results of the field studies are described in detail in **Attachment B – Birds Technical Support Document**.

For each bird Valued Component, the existing environment is described to provide context for the assessment of the proposed Project and to estimate sensitivity and resiliency of each bird Valued Component to future activities in the study areas. Data summarized in **Attachment B** are heavily relied upon to characterize the existing conditions, which is described for each Valued Component according to the following indicators: habitat availability, habitat distribution, and survival and reproduction. The relevance of changes in each indicator depends on how historical changes have affected the integrity of each Valued Component at the population level, and the known or inferred ability of the Valued Component to absorb or otherwise accommodate disturbance (i.e., its resilience and adaptability).

The characterization of existing conditions seeks to understand the population status of each bird Valued Component in the birds Regional Study Area, which provides context for understanding the sensitivity of the Valued Component to future activities in the birds Local Study Area. An integral component of the characterization was the development of empirical models for habitat selection. These models provide quantitative and spatially explicit descriptions of habitat availability and habitat distribution for bird Valued Components. The development of models was undertaken to meet the information requirements outlined in the Project *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) issued by the Impact Assessment Agency of Canada (**Table 4-6**) and their methods and results are described in detail in **Attachment C – Bird Habitat Modelling Report**.

Table 4-6: Summary of Indicators and Supporting Metrics for Birds

Relevant *Tailored Impact Statement Guideline* Section(s)	Indicator	Supporting Metric	Method	Season(s)	Data Source	Spatial Scale[a]	Temporal Scale
Birds							
8.9, 15.4	Habitat availability	Amount of suitable habitat (spatial and temporal)	Habitat suitability index models; qualitative literature review	Breeding	Landcover (developed by WSP Canada Inc.); Ministry of Natural Resources Far North Land Cover; Ontario Hydro Network Watercourses; Ontario Hydro Network Waterbodies; Ministry of Natural Resources, Forestry Road Crossing Water - Bridge; breeding bird point count data; autonomous recording unit data	Effects Assessment Construction Disturbance Area; Local Study Area; Birds Regional Study Area	2024 (habitat suitability index models); qualitative literature review compiled based on information available in 2024
8.9, 15.4	Distribution	Distribution of suitable habitat and habitat fragmentation (spatial and temporal)	Habitat suitability index models; qualitative literature review	Breeding	Landcover (developed by WSP Canada Inc.); Ministry of Natural Resources Far North Land Cover; Ontario Hydro Network Watercourses; Ontario Hydro Network Waterbodies; Ministry of Natural Resources, Forestry Road Crossing Water - Bridge; breeding bird point count data; autonomous recording unit data	Effects Assessment Construction Disturbance Area; Local Study Area; Birds Regional Study Area	2024 (habitat suitability index models); qualitative literature review compiled based on information available in 2024
		Species presence and distribution of observations (spatial and temporal)	Species detections; qualitative literature review	Spring (migration) Breeding (summer) Fall (migration) ▪ Winter[b]	Point count surveys; bird autonomous recording unit surveys; species at risk autonomous recording surveys; marshbird call playback surveys; aerial surveys; targeted species at risk surveys	Effects Assessment Construction Disturbance Area; Local Study Area; Birds Regional Study Area	2018 to 2023 (field surveys); qualitative literature review compiled based on information available in 2024
		Movement capacity	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024
8.9, 15.4	Abundance	Relative abundance (spatial and temporal)	Calculated relative abundance; habitat suitability index models; qualitative literature review	Spring (migration) Breeding (summer) Fall (migration) ▪ Winter[b]	Point count surveys; bird autonomous recording unit surveys; species at risk autonomous recording surveys; marshbird call playback surveys; aerial surveys; targeted species at risk surveys	Effects Assessment Construction Disturbance Area; Local Study Area; Birds Regional Study Area	2018 to 2023 (field surveys); qualitative literature review compiled based on information available in 2024
		Population status	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024
		Predation / hunting risk	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024
		Prey abundance and distribution	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024
		Other threats to bird survival	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024
		Reproductive capacity	Qualitative literature review	N/A	N/A	Birds Regional Study Area	Compiled based on information available in 2024

Notes:
(a) Only aerial and autonomous recording unit (autonomous recording unit) surveys were completed in the spring and fall; all survey types were completed in the breeding season.
(b) Only autonomous recording unit surveys were completed in the winter.
N/A = not applicable.

4.3.1 Desktop Assessment

A desktop review of existing information sources and previous studies was completed to inform and augment the existing environmental information gathered from the field investigations and used to characterize existing environmental conditions for birds.

4.3.1.1 Information Sources

Information sources reviewed and incorporated into the characterization of existing environmental conditions for birds included:

- *Ontario Land Cover Compilation* version 2.0 (Land Information Ontario, 2020), which is a compilation of Far North Land Cover v 1.4 and Provincial Land Cover 2000 Edition;
- *Crown Land Use Policy Atlas* (Ministry of Natural Resources and Forestry, 2023a);
- Ontario's *Provincial Satellite Derived Disturbance Mapping* digital resource (Government of Ontario, 2020);
- Ontario's Far North Land Cover layer (Ministry of Natural Resources and Forestry, 2014);
- Ramsar Canada Sites (Ramsar Canada, 2023);
- Land Information Ontario databases (Land Information Ontario, 2023);
- LiDAR-Derived Provincial Digital Elevation Model (Ministry of Natural Resources and Forestry, 2020);
- Esri image web service (Esri et al., 2023);
- *Forest Management Plan for the Ogoki Forest Management Unit* (Greenforest Management Inc., 2020);
- Natural Heritage Information Centre database (Ministry of Natural Resources and Forestry, 2023b);
- Geological Highway Map, Northern Ontario. Map 2506 (Ontario Geological Survey, 1986);
- *Northern Ontario Engineering Geology Terrain Study* (Ministry of Northern Development and Mines, 2005);
- *The Ecosystems of Ontario, Park 1: Ecozones and Ecoregions* (Crins et al., 2009);
- *Marten Falls All Season Road Project Baseline Report: Other Incidental Bird Observations* (Zoetica Wildlife Research Services Inc., 2018);

- Environment and Climate Change Canada Species at Risk database (Government of Canada, 2023);
- Canada's *Species at Risk Act*;
- Recovery strategies and management plans under the *Species at Risk Act;*
- Committee on the Status of Endangered Bird in Canada website (Committee on the Status of Endangered Wildlife in Canada, 2023);
- Ontario's *Endangered Species Act,* 2007 and its regulations;
- Recovery strategies and management plans under the *Endangered Species Act,* 2007 (Government of Ontario, 2007)*;*
- Ontario's *Fish and Wildlife Conservation Act* and its regulations (Government of Ontario, 1997);
- Species at risk and species at risk habitat data provided by the Ministry of the Environment, Conservation, and Parks and Environment and Climate Change Canada under data sharing agreements for the Project;
- *Migratory Birds Convention Act,* 1994 and its regulations;
- *Ontario Breeding Bird Atlas* (Birds Canada, 2023);
- iNaturalist (2023);
- eBird (2023);
- *Bird Conservation Strategy for Bird Conservation Region 8 in Ontario Region: Boreal Softwood Shield* (Environment Canada, 2014);
- *Bird Conservation Strategy for Bird Conservation Region 6: Boreal Taiga Plains* (Environment Canada, 2013a);
- *Bird Conservation Strategy for Bird Conservation Region 7 in Ontario Region: Taiga Shield and Hudson Plains* (Environment Canada, 2013b);
- Boreal Avian Modelling Project (2024);
- Marsh Monitoring Program (Birds Canada, 2024a);
- *Birds of the World* (Cornell Lab of Ornithology, 2024);
- Important Bird and Biodiversity Areas database (Birds Canada, 2024b);

- *Migratory bird sanctuaries across Canada* (Environment and Climate Change Canada, 2023a);
- *National Bird Areas* (Environment and Climate Change Canada, 2023b);
- *World Heritage List* (United Nations Educational, Scientific and Cultural Organization, 2023);
- Canadian Protected and Conserved Areas Database (Government of Canada, 2024a); and
- Indigenous Traditional Knowledge.

Information about habitat conditions collected from the desktop review were compiled at the local and regional scale for each bird Valued Component and proxy Valued Component to inform and supplement the field investigations for the Project, and to inform methods of data analysis. Results of the desktop review do not confirm species absence if records are not reported; due to the remote location of the Project, detections, particularly of uncommon species, are expected to be limited.

4.3.2 Ecosite and Habitat Review

During plot selection and study design, results of the vegetation study were not yet available, so ecosite information and classification were based on desktop review of the Far North Land Cover dataset (Ministry of Natural Resources and Forestry, 2014). During data analysis, updated ecosite data from the vegetation study were used. Through the vegetation desktop ecosite mapping and field verification, ecosite types were identified within the Local Study Area (*Vegetation Technical Support Document* - Section 6.4). For breeding bird point count survey plots that were outside of the Local Study Area, the Far North Land Cover dataset (Ministry of Natural Resources and Forestry, 2014a) and Provincial Land Cover 2000 were used to acquire a broad description of habitat type. Given the scale of the Project and the limitations identified in the desktop mapping exercise, for mapping and analyses purposes, ecosites were then rolled into vegetation community groupings (**Table 4-7**).

Table 4-7: Vegetation Community Groupings

Ecosystem	Vegetation Community Grouping
Upland	Coniferous forest
	Deciduous forest
	Mixed forest
	Rock / barren
	Early successional / sparse treed
Wetland	Swamp
	Bog
	Fen
	Marsh
Anthropogenic	Anthropogenic (human-altered)
Water	Water

To contribute to the vegetation study and further refine the ecosite information used in the analysis of bird Valued Components wherever possible, photos were collected at bird survey plots using the method described in Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020).

The vegetation study was ongoing when bird data were analyzed, so changes to the ecosite information may have occurred after bird data analysis was completed.

4.3.3 Field Investigations

4.3.3.1 Study Design

The study design for bird field investigations was informed by the requirements of the *Tailored Impact Statement Guidelines* (**Table 4-8**) as well as from engagement with regulators (**Section 1.1**), provincial guidance documents and peer-reviewed literature about approved methodology for scientific studies. The study design was intended to meet the overarching objectives of the requirements in the *Tailored Impact Statement Guidelines*. A summary of *Tailored Impact Statement Guidelines* requirements and the relevant studies that were designed to meet them is outlined in **Table 4-8**.

Table 4-8: Regulatory Requirements for Existing Conditions Specific to Birds Discipline

***Tailored Impact Statement Guidelines* Section**	***Tailored Impact Statement Guidelines* Requirement**	**Existing Conditions Field Investigation and Methods**
8.11	Provide a list of all provincially listed protected species at risk, species assessed by the Committee on the Status of Endangered Bird in Canada that have the status of extirpated, endangered, threatened or of special concern, and species at risk listed under Schedule 1 of the *Species at Risk Act* that may be directly or indirectly affected by the Project. Use existing data and literature as well as surveys to provide current field data that reflect the natural inter-annual and seasonal variability.	In addition to review of desktop resources, field surveys were designed and implemented to determine presence, distribution, abundance and density of birds and bird species at risk as follows: ■ Breeding bird point count surveys and bird autonomous recording unit surveys; ■ Additional autonomous recording unit targeted plots established to monitor for specific species at risk; ■ Marshbird call playback surveys to monitor for marshbird species including yellow rail (*Coturnicops noveboracensis*); ■ Aerial surveys for waterfowl, waterbirds and shorebirds during breeding and spring and fall migration; ■ Aerial raptor stick nest surveys; and ■ Other species-specific species at risk surveys. A desktop review of significant bird habitat was completed.
8.9 and 8.11	Describe biodiversity of bird species and their habitats that are found or likely to be found in the study area, including identification of Bird Conservation Regions and Bird Conservation Region Strategies.	
8.9	Consider migratory and non-migratory birds as Valued Components including: forest birds; raptors; shorebirds; waterfowl; and bog / fen birds and other wetland birds.	
8.9 and 8.11	Identify any and all federal species at risk and or critical habitat in the study area, sites that are likely to be sensitive locations and habitat for birds or environmentally significant areas.	
8.9 and 8.11	Provide estimates of the abundance and distribution, and information of the life history of migratory and non-migratory birds in the study area based on existing information or additional surveys to provide current data sufficient for reliable estimates.	
8.9 and 8.11	Collect bird data including species at risk to adequately represent temporal sources of variation including: ■ Among years; ■ Within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and ■ Within the 24 hour daily cycle.	Temporal trends for bird species were monitored in 2018, 2019 and 2022 during breeding bird point count surveys, and in 2022 during bird autonomous recording unit surveys and targeted species at risk autonomous recording unit surveys. This results in data to represent variation within and among seasons and within the 24 hour daily cycle.
8.9	Collect data in a manner that enables reliable extrapolations in space (i.e., at a minimum to Project, Local and Regional Study Areas) and in time (i.e., across years).	

***Tailored Impact Statement Guidelines* Section**	***Tailored Impact Statement Guidelines* Requirement**	**Existing Conditions Field Investigation and Methods**
8.9	Provide an estimate of year-round bird use of the area (e.g., winter, spring migration, breeding season, fall migration), based on data from existing sources and surveys to provide current field data if required to generate reliable estimates.	
8.11	Account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys.	Survey designs were robust and collected over at least two years, with the objective of sampling across the Local Study Area. Survey protocols for birds were designed following consultation with federal and provincial regulatory experts. Surveys were designed to optimize detectability and coverage at the appropriate time of year. Survey methods are described in **Section 4.3**, including the design, protocols, and analysis.
8.9	Collect explanatory (i.e., covariate) data necessary for modelling in such a way as to adequately represent spatial and temporal sources of variation.	
8.9	Use a standardized design approach during survey planning.	
8.9 and 8.11	Consider key habitat associated with species at risk as Valued Components including eskers and similar geologic features, wetlands, and peatlands.	Survey designs considered key habitat associations of bird species and bird species at risk. During data analysis, updated ecosite data from the vegetation study were used. Through the vegetation desktop ecosite mapping and field verification, ecosite types were identified within the Local Study Area (*Vegetation Technical Support Document* - Section 6.4). For breeding bird point count survey plots that were outside of the Local Study Area, the Far North Land Cover dataset (Ministry of Natural Resources and Forestry, 2014) and Provincial Land Cover 2000 were used to get a broad description of habitat type.
8.9	Provide detailed descriptions of bird habitat that includes at a minimum, characterization of biophysical conditions with regard to ecoregion, Bird Conservation Region, and with respect to the particular conditions of boundary regions.	
8.9	Provide a characterization of habitat features found in the Project area that are associated with the presence of those bird species that are likely to be affected, based on the best available existing information (e.g., land cover types, vegetation, aquatic elements), including habitat fragmentation.	
8.9	Identify the biodiversity metrics, biotic, and abiotic indicators that are used to characterize the baseline avifauna biodiversity and discuss the rationale for their selection.	
8.9 and 8.11	Provide written description and maps of ecozones, ecoregions, and ecodistricts as per Ontario or Canada's Ecological Landscape Classification.	A written description of landscape ecology including ecozone, ecoregions, and ecodistricts is provided in the *Vegetation Technical Support Document* – Section 3.1.

***Tailored Impact Statement Guidelines* Section**	***Tailored Impact Statement Guidelines* Requirement**	**Existing Conditions Field Investigation and Methods**
8.9	Identify areas of concentration of migratory birds, including sites used for migration, staging, breeding, feeding, and resting.	In addition to review of desktop resources, field surveys were designed and implemented to identify areas of concentration of migratory birds including sites used for migration, staging, breeding, feeding, and resting including aerial surveys for waterfowl, waterbirds and shorebirds during breeding, and spring and fall migrations.
8.9	Describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada goose [*Branta canadensis, nikah*], snow goose [*Anser caerulescens, nikah*, swan [*Cygnus* spp., *waabihssi*], gyrfalcon [*Falco rusticolus*, *gaagishiiyaashich migiziiw binechiinch*], loon [*Gavia* spp., *maang*], peregrine falcon [*Falco peregrinus*, *gaagishiiyaashich migiziiw binechiinch*], and duck [*Aythya* spp., *shesheeb*]).	Information relating to the importance of country foods or Indigenous cultural importance has been outlined for each Valued Component where information is available.
8.11	Contain complete datasets from all survey sites. Provide documentation and digital files for results of analyses that allow for a clear understanding of the methods and a replication of the results.	Datasets and digital files have been provided as part of the Environmental Assessment submission.

Field studies were conducted to substantiate information available from the desktop review. Surveys were initiated in 2018; breeding bird surveys were completed by Zoetica Wildlife Research Services Inc. in a large study area that overlaps the Local Study Area and birds Regional Study Area. Targeted field investigations completed in 2019 through 2022 and were designed to collect bird and species at risk data that meet requirements in the *Tailored Impact Statement Guidelines,* Sections 8.9 and 8.11 (**Table 4-9**). In addition, incidental observations of birds and habitat features (e.g., stick nests) were recorded during other discipline baseline field surveys. Results of the field surveys do not confirm species absence if records are not observed. There are limitations to field surveys; for example, detections during autonomous recording unit surveys, specifically, during migration and winter bird surveys are limited by only detecting auditory signals.

After the land cover classification was complete, a Generalized Random Tessellation Stratified study design was used to select autonomous recording unit survey locations, with consideration of access and differences in habitat quality. Model simulations were completed to demonstrate the optimal sampling to fill data gaps while reducing variance and producing non-biased estimates representing all land cover types. More details on the Generalized Random Tessellation Stratified design are provided in **Attachment B**.

Table 4-9: Summary of Bird Field Surveys

Valued Component	Field Survey	Description
■ Forest Birds ■ Shorebirds ■ Waterfowl and Waterbirds ■ Bog / Fen Birds and Other Wetland Birds ■ Species at Risk Birds	Breeding Bird Point Count Surveys	In 2018, surveys were completed at 160 survey stations within the Local Study Area and Regional Study Area.[(a)] In 2019, surveys were completed at 41 survey stations focusing on the Local Study Area. In 2022, surveys were completed at 89 survey stations focusing on the Local Study Area. Nineteen survey stations were placed in locations that were surveyed in 2018 (n=9) or 2019 (n=10). Among all sample years, a total of 31 unique bird point count stations were established in the Local Study Area, and an additional 30 point count stations were established in the Regional Study Area, outside of the Local Study Area boundaries.
■ Forest Birds ■ Raptors ■ Shorebirds ■ Waterfowl and Waterbirds ■ Bog / Fen Birds and Other Wetland Birds ■ Species at Risk Birds	Bird Autonomous Recording Unit Surveys (breeding, spring and fall migration, and winter)	In 2022, data were collected during the breeding season (June 1 through July 10 [Northern Ontario Ecozone] or July 17 [Hudson Bay Lowlands Ecozone]) from 57 of 60 autonomous recording unit survey stations in the Local Study Area. A total of 30 segments (15 at dawn and 15 at dusk) spread out over the breeding season were transcribed from each station. In 2022, data were collected during the spring (April 15 through May 31) and fall (August 1 through September 30) migration period. Data were collected from 29 of 30 autonomous recording unit stations in the Local Study Area during the spring migration period and from 27 of 30 autonomous recording unit stations during the fall migration period. A total of 35 segments (15 at dawn and 20 at dusk) were transcribed from each station spread out over the spring migration season. A total of 20 segments (all at dawn) were transcribed from each station spread out over the fall migration season. In 2022 and early 2023, data were collected during the winter season (December 1, 2022, through January 10, 2023) from 21 of 30 autonomous recording unit stations in the Local Study Area. A total of 15 segments (all at dawn) were transcribed from each station spread out over the winter season.

Valued Component	Field Survey	Description
■ Raptors ■ Shorebirds ■ Waterfowl and Waterbirds ■ Bog / Fen Birds and Other Wetland Birds ■ Species at Risk Birds	Targeted Species at Risk Autonomous Recording Unit Surveys	In 2022, a total of 11 autonomous recording units were deployed with the objective to target four crepuscular / nocturnal bird species at risk: common nighthawk (seven targeted autonomous recording units), eastern whip-poor-will (seven targeted autonomous recording units), short-eared owl (one targeted autonomous recording unit), and yellow rail (three targeted autonomous recording units). Survey periods and number of data segments analyzed differed among targeted species at risk; the survey window for each species also differed slightly but generally extended from mid-May through early July. For common nighthawk and eastern whip-poor-will segments were selected and analyzed from sunset to one hour after sunset; ten segments were analyzed for common nighthawk and eight segments were analyzed for eastern whip-poor-will. For short-eared owl, 15 segments were analyzed and were selected from one hour before sunset to one hour after sunset. For yellow rail, five segments were analyzed and were selected from midnight to 4 a.m.
■ Waterfowl and Waterbirds ■ Bog / Fen Birds and Other Wetland Birds ■ Species at Risk Birds	Marshbird Call Playback Surveys	In 2018, ten marshbird call playback survey stations were sampled over a single survey round within the Local Study Area (one plot surveyed twice) to determine the presence, distribution, abundance, and density of breeding marshbirds. In 2022, nine additional survey stations were established at marshes identified through a desktop review of the Local Study Area and surveyed over a single survey round. Among all sample years, 19 survey stations were established at marshes in the Local Study Area. Of these, three of the survey stations were located within 1 km of each other.
■ Shorebirds ■ Waterfowl and Waterbirds ■ Species at Risk Birds	Waterfowl, Waterbird, and Shorebird Breeding Aerial Surveys	In 2022, two aerial surveys focused on identifying breeding pairs / broods and incubating adults of conspicuous waterfowl were conducted during the breeding season. Two pre-determined flight paths were flown in the Local Study Area. The shoreline perimeter of large waterbodies (i.e., large lakes and open areas of the Albany and Ogoki rivers) was surveyed when these features were encountered during the transect flight.
■ Shorebirds ■ Waterfowl and Waterbirds ■ Species at Risk Birds	Waterfowl, Waterbird, and Shorebird Spring and Fall Migration Aerial Surveys	In 2022, one spring migration aerial survey and two fall migration aerial surveys were conducted to identify potential stopover features for waterfowl, waterbirds, and shorebirds in the Local Study Area. Open habitats were targeted with a focus on larger lakes and wider reaches of the Albany and Ogoki rivers. Surveys were completed by circling the perimeter of each feature.

Valued Component	Field Survey	Description
■ Raptors ■ Species at Risk Birds	Raptor Stick Nest Aerial Surveys	In late winter of 2018, aerial surveys were completed to identify conspicuous raptor stick nests in the Local Study Area. Effort was also made to identify stick nests during all bird field programs with an aerial component completed in the winter of 2021 through spring of 2022. All identified stick nests from 2018 and 2022 were revisited and verified in conjunction with the waterfowl, waterbird, and shorebird breeding aerial surveys in June 2022 to determine activity status.
■ Raptors ■ Species at Risk Birds	Species-specific Species at Risk Surveys	Suitable barn swallow, bank swallow, chimney swift, and peregrine falcon breeding habitat was searched for during all aerial surveys in the Local Study Area. Observers searched for and made note of vertical riverbanks and bluffs (bank swallow), buildings and other anthropogenic structures (barn swallow), cliffs (peregrine falcon), and large hollow trees or tree cavities (chimney swift).

Note:
(a) Surveys were completed by Zoetica *Wildlife Research Services Inc. in a larger study area that overlaps the Local Study Area and birds Regional Study Area.*
n = visits*; km = kilometre.*

Incidental observations of all birds, but particularly raptors and species at risk, were recorded during all bird field programs. The full details including methods and results of bird baseline studies are provided in *Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*.

4.3.4 Data Management

Data management, including quality assurance and quality control was employed to minimize potential for data entry and analysis errors, prepare datasets for analysis, and limit sensitive data distribution in accordance with established agreements.

4.3.4.1 Field Investigations

A quality assurance / quality control program was used for all field programs to minimize the possibility of error during data collection, data entry, and data interpretation. Trained and experienced field personnel were used. Standardized data entry spreadsheets and methods were used as a means of consistency and to control the quality of data collected. Specific work instructions were written to provide field crews with detailed methods describing how to collect the data.

All data were entered into Excel spreadsheets. Data entry was evaluated for errors or omissions to verify that the electronic database accurately reflected the data collected during the breeding bird point count, autonomous recording unit (bird and targeted species at risk), marsh play call-back, and aerial surveys. Quality assurance / quality control for the

bird field programs included review by more than one person, including a senior bird biologist.

All data collected on autonomous recording units were uploaded to the WSP Canada Inc. server as soon as the units were collected and the SD cards from each unit were available in a location where data upload could occur without interference (i.e., not a remote, patch internet connection).

4.3.5 Data Analysis

4.3.5.1 Spatial Analysis of Landscape Composition

An iterative process was used to develop the desktop vegetation community mapping for the Construction Disturbance Area and the Local Study Area. The process first involved the development of the preliminary terrain mapping (as described in the *Vegetation Technical Support Document*, and further detailed in the *Physiography, Terrain, and Soils Technical Support Document*). This preliminary terrain mapping, which informed the ecosite mapping that was completed by KBM Resources Group. The desktop photo interpretation mapping exercise included assessment using two imagery sources viewed in 3D, using software called Summit Evolution:

- 1:60,000 scale black and white aerial photos acquired in 1973, 1975, and 1976 from the National Air Photo Library in Ottawa, Ontario (covering the Local Study Area); and
- 1:33,000 scale 20 cm resolution colour aerial photographs acquired in 2019 by KBM Resources Group's aerial survey division (within one km on either side of the Project centreline).

All the delineated polygons (excluding water) were assigned a primary ecosite code (PRI_ECO) based on the Ecosites of Ontario ecosite keys (Banton et al., 2009). An ecosite is defined as "an ecological unit composed of relatively uniform geology, parent material, soils, topography, and hydrology and consists of related vegetation conditions" (Ministry of Natural Resources, 2012, p. 11). Where a secondary ecosite represents at least 20% of the area of a polygon and is not equal to or greater than 8 ha, a secondary ecosite was assigned (SEC_ECO) to the polygon.

A more detailed description of the desktop vegetation mapping exercise was outlined in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a), as part of the *Environmental Assessment / Impact Statement Report*.

After desktop vegetation mapping was completed, vegetation communities were grouped into broader categories based on bird habitat associations; these broad habitat categories were used in bird analyses. The vegetation communities and combined broad habitat categories are presented in **Attachment C**.

4.3.5.2 Natural and Anthropogenic Disturbance Mapping

Anthropogenic and natural disturbance analysis included an assessment of habitat fragmentation, historical and current fire disturbance, and forestry cut blocks. The analysis combined existing vegetation mapping overlayed with Ontario's Provincial Satellite Derived Disturbance Mapping digital resource (Government of Ontario, 2020). This digital mapping layer included disturbance to vegetation communities including burns, commercial forestry (cuts), weather events, infrastructure, and pests / disease. The total area of disturbance will be existing conditions data compared to the area of undisturbed vegetation communities that will be lost or affected by the Project.

4.3.6 Statistical Analyses

4.3.6.1 Field Data

Data from point count, call playback, aerial, and autonomous recording unit surveys were summarized for each bird proxy Valued Component to show the following:

- Frequency of occurrence (i.e., total number of detections and number of survey stations with detections), by study area, season, and habitat;
- Abundance (i.e., number of individuals by survey plot) by study area, season, and habitat; and
- Spatial and temporal distributions of occurrence and abundance.

Abundance of proxy bird Valued Components was estimated by applying home range size estimates presented in literature to the amount of moderate and high suitability habitat that as modelled to be present in each of the study areas.

4.3.6.2 Habitat Models

Bird habitat models were developed to evaluate the biotic and abiotic variables that best explain the spatial and temporal patterns of presence, abundance, density, and / or distribution for proxy Valued Components with sufficient data collected during field programs. Habitat models were defined for nine proxy Valued Components: red-eyed vireo (*Vireo olivaceus*), ovenbird (*Seiurus aurocapillus*), boreal owl (*Aegolius funereus*), Wilson's snipe (*Gallinago delicata*), palm warbler (*Setophaga palmarum*), common yellowthroat (*Geothlypis trichas*), northern waterthrush (*Parkesia noveboracensis*), common nighthawk (*Chordeiles minor*), and olive-sided flycatcher (*Contopus cooperi*). A model for dark-eyed junco (*Junco hyemalis*) was initially developed, but this model did not validate well and so was not used in this Report. For passerines, breeding bird survey data were used to determine habitat models. For boreal owl, common nighthawk, and Wilson's snipe, more detections were made on autonomous recording units than at breeding bird survey stations. Therefore, models were defined using autonomous recording unit data. Bird habitat models were compared to maps, data, and model predictions from the Boreal

Avian Modelling Project (BAM, 2020), where possible. Detailed habitat modelling methods are presented in **Attachment B** and **Attachment C**.

Predicted relative abundance for each proxy Valued Component was initially binned into ten categories based on the ten equal-width quantiles calculated across the range of values within the Regional Study Area. These ten bins were collapsed into four bins (i.e., high, moderate, low, and poor), based on the comparison between the initial ten bins and area-corrected abundance estimates derived from alternative survey data (Autonomous Records Units if models were developed with Breeding Bird Survey, or vice versa). This comparison and re-binning provided biological rationale for these four habitat quality ranks. When alternative survey data were unavailable (i.e., for boreal owl and common nighthawk), the four bins were determined using four equal-width quantiles to bin predicted relative abundance. For this assessment, the moderate and high habitat bins were considered suitable habitat for proxy Valued Components. Habitat availability are assessed for the Existing Conditions Case, the Base Case, the Application Case, and the Planned Development Case for all study areas.

4.4 Effects Assessment

The following is a broad overview of the approach for the identification, assessment, and evaluation of the potential effects:

- Review Construction and Operation and Maintenance Phase activities to identify potential interaction(s) that could result in environmental effects;
- Characterize the existing environment for both route alternatives, which considers past, present, and approved projects;
- Identify potential environmental effects Preferred Route and recommend mitigation measures to avoid or minimize identified effects, as well as identify opportunities to enhance benefits to the environment;
- Predict and assess potential environmental effects remaining after taking into consideration the recommended mitigation measures (i.e., residual effects) using direction, magnitude, geographic extent, duration, frequency, reversibility, and likelihood;
- Predict cumulative effects that may result from a combination of the residual effects of the Preferred Route with the effects of other past, present, and reasonably foreseeable projects; and
- Identify a follow-up program for the Preferred Route that includes monitoring to verify the prediction of the effects assessment and effectiveness of the mitigation measures, and a requirement for monitoring of the commitments made in the *Terms of Reference* and *Environmental Assessment / Impact Statement Report*.

The following sections provide discipline-specific input and considerations as they pertain to the methodology for the Effects Assessment. For detailed descriptions of the methodology used to inform this study refer to the *Environmental Assessment / Impact Statement Report*. Refer to **Section 6** for details related to the Preferred Route, including the revised study area that has been used in the Effects Assessment.

4.4.1 Project–Environment Interactions

Considering the Project components and activities presented in **Section 2**, interactions were identified between the Project components and activities and the existing conditions of birds Valued Components. These interactions support the identification of potential effects, both direct and indirect, that may result in changes to Birds. The likely Project–environment interactions were identified based on professional judgment, activities planned to occur, and as described in the *Marten Falls First Nation Community Access Road Project Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020). **Table 4-10** provides the preliminary analysis of Project–environment interactions for Birds that was presented in the *All Season Community Access Road: Birds Study Plan* (AECOM, 2021) and *Final All Season Community Access Road: Birds Study Plan* (Golder, 2021) found in **Attachment A**. The analysis of Project–environment interactions for Birds that are likely to have a potential effect is provided in **Section 7.2**.

Table 4-10: Project–Environment Interactions

Project Phases	Project Activities	Birds
Construction Phase	Mobilization of equipment and supplies	X
	Temporary construction staging areas[(a)]	X
	Temporary access roads and trails[(a)]	X
	Temporary construction camps[(a)]	X
	Right-of-way clearing and grubbing	X
	Brush and timber disposal	X
	Pits and quarries[(a)]	X
	Temporary concrete batch plants	X
	Drilling / blasting / aggregate production	X
	Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	X
	Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	X
	Construction site restoration	X
	Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*;	X
	Decommissioning and reclamation temporary camps, roads / trails, and staging areas	X
Operation and Maintenance Phase	Operate the Preferred Route	X
	Maintain the Preferred Route[(a)]	X

Notes:
(a) Includes General Maintenance (e.g., grading, erosion control, quarrying, borrow pits), Seasonal Maintenance (e.g., snow clearing, bridge and culvert maintenance), and Special Maintenance (e.g., slope failures, road settlement / break-up).

4.4.2 Assessing Residual Effects

4.4.2.1 Potential Effects

Following the identification of the Project–environment interactions, the existing conditions for the Preferred Route were reviewed to determine the potential effects of the Project. The potential effects on birds and bird habitat were described as either direct or indirect, and the potential effects on other disciplines were described as Discipline Interactions. The potential direct and indirect effects resulting from the Project–environment interactions were based on input received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement.

A **direct effect** is an immediate change to an environmental component caused by a project activity at the same time and place as the activity.

An **indirect effect** occurs when a change resulting from a Project activity leads to subsequent changes in other environmental component, which may occur later in time or at a different location but are reasonably foreseeable.

Residual effects are the effects that remain after the application of mitigation measures. Where a potential effect has been identified, but implementation of mitigation measures is likely to avoid or sufficiently minimize the potential for an effect, the result is no residual effect, and no further analysis is required.

Discipline interactions occur when a change to one Valued Component resulting from a Project activity causes a change to another Valued Component in another discipline (e.g., changes in bird abundance or distribution could indirectly affect recreational tourism).

Table 4-11 provides a preliminary identification of how changes to other environmental disciplines may result in indirect effects on birds and bird habitat.

Table 4-11: Potential Bird Interactions with Other Disciplines

Indirect Interactions with Birds and Bird Habitat	Discipline															
	Aboriginal and Treaty Rights and Interests	Atmospheric Environment	Climate Change	Acoustic and Vibration Environment	Physiography, Geology, Terrain and Soils	Surface Water	Groundwater and Geochemistry	Vegetation	Wildlife	Fish and Fish Habitat	Birds	Social	Economy	Land and Resource Use	Human Health and Community Safety	Visual Aesthetics	Archaeological and Cultural Heritage
Indirect effects on birds as a result of changes in other disciplines.	-	X	X	X	X	X	X	X	N/A	X (osprey and bald eagle)	N/A	N/A	N/A	N/A	N/A	N/A	N/A

X = Potential interaction for indirect effect as a result of the Project

4.4.2.2 Mitigation and Enhancement Measures

Following the identification of potential effects, the effects assessment has explored technically and economically feasible mitigation measures to avoid or minimize the identified negative effects. In addition, enhancement measures to increase positive effects beyond those that are already inherent to the design have been considered where appropriate. These measures consist of industry-standard practices, federal and provincial standard specifications, regulator-mandated measures, best management practices, Indigenous and community recommendations and recommendations from environmental professionals based on expertise, scientific publications, experience, and judgement.

It is important that mitigation and enhancement measures are achievable, measurable, verifiable, and monitored for compliance and effectiveness during all temporal phases as part of the Project follow-up monitoring plan. Recommended environmental monitoring will verify the potential environmental effects predicted, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective.

The *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) Section 20 requirements and Terms of Reference Requirements (AECOM, 2020) for Birds are provided in **Table 4-12.** The applicability of these requirements has been evaluated and will be adapted to the needs of the site, environment, and Project activities.

Table 4-12: *Tailored Impact Statement Guidelines* Section 20 Requirements and *Terms of Reference* Requirements

***Tailored Impact Statement Guidelines* Section 20 Requirement**	**Section Addressed In**
Mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the Proponent: ■ To avoid harm to migratory birds, clearing and construction should be conducted outside of the core breeding period. Follow Environment and Climate Change Canada guidance for avoiding harm; ■ Refer to Environment and Climate Change Canada guidance for nesting periods; and ■ It should be noted that these dates cover the core period for nesting activity of migratory birds, reducing the risk of taking a nest or eggs of a migratory bird. This recommendation does not authorize the disturbance, destruction, or take of a migratory bird, its nest, or its eggs outside of these data ranges.	■ **Sections 7** and **8**

***Tailored Impact Statement Guidelines* Section 20 Requirement**	**Section Addressed In**
Identify measures to prevent and mitigate the risk of engaging in harmful, destructive, or disruptive activities in key sensitive periods and locations (e.g., breeding bird season, migration, and nesting) to migratory birds, their nests and eggs, in areas frequented by migratory birds.	■ **Sections 7** and **8**
Identify measures to avoid the deposit of substances harmful to migratory birds in water or areas frequented by migratory birds.	■ **Sections 7** and **8**
In relation to Birds mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the Proponent: ■ Specifically address mitigation of effects on eskers and related features rich in aggregate material, as these features are likely to be strongly impacted, to a degree much higher than their prevalence on the landscape; ■ Describe, at a landscape scale rather than a single assessment of multiple hectares, how these measures address this uncommon high value landcover for forest birds during migration and breeding; and ■ Describe the cumulate effects of development on this type of landscape.	■ **Sections 7** and **8**
Provide offsetting or compensation plans to address all residual effects on species at risk, and their critical habitat, migratory birds, fish, and fish habitat, and / or wetland functions (if applicable) for review during the Impact Assessment process; the plans should: ■ Describe the baseline condition of the species at risk, critical habitat, migratory birds, and wetland functions potentially impacted by the Project; ■ Apply the mitigation hierarchy; ■ Identify and describe residual effects; ■ Identify a compensation ratio with rationale, including how any policies or guidance provided by federal authorities and Indigenous Groups have been considered; ■ Identify the location and timing of implementation of compensation projects (where feasible); ■ Identify and describe the success criteria; ■ Identify and detail non-habitat measures; ■ Describe how the proposed measures align with published provincial and federal recovery, management, or action plans and strategies for species at risk; ■ Identify the parties responsible for implementation, including monitoring and review; ■ Identify indicator species for setting compensation objectives. Identification should be based on baseline data, Bird Conservation Strategies, and other information where available (note: species at risk should not be used as indicator species; compensation efforts need to be directed specifically to these species);	■ **Section 9**

***Tailored Impact Statement Guidelines* Section 20 Requirement**	**Section Addressed In**
■ Describe the functions gained at the compensation site(s); ■ Provide evidence that functions can be replaced by the proposed offset activities; ■ Describe the process of selecting proposed compensation site(s) and baseline condition(s); and ■ Provide a description of the monitoring schedule and activities to be completed to monitor the success of compensation activities.	
Terms of Reference Requirement (AECOM, 2020)	**Section Addressed In**
■ The potential effects on vegetation may result in effects on wildlife where vegetation that provides suitable habitat will be lost or altered by the Project. o This includes direct habitat loss, habitat degradation and fragmentation during site preparation (e.g., vegetation clearing and site grading), and stockpiling of materials, transportation of equipment and materials, and excavation activities. o These activities may negatively affect wildlife habitat through increased erosion and sedimentation, soil removal, disturbance and compaction, and accidental release of contaminants. o Wildlife may also be displaced during construction when habitat is removed (e.g., clearing and grubbing). ■ The effects of dewatering, water-taking or water discharging activities, may negatively affect wildlife and wildlife habitat, particularly for species habitat dependent on surface water or groundwater (e.g., amphibian breeding habitat).	■ **Sections 7** and **8**
■ The Project Construction and Operation and Maintenance Phases may result in a higher potential for accidental wildlife mortality through collisions with vehicles, equipment and machinery. Increased mortality risk is a concern during sensitive life stages (e.g., breeding season). ■ Operation of the Community Access Road may result in continued disturbance and increased risk of mortality of wildlife species through vehicular collisions.	■ **Section 7 and 8**
■ Noise, lights, and human presence have the potential to change wildlife behaviour through disturbance or attraction of wildlife (e.g., insects attracted to lights). ■ Disturbance to wildlife during site preparation (e.g., vegetation clearing) and other construction activities may result in long-term effects.	■ **Section 7 and 8**
■ The Community Access Road will provide year-round access to the Far North, which is likely to increase access for recreational and traditional resource use. This has the potential to result in an increase in hunting pressure and predation due to increased sight-lines along linear corridors, a change to seasonal migration pathways, higher risk of the introduction of invasive species, parasites and disease, and the accidental release of contaminants to waterbodies.	■ **Section 8**

4.4.2.3 Predicting Residual Effects

Following the identification of direct and indirect effects on birds and identification of mitigation measures, residual effects were predicted. Once predicted, residual effects were characterized by residual effects characteristics, which are described in **Section 7.3.2.** Any predicted residual effects are also carried forward into the cumulative effects assessment, which is described in **Section 8.2.**

4.4.2.4 Characterization of Predicted Residual Effects

Predicted residual effects, if identified, will be described in terms of the effects assessment characteristics presented in **Table 4-13**. These effect characteristics are described in detail in the *Environmental Assessment / Impact Statement Report*. The section that follows outlines how these characteristics were applied as well as any discipline-specific characteristics, if applicable.

Table 4-13: Residual Effects Characteristics

Effects Characteristic	Definition	Description
Context	■ Ecological context ■ Socio-economic context (mallard)	■ Qualitative discussion ■ See description under **Discipline-Specific Characteristics**
Direction	■ Direction of change from existing conditions	■ Positive: net gain or positive effect ■ Neutral: no change to existing condition ■ Negative: net loss or adverse effect
Magnitude	■ Magnitude is the expected change from existing conditions	■ Negligible, low, moderate, high ■ See description under **Discipline-Specific Characteristics**
Geographic Extent	■ The spatial area that the effect is expected to occur	■ Effects Assessment Construction Disturbance Area: effect is confined within the direct physical disturbance of the Project. ■ Local: effect extends into the effects assessment Local Study Area ■ Regional: effect extends into the effects assessment Regional Study Area. ■ Beyond Regional: effect extends beyond the effects assessment Regional Study Area.
Duration	■ The period of time that the effect is expected to occur	■ Short term: effect ends before the end of Construction ■ Medium term: effect occurs during Construction and ends soon after operation begins and / or during maintenance and ends soon after the activity causing the effect ends ■ Long term: effect occurs during Construction and persists into Operation and Maintenance, and / or the effect is considered permanent, or the likelihood of reversibility is low or uncertain
Frequency	■ How often the effect is expected to occur	■ Infrequent: The effect is expected to occur rarely ■ Frequent: The effect is expected to occur intermittently ■ Continuous: the effect is expected to occur continuously
Reversibility	■ The ability of the effect to return to existing conditions	■ Reversible: effect is not permanent ■ Irreversible: effect is permanent
Likelihood	■ Probability that the effect will occur	■ Unlikely: the effect is not likely to occur but is not impossible ■ Possible: the effect may occur but is not likely ■ Probable: the effect is likely to occur but is uncertain ■ Certain: the effect will occur
Uncertainty	■ The potential for observed results to deviate from predictions made	■ See description below in **Section 4.4.2.6**
Direct / Indirect	■ Nature of the pathway through which the effect occurs.	■ Direct effects are typically immediate and spatially aligned with the activity. Indirect effects may be delayed or spatially removed but are causally linked and predictable.

4.4.2.4.1 Discipline-Specific Characteristics

In addition to the residual effects characteristics described in **Table 4-13**, the following discipline-specific characteristics were used to characterize the residual effects of the Project on and determine the significance of those effects on birds.

4.4.2.4.1.1 Ecological and Social Context

The context within which the Project's potential effects may occur was taken into account when considering the effects criteria. Effects criteria considered the physical characteristics of an effect (e.g., magnitude, geographical extent, and duration), as well as the context-specific value characteristics (e.g., environmental, health, and social and economic conditions). Context is considered one of the most critical factors when evaluating effects, and the effects assessment has considered potential or existing effects or pressures on social, economic, and health conditions affecting the sensitivity or resilience of a Valued Component.

Context for bird Valued Components considers species sensitivity, resilience, and adaptive capacity, current status and trends, and applicable legislation and best management practices. The current and future sensitivity and resilience of bird Valued Components to change caused by the Project are considered and includes Indigenous Knowledge, where available. Consideration of ecological context includes timing, such as when the effect could occur during a critical life cycle of the Valued Component. Context also informs whether the residual effect would alter the ability of the Valued Component bird populations to be self-sustaining and ecologically effective (i.e., the determination of significance). Ecological context is discussed in a reasoned narrative with other characteristics such as magnitude, geographic extent, duration, reversibility, and probability of occurrence used to characterize residual effects (**Table 4-13**) and determine significance (**Section 4.4.2.5**).

4.4.2.4.1.2 Magnitude

Magnitude refers to the amount of change in an indicator relative to the existing conditions of a Valued Component and / or to known thresholds, standards or guidelines. Magnitude is categorized as negligible, low, moderate, or high using numeric quantification or qualitative expression and supported by the literature through a reasoned narrative. Integrating ecological context to understand the point at which a given magnitude is large enough to be critical for a Valued Component is directly linked to the self-sustaining and ecologically effective status of the population, and therefore directly linked to significance (**Section 4.4.2.5**).

For magnitude, environmental discipline-specific definitions are required and are provided in **Table 4-14**.

Table 4-14: Bird Magnitude Definition

Magnitude Level	Definition	Rationale
Negligible	■ Limited to no variation predicted in the measurement indicators for bird Valued Components	■ Changes to regional ecosystems or populations are minor and largely **indiscernible**; therefore, no effect on regional population resilience.
Low	■ A small variation predicted in the measurement indicators for bird Valued Components	■ Minor incremental effects on regional ecosystems or populations are anticipated to be **discernible** but remain within the limits of ecosystem or regional population resilience.
Medium	■ A moderate variation predicted in the measurement indicators for bird Valued Components	■ Incremental effects on regional ecosystems or populations are anticipated to be **measurable** but is inferred to remain within the limits of regional population resilience.
High	■ A large variation predicted in the measurement indicators for bird Valued Components	■ Effects on regional ecosystems or populations are anticipated to be **severe** and likely to impair regional population resilience.

4.4.2.5 Determination of Significance

The significance of adverse residual effects on bird Valued Components was evaluated using the assessment endpoints self-sustaining and ecologically effective populations as significance thresholds. The significance of effects was predicted as a binary response, with effects classified as significant or not significant. Adverse residual effects were determined to be significant if the bird Valued Component is not expected to be self-sustaining or ecologically effective at the scale of the Effects Assessment Regional Study Area. The Effects Assessment Regional Study Area was defined using ecological boundaries and is at a scale suitable for the application of cumulative effects management strategies for most terrestrial Valued Components and, therefore, an appropriate and relevant scale for evaluating population integrity for bird Valued Components.

Self-sustaining and ecologically effective populations are populations that would be maintained into the future without the need for immigration of individuals from other populations. They are healthy, functioning, and robust populations capable of withstanding environmental change and accommodating stochastic (i.e., random) processes. Wildlife populations that are capable of stabilizing at a lower abundance and are not expected to be extirpated (i.e., local extinction of a species) because of unrelated stochastic events (e.g., unpredictable events such as floods or forest fire) are considered self-sustaining, and it is assumed that no additional mitigation beyond that proposed for the Project and provincial management actions (e.g., harvest regulations) would be required to maintain these populations. Loss of ecological function occurs when a wildlife population can no longer perform its ecological role, such that it may trigger ecological changes that result in

degraded or simplified ecosystems (Soulé et al., 2003). The potential to lose ecological function is more common for highly interactive wildlife that have important ecological effects on other species, such as predators (e.g., grey wolves [*Canis lupus*]) or ecosystem engineers (e.g., beavers [Oji-Cree translation, *amik*; *Castor canadensis*]; Soulé et al., 2003).

The ability of a Valued Component to accommodate disturbance was evaluated using the concepts of ecological adaptability and resilience. Adaptable wildlife species are those that can change their behaviour, physiology, or population characteristics (e.g., reproduction rate) in response to a disturbance such that the integrity of the population remains more or less unchanged. For example, certain wildlife populations can accommodate loss of some individuals without a change in overall population status or trajectory (known as compensatory mortality; Connell et al., 1984) or can adjust their physiology or behaviour to accommodate disturbance (Knopff et al., 2014; Chapron et al., 2014). Adaptable species can accommodate substantial disturbance and sometimes thrive in highly modified environments, whereas species with low adaptability can accommodate little or no disturbance.

Resilience is a concept that is distinct from, yet closely related to, adaptability. Biological populations often have inertia and will continue to function after disturbance up to the point where the disturbance becomes severe and lasts long enough that the population undergoes a fundamental change. Adaptability influences the duration and magnitude of effect required for this change to happen, whereas resilience defines the ability of a species or ecosystem to recover from disturbance. Highly resilient wildlife species have the potential to recover quickly from disturbance (e.g., after reclamation is achieved or a mortality source is removed), whereas species with low resilience will recover more slowly or may not recover at all (Weaver et al., 1996).

Resilience, adaptability, and existing conditions provide important ecological context for the determination of significance. Existing conditions represent the combined effects of previous and current human activities and natural factors that have shaped the observed conditions / patterns of each Valued Component the Effects Assessment Regional Study Area. These conditions represent the starting point for assessing Project effects and were considered as context to help define how close each Valued Component might be to its resilience limits when making the significance determination for the Project and cumulative effects.

Critical thresholds, such as the amount or distribution of habitat required to maintain a self-sustaining population or the specific number of individuals required to maintain an ecologically effective population size, are rarely available for Valued Components. Ecological thresholds also vary by species, landscape type, and spatial scale (Swift and Hannon, 2010; Environment Canada, 2013a,b). As such, a detailed and transparent account of whether the predicted effects from the Project and other developments would cause the defined significance threshold to be exceeded was prepared for bird Valued Components by combining residual effects criteria, available scientific literature, data collected in the study areas, and logical reasoning (i.e., a weight of evidence, or reasoned narrative approach). Overall, the determination of significance considered all the interactions resulting in net residual effects on measurement indicators that influence a particular Valued Component assessment endpoints (i.e., population is self-sustaining and ecologically effective).

Although significance was assigned to each interaction and associated measurement indictor(s), an overall determination of significance was provided. The relative and combined contribution of the effects from each interaction was used to determine the significance of potential adverse effects of the Project and other developments on a Valued Component in context of the associated assessment endpoint(s). The approach was based on a “weight of evidence” or an evaluation of the persuasiveness of the collective evidence considering the concepts described above, including the magnitude, geographic extent, duration, and likelihood of the effect, as well as resilience and adaptive capacity. Effects were predicted to be less harmful if the likelihood of the effect was unlikely as supported by the assessment results and scientific studies. The relative effect from each interaction on a Valued Component and the assessment endpoint is discussed; however, interactions that were predicted to have the largest influence on the assessment endpoint were assumed to contribute the most to the determination of significance for the Valued Component. The weight-of-evidence approach included the process of assembling, weighing, and evaluating information to come to a scientifically defensible conclusion. Significance was generally as follows (with consideration of context):

- **Significant**—Residual effects are measurable at the population level and are likely to decrease resilience and increase the risk to the maintenance of a self-sustaining and ecologically effective bird Valued Component population. Loss of habitat that causes permanent adverse changes to survival or reproduction at the population level would likely be significant. A significant effect may also result from habitat loss and fragmentation that reduces migratory or seasonal range movements to the point that it disrupts (breaks) population connectivity; and
- **Not Significant**—Residual effects are measurable at the individual level, and strong enough to be detectable at the population level but are not likely to decrease resilience and increase the risk to a self-sustaining and ecologically effective bird Valued Component population.

Confidence in the significance prediction was identified and discussed for each Valued Component as part of the reasoned narrative. If the threshold for where a significant effect would occur in the range of potential values had high uncertainty (low prediction confidence), and if the effect could be assessed as significant or not significant, a precautionary approach was applied, and the effect was identified as significant. The greater the uncertainty, the earlier a significant effect would be identified on the continuum of cumulative change from the Project and Reasonably Foreseeable Developments, where applicable.

Taking into account the significance for each residual effect along with the context, an overall significance determination was completed for each bird Valued Component.

4.4.2.6 Prediction Confidence and Uncertainty

Prediction confidence refers to the degree of certainty in the predicted residual effects and associated determination of significance. All Impact Assessments involve some level of uncertainty, often over many geographic, biophysical, and social dimensions, and observed results may deviate, to some degree, from predictions made in the assessment. Therefore, the residual effects predictions vary in their level of certainty, which could be related to several factors such as Project design and components, existing conditions, spatial and temporal scope, Valued Component response, effectiveness of mitigation measures, overall scope of factors considered, and natural and human-induced influences on the biophysical and human environment.

Transparency in describing sources of uncertainty is critical to understanding the confidence that can be attributed to the analysis of effects and is important to decision-making. Efforts to address uncertainties have been focused on those uncertainties that are most meaningful to decision-making, such as how the biophysical and human environment will respond to changes and the efficacy of mitigation measures. Each of the potential residual effects was assigned a confidence level as a means of ranking the potential effects on birds. The levels of uncertainty are defined as:

- **Low**—Uncertainty was considered to be low if there were baseline data for almost all of the study area and the ecology of the Valued Component is well known generating statistically and ecologically robust habitat models and effects predictions, the Project-related effects are clearly understood, and the level of certainty associated with the effectiveness of proposed mitigation measures is high;
- **Moderate**—Uncertainty was considered to be moderate if there were baseline data for much of the study area and the ecological knowledge of the Valued Component is adequate to generate habitat models with confident assumptions and predictions supported by the literature, the Project-related effects are mostly understood, and the level of certainty associated with the effectiveness of proposed mitigation measures is moderate to high; and

- **High**—Uncertainty was considered to be high if there were little to no baseline data available and / or the ecology of the Valued Component is poorly understood, habitat models are based on assumptions with little to no field data or scientific literature, the Project-related effects are poorly understood, and the level of certainty associated with the effectiveness of proposed mitigation measures is low or unknown.

The assessment applied a precautionary approach to address uncertainty by using the largest magnitude, duration, and geographic extent of potential adverse effects when a range of possible outcomes could be possible. Similarly, a conservative approach was implemented when information was limited so that effects were typically overestimated (e.g., defining the key input variables in a model to produce a conservatively high effect prediction). Consequently, uncertainty is addressed in a manner that increases the level of confidence that residual effects would not be larger than predicted, especially because layers of uncertainty can accumulate throughout the assessment of any given Valued Component. Discussion is provided on how uncertainty was addressed to increase the level of confidence so that residual effects will not be worse than predicted.

4.4.2.7 Deviations from Tailored Impact Statement Guidelines

Project effects for birds were not classified using all criteria described in the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020). Most of the criteria outlined in the *Tailored Impact Statement Guidelines* are obtained from *NatureServe Conservation Status Assessment: Factors for Evaluating Species and Ecosystem Risk* (NatureServe, 2012). Although the criteria presented in NatureServe (NatureServe, 2012) are useful for assessing and assigning the conservation status of species at risk from different threats, these criteria are less appropriate for characterizing residual effects in an Environmental Assessment. For example, characterizing magnitude using an ordinal scale (e.g., low, moderate, or high) in a manner meaningful for bird Valued Components requires that the effect size be placed in the ecological context of the criterion, such as resilience, adaptability, and amount of existing disturbance. Universal effect size boundaries, such as a 20% change at the Effects Assessment Regional Study Area scale used to define a high magnitude effect, work poorly because they do not consider ecological context. A 20% additional habitat loss from the Project relative to existing conditions in the Effects Assessment Regional Study Area may be required to cause a high magnitude effect on some Valued Components, whereas a 2% habitat loss may be sufficient for others, depending on ecological context (British Columbia Environmental Assessment Office, 2013).

It is important to note that although the criteria and method of combining criteria (i.e., matrices) outlined in *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) were not explicitly applied in this Report, the criteria are captured in the residual effects characterization for bird Valued Components. For example, elements of “scope” and “severity” are used in the characterization of magnitude,

geographic extent, and duration (**Table 4-13**). In addition, severity is captured through the inclusion of resilience and adaptive capacity of Valued Components (i.e., ecological context), which provide necessary context for understanding the damage or disruption to species and ecosystems. Irreversibility / permanence is also a criterion used to describe and assess residual effects in this Report (**Table 4-13**). The "degree of effect" criterion in the *Tailored Impact Statement Guidelines* is not classified in this Report but is incorporated into the reasoned narrative for the characterization of residual effects and determination of significance (**Section 4.4.2.5**).

4.4.3 Assessing Cumulative Effects

4.4.3.1 Definitions

The Impact Assessment Agency of Canada defines **Cumulative Effects** as "changes to the environment, health, social and economic conditions, as a result of the Project's residual environmental, health, social and economic effects combined with the existence of other past, present and reasonably foreseeable physical activities, as well as within activities of the Project itself from multiple emissions and discharges (e.g., simultaneous operations) to understand synergistic or additive effects" (Impact Assessment Agency of Canada, 2020). Cumulative effects may result if:

- The implementation of the Project has the potential to cause direct residual adverse effects on the Valued Components, taking into account the application of technically and economically feasible mitigation measures; and
- The same Valued Component may be affected by other past, present, and future physical activities.

A cumulative effect on an environmental, health, social, or economic component may be important even if the Project's effects on this component by themselves are minor. The method for assessment of cumulative effects is consistent with the *Tailored Impact Statement Guidelines*, *Operational Policy Statement: Assessing Cumulative Environmental Effects* under the *Canadian Environmental Assessment Act, 2012* (Canadian Environmental Assessment Agency, 2013), and the *Interim Technical Guidance for Assessing Cumulative Environmental Effects* under the *Canada Environmental Assessment Act, 2012* (Canadian Environmental Assessment Agency, 2018). The identification and assessment of cumulative effects will be undertaken as follows:

- Identify and assess the residual effects of the Project;
- Define the spatial and temporal boundaries for cumulative effects based on the residual effects predicted;

- Identify other past, present, and reasonably foreseeable activities with effects likely to overlap in type of effect (i.e., Valued Component), temporally and spatially with the predicted residual effects of the Project; and
- Predict potential cumulative effects and identify additional mitigation.

4.4.3.2 Cumulative Effects Scoping

4.4.3.2.1 Valued Components with Residual Effects

The cumulative effects assessment builds on the results of the residual effects assessment described in **Section 4.4.2** and will consider the incremental changes that are predicted to have a likely residual adverse effect on a Valued Component. The Valued Components that do not have a residual effect predicted, or the residual adverse effect is of negligible magnitude and unlikely or possible to occur, or positive in direction, will not be carried forward into the cumulative effects assessment. All remaining residual effects identified for Valued Components will be brought into the cumulative effects assessment. The rationale for the exclusion of Valued Components from the cumulative effects assessment will be provided.

4.4.3.2.2 Temporal and Spatial Boundaries

Temporal boundaries for the cumulative effects assessment as described in **Section 4.2,** correspond to the duration that the likely residual adverse effects of the Project are predicted to occur. The *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) indicates the cumulative effects assessment should look at potential effects throughout the life cycle of the Project, including decommissioning and abandonment; however, there are currently no plans to decommission the Project. Therefore, this assessment is limited to identifying and assessing cumulative effects during the Project Construction, and Operation and Maintenance Phases.

Spatial boundaries, which are the study area(s) within which the geographic extent of cumulative effects will be studied, may vary by the residual effects of each Valued Component selected. For example, the geographic extent of residual effects on the migration patterns of wildlife Valued Components may differ from the geographic extent of habitat loss to the same Valued Components as a result of the Project. The spatial boundaries used to assess cumulative effects are described in **Section 8.1.2.**

The Characteristics described in **Section 4.4** for the residual effects assessment have also been used to determine significance of cumulative effect, a summary of these is described in **Table 4-15**.

Table 4-15: Cumulative Effects Characteristics – Definitions

Effects Characteristic	Definition	Description
Context	■ Ecological context	■ Ecological context can integrate bird population status and trends, current threats, the amount of historical disturbance in the birds effects assessment Regional Study Area, resilience, and adaptability. The timing of effects, such as during critical life cycle periods (e.g., nesting), is also important for the determination of significance.
Direction	■ Direction of change from existing conditions	■ Positive: net gain or positive effect ■ Neutral: no change to existing condition ■ Negative: net loss or adverse effect
Magnitude	■ The expected change from existing conditions	■ Narrative or numeric quantification of effects. Effects with negligible magnitude have detectable changes to indicators that are predicted to result in no measurable effects on a criterion (e.g., dust deposition reduces the health of some plants inhabiting ecosites immediately adjacent to the effects assessment Construction Disturbance Area but has no measurable effect on bird habitat availability and distribution).
Geographic Extent	■ The spatial area that the effect is expected to occur	■ Regional: effect extends into the Regional Study Area ■ Beyond Regional: effect extends beyond the Regional Study Area
Duration	■ The period of time that the effect is expected to occur	■ Short term: effect ends before the end of Construction ■ Medium term: the effect occurs during Construction and ends soon after Operation and Maintenance begins and / or maintenance ends soon after the activity causing the effect ends ■ Long term: the effect occurs during Construction and persists into Operation and Maintenance, and / or the effect is considered permanent, or the likelihood of reversibility is low or uncertain
Frequency	■ How often the effect is expected to occur	■ Infrequent: The effect is expected to occur rarely ■ Frequent: The effect is expected to occur intermittently ■ Continuous: the effect is expected to occur continuously

Effects Characteristic	Definition	Description
Reversibility	■ Duration is the period of time over which the environmental effect will be present: the amount of time between the start and end of an activity or stressor (which relates to Project development stages), plus the time required for the effect to be reversed. Duration and reversibility are functions of the length of time a criterion is exposed to activities. ■ Reversibility is an indicator of the potential for recovery of the criterion from an effect. Reversible implies that the effect will not influence the criterion at a future predicted period in time. For effects that are permanent, the effect is determined to be irreversible.	■ Short term: the effect is reversible before the end of Construction ■ Medium term: the effect occurs during Construction and / or Operation and Maintenance and is reversible soon after operation and Maintenance begins ■ Long term: the effect occurs during Construction and / or Operation and Maintenance, and persists into operations, but is reversible ■ Permanent: the effect occurs during Construction and / or Operation and Maintenance, and is irreversible
Likelihood	■ Probability that the effect will occur	■ Unlikely: the effect is not likely to occur but is not impossible ■ Possible: the effect may occur but is not likely ■ Probable: the effect is likely to occur but is uncertain ■ Certain: the effect will occur

4.4.3.2.3 Identification of Past, Present, and Reasonably Foreseeable Developments

Activities that will be considered in the cumulative effects assessment will include other past and existing anthropogenic developments and future activities that are reasonably foreseeable. For an activity to be considered foreseeable and included in the cumulative effects assessment, sufficient information about the activity must be available to make a reasonable assessment of its potential effects (i.e., in the planning / approvals / design stage). This will include induced development that is certain or reasonably foreseeable and activities with additive effects where appropriate (Impact Assessment Agency of Canada, 2018). Reasonably foreseeable activities that will not be considered are those for which formal plans have not been publicly disclosed and information is not available. For a potential future project to be considered in the cumulative effects assessment, preliminary information such as activity description, activity size, footprint, project components, and anticipated timelines needs to be identified. This information will help to evaluate if the Project and the potential future project will overlap spatially and / or temporally. The full list

of past, present, and reasonably foreseeable developments considered in the cumulative effects assessment is presented in the *Environmental Assessment / Impact Statement Report*.

To determine which past, present and reasonably foreseeable developments and their activities should be considered in the birds cumulative effects assessment, the following questions will be answered. If effects of the activities of the Projects are expected to overlap in type, time, and space with the residual effects of the identified Valued Components, it will be assumed that those activities will act cumulatively and be assessed for cumulative effects with the Project.

- Do the project's activities overlap in the type of effects (e.g., removal of vegetation)?
- Do the project's activities overlap in the timing of effects (i.e., do they overlap with the cumulative effect temporal boundaries with the identified residual effects)?
- Do the project's activities overlap in the location of effects (i.e., do they overlap with the cumulative effect spatial boundaries)?

4.4.3.3 Cumulative Effects Assessment

Following the scoping of the cumulative effects assessment, cumulative effects were assessed for applicable birds Valued Components. Cumulative effects on each Valued Component were identified by reviewing the effects of the Project with and without the other activities. Effects of past activities (i.e., activities that have been carried out) will be used to contextualize the current state of the Valued Component.

Mitigation measures that are technically and economically feasible to eliminate or reduce adverse cumulative effects will be described. A qualitative assessment of the effectiveness of the measures will be provided, taking into consideration all applicable reasonably foreseeable developments to provide a regional context.

Cumulative effects will be characterized using the same effects characteristics presented in **Table 4-15.**

4.5 Identify Monitoring Programs and Future Commitments

Following the residual and cumulative effects assessments, effects monitoring programs are recommended to verify the prediction of the effects assessment and the effectiveness of the mitigation and enhancement measures presented in this Report. Commitments made in this Report are also presented to support compliance monitoring to evaluate whether the Project has been constructed, implemented, and operated in accordance with the commitments made.

4.6 Predicting Future Conditions

The prediction of potential future conditions or amount of change from existing conditions for both route alternatives included:

- Change in habitat availability, including temporary and permanent habitat loss, during both the Construction and Operation and Maintenance Phases;
- Changes in habitat distribution, including the effects on movement and connectivity, during both the Construction and Operation and Maintenance Phases;
- Changes in survival and reproduction during both the Construction and Operation and Maintenance Phases; and
- Discussion of the existing activities and infrastructure which may currently or previously have had an effect on Birds and their habitat. Existing activities were identified using desktop analysis, consultation with local Indigenous communities, and field observations.

Qualitative review of the potential future conditions and potential changes to sensitive features within the birds effect assessment study areas were described. The predictions of changes as a result of the Project and future conditions were used to inform the effects assessment and identify mitigation and enhancement measures.

4.7 Data Management and Analysis

Data management including quality assurance / quality control has been employed to minimize potential for data entry and analysis errors, prepare datasets for analysis and limit sensitive data distribution in accordance with established agreements.

4.7.1 Field Surveys

To maintain consistency and for quality assurance / quality control of the data collected, standardized datasheets (either digital or paper) paired with mapping software have been used in the field. Field studies have followed technical protocols that outlined specific work instructions and have been developed to follow federally and provincially acceptable methods. Completeness and accuracy of field data were verified daily during field verification and field photos and coordinate information has been backed up regularly.

4.7.2 Geographic Information Systems

Where existing conditions data are available in Geographic Information Systems format, this information will be provided to the Impact Assessment Agency of Canada as electronic geospatial data file(s) compliant with the *International Organization for Standardization 19115* standard. This will support the Government of Canada's commitment to Open

Science and Data and will facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. The Impact Assessment Agency of Canada intends to make the geospatial data files available to the public under the terms of the Open Government Licence–Canada, excluding geospatial data files related to sensitive species at risk and Indigenous Knowledge.

Complete datasets from all survey sites will be provided upon finalization of this Report. They will be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation / visit information, and observations and measurements in un-summarized form. Databases and Geographic Information Systems files will be accompanied by detailed metadata that meets International Organization for Standardization 19115 standards. Documentation and digital files will be provided for all results of analyses that allow for a clear understanding of the methods and a replication of the results. All geographic data, along with accompanying metadata, pertaining to species at risk will be provided to the Natural Heritage Information Centre and the Ministry of the Environment, Conservation and Parks–Species at Risk Branch.

4.7.3 Data Analysis

4.7.3.1 Field Data

Data from point count, call playback, aerial, and autonomous recording unit surveys were summarized for each bird proxy Valued Component to show the following:

- Frequency of occurrence (i.e., total number of detections and number of survey stations with detections), by study area, season, and habitat;
- Abundance (i.e., number of individuals by survey plot) by study area, season, and habitat; and
- Spatial and temporal distributions of occurrence and abundance.

Abundance of proxy bird Valued Components was estimated by applying home range size estimates presented in literature to the amount of moderate and high suitability habitat that as modelled to be present in each of the study areas. More information on habitat modelling can be found in **Section 4.3.6.2**.

4.7.3.2 Habitat Models

For empirical models, predicted relative abundance for each proxy Valued Component was initially binned into ten categories based on the ten equal-width quantiles calculated across the range of values within the Regional Study Area. These ten bins were collapsed into four bins (i.e., high, moderate, low, and poor), based on the comparison between the initial ten bins and area-corrected abundance estimates derived from alternative survey data (Autonomous Records Units if models were developed with Breeding Bird Survey, or

vice versa). This comparison and re-binning provided biological rationale for these 4 habitat quality ranks. When alternative survey data were unavailable (i.e., for boreal owl and common nighthawk), the four bins were determined using four equal-width quantiles to bin predicted relative abundance. For this assessment, the moderate and high habitat bins were considered suitable habitat for proxy Valued Components. Habitat availability is assessed for existing conditions, the Residual Effects Assessment, and the Cumulative Effects Assessment. Habitat availability at existing conditions and the Residual Effects Assessment is determined for the Local and Regional study areas. Habitat availability for the Cumulative Effects Assessment is determined for the Regional Study Area. Detailed habitat modelling methods are presented in **Attachment B** and **Attachment C.**

5 Existing Conditions

The existing conditions are described based on a combination of information obtained through engagement and consultation, desktop assessment, field investigation, and modelling.

The following description of existing conditions are based on a combination of information obtained through engagement and consultation, desktop assessment, and field investigations. Information is presented by bird Valued Component with subsections for each measurement indicator used to describe existing conditions for Valued Components. Existing conditions are described in detail for select proxy Valued Component species within each Valued Component section. The description of conditions for the bird Valued Component is intended to be representative of the conditions faced by the myriads of other species included in each bird Valued Component. Habitat modelling results are presented for each of the bird Valued Component within the habitat availability and distribution indicators; a detailed description of the habitat modelling methods used to describe existing conditions for Valued Components is provided in **Attachment B** and **Attachment C.**

5.1 Forest Birds

Billions of forest-nesting migratory birds in North America rely on the boreal forest (Wells and Childs, 2018). Forest birds are woodpecker (Oji-Cree translation, *papaseh*), songbird, and grouse species that use upland coniferous, deciduous, and mixed forest habitat types for breeding. Based on sources reviewed during the desktop review, there are 65 forest bird species that may be present in the Project study areas (**Attachment B, Annex A**). Of these, 64 species were detected during baseline surveys from 2018 to 2022 (**Attachment B, Annex A**).

There is potential for five federally and provincially listed forest bird species at risk to be in the Project study areas: Canada warbler (*Cardellina canadensis*), eastern wood-pewee (*Contopus virens*), evening grosbeak (*Coccothraustes vespertinus*), olive-sided flycatcher, and wood thrush (*Hylocichla mustelina*) (Government of Canada, 2023; Government of Ontario, 2024a). Four of these species (Canada warbler, eastern wood-pewee, olive-sided flycatcher, and wood thrush) were detected during baseline surveys. Existing conditions for Canada warbler, eastern wood-pewee, evening grosbeak, and olive-sided flycatcher are discussed in **Section 5.65.6**. Pileated woodpeckers (*Dryocopus pileatus*) are an important bird species in forested ecosystems of the boreal forest as their nest cavities provide breeding habitat for many migratory bird species. For this reason, pileated woodpecker nests are protected year-round for 36 months after they were last actively used by any migratory bird species (Government of Canada, 2022).

Several species that fall within the forest birds Valued Component are considered priority species within at least one of the two Bird Conservation Regions that overlap the birds existing conditions Local Study Area and existing conditions Regional Study Area (i.e., Bird Conservation Region 7 Taiga Shield and Hudson Plains and Bird Conservation Region 8 Boreal Softwood Shield [Environment Canada 2013b, 2014]). A total of 32 forest bird species is considered priority species in Bird Conservation Region 7 and / or Bird Conservation Region 8 (Environment Canada 2013b, 2014). All priority forest bird species were detected during field surveys for the Project from 2018 to 2022, except for evening grosbeak.

The following are the proxy Valued Component species selected to represent the forest bird Valued Component:

- Red-eyed vireo - proxy Valued Component for species that use deciduous forests;
- Ovenbird - proxy Valued Component for species that use mixed forests; and
- Dark-eyed junco - proxy Valued Component for species that use coniferous and disturbed forests.

Existing conditions for each of the proxy Valued Component species follow and are organized using the measurement indicators provided in **Table 4-2**.

Information contained in the following sections provides a summary of data in relation to indicators for each proxy Valued Component. For detailed forest birds data refer to **Attachment B**.

Indigenous Knowledge relating to forest birds was also shared by communities including Aroland First Nation, Fort Albany First Nation, and Kashechewan First Nation. Aroland First Nation noted the presence of Ptarmigan within the area of Patience Lake (Shared Value Solutions, 2024). Additionally, several Indigenous communities noted that grouse is a species of importance, which is traditionally harvested (Dillon, 2024a; Firelight Research Inc., 2024; MNP LPP, 2024a; LeBlanc, 2014; Marten Falls First Nation, 2023; Stantec, 2017a). Fort Albany First Nation notes that grouse are hunted in May and June during the spring break-up – and that this is also the time when the species perform their mating dances (Firelight Research Inc., 2024).

5.1.1 Red-eyed Vireo

5.1.1.1 Habitat Availability

Red-eyed vireo was selected as a proxy Valued Component for species that use deciduous forests. Within the breeding range, red-eyed vireos are typically associated with deciduous forests and riparian areas and often nest in alder (*Alnus* spp.) thickets and aspen (*Populus tremuloides*) groves (Cimprich et al., 2020). This species prefers small

forest openings for nesting and can be found in urban areas (Cimprich et al., 2020). During point counts, red-eyed vireos were most common in deciduous forest in the existing conditions Local Study Area and existing conditions Regional Study Area (**Attachment B**). The autonomous recording unit surveys detected red-eyed vireo at the highest relative abundance in deciduous and coniferous forest habitats in the existing conditions Construction Disturbance Area and existing conditions Local Study Area (**Attachment B**).

According to the habitat model, red-eyed vireo abundance was greater at higher elevations in landscapes with more deciduous forest, mixed forest, and riparian habitat (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable red-eyed vireo habitat is abundant in the study areas and covers approximately 40% of each study area (**Table 5-1**).

Red-eyed vireos are expected to have the capacity to adapt and be resilient to existing human-related disturbances and natural variations in habitat availability in the Project study areas. Generally, in red-eyed vireo habitat that is temporarily influenced by fire; individuals may return to burned areas within one to two years (Rush et al., 2012). This effect may be similar for habitats affected by insect outbreaks. Some types of anthropogenic disturbances may have a positive effect on red-eyed vireo habitat availability. A study in the Athabasca Oil Sands region of Alberta found that red-eyed vireo abundance was positively associated with the amount of linear disturbance, forest harvesting, and oil wells on the landscape (Mahon et al., 2019).

Insect outbreaks may affect the condition of boreal forest ecosystems in Ontario by shifting sites back to early seral deciduous forests, which may benefit red-eyed vireo. Therefore, insect outbreaks may have improved ecological function for red-eyed vireo in the Project study areas during existing conditions, relative to historical conditions.

Table 5-1: Habitat Suitability for Red-Eyed Vireo at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	3,489.6	27.6	51,624.8	20.8	132,322.8	19.9
Moderate	3,006.1	23.7	50,919.5	20.5	132,310.6	19.9
Low	5,031.5	39.7	77,134.6	31.1	198,585.9	30.0
Poor	1,138.2	8.9	68,278.9	27.5	198,544.1	30.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent.

5.1.1.2 Distribution

Red-eyed vireo is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023). Red-eyed vireos were detected every monitoring year from 2018 to 2022. During the breeding season, this species was recorded at all four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 31 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at seven of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 40 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at nine of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**). Red-eyed vireos were detected most frequently in the southern portion of the existing conditions Local Study Area and near the Albany River.

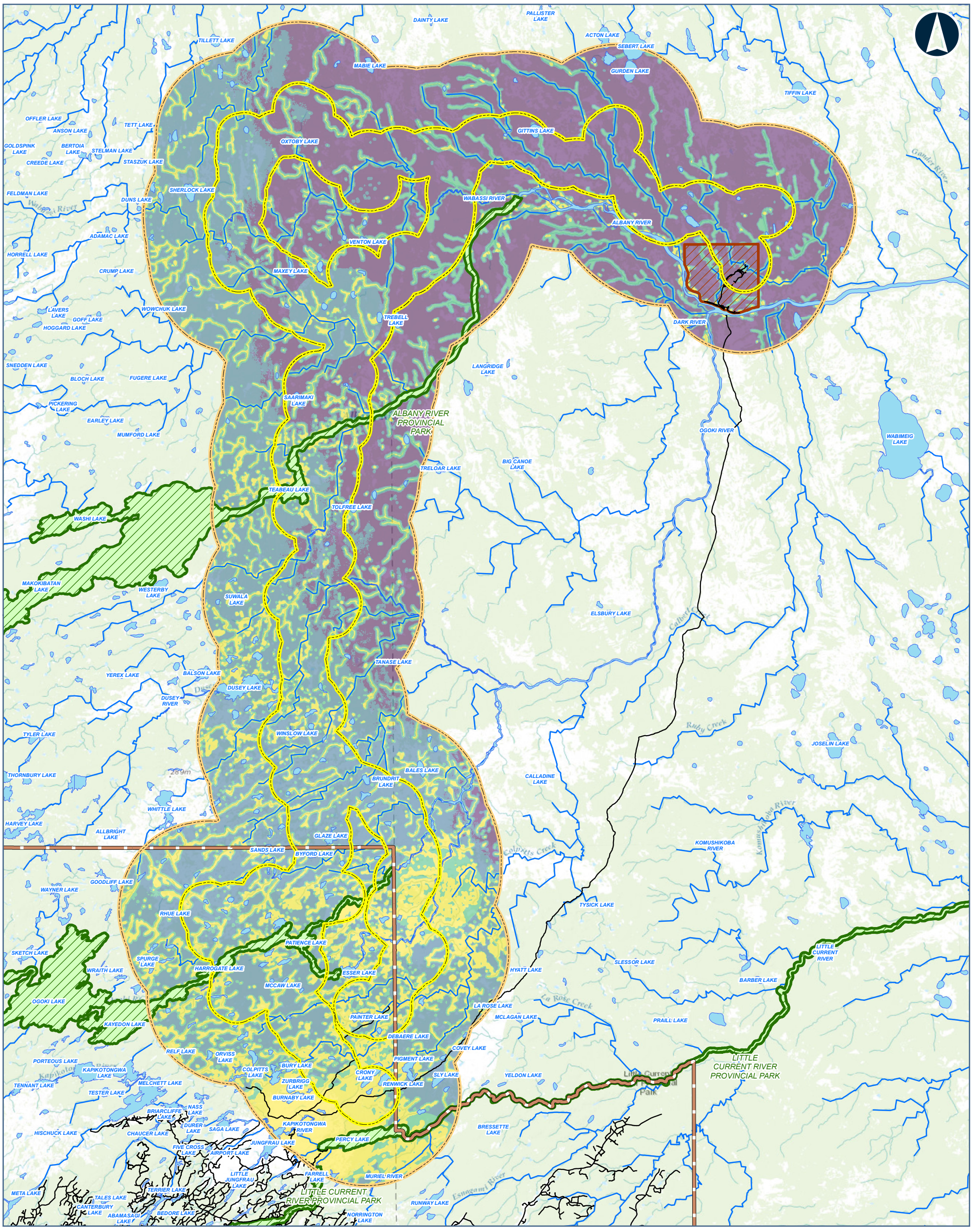
Red-eyed vireos may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to South America for the winter (Cimprich et al., 2020). The autonomous recording unit surveys in the existing conditions Construction Disturbance Area and existing conditions Local Study Area detected red-eyed vireo at highest relative abundance during the breeding season, followed by fall, then spring. Red-eyed vireo activity recorded on autonomous recording units was highest in early to mid-June and at dawn.

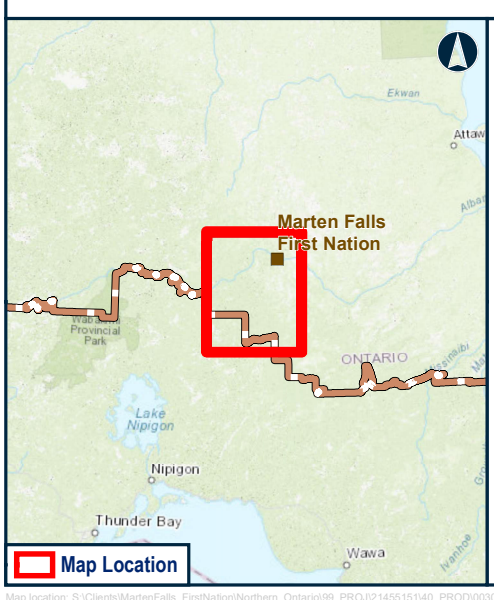
Red-eyed vireos appear to have relatively high site fidelity with one study reporting that 49% of males and females return to the same breeding area each year (Cimprich et al., 2020). The territory size defended by males averages 0.7 ha, but females use areas beyond these limits (Cimprich et al., 2020).

The amount of high and moderate suitability red-eyed vireo habitat is greater in the southern and eastern portions of the existing conditions Local Study Area and birds existing conditions Regional Study Area (**Figure 5-1**). Small patches of moderate and high suitability habitat are present in the eastern and northern portions of the existing conditions Local Study Area and existing conditions Regional Study Area and generally associated with riparian areas along watercourses (**Figure 5-1**).

Red-eyed vireos are highly mobile and can establish territories in areas below carrying capacity. Red-eyed vireos do not appear to be sensitive to patch size (Dunford et al., 2004). Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest songbird species. For example, in a fragmented landscape, wood thrushes and hooded warblers (*Setophaga citrina*) generally foraged more than 150 m from their nest site, and some individuals travelled over 1 km (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011). Similarly, habitat fragmentation did not constrain the movements of successful breeding male ovenbirds in a boreal landscape (Bayne and Hobson, 2001).

Although some forest birds may be reluctant to cross gaps greater than 50 m, individuals will cross gaps of 200 m when no other choice exists (St. Clair et al., 1998). However, Bélisle and Desrochers (2002) found that birds rarely ventured greater than 25 m from a forest edge and Desrochers and Hannon (1997) found that certain bird species preferred travelling through woodland cover, even when travel routes were substantially longer than crossing a forest gap of 10 to 170 m.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

RED-EYED VIREO HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Red-Eyed Vireo in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-1

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5.1.1.3 Survival and Reproduction

Red-eyed vireo is one of the most abundant breeding songbirds in the forests of eastern North America (Cimprich et al., 2020). This species was also one of the most abundant forest songbird species detected during field surveys from 2018 to 2022. During point count surveys completed during the breeding season from 2018 to 2022, red-eyed vireo was detected at the highest relative abundance at plots that occurred in the existing conditions Regional Study Area (0.47 individuals per plot). Mean relative abundance of individuals was highest in 2018 (0.29 individuals per plot), and lowest in 2019 (0.20 individuals per plot) (**Attachment B**). During autonomous recording unit surveys completed during the breeding season in 2022, red-eyed vireo was detected at the highest relative abundance in the existing conditions Construction Disturbance Area (1.75 individuals per plot) (**Attachment B**).

The Project is located in *Ontario Breeding Bird Atlas* Regions 44 and 37. The density estimates for red-eyed vireo in these regions are 10.8 and 23.8 individuals per square kilometre (km^2), respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the red-eyed vireo population in Bird Conservation Region 7 has increased by 0.3% per year from 1970 to 2021 (total increase of 16.9%) (Smith et al., 2022). However, the reliability of this estimate is considered low. There is a 40.4% chance of future population decrease in the region (Smith et al., 2022). The red-eyed vireo population in the Ontario portion of Bird Conservation Region 8 has increased by 0.8% each year from 1970 to 2021 (total increase of 50.5%) (Smith et al. 2022). The reliability of this estimate is considered medium and there is predicted to be a <0.1% chance of future population decreases in the region (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as red-eyed vireo, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Red-eyed vireos typically start breeding at one year of age. Adults have a 53% chance of surviving to the following year. This species typically lives one to two years but individuals of 10 to 12 years of age have been reported (Cimprich et al., 2020). Females lay an average of three eggs per brood and typically only raise one brood per season (Cimprich et al., 2020). Nest success is generally around 65% (Cimprich et al., 2020).

Adult red-eyed vireos may be depredated by sharp-shinned hawks (*Accipiter striatus*), while American crows (Oji-Cree translation, *andaagog / ahahjihwug*) (*Corvus brachyrhynchos*), blue jays (Oji-Cree translation, *windigo kwiikwiishihwug*) (*Cyanocitta*

cristata), common grackles (*Quiscalus quiscula*), eastern chipmunks (Oji-Cree translation, *shashakawabikoshag*) (*Tamias striatus*), and red squirrels (Oji-Cree translation, *ajidamog*) (*Tamiasciurus hudsonicus*) are known to consume eggs and nestlings (Cimprich et al. 2020).

The red-eyed vireo primarily consumes caterpillars during the summer, although other insects such as beetles, mosquitoes, ants, and wasps may also be eaten; diet in the winter is primarily made of fruits (Cimprich et al., 2020).

Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Insect declines are thought to be due to several factors including habitat loss, pesticides, pollution, introduced species, and climate change (Wagner et al., 2021).

These factors are largely absent from the Project Study Areas because there are limited forestry and human development and no agriculture in the existing conditions Regional Study Area (e.g., limited risk for pesticides and introduced insect species). However, climate change and pollution are factors present in the birds existing conditions Regional Study Area. A decline in aerial insect abundance and availability may negatively affect red-eyed vireo populations by reducing prey availability for this species.

Climate change may be creating asynchrony between peak insect emergence and songbird nesting as insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). In eastern North America, red-eyed vireo appears vulnerable to this timing disjunct because this species is arriving on breeding grounds later than was typical 100 years ago (Butler, 2003). One factor for this may be that, recently, climate change has been causing a delay of the onset of spring immediately south of the Great Lakes; this may be delaying caterpillar development on southern migratory staging areas and limiting the amount of food available for fattening up prior to migratory flights (Strode, 2003). If spring continues to arrive later south of the Great Lakes region, this may increase pressure on caterpillar specialist populations, such as red-eyed vireo, by widening the time gap between peak insect emergence in their migratory staging areas and northern breeding grounds (Strode, 2003).

Forest fragmentation can increase accessibility for brown-headed cowbirds (*Molothrus ater*), which are brood parasites of some songbird species, including red-eyed vireos (Cimprich et al., 2020). In Ontario, red-eyed vireos are highly susceptible to brown-headed cowbird parasitism; it is estimated that 40% to 77% of nests in southern Ontario are parasitized (Peck and James, 1989). However, cowbird densities in northern Ontario are

much lower than densities in more southern areas of the province. Brown-headed cowbirds were not recorded in Blocks 16EB or 16EC during the first or second *Ontario Breeding Bird Atlas* survey (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline surveys. As such, nest parasitism at existing conditions is unlikely to have had a measurable effect on red-eyed vireo populations in the Project study areas.

5.1.2 Ovenbird

5.1.2.1 Habitat Availability

Ovenbird was selected as a proxy Valued Component for species that use mixed forests. Ovenbirds are typically found in large, contiguous areas of mature deciduous or mixed forest habitats (Porneluzi et al., 2020). During point count and autonomous recording unit surveys, ovenbirds were detected at the highest relative abundance in deciduous forest habitat in all study areas (**Attachment B**).

According to the habitat model, ovenbird abundance was greater in areas with rougher terrain and more water and deciduous forest habitat and less mixed forest habitat at the landscape scale (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable ovenbird habitat is abundant in the study areas and covers approximately 55% of each study area (**Table 5-2**).

Forest habitat structure may not be suitable for ovenbirds until 20 years after a fire (Haney et al., 2008). This may also apply to forests that have been affected by insect outbreaks.

Table 5-2: Habitat Suitability for Ovenbird at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	4,142.9	32.7	69,240.1	27.9	198,213.8	29.9
Moderate	3,053.6	24.1	56,215.0	22.7	134,010.9	20.3
Low	1,080.0	8.5	23,314.1	9.4	60,052.7	9.1
Poor	4,388.8	34.7	99,188.6	40.0	269,447.2	40.7

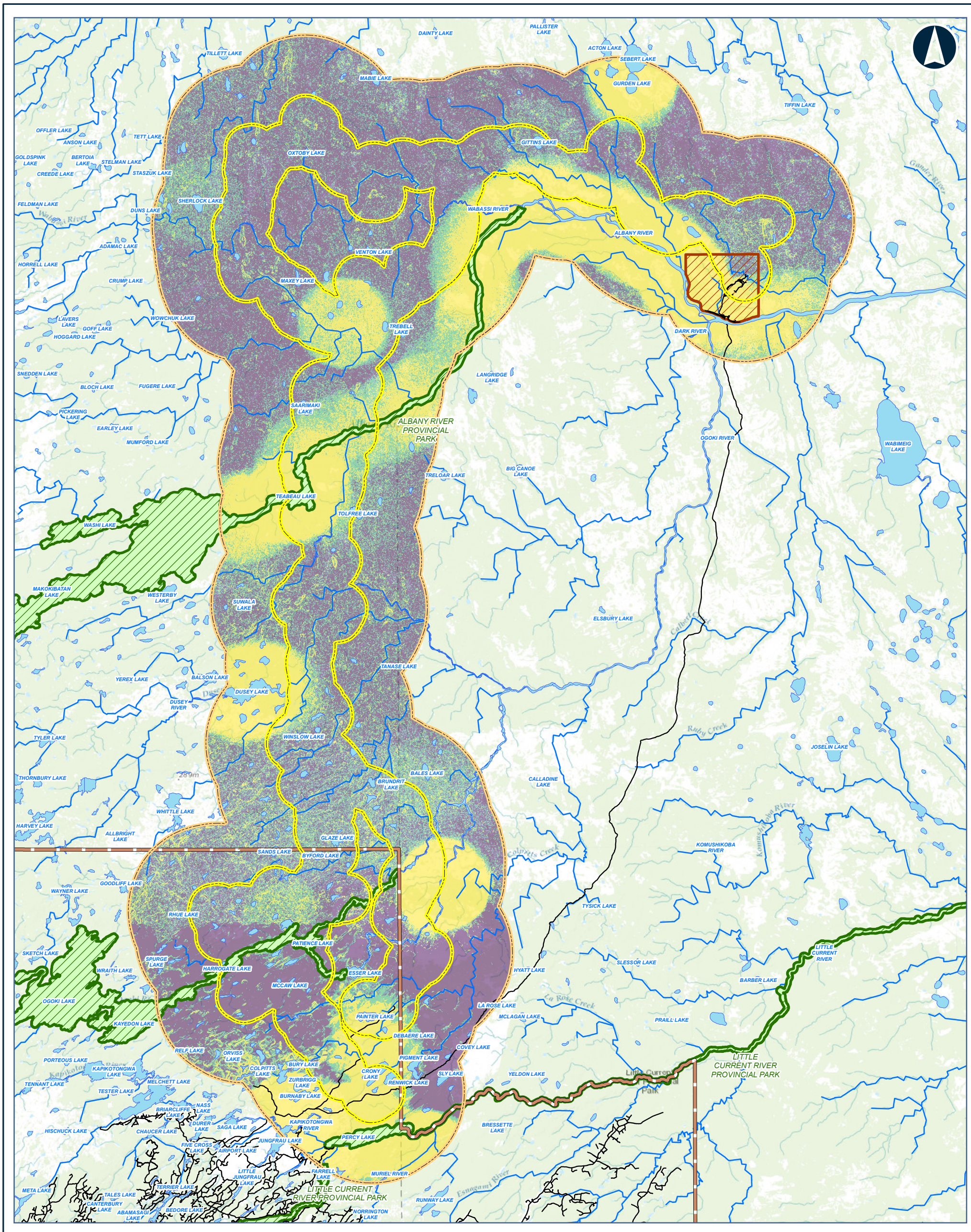
Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent

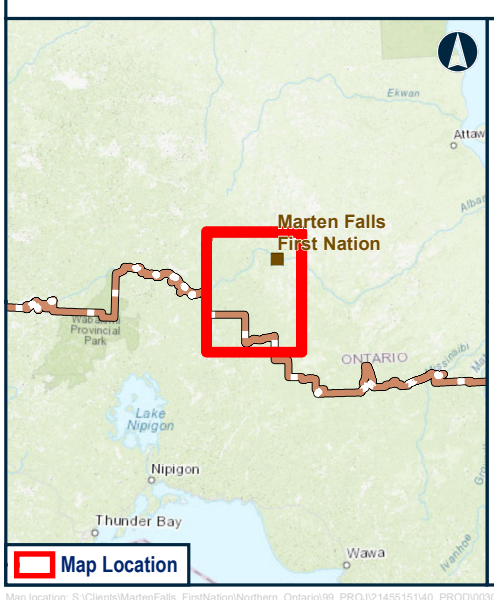
5.1.2.2 Distribution

Ovenbirds generally require large tracts of undisturbed forest for breeding. Although some studies have found that the presence of male ovenbirds is not influenced by habitat fragmentation (Betts et al., 2007; Smith et al., 2011), it appears that females are more sensitive to habitat fragmentation (Villard et al., 1993; Burke and Nol, 1998; Bayne and Hobson, 2001). Studies have shown that males that establish breeding territories in the forest interior (i.e., >250 m from an edge) have higher pairing success than individuals that establish breeding territories in edge habitat (Villard et al., 1993; Burke and Nol, 1998; Bayne and Hobson, 2001). Similarly, this species is sensitive to patch size but only when patches are isolated from each other (Villard et al., 1993; Burke and Nol, 1998; Bayne and Hobson, 2001). As such, this species is considered vulnerable to human-related disturbances and natural variations in habitat availability in the Project study areas. Large areas of high quality habitat for ovenbird are present in the study areas. There are two large patches of high quality habitat present south of Glaze Lake. Large patches of high quality habitat in more northern portions of the study areas are primarily associated with the Albany River, Dusey Lake (Oji-Cree translation, *Atikameko Zakaihkan*), and Gurden Lake (**Figure 5-2**).

Ovenbirds are highly mobile and can establish territories in areas below carrying capacity. Several studies have found that habitat fragmentation may not impede daily movements of ovenbirds (Bayne and Hobson, 2001) and forest birds are likely to cross gaps of 200 m when no other choice exists (St. Clair et al., 1998). However, other studies have found that certain bird species will not cross forest gaps of 10 to 170 m (Desrochers and Hannon, 1997).

Ovenbird is a common breeding species south of the southern portion of the Hudson Bay Lowland ecozone (Natural Heritage Information Centre, 2023). During field studies for the Project, ovenbirds were detected throughout the study areas, but more observations were recorded south of the Albany River than in the northern portions of the study areas. During the breeding season, this species was recorded at four of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 21 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at four of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 29 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at seven of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

OVENBIRD HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Ovenbird in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 5-2

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Ovenbirds are anticipated to be present in the Project study areas only during the migration and breeding seasons; this species migrates to Central America and the Caribbean for the winter (Porneluzi et al., 2020). During autonomous recording unit surveys for the Project, ovenbirds were recorded during the spring, summer, and fall, with the highest detection rate reported in the spring and summer. This species was detected every monitoring year for the Project from 2018 to 2022. Ovenbird activity recorded on autonomous recording units was highest in early June and early July and at dawn.

Ovenbirds appear to have fairly high site fidelity with 40% to 55% of males and females returning to the same breeding area each year (Porneluzi et al., 2020). Average territory size is approximately 2.7 ha (Porneluzi et al., 2020) and is similar in fragmented and undisturbed landscapes. However, ovenbird density is much higher in undisturbed landscapes than in fragmented landscapes. In boreal environments in eastern Canada, ovenbird density can be 15 times higher in large forest fragments than in small fragments (i.e., 4.5 individuals per 10 ha versus 0.3 individuals per 10 ha; Villard et al., 1993).

5.1.2.3 Survival and Reproduction

Ovenbirds were commonly detected during field surveys in the Project study areas. During point count surveys completed during the breeding season from 2018 to 2022, ovenbird was detected at the highest relative abundance at plots that occurred in the existing conditions Regional Study Area (0.37 individuals per plot). Mean relative abundance of individuals was highest in 2018 (0.21 individuals per plot), and lowest in 2019 (0.05 individuals per plot). During autonomous recording unit surveys completed during the breeding season in 2022, ovenbird was detected at the highest relative abundance in the existing conditions Construction Disturbance Area (0.75 individuals per plot) (**Attachment B**).

The density estimates for ovenbird in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 4.7 and 14.3 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the ovenbird population in Ontario portion of Bird Conservation Region 8 has decreased by 0.3% each year from 1970 to 2021 (total decrease of 15.0%) (Smith et al., 2022). The reliability of this estimate is considered “medium” and there is predicted to be an 87.2% chance of future population decrease in the region (Smith et al., 2022). Population trends for ovenbird in Bird Conservation Region 7 are not available.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as ovenbird, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Ovenbirds typically start breeding at one year of age and have an average lifespan of 2.7 years (Porneluzi et al., 2020). Adults have a 42% to 58% chance of surviving to the following year (Porneluzi et al., 2020). Females lay an average of four eggs per brood and typically only raise one brood per season (Porneluzi et al., 2020). Nest success is influenced by forest patch size. Nest success rates of 60% to 70% have reported in unfragmented landscapes, while nest success rates in fragmented landscapes range from 10% to 50% (Porneluzi et al., 2020).

Barred owls (Oji-Cree translation, *wakayabedesihwug*) (*Strix varia*) and broad-winged hawks (*Buteo platypterus*) may depredate adult ovenbirds. Predators of ovenbird eggs and young include red squirrel, eastern gray squirrel (*Sciurus carolinensis*), raccoon (*Procyon lotor*), striped skunk (*Mephitis mephitis*), and weasels (Oji-Cree translation, *zikosihwag*) (Porneluzi et al., 2020).

Ovenbirds are insectivorous and primarily consume ants, weevils, and beetles (Porneluzi et al., 2020). Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Many factors implicated in insect declines in other parts of the world (e.g., effects from agriculture), which may contribute to ovenbird population declines, are not present in the existing conditions Regional Study Area at existing conditions. However, climate change and pollution may be factors present in the study areas. A decline in aerial insect abundance and availability may negatively affect ovenbird populations by reducing prey availability for this species.

Climate change may be creating asynchrony between peak insect emergence and songbird nesting because insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). However, in eastern North America, ovenbirds appear to be arriving on their breeding grounds earlier, possibly responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow ovenbirds to adapt to climate change.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of ovenbirds. Peck and James (1998a) report that 11% of ovenbird nests in Ontario are parasitized by brown-headed cowbirds. Brown-headed cowbirds were not recorded in *Ontario Breeding Bird Atlas* blocks 16EB or 16EC during the first or second atlas surveys (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline surveys. As such, nest parasitism is unlikely to have had a measurable effect on ovenbird populations in the Project study areas at existing conditions.

5.1.3 Dark-eyed Junco

5.1.3.1 Habitat Availability

Dark-eyed junco is a habitat generalist and breeds in a wide variety of habitats and levels of disturbance (Nolan et al., 2020). Dark-eyed junco was selected as a proxy Valued Component species for birds that use coniferous and disturbed forest habitats Suitable habitat for dark-eyed junco was determined to be coniferous forest, early successional / sparse treed forest, and mixedwood forest (**Attachment C**). During autonomous recording unit and point count surveys in the existing conditions Local Study Area, this species relative abundance was generally highest in wetland habitat types; bog habitat types had the highest abundance followed by marsh, fen, and swamp habitats (**Attachment B**). During point count surveys in the existing conditions Regional Study Area, dark-eyed juncos were most abundant in early successional sparse treed habitat (**Attachment B**).

Suitable dark-eyed habitat is abundant in the study areas and covers approximately 30% of each study area (**Table 5-3**).

Table 5-3: Habitat Suitability for Dark-eyed Junco at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	7,207.6	56.9	75,765.9	30.6	190,174.4	28.7
Low to Poor	5,457.7	43.1	172,191.9	69.4	471,857.9	71.3

ha = hectare; % = percent.

Dark-eyed juncos are expected to have the capacity to adapt and be resilient to existing human-related disturbances and natural variations in habitat availability in the Project study areas as this species uses disturbed areas for nesting. Insect outbreaks and wildfire shift forest ecosystems back to early seral forests and this may have a positive effect on dark-eyed junco habitat availability (Smucker et al., 2005). Some studies report higher junco abundance in recently burned forests than in mature forests (Nolan et al., 2020). This may be similar for insect outbreak-affected habitats.

Some types of anthropogenic disturbances may also have a positive effect on dark-eyed junco habitat availability. Dark-eyed junco occurrence may be positively associated with the number of permanent linear disturbance features on the landscape (Mahon et al., 2019). The effects of forestry clear cuts are unclear as some studies have found negative effects on this species (Mahon et al., 2019), while other studies have shown positive effects (Holmes et al., 2017).

5.1.3.2 Distribution

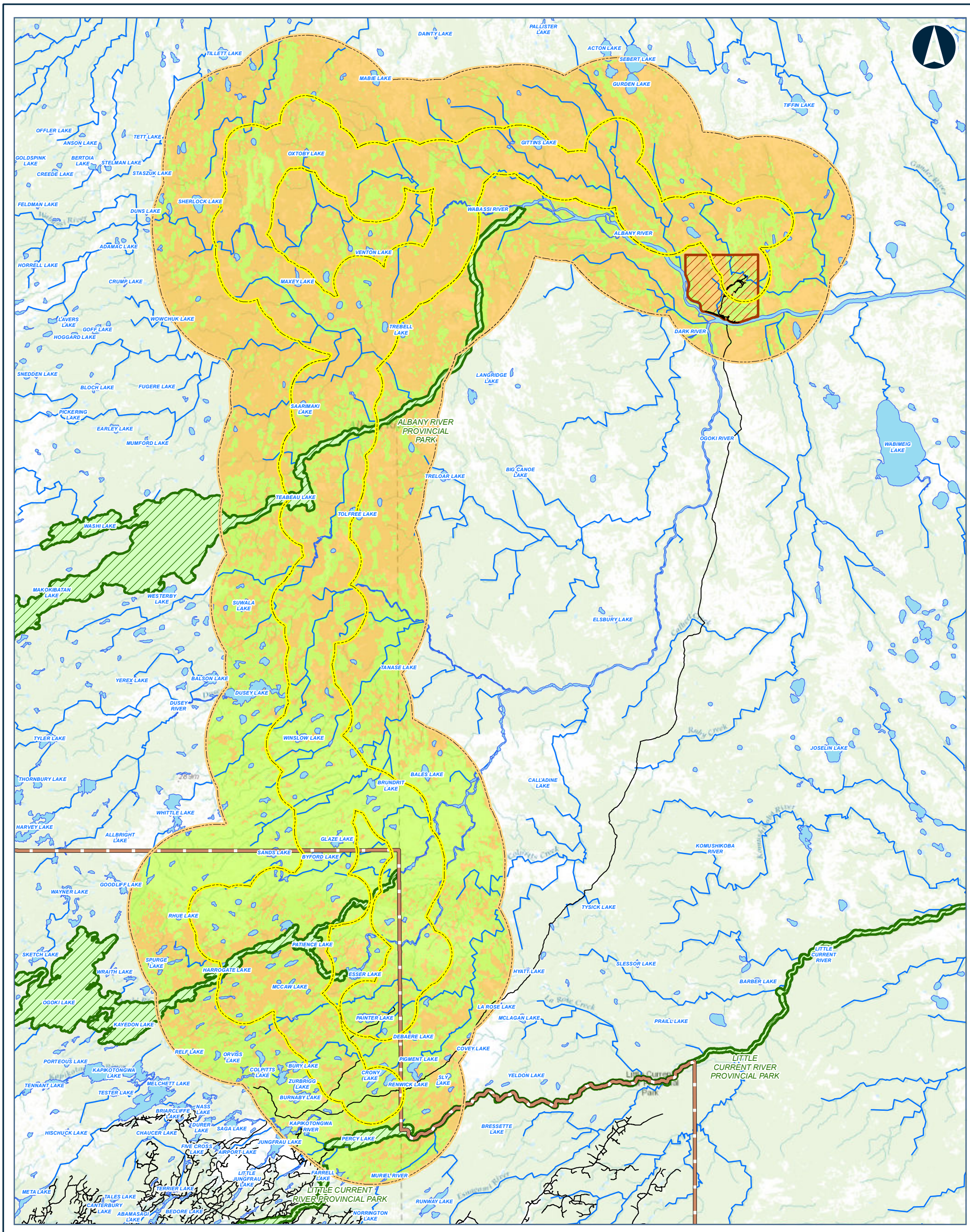
Dark-eyed juncos are highly mobile and can establish territories in areas below carrying capacity. Habitat fragmentation is not likely to impede daily movements of juncos. This species was found to cross forest gaps more readily than forest specialists (Rail et al., 1997).

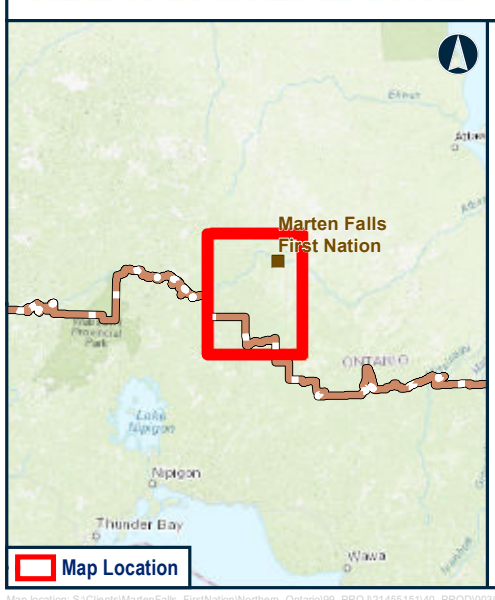
Dark-eyed junco is a common breeding species in and north of the Canadian Shield ecozone (Natural Heritage Information Centre, 2023). Dark-eyed juncos were detected in all monitoring years from 2018 to 2022. During the breeding season, this species was recorded at four of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 48 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at 12 of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 114 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at seven of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**). During field studies, dark-eyed juncos were detected evenly throughout the study areas.

Upland forest (i.e., coniferous, deciduous, and mixed forest), which may provide suitable habitat for this species, is more common in the southern portion of the existing conditions Local Study Area (**Figure 5-3**).

Dark-eyed juncos are only anticipated to be present in the Project study areas during the breeding season; this species migrates to southern Canada, the United States, and northern Mexico for the winter (Nolan et al., 2020). During autonomous recording unit surveys for the Project, dark-eyed juncos had the highest detection rate in the fall, followed by the spring and then breeding seasons. Daily dark-eyed junco activity recorded on autonomous recording units was highest at dawn in June.

Dark-eyed juncos have some site fidelity; 23% to 48% of males and 42% of females may return to the same breeding area each year (Nolan et al., 2020). Territory size estimates range from 1.3 to 2.1 ha (Nolan et al., 2020).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

DARK-EYED JUNCO HSI SCORE

- Moderate to High
- Low to Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Dark-eyed Junco in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-3

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5.1.3.3 Survival and Reproduction

During point count surveys in 2018 to 2022, dark-eyed junco was detected at the highest relative abundance at plots that occurred in the existing conditions Local Study Area (mean relative abundance = 0.70 individual per plot). Mean relative abundance of individuals was highest in 2022 (0.96 individuals per plot), and lowest in 2019 (0.41 individuals per plot). During autonomous recording unit surveys completed during the breeding season in 2022, dark-eyed junco was detected at the highest relative abundance in the existing conditions Construction Disturbance Area (1.25 individuals per plot) (**Attachment B**).

The density estimates for dark-eyed junco in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 8.8 and 4.0 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the dark-eyed junco population in Bird Conservation Region 7 has decreased by 0.6% per year from 1970 to 2021 (total decrease of 28.1%). The reliability of this estimate is considered “low” but there is predicted to be a 76.8% chance of future population decrease in the region (Smith et al., 2022). In Bird Conservation Region 8, North American Breeding Bird Survey data indicate a 2.4% annual decline from 1970 to 2021 (total decrease of 70.9%) (Smith et al., 2022). Although the reliability of this estimate is “low,” there is predicted to be a 100.0% chance of continued population decline in the future (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as dark-eyed junco, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008). Dark-eyed juncos are less vulnerable to hurricanes than other migratory birds because this species does not cross the Gulf of Mexico or Caribbean Sea during migration.

Dark-eyed juncos typically start breeding at one year of age and have an average lifespan of 2.3 years, although ages of 11 years have been reported (Nolan et al., 2020). Adults have an average of 49% chance of surviving to the following year (Nolan et al. 2020). Females lay an average of 3.5 eggs per brood and typically only raise one brood per season in northern environments (Nolan et al., 2020). Nest success rates of 55% to 76% have been reported in literature (Nolan et al., 2020).

Adult dark-eyed juncos are reported to be predated upon by sharp-shinned hawks, shrikes (*Lanius* spp.), owls, and occasionally by jays. Predators of dark-eyed junco eggs and young include mice (Oji-Cree translation, *wabigoshishag*), weasels (*Mustela* spp.), and eastern chipmunk (Nolan et al., 2020).

Dark-eyed juncos are primarily herbivorous with 75% of their diet consisting of seeds (Nolan et al., 2020). Insects make up the remaining 25% of junco diet; spiders, beetles, butterflies, moths, ants, wasps, flies are consumed.

Although dark-eyed juncos are primarily herbivorous, declines in aerial insect abundance and availability could have a negative effect on this species. In the Project study areas, climate change and pollution are factors that could contribute to insect declines. A decline in aerial insect abundance and availability may negatively affect dark-eyed junco populations by reducing prey availability for this species.

Climate change may be creating asynchrony between peak insect emergence and songbird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study that reviewed daily insect abundance and nest-record data from 1989 to 2014 found that spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, dark-eyed juncos may be an exception to this. In the Appalachian Mountains, dark-eyed junco nest initiation was 11 days earlier in 2010 relative to 1983 (Nolan et al., 2020). This plasticity in timing of migration and breeding may allow dark-eyed juncos to adapt to climate change.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of dark-eyed juncos. The rates of cowbird nest parasitism on dark-eyed juncos can vary widely with rates of 1.3% to 40.0% reported in the literature (Nolan et al., 2020). Parasitism rates in Ontario were at the lower end of this range (4.6%; Peck and James, 1989). Brown-headed cowbirds were not recorded in in any of the survey blocks that were surveyed in or near the Project study areas during the first or second *Ontario Breeding Bird Atlas* (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline surveys. As such, nest parasitism is unlikely to have had a measurable effect on dark-eyed junco populations in the Project study areas at existing conditions.

5.2 Raptors

Raptors are birds of prey such as owls, hawks, and eagles. Based on sources reviewed during the desktop review, there are 17 raptor species that may be present in the Project study areas; of these, 15 were detected during baseline surveys from 2018 to 2022 (**Attachment B, Annex A**). Overall, raptor populations in North America are declining (Oleyar et al., 2021). The boreal forest provides important breeding habitat for many raptor species in North America.

Short-eared owl (*Asio flammeus*) is the only federally listed raptor species with potential to occur in the Project study areas. Short-eared owl is also listed under the Ontario *Endangered Species Act, 2007*, as are bald eagle (*Haliaeetus leucocephalus*) and golden eagle (*Aquila chrysaetos*). Bald eagle and golden eagle were detected during field studies for the Project from 2018 to 2022, but short-eared owl was not detected. Existing conditions for short-eared owl are discussed in **Section 5.6.9**.

Eight raptor species are considered priority species within Bird Conservation Region 7 or Bird Conservation Region 8: bald eagle, boreal owl, golden eagle, northern goshawk (*Accipiter gentilis*), northern hawk owl (*Surnia ulula*), peregrine falcon (*Falco peregrinus*), sharp-shinned hawk, and short-eared owl (Environment Canada, 2013b, 2014). Six of these species (bald eagle, boreal owl, golden eagle, northern goshawk, northern hawk owl, and sharp-shinned hawk) were detected during field surveys for the Project from 2018 to 2022.

The following are the proxy Valued Component species selected to represent the raptor Valued Component:

- Osprey (*Pandion haliaetus*) – proxy Valued Component for diurnal raptors; and
- Boreal owl – proxy Valued Component for nocturnal raptors.

Existing conditions for each of the proxy Valued Component species follow and are organized using the measurement indicators provided in **Table 4-2**.

Information contained in the following sections provides a summary of data in relation to indicators for each proxy Valued Component. For detailed raptor data refer to **Section 5.2** and **Section 6.2** of **Attachment B**.

Indigenous Knowledge relating to raptors was also shared by communities including Aroland First Nation:

- Aroland First Nation noted the presence of eagles within the areas of Ogoki Lake, Melchett Lake, Tennant Lake, Kapikotongwa Lake, Briarcliffe Lake, Nass Lake, and Durer Lake (Shared Value Solutions, 2024).

5.2.1 Osprey

5.2.1.1 Habitat Availability

Osprey was selected as a proxy Valued Component for diurnal raptor species. Osprey breeding habitat can vary greatly but common denominators are (Bierregaard et al., 2020):

1) Adequate food supply within 20 km of the nest site;
2) Locations for nests that are elevated (e.g., trees, bluffs, artificial nest platforms) (to deter mammalian predators); and
3) Waterbodies that are ice-free for a sufficient duration to allow fledging of young.

This species generally nests within 20 km of shallow (0.5 to 2 m deep), fish-bearing waterbodies (Bierregaard et al., 2020). Upland ecosystems are more likely to provide osprey nesting requirements than wetland ecosystems as upland habitats are more likely to support large trees that can be used by osprey for nesting (**Attachment C**).

According to the habitat suitability model, approximately 30% and 15% of the Local Study Area and Regional Study Area, respectively, contains high to moderate suitability habitat for osprey (**Table 5-4**). Water habitat covers approximately 3.8% of the existing conditions Local Study Area (*Vegetation Technical Support Document*, Table 5-4, WSP, 2026a). Upland ecosystems cover 25.8% of the existing conditions Local Study Area (*Vegetation Technical Support Document*, Table 5-4, WSP, 2026a). Fish-bearing lakes and rivers are patchily distributed throughout the existing conditions Local Study Area and existing conditions Regional Study Area (*Fish and Fish Habitat Existing Conditions Report*, WSP, 2026c). If climate change causes increased periods of drought in the Project study areas, this may result in a reduction in osprey foraging habitat because lower water levels may decrease fish abundance (Houston et al., 2010).

Table 5-4: Habitat Suitability for Osprey at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	7,776.4	61.4	79,351.5	32.1	110,142.7	16.6
Low to Poor	4,888.9	38.6	168,606.4	67.9	551,889.7	83.4

ha = hectare; % = percent.

5.2.1.2 Distribution

Osprey is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). This species was detected on two of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022 and at one location in the existing conditions Local Study Area during point count surveys in 2022 (**Attachment B**). Ospreys were detected sporadically throughout the existing conditions Local Study Area. Indigenous Knowledge provided by Marten Falls First Nation included an observation noting that species including osprey and kingfisher often are common where fish are present (Marten Falls First Nation, n.d.). One osprey nest was found during field surveys and was located along a tributary of the Ogoki River in the existing conditions Local Study Area, approximately 5 km northwest of Dusey Lake (**Attachment B**).

Ospreys are only anticipated to be present in the Project study areas during the breeding season; this species migrates to Central and South America for the winter (Bierregaard et al., 2020). Ospreys were only detected in the existing conditions Local Study Area during the summer; this species was not detected during the spring and fall migration periods or during the winter.

Ospreys have high site fidelity. Breeding individuals usually nest within ten to 15 km of previous breeding sites and most individuals disperse less than 50 km from their natal site (Bierregaard et al., 2020). Ospreys typically only defend their nest sites; foraging areas are not defended (Bierregaard et al., 2020). In boreal environments, osprey nests are generally spaced greater than ten kilometres from each other (Bierregaard et al., 2020). Distribution of breeding osprey pairs is dependent on local landscape features, such as suitable foraging and breeding habitats (Bai et al., 2009). Breeding adults may travel 14 to 19 km from their nest to foraging areas (Bierregard et al., 2020). High to moderate osprey habitat is most common in the southern portion of the Regional Study Area (**Figure 5-4**).

Ospreys are expected to have the capacity to adapt and be resilient to existing human-related disturbances and natural variations in habitat availability in the Project study areas. Osprey nests are often established near areas with human presence (Bierregard et al., 2014). Ospreys are highly mobile, and habitat fragmentation is not a large threat to osprey populations (Ewins, 1997). This species can establish territories in areas below carrying capacity.

5.2.1.3 Survival and Reproduction

A total of three ospreys were detected on two autonomous recording units during surveys in 2022 and one active nest that contained three hatchlings was found during aerial surveys in 2022 (**Attachment B**). The density estimates for osprey in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.2 and <0.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). The osprey population in Ontario is increasing (Natural Heritage Information Centre, 2023).

Ospreys appear to be tolerant of sensory disturbance. Osprey nest success at a lake (Oji-Cree translation, *zaakaihgan*) in central Saskatchewan remained high, even after a dramatic increase in recreational use of the lake (Houston et al., 2010).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as osprey, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

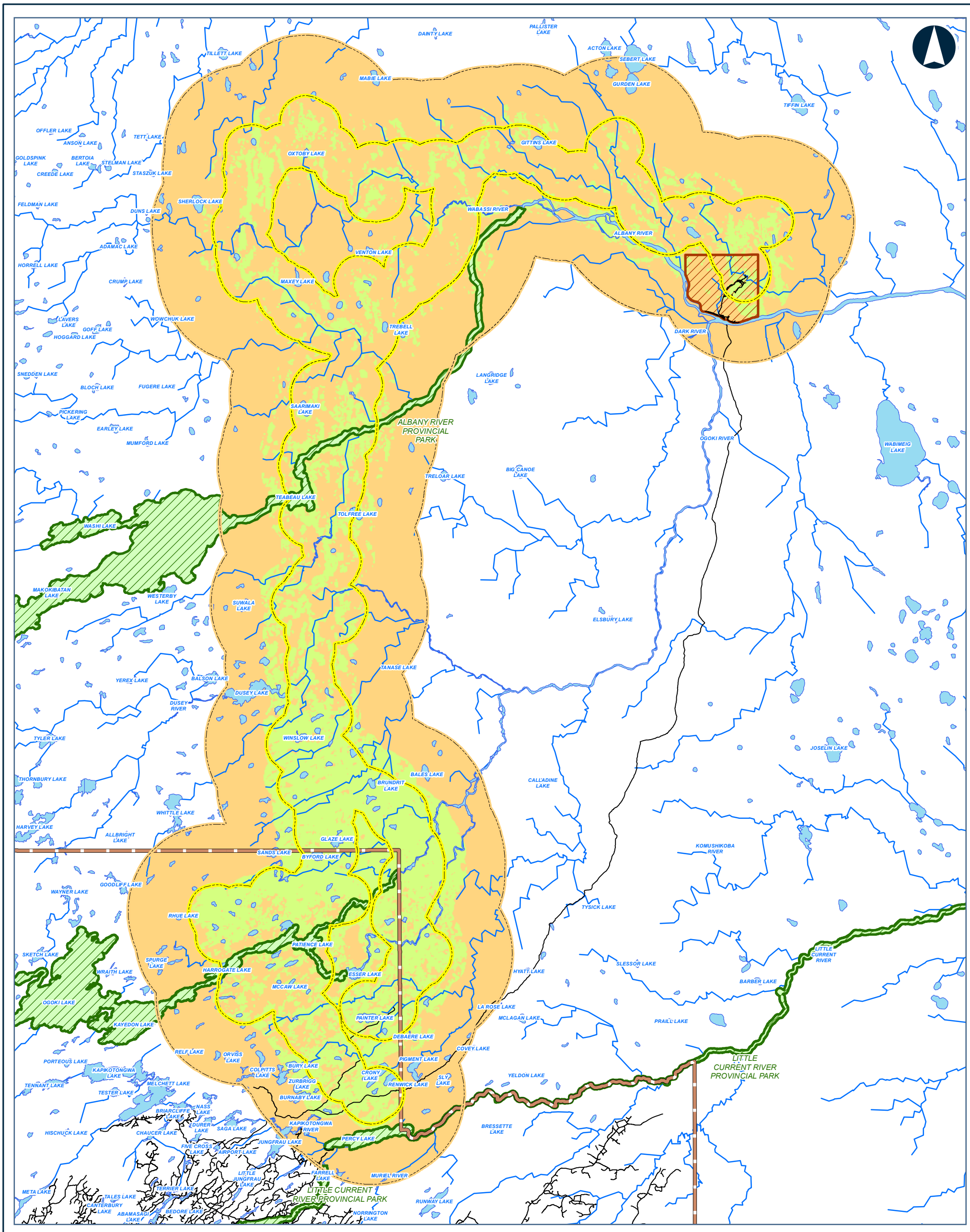
Ospreys typically start breeding at three or four years of age (Bierregaard et al., 2020). This species has a survival rate of 43% to 49% for their first year of life and this increases to 82% to 84% for each year thereafter (Bierregaard et al., 2020). Ospreys are a long-lived species and birds 23 to 25 years old may still be reproductively active (Bierregaard et al., 2020). Females lay an average of three eggs per brood and typically raise one brood per season (Bierregaard et al., 2020). Nest success estimates reported in literature range from 38% to 63% (Bierregaard et al., 2020). Nest success is positively related to food availability and water level (Houston et al., 2010).

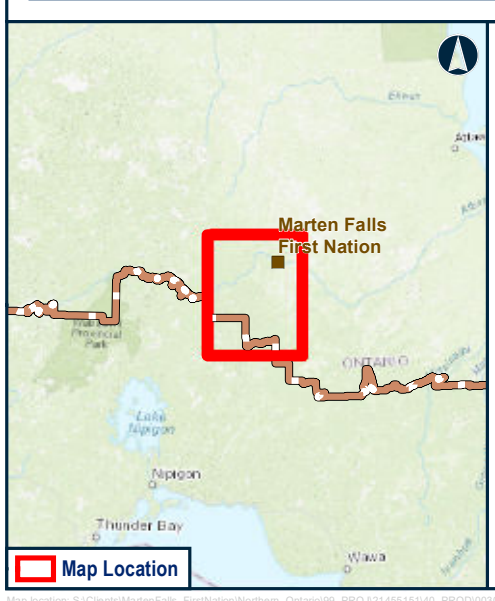
Osprey time of breeding in Finland was positively correlated with warmer January temperatures, which may reflect changes in ice melt (Solonen, 2008). This suggests that climate change could be advancing the osprey breeding season.

Humans are the only species known to kill osprey adults. Bald eagles, peregrine falcons, great horned owls (Oji-Cree translation, *kookooko'ohg*) (*Bubo virginanus*), and raccoons (*Procyon lotor*) may depredate osprey young (Bierregaard et al., 2020).

Ospreys are primarily piscivorous and consume a wide variety of fish species; other animals that may be consumed include birds and small mammals (Bierregaard et al., 2020). Generally, fish captured by ospreys range from 25 to 35 cm in length and weigh 150 to 300 grams (g), though up to 2,000 g has been reported (Bierregaard et al., 2020). Spawning areas for large-bodied fish Valued Component species (i.e., lake sturgeon [Oji-Cree translation, *nameh*] [*Acipenser fulvescens*], lake whitefish [Oji-Cree translation, *atikameg*] [*Coregonus clupeaformis*], brook trout [Oji-Cree translation, *masamekos*] [*Salvelinus fontinalis*], walleye [Oji-Cree translation, *okaas*] [*Sander vitreus*], northern pike [Oji-Cree translation, *najwabe*] [*Esox lucius*], and burbot [*Lota lota*]) were found in Patience Lake (Oji-Cree translation, *Bakihda'hawgan*) and the Albany and Ogoki rivers (*Fish and Fish Habitat Existing Conditions Report*, Section 3.1.1.1, WSP, 2026c). Spawning areas for brook trout, burbot, northern Pike, and walleye were also found in the Dusey River. Additional spawning areas noted at unnamed watercourse RA1-WC-17 (brook trout and walleye), unnamed watercourse RA4-WC-22 (lake sturgeon, burbot), Gourlie Creek (Oji-Cree translation, *Onagwa'ihgan Ziibih*) (burbot and walleye), Colpitts Creek (northern pike), unnamed watercourse RA1-WC-57 (burbot), Wabassi River (Oji-Cree translation, *Wabihzii Wih Ziibih*) (northern pike), and unnamed watercourse RA1-WC-13 (walleye). Potential spawning habitat for other large-bodied fish species (e.g., suckers [Oji-Cree translation, *namebin*] [*Catostomus* spp.]) was also identified at multiple crossings in the existing conditions Construction Disturbance Area and Aquatics existing conditions Local Study Area (*Fish and Fish Habitat Existing Conditions Report*, Section 3.1., WSP, 2026c).

Increased periods of drought may negatively effect ospreys by reducing prey availability (Houston et al., 2010).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- **OSPREY HSI SCORE**
  - MODERATE TO HIGH
  - LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Osprey in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-4

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0006_5-4.mxd
Date Saved: 2/11/2026 9:52:44 PM User Name: gld_rduval

5.2.2 Boreal Owl

5.2.2.1 Habitat Availability

Boreal owl was selected as a proxy Valued Component for nocturnal raptor species. In Canada, boreal owls can be found in coniferous, deciduous, and mixed habitats during all seasons (Hayward and Hayward, 2020). Nests are typically found in natural cavities or old woodpecker nests in mature or old deciduous trees (Hayward and Hayward, 2020). This species primarily establishes daytime roosts in coniferous trees (Hayward and Hayward, 2020). Boreal owls prefer mature and old forest because low herbaceous cover and snow cover in these habitat types allow for easier access to prey (Hayward and Hayward, 2020).

According to the habitat model, boreal owl abundance was greater in landscapes at lower elevations with high proportions of sparse, coniferous, and mixed forest habitat types (**Attachment C**). Suitable boreal owl habitat is abundant in the study areas and covers approximately 50% to 70% of each study area (**Table 5-5**).

Table 5-5: Habitat Suitability for Boreal Owl at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	6,358.6	50.2	71,502.1	28.8	165,427.0	25.0
Moderate	2,974.5	23.5	66,839.4	26.9	165,434.7	25.0
Low	1,951.7	15.4	60,340.7	24.3	165,474.4	25.0
Poor	1,380.5	10.9	49,275.6	19.9	165,450.3	25.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent.

The level of effect that insect outbreaks have on boreal owls depends on habitat type and habitat availability. Spruce-fir and aspen forests provide primary breeding habitat for this species; pine forests provide secondary breeding habitat. As such, in landscapes greater than 4,050 ha that are dominated by spruce-fir and aspen forests, effects from wildfire and insect outbreaks will be minimal because forest patches left after a disturbance event will still provide suitable breeding habitat for this species (Hayward and Hayward, 2020). However, if landscapes are dominated by pine forests, habitat patches remaining may not provide enough suitable breeding habitat for this species to be able to maintain a breeding population (Hayward and Hayward, 2020). Upland forested communities in the existing conditions Local Study Area are dominated by jack pine ecosites (*Vegetation Technical Support Document*, Section 1.15.3.1, WSP, 2026a) and, so, boreal owls in the Project study areas may be susceptible to changes in habitat availability caused by fire and insect outbreaks.

5.2.2.2 Distribution

Large patches of moderate and high suitability habitat for boreal owl are present along most of the southern, central, and northwestern portions of the existing conditions Regional Study Area, although habitat suitability in the extreme south portion of the existing conditions Regional Study Area is poor (**Figure 5-5**). In the northeastern portion of the existing conditions Regional Study Area, there is a large patch of suitable boreal owl habitat northwest of Marten Falls First Nation.

Boreal owl distribution is poorly understood and an uncommon breeding species in the boreal forest and Hudson Bay Lowland regions of Ontario (Natural Heritage Information Centre, 2023). During the spring recording season, this species was recorded at four of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 27 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, and at two of 119 point count stations in the existing conditions Local Study Area in 2018; this species was not recorded in the existing conditions Construction Disturbance Area or existing conditions Regional Study Area during point count surveys; however this is expected as breeding bird surveys start 30 minutes prior to sunrise and boreal owls are most active at night (**Attachment B**). Boreal owls were detected throughout the existing conditions Local Study Area, although detections were absent in the northwestern portion of the existing conditions Local Study Area.

Boreal owls may be present throughout the Project study areas year-round as this species is non-migratory (Hayward and Hayward, 2020). This species was detected in 2018 and 2022. Boreal owls were most frequently detected on autonomous recording units during the spring season; this correlates with the boreal owl calling period, which typically begins February and continues through early May (Hayward and Hayward, 2020). Boreal owls are nocturnal and were primarily detected on autonomous recording units during the nighttime recording period.

Territory size and shape is influenced by geographic characteristics, prey availability, and breeding status of an individual (Hayward and Hayward, 2020). Territory size estimates reported in literature range from 1,182 to 1,576 ha; territories may overlap (Hayward and Hayward, 2020). Boreal owls traverse much of their territory over a two-to-three-week period (Hayward and Hayward, 2020). Distances between daily roosts range from 708 to 1,500 m (Hayward and Hayward, 2020). Boreal owls typically travel and roost individually; even mated pairs are rarely found together (Hayward and Hayward, 2020).

Boreal owls are nomadic and may not occupy the same territory in successive years. Male owls are less nomadic than females and generally disperse less than five kilometres between successive breeding seasons (Hayward and Hayward, 2020). Conversely, females may disperse up to 580 km between successive breeding seasons (Hayward and Hayward, 2020). Nomadism may depend on prey abundance; more than half of all female

owls may be nomadic during years with low prey abundance (Hayward and Hayward, 2020). During the summer, boreal owls roost in cooler microsites with higher canopy cover and leaf cover and higher tree density (Hayward et al., 1993).

5.2.2.3 Survival and Reproduction

During autonomous recording unit surveys completed during the breeding season in 2022, boreal owl abundance was higher in the existing conditions Construction Disturbance Area than the existing conditions Local Study Area (1.5 individuals per plot vs. 0.3 individuals per plot) (**Attachment B**).

Density estimates for boreal owl in *Ontario Breeding Bird Atlas* Regions 37 and 44 are not available (Bird Studies Canada et al., 2006). The average home range size for boreal owls reported in literature is 1,182 ha (Hayward and Hayward, 2020).

Population trends for boreal owl are difficult to determine because this species is nomadic and abundance varies with prey abundance (Hayward and Hayward, 2020). Additionally, there is little data available for this species in North America (Hayward and Hayward, 2020; Oleyar et al., 2021). European populations are considered stable in the long term and population trends for North America are assumed to be similar (Hayward and Hayward, 2020). However, in Ontario, there are concerns regarding the effects of forestry on this species (Natural Heritage Information Centre, 2023).

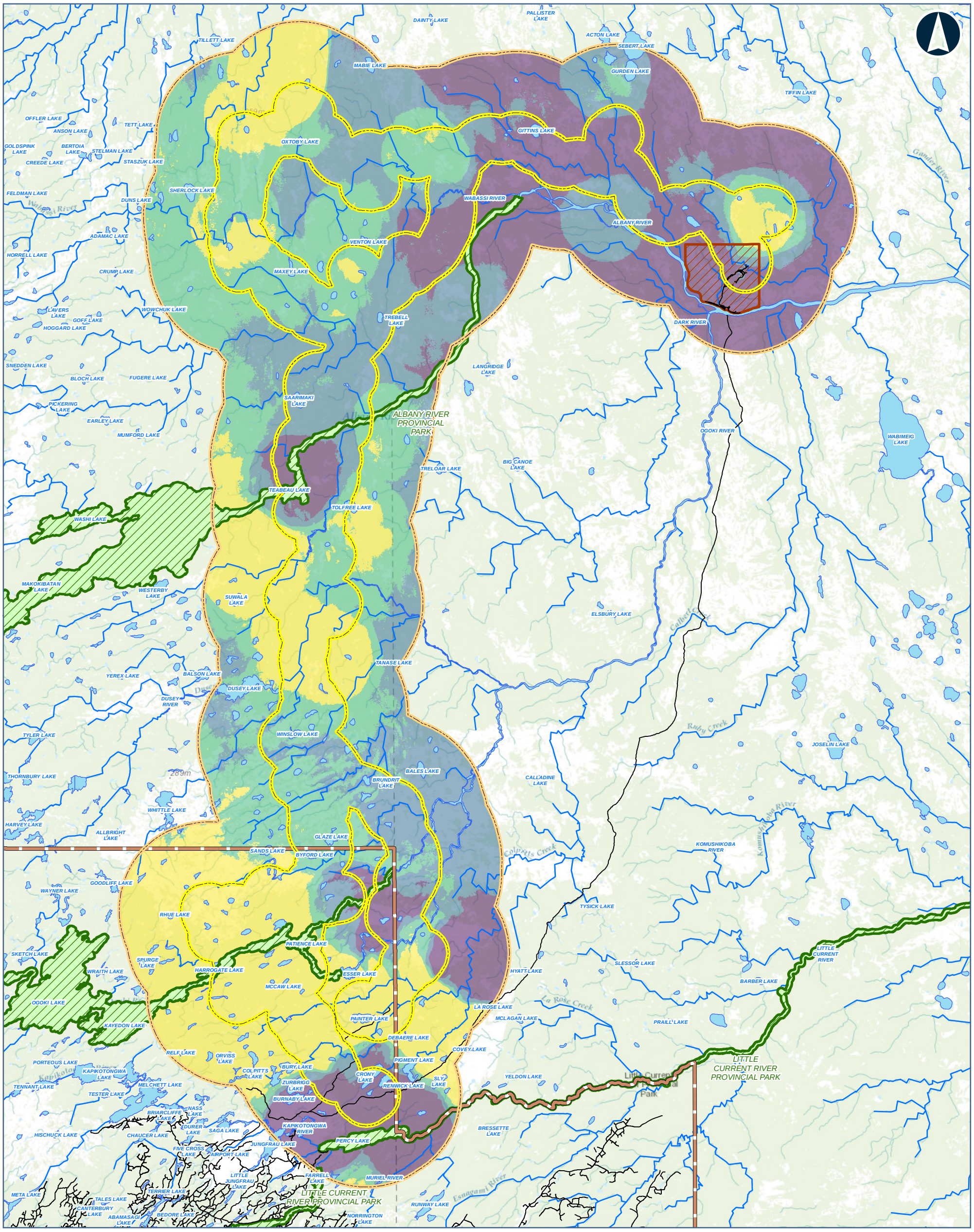
Boreal owls are able to breed in their first year, but females are more likely to breed during their first year than males; most males start breeding in their second year (Hayward and Hayward, 2020). Annual survival rates for adults reported in literature range from 62% to 72%; yearlings have lower survival rates (22% to 50%) (Hayward and Hayward, 2020). Boreal owls have an average lifespan of three and half years (range 2-11 years) (Hayward and Hayward, 2020). In North America, females lay an average of three eggs per brood and only raise one brood per season (Hayward and Hayward, 2020). Nest success is correlated with prey abundance with higher success reported in years with abundant prey (Hayward and Hayward, 2020).

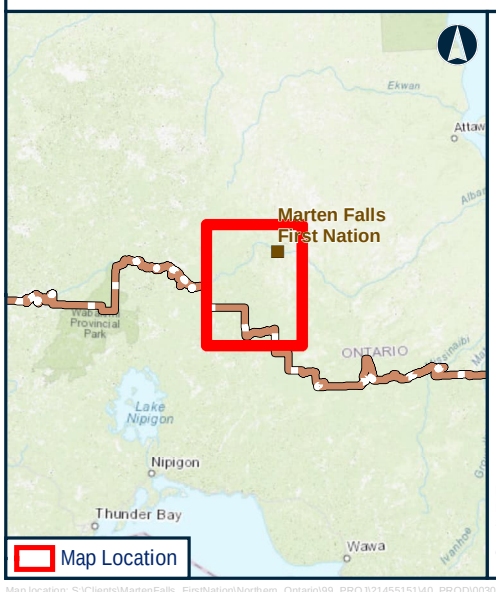
Boreal owls are expected to have the capacity to adapt and be resilient to existing human-related disturbances and natural variations in habitat availability in the Project study areas. Boreal owls are naturally nomadic and can disperse several hundred kilometres between breeding years (Hayward and Hayward, 2020).

In northern environments, American marten (*Martes americana*) and red squirrel are the primary predators of boreal owl eggs, owlets, and adult females at nest sites (Hayward and Hayward, 2020). Predation may remove a large number of clutches (up to 48%) (Hayward and Hayward, 2020). Northern goshawk and great horned owl are the primary predators of boreal owls away from their nest sites.

Boreal owls primarily eat small mammals such as voles and mice; birds, insects, and larger mammals are also occasionally consumed (Hayward and Hayward, 2020). Although fire and insect outbreaks may initially increase small mammal abundance, small mammal populations typically start declining three years post disturbance (Hayward and Hayward, 2020). Suitable foraging conditions in spruce-fir and aspen forests may not be re-established until at least 40 years after disturbance or at least 80 years after disturbance in pine forests (Hayward and Hayward, 2020).

Weather changes caused by climate change may affect boreal owl prey availability by increasing winter freeze-thaw events, which may create hard crust on or ice layers in the snowpack. A hard crust or ice layers may impede boreal owl access to prey as this species is dependent on loose snow structure to capture prey below the snow (Mysterud, 2016). Climate change may also be causing a decrease in small mammal abundance and collapse of small mammal population fluctuation cycles (Mysterud, 2016). However, not all areas have shown these trends and the effects of climate change on small mammal populations is unclear (Mysterud, 2016).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

BOREAL OWL HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:

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Habitat Suitability for Boreal Owl in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-5

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0007_5-5.mxd
Date Saved: 2/12/2026 10:17:13 AM User Name: INBA08973

5.3 Shorebirds

Shorebirds are birds that forage and nest in shoreline habitats around waterbodies, watercourses, and wetlands and include plovers and sandpipers. Based on sources reviewed during the desktop review, there are 22 shorebird species that may be present in the Project study areas; most of these species (16) have potential to occur in the study areas only at stopover sites used during migration (**Attachment B, Annex A**). Eleven shorebird species were detected during field surveys from 2018 to 2022.

The boreal forest is an important ecozone for many shorebird species. Approximately 30% of all shorebird species that breed in Canada and the United States nest in the boreal forest (Wells et al., 2018). Canadian population estimates for shorebird species that could be present in the Project study areas range from 25,000 to 3.5 million individuals (Morrison et al., 2001). The accuracy of these estimates is low to poor (Morrison et al., 2001).

Lesser yellowlegs (*Tringa flavipes*) is the only federally and provincially listed shorebird species at risk with potential to occur in the Project study areas. Existing conditions for lesser yellowlegs are discussed in **Section 5.6.11.**

A total of 16 shorebird species with potential to occur in the study areas are considered Priority Species within Bird Conservation Region 7 or Bird Conservation Region 8. Eight of these priority shorebird species were detected during field surveys for the Project from 2018 to 2022.

The following species was selected as a proxy Valued Component species to represent the shorebird Valued Component:

- Wilson's snipe.

Wilson's snipe is a Priority Species in both Bird Conservation Region 7 and Bird Conservation Region 8, with population objectives for both Bird Conservation Regions of assessing / maintaining the populations in these regions (Environment Canada 2013b, 2014).

Information shared by Kashechewan First Nation within noted that a community member had identified the importance of various shorebird species utilized for harvesting purposes including snipe and godwit (MNP LPP, 2024a).

Existing conditions for Wilson's snipe follow and are organized using the measurement indicators provided in **Table 4-2.**

Information contained in the following sections provides a summary of data in relation to indicators for each proxy Valued Component. For detailed shorebirds data refer to **Attachment B, Section 5.3** and **Section 6.3**.

5.3.1 Wilson's Snipe

5.3.1.1 Habitat Availability

Wilson's snipe was selected as a proxy Valued Component for shorebird species. Within their breeding range in Canada, Wilson's snipes primarily inhabit sedge bogs, fens, swamps, and pond and river edges (Mueller, 2020). Wetlands with tall, dense vegetation are avoided (Monfils and Corace, 2018; Mueller, 2020). During autonomous recording unit surveys, this species was at similar relative abundance in coniferous forest, deciduous forest, fen, and marsh habitats (**Attachment B**).

According to the habitat model, Wilson's snipe abundance was greater in landscapes with low proportions of sparse forest and bog habitat types and in areas with locally high proportions of fen and riparian habitats (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable Wilson's snipe habitat is abundant in the study areas and covers approximately 50% of each study area (**Table 5-6**).

Wilson's snipe appears to be vulnerable to anthropogenic disturbance; this species was found to be negatively affected by the amount of anthropogenic land use at the landscape level (Saunders et al., 2019).

Table 5-6: Habitat Suitability for Wilson's Snipe at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	3,171.0	25.0	48,942.2	19.7	132,190.2	20.0
Moderate	5,001.0	39.5	76,780.5	30.9	198,659.1	30.0
Low	1,736.4	13.7	30,176.7	12.2	66,182.2	10.0
Poor	2,756.8	21.8	92,058.4	37.1	264,741.7	40.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent.

Habitat availability for Wilson's snipe may be increased after fire; one study in British Columbia reported a nine-fold increase in Wilson's snipe detections within eight years after a fire (Gyug, 2012). Insect outbreaks may result in similar changes to Wilson's snipe habitat availability. Insect outbreaks and fires at existing conditions may be more common in the Project study areas, compared to historical conditions. This may have resulted in improved ecological function for Wilson's snipe in the Project study areas. Wilson's snipe breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

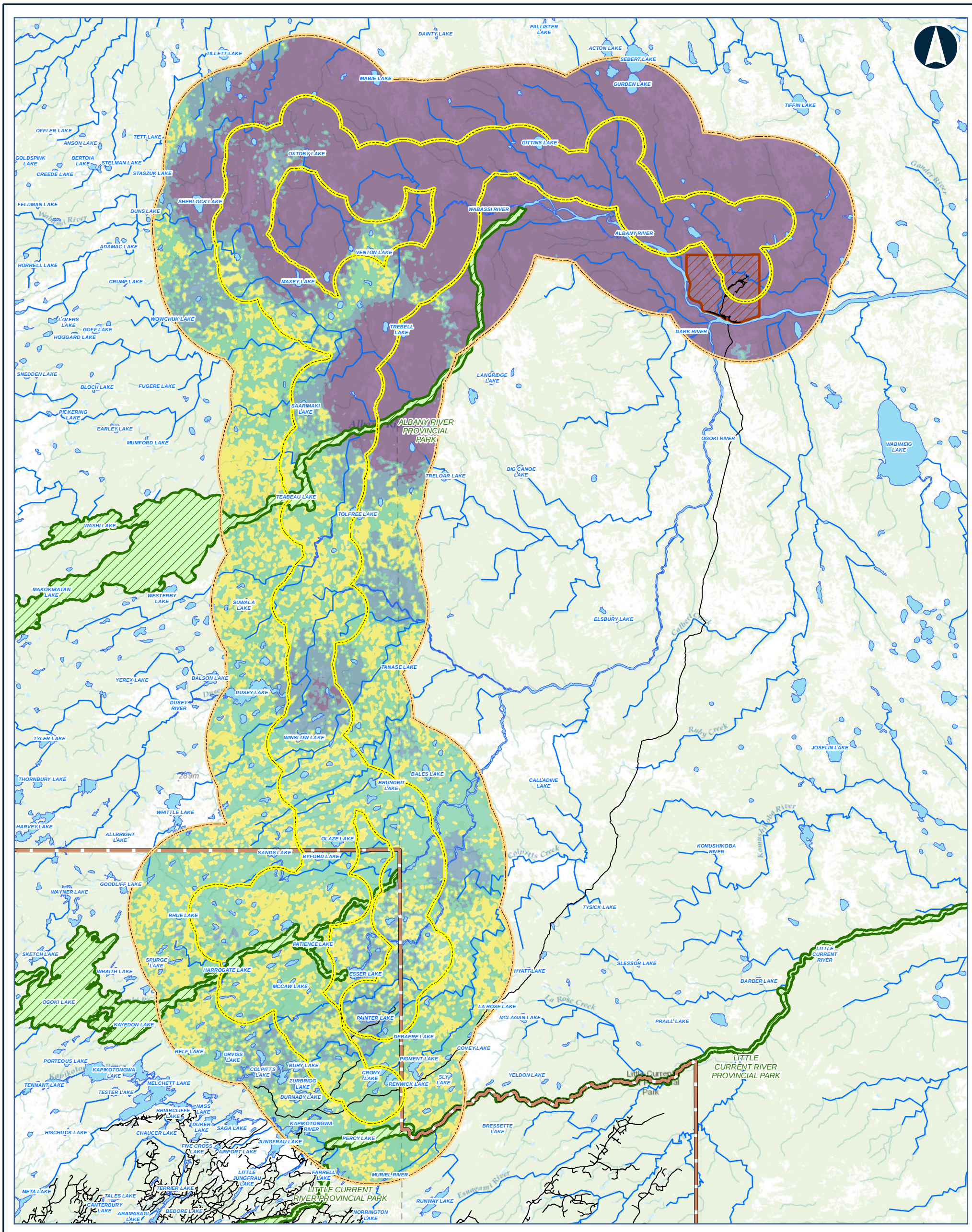
5.3.1.2 Distribution

Wilson's snipe is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). Wilson's snipes were detected throughout the Local Study Area, but detections occurred more frequently south of Dusey Lake. This species was recorded at three of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 23 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at 4 of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, and at 14 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022 (**Attachment B**). This species was not detected during spring or fall migration or brood aerial surveys and was not detected in the during point counts in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**).

Wilson's snipes are predicted to occur throughout the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to southern North America, Central America, and northern South America for the winter (Mueller, 2020). Wilson's snipes were detected on autonomous recording units during the spring and summer periods. Daily Wilson's snipe activity recorded on autonomous recording units was highest at night.

A study in Ontario found that the average breeding territory size for Wilson's snipe was 14.8 ha (Mueller, 2020). Feeding areas are not defended and nesting areas are only defended from displaying males (Mueller, 2020). Wilson's snipes may not have high fidelity to breeding or foraging sites; one study found that radiomarked individuals visited an average of 19 sites during the summer breeding period (Cline and Haig, 2011).

High and moderate suitability Wilson's snipe habitat is widely distributed throughout the southwest two thirds of the existing conditions Regional Study Area (**Figure 5-6**). Suitable snipe habitat is generally absent in the northeastern third of the of the existing conditions Regional Study Area.



Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

WILSON'S SNIPE HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

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Habitat Suitability for Wilson's Snipe in the Regional Study Area at Existing Conditions

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Figure 5-6

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5.3.1.3 Survival and Reproduction

During autonomous recording unit surveys completed during the breeding season in 2022, Wilson's snipe had the highest relative abundance in the existing conditions Construction Disturbance Area (1.00 ± 0.41 individuals per plot) (**Attachment B**). However, it should be noted that sample size in the existing conditions Construction Disturbance Area was limited to four autonomous recording units.

Density estimates for Wilson's snipe in *Ontario Breeding Bird Atlas* Regions 37 and 44 are not available (Bird Studies Canada et al., 2006). The average home range size for Wilson's snipe reported in literature in Ontario is 14.8 ha (Mueller, 2020).

Population trends for Wilson's snipe are difficult to determine because this species is cryptic and difficult to count and observe (Morrison et al., 2001). In 2001, there were estimated to be two million Wilson's snipes in the breeding population in Canada, but this estimate has "poor" accuracy (Morrison et al., 2001). The North American Breeding Bird Survey suggests that the Wilson's snipe population in Bird Conservation Region 7 has decreased by 0.01% each year from 1970 to 2021 (total decrease 0.5%) (Smith et al., 2022). The reliability of this estimate is considered "high" (Smith et al., 2022). There is a 50.3% chance of future population decline in the region (Smith et al., 2022). The Wilson's snipe population in Bird Conservation Region 8 has increased by 0.2%, annually, from 1970 to 2021 (total increase 11.5%) (Smith et al., 2022). The reliability of this estimate is considered "medium" and there is a 38.0% chance of future population decline (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can influence migratory bird populations, such as Wilson's snipe, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Wilson's snipes can start breeding at one year of age and have an average lifespan of 1.5 years, although individuals up to 12 years of age have been reported (Mueller, 2020). Juveniles have a 37% chance of surviving to their second year, while adults have a 50% to 65% chance of annual survival (Mueller, 2020). Females lay an average of four eggs per brood and raise one brood per season (Mueller, 2020). Nest success rates are generally unknown; one estimate of 41% has been reported (Mueller, 2020).

Wilson's snipes are highly mobile; individuals have been reported on isolated islands such as the Hawaiian Islands, Bermuda, and Midway Island (Mueller, 2020). As such, it is expected that this species can establish territories in areas below carrying capacity. Although little information on response of Wilson's snipes to habitat fragmentation is currently available, permanent linear disturbances that have little sensory disturbance

associated with them (e.g., transmission lines) may providing suitable breeding habitat for Wilson's snipes because this species prefers to nest in areas with short vegetation.

Raptors that feed on birds, such as peregrine falcon and sharp-shinned hawk, may prey on Wilson's snipes (White et al., 2020; Bildstein et al., 2020). Additionally, Wilson's snipes are hunted in Ontario. In the Northern District of Ontario, which encompasses the bird Project study areas, the daily hunting limit for this species is ten individuals with a total capture limit of 30 birds (Government of Canada, 2024b). Snipes can be hunted from September 10 to December 25 in the Northern District of Ontario (Government of Canada, 2023d).

Wilson's snipes are primarily insectivorous and consume a wide variety of insect larvae (Mueller, 2020). The worldwide declines in aerial insect abundance and availability could have a negative effect on this species in the Project study by reducing insect abundance and availability. Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting Wilson's snipes by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019).

5.4 Waterfowl and Waterbirds

Waterfowl include ducks, geese, and swans. Waterbirds include species that require open water habitat for nesting such as loons, grebes (Oji-Cree translation, *siingihbisug*), coots, herons, and gulls. Based on sources reviewed during the desktop review, there are 30 waterfowl and waterbird species that may be present in the Project study areas (**Attachment B, Annex B**). Of these, 25 were detected during baseline surveys from 2018 to 2022 (**Attachment B, Annex B**). Although the Prairie Pothole Region has the highest waterfowl productivity in North America, the boreal forest is an important breeding area for many waterfowl species (Johnstone et al., 2023).

Information shared by Marten Falls First Nation included observations of a number of waterfowl and waterbird species in the area of Washi Lake, including mergansers, golden eye, mallards, and loons (Marten Falls First Nation, 2023). However, communities have noted a decline in the number of mergansers, golden eyes, mallards, and loons present in this area. Information shared by the community noted that seeing these specific species was becoming a rarer occurrence (Marten Falls First Nation, 2023). It was noted that geese tended to reside within peatlands / near rivers and lakes and migrate towards the east. The community also noted that loons, ducks, and geese are present and nest along the Albany River (Marten Falls First Nation, n.d.). Additional communities including Fort Albany First Nation, Nibinamik First Nation, and Kashechewan First Nation also highlighted the importance of some of the species described above including Canada geese, snow geese, swans, and loons, ducks, and other waterfowl (Dillon, 2024b; Firelight Research Inc., 2024; MNP LPP, 2024a). Kashechewan First Nation, Fort Albany First

Nation, and Weenusk First Nation community members have described an observed decline in geese and duck population numbers, as well changes to migratory patterns associated with anthropogenic stressors (e.g., climate change and earlier winter snowmelt, as well as linear infrastructure development within their traditional territory and in the Moosonee and Attawapiskat area) (Firelight Research Inc., 2024; MNP LPP, 2024a; MNP LPP, 2024b).Fort Albany First Nation also identified a decline in the taste of harvested migratory birds due to changes in feeding environments (including the muskeg and shoreline of James Bay). Within the community, there have also been reports of a goose found covered in oil (Firelight Research Inc., 2024).

Fort Albany First Nation also provided information related to the correspondence between the six-season cycle (observed by Fort Albany First Nation) and changes in the environment – noting a particular relationship between the timing of the early spring thaw and the return of migratory birds including spring geese and snow geese, which feed at multiple locations within their traditional territory (Firelight Research Inc., 2024).

One community member from Fort Albany First Nation noting the following regarding the spring geese migration, describing return of the geese in the springtime:

> *“[Spring Geese] they would be migrating from the south to come and stay. And they would stay in the coastal areas. They would moult in the coastal areas, and they would go as far as like Akimiski Island, which is Attawapiskat and goes north from there. The snow geese would do the same thing. They would migrate from the south, and then stop for a while and — to feed, and then they would go north in the arctic.”* (Firelight Research Inc., 2024).

Additional community members from Fort Albany First Nation also shared observations relating to the Moulting Moon (July), and the fall season (September and October) describing moulting behaviours during the summertime and departure of the geese back south during the fall.

> *"July would be the moulting season — Moulting moon. That’s when all the geese and the ducks and the snow geese would drop their feathers, their prime feathers, and they would change. They would get new — new feathers in July. They can’t fly. … And in August it’s the Flight moon. That’s when all the birds start flying again. They become airborne in August. So, that’s what we call summer.”* (Firelight Research Inc., 2024).

> "*….In September, they would come there, and they would stop there for about a month or so. And then October is the Migrating moon. It’s when all the birds — all the birds leave in October and go back south in October. So, that’s the fall season.*" (Firelight Research Inc., 2024).

Fort Albany First Nation highlighted that rivers (including the Albany River) are a key feature of the Atlantic migration flight route, playing important roles as geographical markers which guide and orient the birds during their fall migration (Firelight Research Inc., 2024).

Attawapiskat First Nation and Marten Falls First Nation have also provided information on species occurrences related to species that were not observed in the past (including pelican and cormorants), with one community member from Attawapiskat First Nation noting *"water is getting warmer, the ice melts early. Other things—what we see today are pelicans migrating North; cormorants, we see many of them.*" (Human Rights Watch, 2020; Marten Falls First Nation, 2022b; Marten Falls First Nation, 2023). In addition, Marten Falls First Nation noted the presence of cormorants at Washi Lake, which a community member noting that *"that they never used to see pelicans, but now they can be seen in many different places North of Geraldton."* (Marten Falls First Nation 2023; Marten Falls First Nation, n.d.).

Aroland First Nation also provided the following details relating to the waterfowl:

- Presence of waterfowl and waterfowl habitat within the areas of Patience Lake, Ogoki Lake, Melchett Lake, Tennant Lake, Kapikotongwa Lake, Briarcliffe Lake, Nass Lake, and Durer Lake (Shared Value Solutions, 2024);
- Presence of goose nesting areas within the area of Patience Lake (Shared Value Solutions, 2024); and
- Forestry activities affecting waterfowl (geese and duck) populations within the area of Patience Lake, as well as an area adjacent to the Anaconda Road where clearcutting activities which occurred in the past have affected the ability of community members to harvest geese, with one community member noted the following after being questioned about whether they had concerns about how the proposed road development (and other types of development projects) result in effects:
    - "*Oh, yes, it will. Because from my experience, like the cutovers, like harvesting areas in our community here, so where we used to hunt, there's less ducks now in that area [Patience Lake], and moose, hardly any moose. Because I think that when the trees are harvested, especially the geese in the springtime, when they wait for the geese to come by, there's hardly any now, because I think they cant navigate on that land because of the trees [being gone] and all that. It's all cut over. Not as much as before it was cut down. It used to be, when we used to have blinds in the mouth of the river, geese used to land maybe every five minutes. You only have enough time to retrieve whatever you kill, but now sometimes you have to sit all day before one flock comes down."* (Shared Value Solutions, 2024).

- Another community member from Fort Albany First Nation echoed these sentiments, noting an observed connection between the effects of forestry impacts on duck and geese populations noting*, "There are already less ducks and geese in the area. Likely impacted by forestry cuts- they can't navigate on the land without the trees. More developments will have a greater impact."* (Shared Value Solutions, 2024).

There are no federally listed waterfowl or waterbird species with potential to occur in the study areas. Black tern (*Chlidonias niger*) is the only provincially listed waterfowl or waterbird species at risk with potential to occur in the Project study areas. This species was not detected during field studies for the Project from 2018 to 2022. Existing conditions for black tern are discussed in **Section 5.6.10**.

A total of 16 species that fall within the waterfowl and waterbird Valued Component are considered Priority Species within Bird Conservation Region 7 or Bird Conservation Region 8; of these, 14 were detected during field surveys for the Project from 2018 to 2022.

The following species was selected as a proxy Valued Component species to represent the waterfowl Valued Component:

- Mallard (Anas platyrhynchos).

Mallard is a Priority Species in both Bird Conservation Region 7 and Bird Conservation Region 8, with population objectives to assess / maintain the population in Bird Conservation Region 7 and to maintain the current population in Bird Conservation Region 8 (Environment Canada 2013b, 2014).

Existing conditions for mallard follow and are organized using the measurement indicators provided in **Table 4-2**.

Information contained in the following sections provides a summary of data in relation to indicators for each proxy Valued Component. For detailed waterfowl and waterbird data refer to **Attachment B**, **Section 5.4** and **Section 6.4**.

5.4.1 Mallard

5.4.1.1 Habitat Availability

Mallard was selected as a proxy Valued Component for waterfowl and waterbird species. Mallards can be found on almost any waterbody habitat from lakes to ephemeral wetlands (Drilling et al., 2020; Marten Falls First Nation, n.d.). Although mallards prefer shallow and calm waterbodies and will generally avoid fast-flowing, oligotrophic waters (i.e., waters low in nutrients) and unvegetated areas such as rocky ground and sand dunes, the species has a few requirements such as a readily available food supply and small areas of open water for roosting and nesting (Drilling et al., 2020). Breeding mallards prefer wetlands that have high amounts of emergent vegetation (Lokemoen et al., 1990; Merendino and

Ankney, 1994) and establish home ranges in areas with more wetland habitat, less forest cover, less forest harvesting, fewer buildings, and closer to roads and pipelines (Johnstone et al., 2023). During autonomous recording unit surveys in the existing conditions Local Study Area in 2022, this species was detected in swamp and fen habitat types.

High to moderate suitability habitat for mallard is abundant in the study areas, covering approximately 85% of both the Local and Regional Study Areas (**Table 5-7**). Open water habitat (i.e., large waterbodies and watercourses) covers approximately 3.8% of the existing conditions Local Study Area and is patchily distributed within the study areas. Fen habitats are the most common habitat types in the existing conditions Local Study Area, covering 37.7% of the existing conditions Local Study Area, and swamp habitats are the second most common habitats in the existing conditions Local Study Area, covering 29.7% of the existing conditions Local Study Area (*Vegetation Technical Support Document*, Section 5.4.5, WSP, 2026a). Marshes and bogs are uncommon in the Local Study Area and cover 2.0% and 1.0% of the existing conditions Local Study Area, respectively.

Table 5-7: Habitat Suitability for Mallard at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	10,355.7	81.8	213281.9	86.4	575,058.7	86.9
Low to Poor	2,309.6	18.2	33,675.9	13.6	86973.8	13.1

ha = hectare; % = percent.

Waterfowl, including mallard, are widely hunted throughout the effects assessment Regional Study Area by Marten Falls First Nation community members. Community members have observed that the high-water levels observed in 2022 throughout the effects assessment Regional Study Area limited food sources for waterfowl, including mallard, which was corroborated by fewer field observations than anticipated during the Project by WSP Canada Inc. staff (Marten Falls First Nation, 2022a). Additionally, cold springs have been noted by Marten Falls First Nations community members to delay waterfowl migration throughout the effects assessment Regional Study Area, as observed Marten Falls First Nations members in spring 2022 (Marten Falls First Nation, 2022a).

Threats to mallard habitat availability include wetland habitat degradation and wetland loss from human activities, particularly effects associated with agriculture (Drilling et al., 2020; BirdLife International, 2023). However, the amount of human disturbance in the Project study areas is low and the amount of suitable habitat for this species in the existing conditions Local Study Area is high.

Habitat availability for mallard may be highest 10-to-20-years after a fire (Beatty et al., 2014) and insect outbreaks may result in similar changes to mallard habitat availability. At existing conditions, climate change may have increased the frequency and intensity of insect outbreaks and fires in the Project study areas compared to historical conditions. Mallard breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

5.4.1.2 Distribution

Mallard is a widespread and common breeding species throughout Ontario (Natural Heritage Information Centre, 2023).

Mallards were detected throughout the existing conditions Local Study Area, although detections were absent in the northwestern portion of the existing conditions Local Study Area (**Attachment B**). Mallards were more frequently detected south of Dusey Lake than in the northern portions of the existing conditions Local Study Area. Mallard was recorded on five of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022; no detections were recorded in the existing conditions Construction Disturbance Area. Mallard was not detected at any point count stations from 2018 to 2022 (**Attachment B**).

Mallards were among the most common waterfowl and waterbird species observed during field surveys in 2018 to 2022. The species was detected in the existing conditions Local Study Area during autonomous recording unit surveys, both spring and fall migration aerial surveys, and during brood aerial surveys.

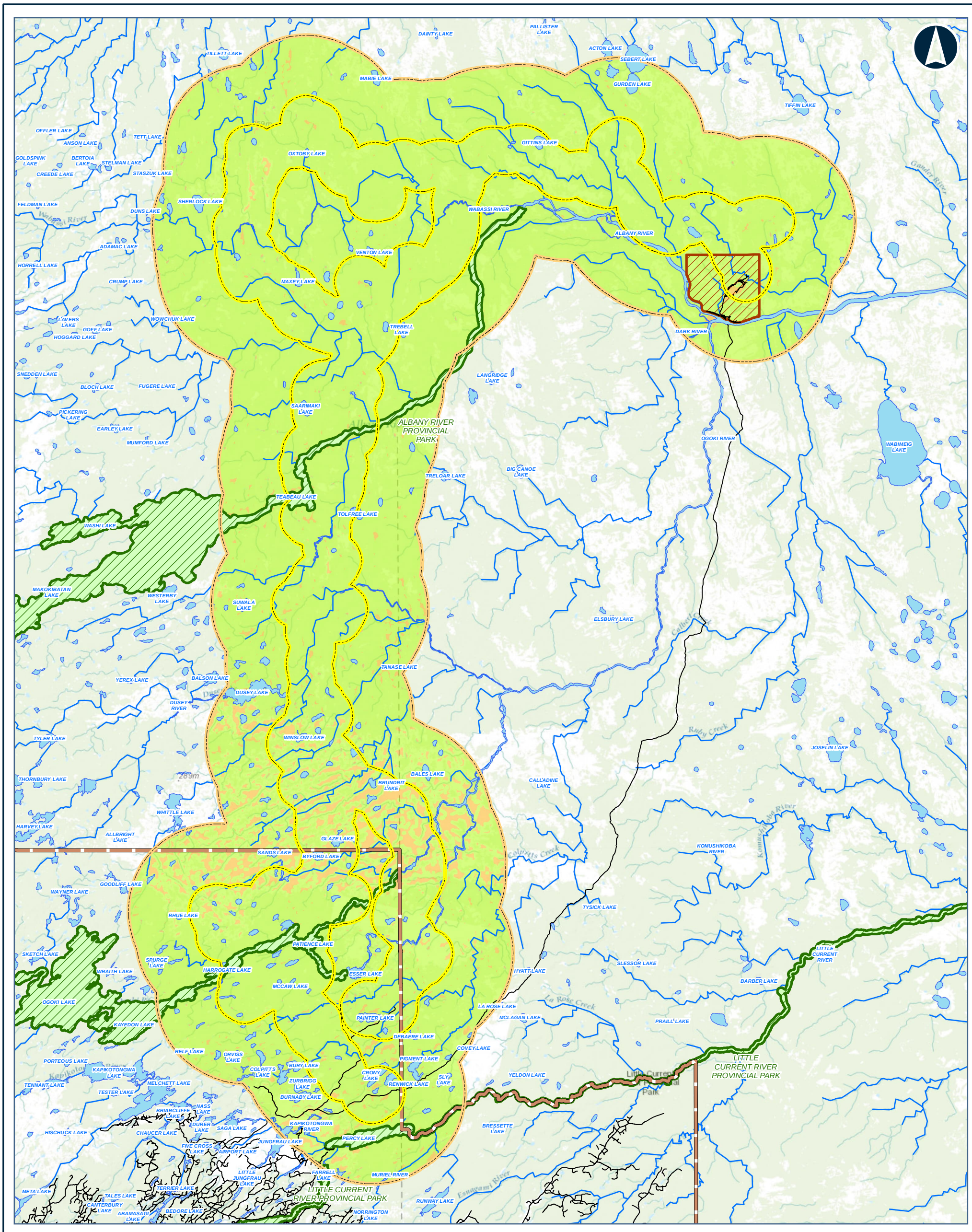
Mallards may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to southern North America for the winter (Drilling et al., 2020). Mallards were detected on autonomous recording units during the spring, summer, and fall periods; highest detections were during the spring and summer seasons. Mallards were detected every monitoring year from 2018 to 2022. Daily mallard activity recorded on autonomous recording units was highest at night during the spring migration season, highest at dawn during the breeding season, and high at night and dawn during the fall migration season.

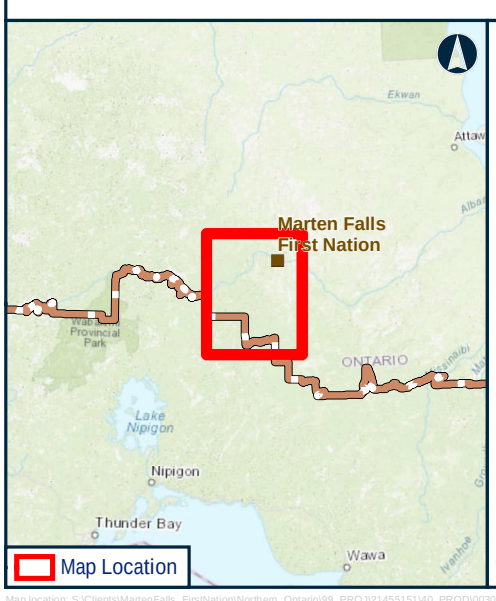
Mallards are highly mobile; one female travelled greater than 1,000 km in one summer among three nesting attempts among the boreal forest and prairie pothole regions (Drilling et al., 2020). As such, it is expected that this species can establish territories in areas below carrying capacity. Females have higher fidelity to breeding site than males (Drilling et al., 2020) and females that breed successfully return more frequently to previous nesting areas than unsuccessful females (Lokemoen et al., 1990). Estimates of female mallard return rates to breeding sites range from 5% to 65% (Lokemoen et al., 1990; Arnold and Clark, 1996). Females may return to the same breeding site for up to four years in a row (Drilling et al., 2020). Although the nest site can be defended, mallards do

not typically maintain or defend structured breeding territories; territories often overlap with adjacent breeding pairs, and nests can at times be as close as one m from each other (Drilling et al., 2020).

Mallards do not appear to be sensitive to habitat fragmentation from human activities (Drilling et al., 2020). This species nests closer to roads and pipelines (Pasitschniak-Arts et al., 1998; Johnstone et al., 2023) and there may be more mallard pairs in areas with a higher disturbance index (Loesch et al., 2021).

Suitable mallard habitat occurs throughout the Local and Regional Study Areas (**Figure 5-7**). Fens are patchily distributed throughout the existing conditions Local Study Area but the amount of fen habitat in the existing conditions Local Study Area is highest north of Winslow Lake (*Vegetation Technical Support Document*, Figure 5.3-1, WSP, 2026a). Swamp habitat patches are distributed throughout the existing conditions Local Study Area (*Vegetation Technical Support Document*, Figure 5.3-1, WSP, 2026a). Marsh habitat is irregularly distributed throughout the existing conditions Local Study Area and is primarily associated with waterbodies and watercourses.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

MALLARD HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Mallard in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-7

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Date Saved: 2/12/2026 10:23:07 AM User Name: INBA08973

5.4.1.3 Survival and Reproduction

Mallard is the most abundant duck species in North America (Drilling et al., 2020) and this species was among the most common waterfowl and waterbird species observed during field surveys in 2018 to 2022 (**Attachment B**). The density estimates for mallard in *Ontario Breeding Bird Atlas* Regions 44 is 0.4 nesting territories per km^2; a density estimate for this species for Region 37 is not available. (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the mallard population in Bird Conservation Region 7 has increased by 1.2% each year from 1970 to 2021 (total increase 79.5%) (Smith et al., 2022). The reliability of this estimate is considered “low” and there is a 14.0% chance of future population decline in the region (Smith et al., 2022). The mallard population in Bird Conservation Region 8 has increased by 3.3%, annually, from 1970 to 2021 (total increase 413%) (Smith et al., 2022). The reliability of this estimate is considered “medium” and there is a <0.1% chance of future population decline in the region (Smith et al., 2022). According to the Eastern Waterfowl Breeding Ground Survey, the mallard population in the eastern boreal shield is estimated to have increased by 1.3% per year from 1990 to 2017; however, the confidence limits of this estimate overlap zero and so there is uncertainty in the estimate (Drilling et al., 2020).

Mallards lay an average of eight eggs each year, but up to 13 eggs have been reported (Drilling et al., 2020). Mallard nesting success rates reported in literature range from 10% to 71% (Lokemoen et al., 1990; Ringelman et al., 2013; Skaggs et al., 2020). Nest success increases if nests are located in dense, wetland vegetation, closer to other nesting mallards, and are initiated earlier in the season (Ringelman et al., 2013; Kaminski et al., 2013; Skaggs et al., 2020). Mallards will re-nest if the initial nest fails (Messmer et al., 2021).

Mallards typically begin breeding at one year of age but can reach sexual maturity at 6 months of age (Drilling et al., 2020). Mallards have an average lifespan of 1.8 years, although individuals up to 29 years of age have been reported (Drilling et al., 2020). Survival rate varies between life stages and sex; adults have a higher chance of survival than juveniles, and adult males survive at higher rates than adult females (Drilling et al., 2020). Annual survival ranges from 48% to 63% for juvenile males, from 46% to 61% for juvenile females, from 54% to 59% for adult females, and from 62% to 68% for adult males (Arnold and Clark, 1996; Drilling et al., 2020).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as mallard, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008). Mallards are less vulnerable to hurricanes than other migratory birds because much of this species population remains in North America for the winter (Drilling et al., 2020).

Ducklings may be susceptible to extreme variations in spring weather as young of this species are susceptible to mortality from exposure in cold weather (Drilling et al., 2020). Other threats to mallard survival include collisions with moving vehicles, collisions with transmission lines, and outbreaks of disease such as avian botulism and avian influenza (Drilling et al., 2020). As mallards are a populous species, have high reproductive potential, and are widely distributed within Canada, this species population can withstand sporadic high losses caused by disease (Rocke, 2006).

Several mammalian and avian species prey on mallards. Red fox (*Vulpes vulpes*), coyote (*Canis latrans*), mink (Oji-Cree translation, *shakweshi*) (*Neovison vison*), raccoon, long-tailed weasel (*Mustela frenata*), great horned owl, and various falcons and hawks may prey on adults (Drilling et al., 2020). Red fox, skunks (Oji-Cree translation, *shikaagwag*) (*Mephitis* spp.), mink, American crow and common raven (*Corvus corax*) can be important predators on mallard eggs and ducklings (Drilling et al., 2020). In the breeding season, females have higher mortality rates than males as many females are killed by mammalian predators while they are on the nest (Drilling et al., 2020).

Mallards are the most sought-after and harvested duck in North America; up to 25% of the autumn North American population can be harvested in one year (Drilling et al., 2020). In the Northern District of Ontario, the daily hunting limit for ducks, which includes mallards, is six individuals with a total capture limit of 18 birds (Government of Ontario, 2023). Ducks can be hunted from September 10 to December 25 in the Northern District of Ontario (Government of Canada, 2023d).

Mallards have a highly flexible diet and composition depends on reproductive stage and time of year (Drilling et al., 2020). During the breeding season, mallards are primarily carnivores and consume insects (primarily flies [Order Diptera]), gastropods, crustaceans, and terrestrial worms (Drilling et al., 2020). Seeds comprise the major of plant material consumed (Drilling et al., 2020).

Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Insect declines are thought to be due to several factors including habitat loss, pesticides, pollution, introduced species, and climate change (Wagner et al., 2021). Of these, climate change and pollution are present in the Project study areas; forestry and agriculture are limited. A decline in aerial insect abundance and availability may negatively affect mallard populations by reducing prey availability for this species.

Climate change may be creating asynchronous peak insect emergence and waterfowl nesting (Messmer et al., 2021). Between 1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several bird species by three to seven days (Shipley et al., 2022). However, mallards have been found to have strong plasticity in their clutch initiation dates and nest earlier in years with warmer spring temperatures (Messmer et al., 2021). This plasticity in timing of migration and breeding may allow mallards to adapt to climate change.

5.5 Bog / Fen Birds and Other Wetland Birds

Bog / fen birds and other wetland species (hereafter wetland birds) are birds that nest in bog, fen, swamp, or marsh habitats. The boreal forest is an important breeding area for bog / fen / other wetland birds in Canada as bog, fen, and swamp habitats are more common in the boreal forest than in other ecozones in the country and, in particular the Hudson Bay Lowlands is a globally significant wetland.

Based on sources reviewed during the desktop review (**Section 4.3.1.1**), there are 15 bog / fen / other wetland species that may be present in the Project study areas (**Attachment B, Annex B**). Eight species are considered Priority Species within Bird Conservation Region 7 or Bird Conservation Region 8 and all eight of these species were detected during baseline surveys from 2018 to 2022 (**Attachment B**, **Annex B**).

Rusty blackbird (*Euphagus carolinus*) and yellow rail (*Coturnicops noveboracensis*) are the only federally and provincially listed wetland bird species with potential to occur in the Project study areas. Existing conditions for these two species are discussed in **Section 5.6.12** and **Section 5.6.13**.

The following species were selected as proxy Valued Component species to represent the wetland birds Valued Component:

- Palm warbler – proxy Valued Component for species that use bogs;
- Common yellowthroat – proxy Valued Component for species that use fens;
- Northern waterthrush – proxy Valued Component for species that use swamps; and
- Sora (*Porzana carolina*) – proxy Valued Component for species that use marshes.

Existing conditions for proxy wetland bird Valued Components follow and are organized using the measurement indicators provided in **Table 4-2.**

Information contained in the sections below provides a summary of data in relation to indicators for each proxy Valued Component. For detailed wetland birds data refer to the **Attachment B** and **Section 5.5**.

5.5.1 Palm Warbler

5.5.1.1 Habitat Availability

Palm warblers prefer open bogs and open coniferous forest that have heavy undergrowth and are close to water (Kirk and Hobson, 2001; Wilson, 2020). Palm warbler was selected as a proxy Valued Component species for birds that use bog habitats. Bogs are uncommon in the existing conditions Local Study Area and only cover 1% of the existing conditions Local Study Area (*Vegetation Technical Support Document*, WSP, 2026a). Patches of bog habitat

are generally small and are inconsistently distributed in the existing conditions Local Study Area (*Vegetation Technical Support Document*, WSP, 2026a).

During point count surveys, palm warblers were detected at the highest relative abundance in marsh and swamp habitat types in the existing conditions Construction Disturbance Area, and in bog, fen, and water habitats in the existing conditions Local Study Area and existing conditions Regional Study Area (**Attachment B**).

According to the habitat model, palm warbler abundance was greater in landscapes with low proportions of bog habitat types and in areas with locally low proportions of water and mature forest habitats (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable palm warbler habitat is abundant in the study areas and covers approximately 70% of each study area (**Table 5-8**).

Table 5-8: Habitat Suitability for Palm Warbler at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	4,072.7	32.6	98,440.8	39.7	264,728.3	40.0
Moderate	2,534.8	20.0	69,616.1	28.1	198,601.3	30.0
Low	3,752.7	29.6	57,317.1	23.1	132,363.7	20.0
Poor	2,305.2	18.2	22,583.9	9.1	66,072.2	10.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent.

Fires may increase habitat suitability for palm warblers for up to 30 years post fire (Kirk and Hobson, 2001). This may also apply to forests that have been affected by insect outbreaks. However, palm warblers were detected at lower abundance in moderate and high intensity burned areas, compared to low burned areas and control areas (Knaggs et al., 2020). As such, depending on how climate change may be affecting the frequency and intensity of fires and insect outbreaks, effects on palm warbler habitat availability in the Project study areas at existing conditions may be positive or negative relative to historical conditions.

5.5.1.2 Distribution

Palm warblers are one of the most northerly breeding warbler species in North America (Wilson, 2020). This species is a common breeder in the Hudson Bay Lowlands and boreal forest of Ontario (Natural Heritage Information Centre, 2023).

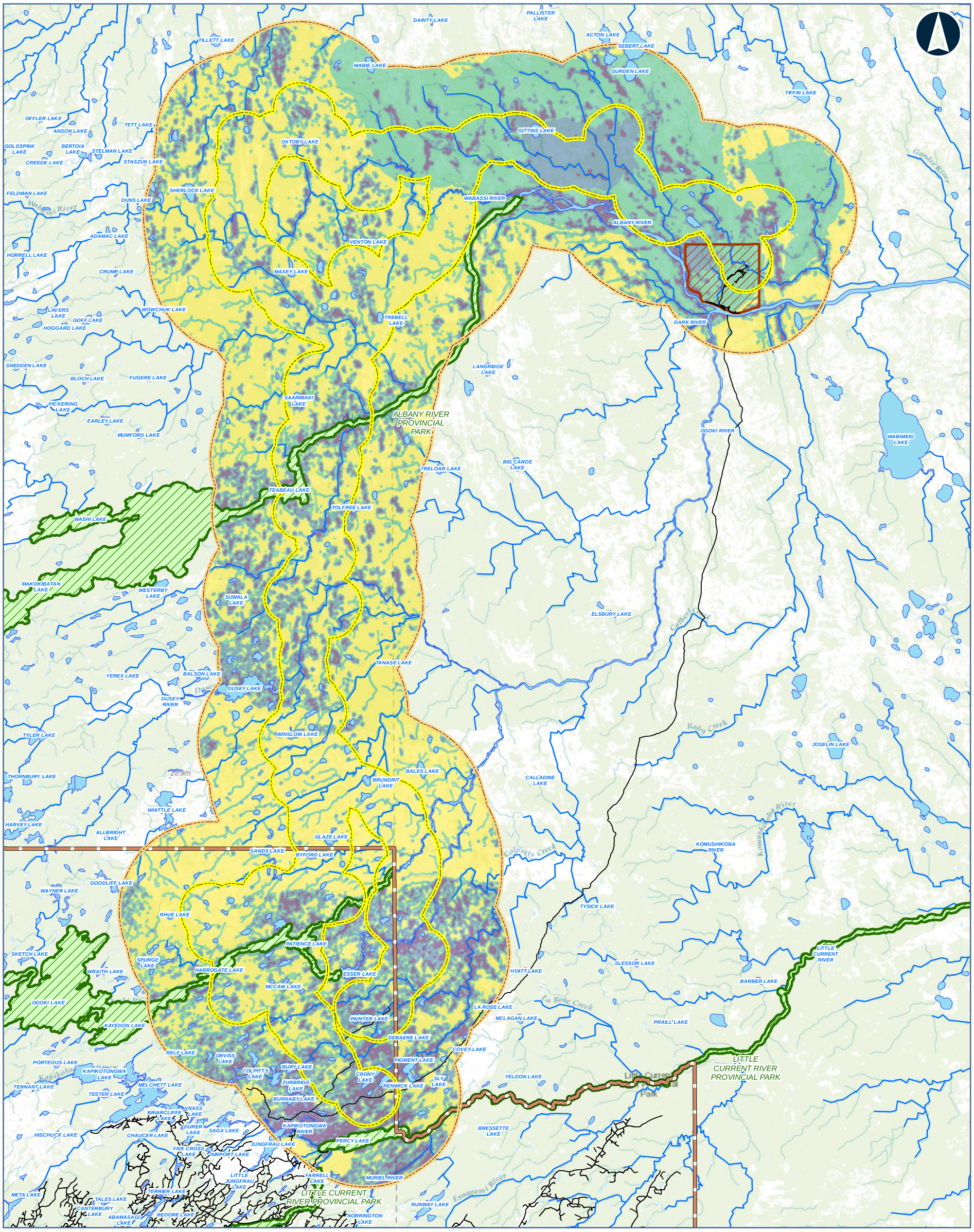
During field studies, palm warblers were spatially distributed fairly evenly throughout the existing conditions Local Study Area. Palm warblers were detected every monitoring year from 2018 to 2022 (**Attachment B**). During the breeding season, this species was recorded at three of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 29 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at five of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, 74 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at 7 of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**).

Palm warblers are present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to the southern United States, Central America, and the Caribbean for the winter (Wilson, 2020). During autonomous recording unit surveys, palm warblers were recorded during the spring, summer, and fall, with the highest detection rate reported in the summer. Daily palm warbler activity recorded on autonomous recording units during the breeding season was highest at dawn.

The average palm warbler territory size in the boreal forest of Quebec was 3.8 ha (Wilson, 2020). Currently, there is no information available on palm warbler breeding site fidelity. Palm warblers can be tolerant of sensory disturbance from human activities (Wilson, 2020).

This species is sensitive to patch size and isolation. Large peatlands (Oji-Cree translation, *maashkiigwabo*) are preferred over small, isolated patches (Calmé and Desrochers, 2000; Poulin et al., 2006). As such, this species is considered vulnerable to human-related disturbances and natural variations in habitat availability in the Project study areas. However, habitat is not considered limiting in the Project study areas at existing conditions. A large patch of high and moderate suitability palm warbler habitat generally extends throughout the existing conditions Regional Study Area (**Figure 5-8**).

Palm warblers are highly mobile and can establish territories in areas below carrying capacity. Several studies have found that habitat fragmentation may not impede daily movements of boreal songbird species, such as palm warblers. For example, wood thrushes and hooded warblers generally foraged more than 150 m from their nest site and some individuals travelled over 1 km from their nest site (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011). Similarly, although some forest birds may be reluctant to cross gaps greater than 50 m, individuals will cross gaps of 200 m when no other choice exists (St. Clair et al., 1998). However, Bélisle and Desrochers (2002) found that birds rarely ventured greater than 25 m from a forest edge and Desrochers and Hannon (1997) found that certain bird species preferred travelling through woodland cover, even when travel routes were substantially longer than crossing a forest gap of 10 to 170 m.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

PALM WARBLER HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Palm Warbler in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-8

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5.5.1.3 Survival and Reproduction

During the breeding season from 2018 to 2022, palm warbler was detected at the highest relative abundance at plots that occurred in the existing conditions Local Study Area (0.48 individuals per plot). Mean relative abundance of palm warbler during point count surveys ranged from 0.64 individuals per plot (in 2022) to 0.30 individuals per plot (in 2018). During autonomous recording unit surveys completed during the breeding season in 2022, palm warbler had the highest relative abundance in the existing conditions Construction Disturbance Area (1.25 individuals per plot) (**Attachment B**).

The density estimates for palm warbler in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 6.4 and 1.7 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the palm warbler population in Bird Conservation Region 7 has increased by 1.4% per year from 1970 to 2021 (total increase of 101%) (Smith et al., 2022). However, the reliability of this estimate is considered “low.” There is an 11.3% chance of future population decrease in the region (Smith et al., 2022). The palm warbler population in the Ontario portion of Bird Conservation Region 8 is estimated to have increased by 2.9% each year from 1970 to 2021 (total increase of 324%); however, the reliability of this estimate is considered “low” (Smith et al., 2022). There is predicted to be a <0.1% chance of future population decrease in the region (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as palm warbler, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Due to the northerly distribution of this species during the breeding season, nests are often located in remote areas that are difficult to access. As such, there is little known about palm warbler breeding biology (Wilson, 2020). Age of first breeding is currently unknown (Wilson, 2020), but may be similar to other North American warblers, which start breeding at one to two years of age. Average survivorship and lifespan are unknown (Wilson, 2020). The oldest reported individual was six years of age at time of capture (Wilson, 2020). Females lay four to five eggs per brood and typically only raise one brood per season (Wilson, 2020). Information on nest success is not available (Wilson, 2020).

Adult palm warblers may be depredated by sharp-shinned hawks, merlins (*Falco columbarius*), and weasels (*Mustela* spp.) and Canada jays (*Perisoreus canadensis*) may depredate eggs (Wilson, 2020).

Palm warblers are primarily insectivorous during the breeding period (Wilson, 2020). Insects that are commonly consumed include grasshoppers, beetles, flies, and caterpillars

(Wilson, 2020). Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Insect declines are thought to be due to several factors including habitat loss, pesticides, pollution, introduced species, and climate change (Wagner et al., 2021). A decline in insect abundance and availability may negatively affect palm warbler populations in the Project study areas by reducing prey availability for this species.

Climate change may be creating an asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in the northeastern North America has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). Palm warbler appears vulnerable to this timing disjunct because this species is arriving on breeding grounds later than 100 years ago (Butler, 2003). One factor for this may be that, recently, climate change has been causing a delay of the onset of spring immediately south of the Great Lakes; this may be delaying caterpillar development on southern migratory staging areas and limiting the amount of food available for fattening up prior to migratory flights (Strode, 2003). If spring continues to arrive later south of the Great Lakes region, this may increase pressure on palm warbler by widening the time gap between peak insect emergence in their migratory staging areas and northern breeding grounds (Strode, 2003).

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of some songbird species, including palm warblers. However, palm warblers are not highly susceptible to brood parasitism by brown-headed cowbirds (Peck and James, 1987; Wilson, 2020) and the northern distribution and remote locations of nest sites of this species may provide some protection from brown-headed cowbirds. Brown-headed cowbirds were not recorded in *Ontario Breeding Bird Atlas* survey blocks in or near the existing conditions Regional Study Area (Birds Canada, 2023) and no brown-headed cowbirds were detected during point count surveys. Nest parasitism at existing conditions is unlikely to have had a measurable effect on palm warbler populations in the Project study areas.

5.5.2 Common Yellowthroat

5.5.2.1 Habitat Availability

Suitable habitat for common yellowthroat is primarily defined by a dense shrub layer, rather than the presence of water (Guzy and Ritchison, 2020). This species can be found in a wide range of habitats, from wetlands to grasslands (Guzy and Ritchison, 2020). Common yellowthroat was selected as a proxy Valued Component for birds that use fen habitat.

During field studies, common yellowthroats were detected at the highest relative abundance in water habitat type in the existing conditions Local Study Area and existing conditions Regional Study Area, and bog habitats in the existing conditions Construction Disturbance Area (**Attachment B**).

According to the habitat model, common yellowthroat abundance was greater in areas with locally low proportions of mature forest habitats and locally high proportions of riparian and fen habitats (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable common yellowthroat habitat is abundant in the study areas and covers approximately 50% to 60% of each study area (**Table 5-9**).

Table 5-9: Habitat Suitability for Common Yellowthroat at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	3,479.9	27.5	99,523.9	40.1	264,950.4	40.0
Moderate	2,208.4	17.4	63,335.6	25.5	175,008.3	26.4
Low	3,409.2	26.9	59,670.2	24.1	155,851.8	23.6
Poor	3,567.8	28.2	25,428.1	10.3	66,068.6	10.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent.

Fires may increase habitat suitability for common yellowthroats because this species abundance is low in areas with dense forest cover (Lachance et al., 2004). Insect outbreaks will also decrease forest cover and so may also have a positive effect on common yellowthroat habitat availability. Climate change may be increasing the frequency and intensity of fires and insect outbreaks, which may have positive effects on yellowthroat habitat availability in the Project study areas at existing conditions compared to historical conditions.

5.5.2.2 Distribution

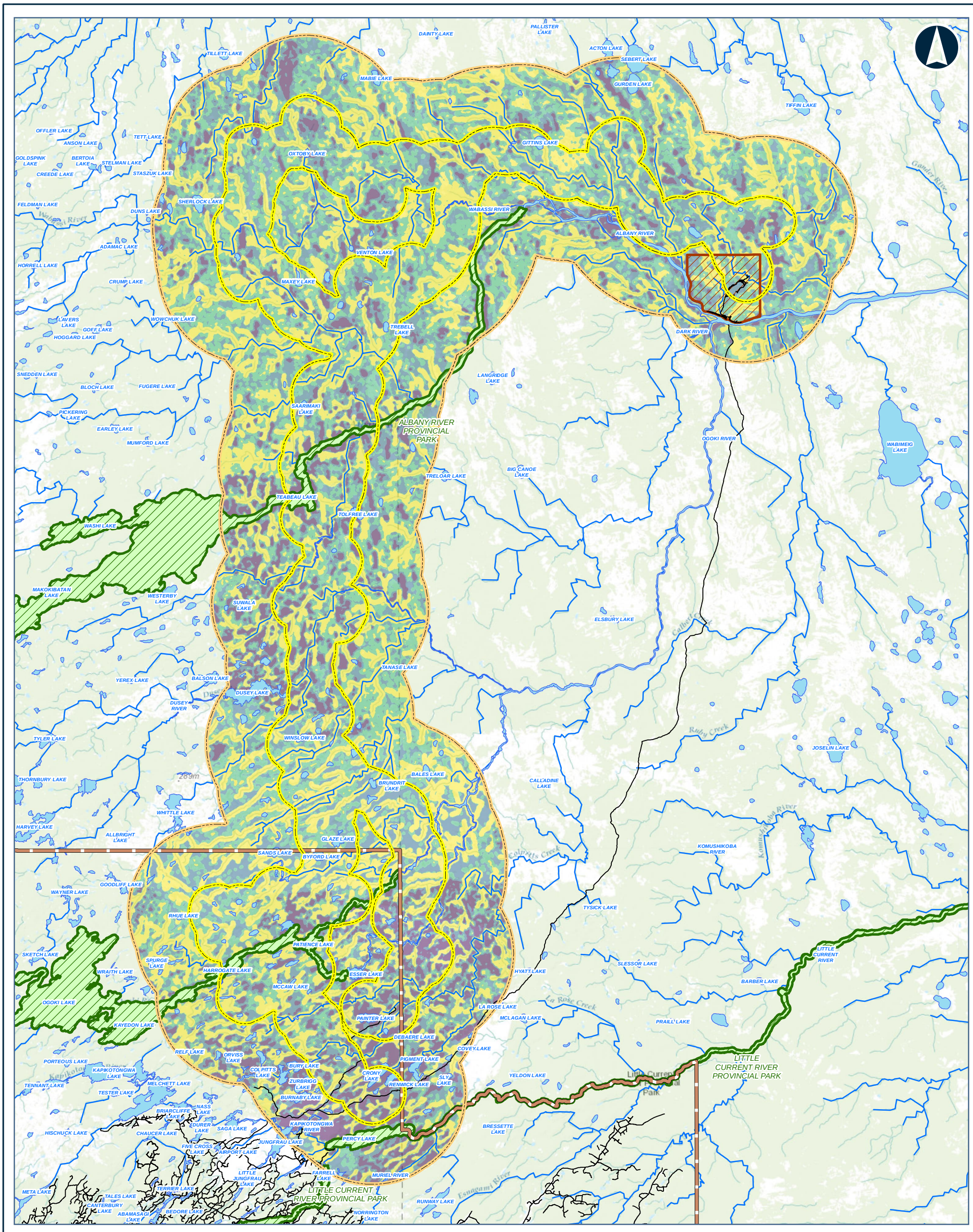
Common yellowthroat is one the most widespread warblers in North America (Guzy and Ritchison, 2020) and is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023). During point count and autonomous recording unit surveys for the Project, yellowthroats were detected every monitoring year from 2018 to 2022. During the breeding season, this species was recorded at two of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 32 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at eight of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 53 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at four of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**). During field studies, yellowthroats were detected throughout the existing conditions Local Study Area, although detections were generally absent in the northwestern portion of the existing conditions Local Study Area (**Attachment B**).

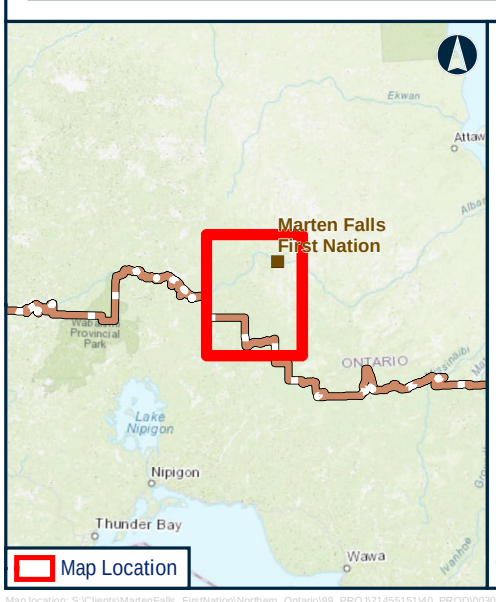
Common yellowthroats may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to the southern United States, Mexico, Central America, and the Caribbean for the winter (Guzy and Ritchison, 2020). During autonomous recording unit surveys for the Project, common yellowthroats were recorded during the spring, summer, and fall, with the highest detection rate reported in the summer. Daily common yellowthroat activity recorded on autonomous recording units was highest at dawn, but high activity was also recorded at night during the breeding season.

Common yellowthroats have fairly high site fidelity. Return rates of 35% to breeding sites have been reported in Texas (Roy, 2010). Another study reports individuals returning to breeding areas for at least three consecutive years (Crank, 2012). Territory size estimates for this species range from 0.2 to 2.9 ha (Guzy and Ritchison, 2020).

High and moderate common yellowthroat habitat is fairly evenly distributed throughout the study areas (**Figure 5-9**). The effects of habitat fragmentation on common yellowthroat habitat availability are unclear. Some studies report that this species may be sensitive to habitat loss at a landscape level but may not be sensitive to habitat patch size at a local scale (Betts et al., 2007; Lehnen and Rodewald, 2009). Conversely, other studies report that common yellowthroats may select landscapes with higher fragmentation (Koper and Schmiegelow, 2006) (Rush et al., 2009) found that habitat loss may not affect this species unless more than 20% of habitat is removed at the landscape scale.

Common yellowthroats are highly mobile and can establish territories in areas below carrying capacity. Several studies have found that habitat fragmentation may not impede daily movements of boreal songbird species, such as common yellowthroats (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011; St. Clair et al., 1998). Common yellowthroats were found to free move among isolated habitat patches in a highly fragmented landscape in Texas (Roy et al., 2013).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

COMMON YELLOWTHROAT HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Common Yellowthroat in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-9

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5.5.2.3 Survival and Reproduction

Common yellowthroats were frequently detected during field surveys in the Project study areas. During point count surveys in 2018 to 2022, common yellowthroat was detected at the highest relative abundance at point count plots that occurred in the existing conditions Local Study Area (0.33 individuals per plot). Mean relative abundance of individuals was highest in 2022 (0.47 individuals per plot), and lowest in 2018 (0.24 individuals per plot). During autonomous recording unit surveys completed during the breeding season in 2022, common yellowthroat was detected at the highest relative abundance in the existing conditions Local Study Area (0.92 individuals per plot) (**Attachment B**).

The density estimates for common yellowthroat in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.7 and 7.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the common yellowthroat population in Bird Conservation Region 7 has increased by 2.0% per year from 1970 to 2021 (total increase of 169%) (Smith et al., 2022). However, the reliability of this estimate is considered “low.” There is a 14.9% chance of future population decrease in the region (Smith et al., 2022). The common yellowthroat population in the Ontario portion of Bird Conservation Region 8 is predicted to have decreased by 0.6% each year from 1970 to 2021 (total decrease of 27.1%) (Smith et al., 2022). The reliability of this estimate is considered “low,” and there is predicted to be a 97.4% chance of future population decrease in the region (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as common yellowthroat, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

There are few data available on breeding biology of common yellowthroats (Guzy and Ritchison, 2020). Individuals may start breeding during their first year, but this can vary with geography. One study reports that the average annual survival rate for common yellowthroat is 45.3% (Roy, 2010). Average lifespan is unknown; the oldest reported individual was 11 years of age at the time of capture (Guzy and Ritchison, 2020). Females usually lay four eggs per brood and only raise one brood per season (Guzy and Ritchison, 2020). Nest success estimates range from 33% to 55% (Guzy and Ritchison, 2020).

Adult common yellowthroats may be depredated on by loggerhead shrikes (*Lanius ludovicianus*), northern harriers (*Circus cyaneus*), merlins, and American kestrels (*Falco sparverius*). Mice, chipmunks, raccoons, and skunks may depredate common yellowthroat nests (Guzy and Ritchison, 2020).

Common yellowthroats are primarily insectivorous, and they eat a wide range of species (e.g., spiders, flies, beetles, and ants). Declines in aerial insect abundance and availability that have been noted throughout the world could be having a negative effect on common yellowthroats. In the Project study areas, climate change and pollution are factors that could contribute to insect declines. A decline in aerial insect abundance and availability may negatively affect common yellowthroat populations by reducing prey availability for this species.

Climate change may be creating a disjunct between peak insect emergence and songbird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study that reviewed daily insect abundance and nest-record data from 1989 to 2014 found that spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates, such as common yellowthroat, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow common yellowthroats to adapt to climate change.

Habitat fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of common yellowthroats. Rates of cowbird nest parasitism on common yellowthroats in Ontario is approximately 19% (Peck and James, 1987). Brown-headed cowbirds were not recorded in in any of the survey blocks that were surveyed in or near the Project study areas during the first or second *Ontario Breeding Bird Atlas* (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline point count surveys. As such, nest parasitism is unlikely to have had a measurable effect on common yellowthroat populations in the Project study areas at existing conditions.

5.5.3 Northern Waterthrush

5.5.3.1 Habitat Availability

Suitable habitat for northern waterthrush is defined by a dense ground vegetation layer and the presence of water (Whitaker and Eaton, 2020). During the breeding season, this species inhabits wooded swamps and bog and riparian thickets (Whitaker and Eaton, 2020). Northern waterthrush was selected as a proxy Valued Component for birds that use swamp habitat.

During point count surveys, northern waterthrush were most common in bog habitats in the existing conditions Construction Disturbance Area, open water habitat in the existing conditions Local Study Area, and fen, swamp, and open water habitats in the existing conditions Regional Study Area (**Attachment B**).

According to the habitat model, northern waterthrush abundance was greater in landscapes with high proportions of bog habitat and areas with locally high proportions of riparian and swamp habitats (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable northern waterthrush habitat is abundant in the study areas and covers approximately 30% to 40% of each study area (**Table 5-10**).

Fires may increase habitat suitability for northern waterthrushes; ground-nesting songbirds generally prefer burned habitats over unburned habitats (Saab and Powell, 2005). Insect outbreaks may have similar effects on northern waterthrush habitat availability.
Climate change may be increasing the frequency and intensity of fires and insect outbreaks, which may have positive effects on waterthrush habitat availability in the Project study areas at existing conditions, relative to historical conditions.

Table 5-10: Habitat Suitability for Northern Waterthrush at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	1,761.0	13.9	51,225.2	20.7	132,385.4	20.0
Moderate	2,239.3	17.7	51,677.8	20.8	132,246.6	20.0
Low	2,654.1	20.9	74,934.1	30.2	198,632.9	30.0
Poor	6,010.9	47.5	70,120.8	28.3	198,490.9	30.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent

5.5.3.2 Distribution

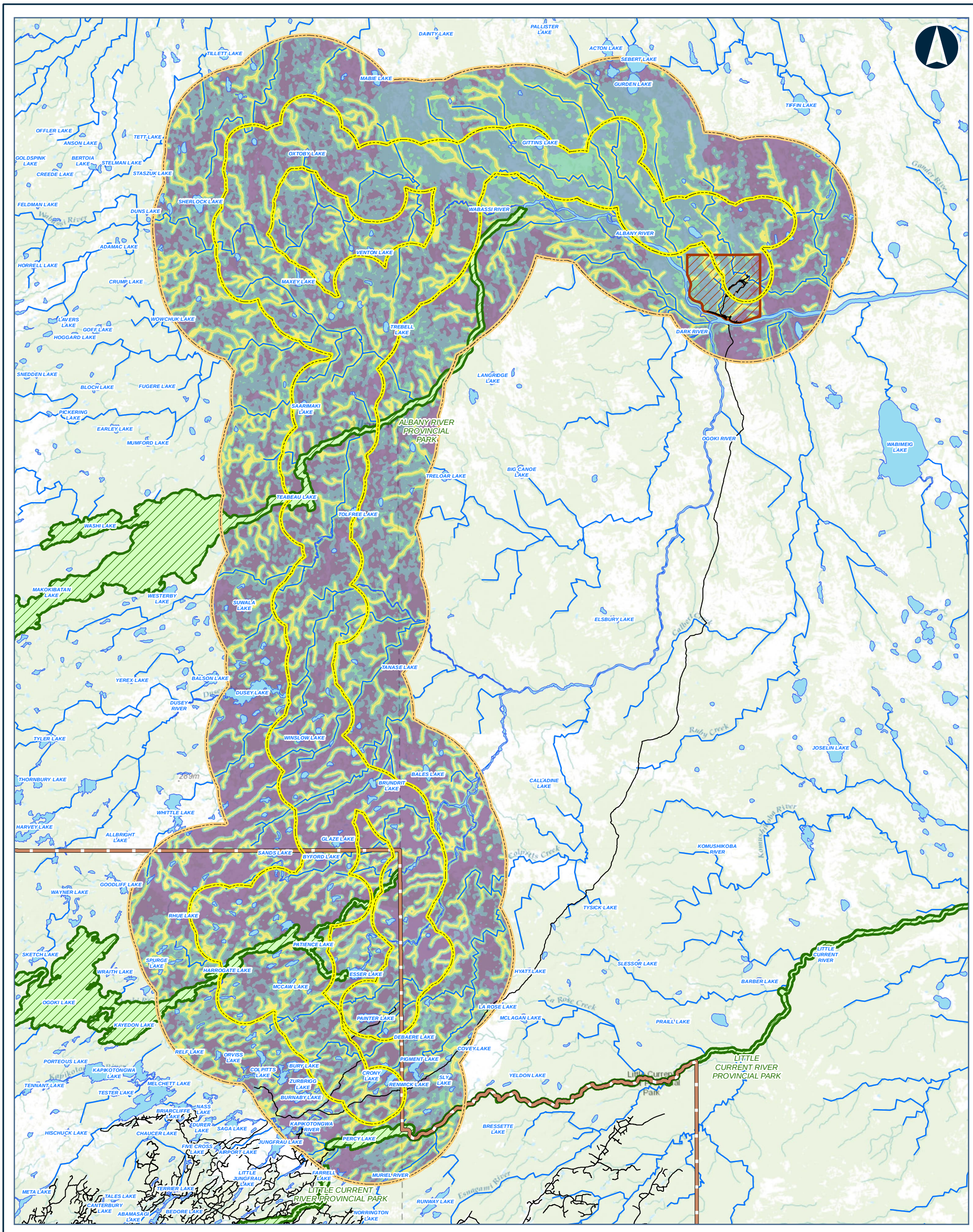
Northern waterthrush is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023). Northern waterthrushes were detected every monitoring year from 2018 to 2022. During the breeding season, this species was recorded at two of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 32 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, at six of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 49 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at 11 of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**). During field studies, northern waterthrushes were detected throughout the study areas.

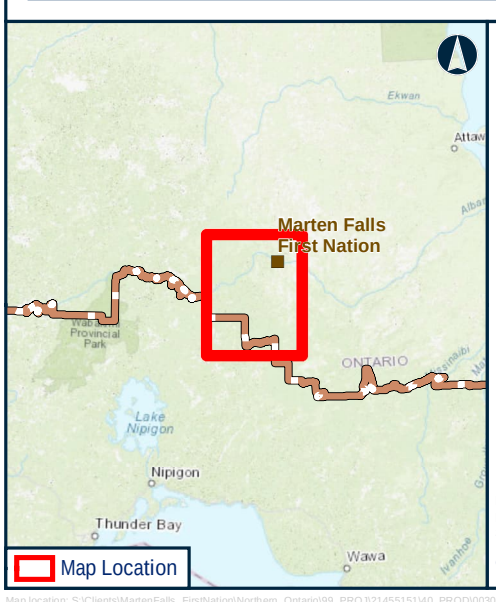
Northern waterthrush may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to the Central America, the Caribbean, and northern South America for the winter (Whitaker and Eaton, 2020). During autonomous recording unit surveys for the Project, northern waterthrush was recorded during the spring, summer, and fall, with the highest detection rate reported in the spring. Daily northern waterthrush activity recorded on autonomous recording units was highest at dawn during the spring and breeding seasons.

Northern waterthrushes occupy landscape-scale home ranges; 0.2 to 15.5 ha (median 4.3 ha) were reported in one study, with larger territories in landscapes with a higher proportion of forestry clear cuts (Leonard et al., 2008). As such, this species is sensitive to habitat changes at the landscape scale (Leonard et al., 2008). Waterthrush territories were 800% larger in landscapes with less than 40% intact forest cover than in landscapes with greater than 40% intact forest cover (Leonard et al., 2008). Similarly, this species abundance is positively related to the amount of forest cover within 1 to 2 km from the nest site (Golet et al., 2001; Whitaker and Eaton, 2020). This species has higher density in areas greater than 100 m from forest edges (Whitaker and Eaton, 2020). This species appears to be more sensitive to landscape effects than local patch size as individuals can be found in patches as small as 1 ha (Golet et al., 2001). Currently, there is no information available on northern waterthrush fidelity to breeding sites.

High and moderate northern waterthrush habitat is patchily distributed throughout the study areas and is primarily associated with riparian areas along watercourses (**Figure 5-10**).

Northern waterthrushes are highly mobile and can establish territories in areas below carrying capacity. Several studies have found that habitat fragmentation may not impede daily movements of forest songbird species, such as northern waterthrush (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011; St. Clair et al., 1998). Northern waterthrushes regularly cross large openings such as lakes and clearcuts (Leonard et al., 2008).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

NORTHERN WATERTRUSH HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Northern Waterthrush in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 5-10

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5.5.3.3 Survival and Reproduction

During point count surveys from 2018 to 2022, northern waterthrush was detected at the highest relative abundance at plots that occurred in the existing conditions Regional Study Area (0.43 individuals per plot). Mean relative abundance of northern waterthrush was highest in 2022 (0.31 individuals per plot), and lowest in 2018 (0.28 individuals per plot). During autonomous recording unit surveys completed during the breeding season in 2022, northern waterthrush was detected at the highest relative abundance in the existing conditions Local Study Area (0.91 individuals per plot) (**Attachment B**).

The density estimates for northern waterthrush in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 7.1 and 0.8 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the northern waterthrush population in Bird Conservation Region 7 has increased by 3.1% per year from 1970 to 2021 (total increase of 382.0%) (Smith et al., 2022). However, the reliability of this estimate is considered “low.” There is a 3.8% chance of future population decrease in the region (Smith et al., 2022). The northern waterthrush population in the Ontario portion of Bird Conservation Region 8 is predicted to have increased by 0.2% each year from 1970 to 2021 (total increase of 10.8%) (Smith et al., 2022). The reliability of this estimate is considered “low” and there is predicted to be a 31.2% chance of future population decrease in the region (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as northern waterthrush, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Northern waterthrushes may start breeding during their first year (Whitaker and Eaton, 2020). Average annual survival rate estimates for northern waterthrush range from 50% to 70% (DeSante and Kaschube, 2009; Whitaker and Eaton, 2020). Average lifespan is unknown; the oldest reported individual was eight years of age at the time of capture (Whitaker and Eaton, 2020). Females usually lay four eggs per brood and only raise one brood per season (Whitaker and Eaton, 2020). A study in Newfoundland reported waterthrush nest success rates of 70% in both intact and disturbed habitats (Warkentin et al., 2004).

Specific predators of northern waterthrush are unknown but this species is a ground-nester and, so, is vulnerable to ground predators such as snakes and mammals (Whitaker and Eaton, 2020).

Northern waterthrush are carnivorous and consume insects, snails, and crustaceans. Declines in aerial insect abundance and availability that have been noted throughout the world and may be negatively affecting northern waterthrush populations in the Project study areas by reducing prey availability for this species.

Climate change may be creating a disjunct between peak insect emergence and songbird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study found that spring insect emergence in the northeastern North America has advanced by three to 12 days from 1989 to 2014 and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates, such northern waterthrush, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Butler, 2003; Strode, 2003). This plasticity in timing of migration and breeding may allow northern waterthrushes to adapt to climate change.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of northern waterthrush. Rates of cowbird nest parasitism on northern waterthrush in Ontario is approximately 12% (Peck and James, 1998a). Brown-headed cowbirds were not recorded in any of the survey blocks that were surveyed in or near the Project study areas during the first or second *Ontario Breeding Bird Atlas* (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline point count surveys. As such, nest parasitism is unlikely to have had a measurable effect on northern waterthrush populations in the Project study areas at existing conditions.

5.5.4 Sora

5.5.4.1 Habitat Availability

Soras prefer to nest in marshes that have shallow to intermediate water depths and dense emergent vegetation (e.g., cattails [Oji-Cree translation, *paskakannoog*] [*Typha* spp.], and sedges [Oji-Cree translation, *wabakamik*] [*Carex* spp.]) (Melvin and Gibbs, 2020). During autonomous recording unit surveys, this species was detected at the highest relative abundance in fen habitat (**Attachment B**). Sora was selected as a proxy Valued Component for birds that use marsh habitat (**Attachment C**). At existing conditions, high to moderate suitability habitat for sora covers approximately 18% of the Local and Reginal Study Areas (**Table 5-11**). Marshes cover 2.0% of the existing conditions Local Study Area and represents 2.9% of wetland ecosystems (*Vegetation Technical Support Document*, Table 5-4, WSP, 2026a). Marsh habitat is patchily distributed throughout the existing conditions Local Study Area and is primarily associated with waterbodies and watercourses (*Vegetation Technical Support Document*, Table 5-4, WSP, 2026a).

Table 5-11: Habitat Suitability for Sora at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	1,797.6	14.2	45,179.8	18.2	121,473.8	18.3
Low to Poor	10,867.7	85.8	202,778.1	81.8	540,558.6	81.7

ha = hectare; % = percent.

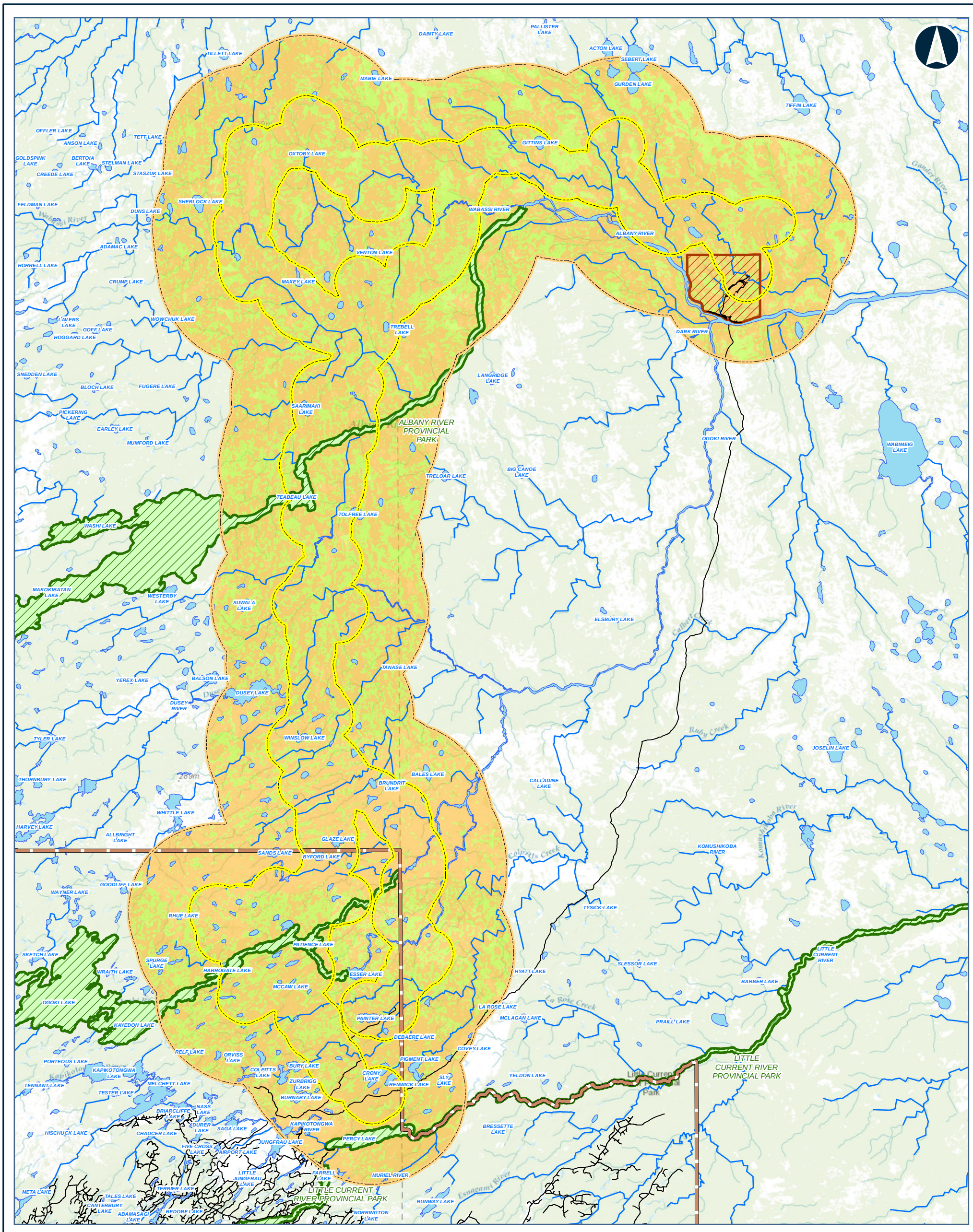
The sensitivity of sora to habitat loss is largely unknown. However, sora were commonly observed at wetlands in highly urbanized landscapes, such as the Chicago area, which suggested that this species is not sensitive to sensory disturbance provided that minimum habitat requirements, are present (Rahlin et al., 2022). However, the amount of human disturbance in the Project study areas is low and the amount of suitable habitat for this species in the existing conditions Local Study Area is expected to be not limiting. As such, sora habitat availability in the Project study areas at existing conditions is expected to be within the ranges of historical natural variation for this species.

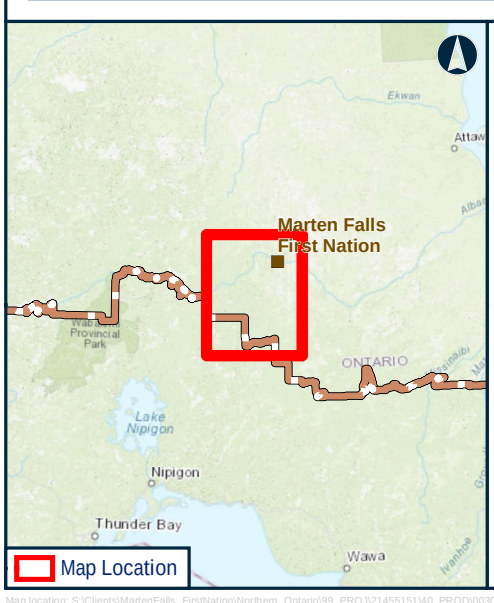
Fire's frequency and intensity may influence habitat availability; one study in Minnesota reported that soras were most abundant in areas with low and high frequency of fires and lowest in areas with moderate fire frequency (Hill, 2017). Fire frequency and intensity may be increasing at existing conditions, compared to historical conditions, which may result in improved ecological function for sora (Hill, 2017) in the Project study areas. Sora breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

5.5.4.2 Distribution

Sora can be found throughout Ontario (Melvin and Gibbs, 2020) but is an uncommon breeder in the Canadian Shield and Hudson Bay Lowland ecozones (Natural Heritage Information Centre, 2023). Sora was recorded on eight of 54 autonomous recording unit survey stations in 2022 (**Attachment B**). This species was detected throughout the existing conditions Local Study Area, north of Sands Lake during field surveys (**Attachment B**). Moderate to high suitability habitat for sora is patchily distributed throughout the Local and Regional Study Area at existing conditions (**Figure 5-11**).

Soras may occur throughout the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to southern North America, Central America, the Caribbean, and northern South America for the winter (Melvin and Gibbs, 2020). Soras were detected on autonomous recording units during the spring and summer periods. Daily sora activity recorded on autonomous recording units was highest at night.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- **SORA HSI SCORE**
- MODERATE TO HIGH
- LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Sora in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 5-11

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Mean sora territory size during the breeding season in Arizona was 0.19 ha (Melvin and Gibbs, 2020). Soras are highly territorial against conspecifics (e.g., Virginia rail [*Rallus limicola*]) but can nest within 1.2 m of other soras (Melvin and Gibbs, 2020). Currently, there is no information available on sora fidelity to breeding sites.

The sensitivity of sora to habitat fragmentation is unknown. However, the amount of human disturbance in the Project study areas is low and soras are highly mobile and can establish territories in areas below carrying capacity.

5.5.4.3 Survival and Reproduction

During autonomous recording unit surveys completed during the breeding season in 2022, sora had the highest relative abundance in the existing conditions Local Study Area; no individuals were recorded in the existing conditions Construction Disturbance Area (**Attachment B**).

The density estimate for sora in *Ontario Breeding Bird Atlas* Region 44 is 0.1 nesting territories per km^2; a density estimate for Region 37 is not available for this species (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the sora population in Bird Conservation Region 7 has increased by 1.2% each year from 1970 to 2021 (total increase 82.8%) (Smith et al., 2022). The reliability of this estimate is considered “low” (Smith et al., 2022). There is a 16.9% chance of future population decline in the region (Smith et al., 2022). The sora population in Bird Conservation Region 8 has increased by 0.3%, annually, from 1970 to 2021 (total increase 18.8%) (Smith et al., 2022). The reliability of this estimate is considered “low” and there is a 35.9% chance of future population decline (Smith et al., 2022).

Climate change may be increasing the frequency and intensity of extreme weather events (e.g., droughts). These extreme weather events can have an effect on migratory bird populations, such as sora, including reduced habitat availability in both breeding, migratory, and wintering grounds, and which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008). Additionally, sora breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

Currently, little information is available on sora breeding biology; age of first breeding, annual survival rates, and average lifespan are not known (Melvin and Gibbs, 2020). Females typically lay eight to 11 eggs per brood and raise one brood per season in northern environments (Melvin and Gibbs, 2020). Nest success estimates range from 43% to 53% (Melvin and Gibbs, 2020).

Coyotes, northern harriers, peregrine falcons, and great horned owls may prey on adult soras (Melvin and Gibbs, 2020). Eggs may be depredated by marsh wren (*Cistothorus palustris*), common grackle (*Quiscalus quiscula*), American crow, striped skunk (*Mephitis mephitis*), coyote, and raccoon.

Soras are omnivorous and consume a wide variety of plant and animal material such as seeds of sedges, duckweed, insects, and snails (Melvin and Gibbs, 2020). The worldwide declines in aerial insect abundance and availability could have a negative effect on this species in the Project study by reducing insect abundance and availability. Additionally, climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting soras by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates and plant material, such soras, appear to be arriving on their breeding grounds earlier than historically, and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow sora to adapt to climate change.

5.6 Species at Risk Birds

The species that fall within the species-at-risk birds Valued Component, as defined for this assessment, are considered priority species within at least one of the two Bird Conservation Regions (Bird Conservation Region) that the Project existing conditions Local Study Area and existing conditions Regional Study Area overlap with (Bird Conservation Region 7 ON [Taiga Shield and Hudson Plains] and Bird Conservation Region 8 ON [Boreal Softwood Shield]) (Environment Canada 2013, 2014). These proxy Valued Components were selected for their species-at-risk listing, both federally under the *Species at Risk Act* and provincially under the *Endangered Species Act, 2007*, cultural and social significance, and functional role in the food web.

The proxy Valued Component species selected to represent the species at risk birds Value Component are:

- Canada warbler;
- Evening grosbeak;
- Chimney swift (*Chaetura pelagica*);
- Common nighthawk;
- Eastern whip-poor-will (*Antrostomus vociferus*);
- Eastern wood-pewee;

- Olive-sided flycatcher;
- Bald eagle;
- Peregrine falcon;
- Short-eared owl;
- Bank swallow (*Riparia riparia*);
- Barn swallow (*Hirundo rustica*);
- Black tern;
- Lesser yellowlegs;
- Rusty blackbird; and
- Yellow rail.

Existing conditions for each of the proxy Valued Component species follow and are organized using the measurement indicators provided in **Table 4-2.**

Information contained in the following sections provides a summary of data in relation to indicators for each proxy Valued Component. For detailed species at risk birds data refer to **Section 6.6** of **Attachment B**.

5.6.1 Canada Warbler

5.6.1.1 Habitat Availability

Canada warblers nest in a range of wet forest types that have a dense shrub layer (Committee on the Status of Endangered Wildlife in Canada, 2020a; Environment Canada, 2016a). In the eastern portion of their range, which includes the Project study areas, Canada warblers are associated with wet mixed forests and early successional forests (6 to 30 years) created by forest harvesting or natural disturbance (Environment Canada, 2016a; Bale et al., 2020). Moderate to high suitability habitat for Canada warbler covers approximately 30% and 15% of the Local and Regional Study Areas, respectively, at existing conditions (**Table 5-12**).

The main disturbance affecting Canada warbler habitat availability in the Project study areas at existing conditions is fire. Insect outbreaks may also be a factor in habitat availability. Fires and insect outbreaks are expected to decrease habitat suitability for Canada warblers (Committee on the Status of Endangered Wildlife in Canada 2020a; Environment Canada, 2016a). Climate change may be increasing the frequency and intensity of fires and insect outbreaks, which may have negative effects on Canada warbler habitat availability in the Project study areas, relative to historical conditions.

Table 5-12: Habitat Suitability for Canada Warbler at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	7,822.6	61.8	79.351.5	32.0	110,12.7	16.6
Low to Poor	4,842.7	38.2	168,606.4	68.0	551,889.7	83.4

ha = hectare; % = percent.

5.6.1.2 Distribution

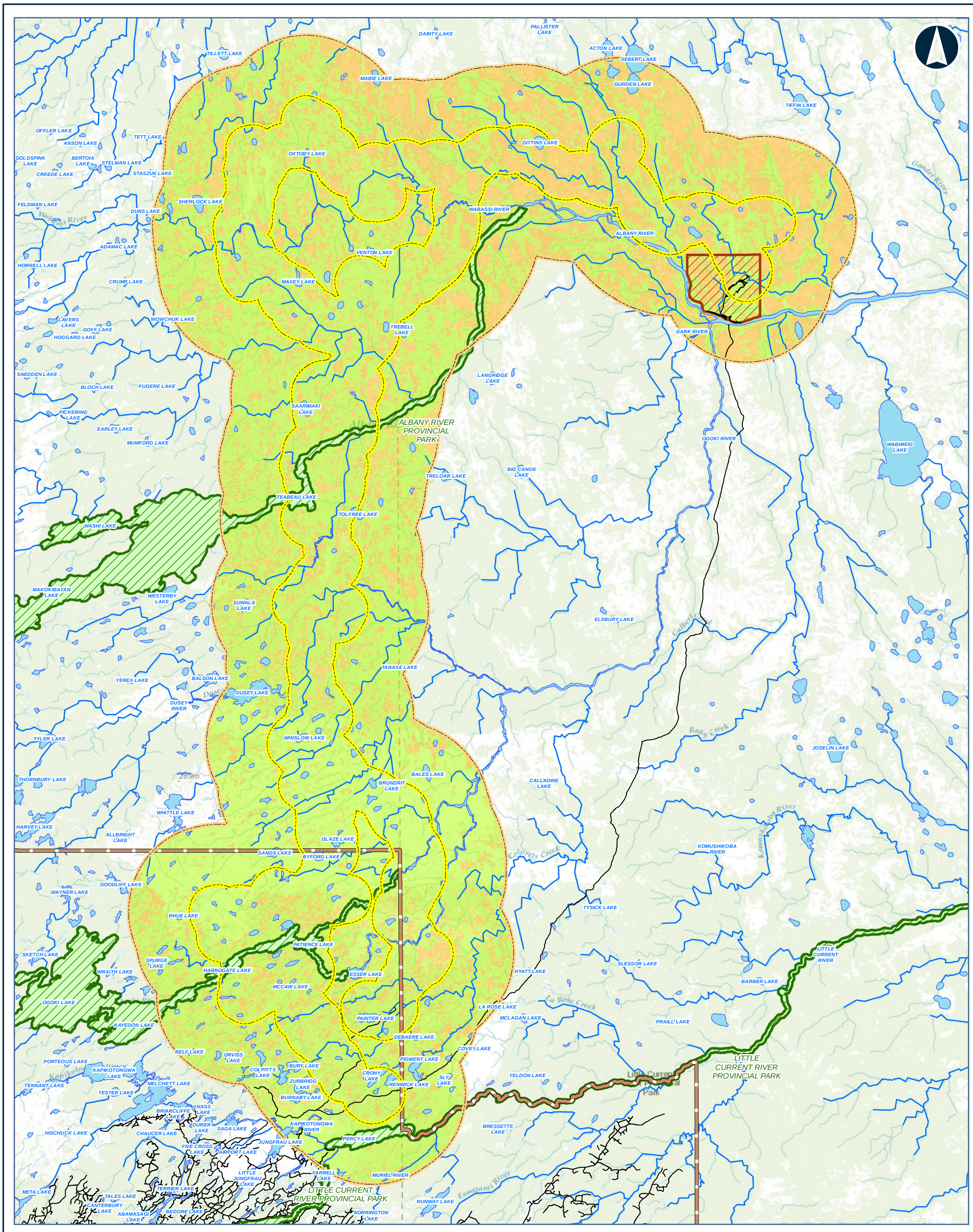
In Ontario, Canada warbler is an uncommon to common breeding species in the boreal forest south to Lake Ontario (Natural Heritage Information Centre, 2023). During field studies for the Project, Canada warblers were detected throughout the existing conditions Local Study Area, although detections were generally absent in the northwestern portion of the existing conditions Local Study Area. During the breeding season, this species was recorded at one of four autonomous recording unit survey stations in the Project Development in 2022, at eight of 54 autonomous recording unit survey stations in the Local Study Area in 2022, at 0 of 31 point count stations in the Project Development from 2018 to 2022, at 11 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at two of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**).

Canada warblers are anticipated to be present in the Project study areas only during the breeding season; this species migrates to southern Central America and northern South America for the winter (Reitsma et al., 2020). During autonomous recording unit surveys for the Project, Canada warblers were recorded during the spring and summer, with the highest detection rate reported in the summer (**Attachment B**). This species was detected in 2018 and 2022. Daily Canada warbler activity recorded on autonomous recording units was highest at dawn, but some activity was recorded at night (**Attachment B**).

High to moderate suitability habitat for Canada warbler is distributed throughout the Local and Regional Study Areas but there is less habitat in the northeastern portion of the study areas (**Figure 5-12**).

Canada warblers appear to have high site fidelity; one study reports that, over the 4-year study, 52% of males returned to within 35 m of the same territory centre in subsequent years (Hallworth et al., 2008). Females also had a high return rate and used areas within one km of a previous mate's territory (Hallworth et al., 2008). Average territory size estimates for this species range from 0.2 to 1.4 ha (Reitsma et al., 2020). Nests are often within 30 m of each other (Reitsma et al., 2020).

Habitat fragmentation from linear disturbances in the Project study areas at existing conditions has likely not negatively affected Canada warbler habitat distribution. This species is highly mobile and can establish territories in areas below carrying capacity. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest songbird species. For example, Norris and Stutchbury (2001), Fraser and Stutchbury (2004), and MacIntosh et al. (2011) report that wood thrushes and hooded warblers in a fragmented landscape generally foraged more than 150 m from their nest site and some individuals travelled over 1 km from their nest site. Similarly, Bayne and Hobson (2001) suggest that habitat fragmentation did not constrain the movements of successful breeding male ovenbirds in a boreal landscape. St. Clair et al. (1998) found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed. Bélisle and Desrochers (2002) found that birds rarely ventured greater than 25 m from a forest edge, which corresponds to a 50 m-wide corridor. In contrast, Desrochers and Hannon (1997) found that certain bird species preferred travelling through woodland cover, even when travel routes were substantially longer than crossing a forest gap of 10 to 170 m.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

CANADA WARBLER HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Canada Warbler in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-12

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5.6.1.3 Survival and Reproduction

Canada warbler is a Threatened species under the *Species at Risk Act* and is a Special Concern species under the *Endangered Species Act, 2007*.

During point count surveys in 2018 to 2022, Canada warbler was detected at the highest relative abundance at point count plots that occurred in the existing conditions Regional Study Area (mean relative abundance = 0.10 individuals per plot). Mean relative abundance of individuals was higher in 2018 (0.10 individuals per plot) than in 2022 (0.01 individuals per plot) (**Attachment B**).

The density estimates for Canada warbler in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.2 and 1.0 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the Canada warbler population in Ontario portion of Bird Conservation Region 8 have decreased by 1.4% each year from 1970 to 2021 (total decrease of 52.0%) (Smith et al., 2022). The reliability of this estimate is considered “low” and there is predicted to be an 97.2% chance of future population decrease in the region (Smith et al., 2022). Population trends for Canada warbler in Bird Conservation Region 7 is not available.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as Canada warbler, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

The average lifespan of Canada warblers is unknown but four-year-old birds are common and the maximum reported age of an individual is eight years (Reitsma et al., 2020). Estimates of annual survival are not currently available (Reitsma et al., 2020). Canada warblers typically start breeding at one year of age (Reitsma et al., 2020). Females lay an average of 4 to 5 eggs per brood and only raise one brood per season (Reitsma et al. 2020). Nest success estimates are not available but are thought to be high; there is relatively low nest loss from predation (Reitsma et al., 2020).

Predators of Canada warblers are unknown (Reitsma et al., 2020), however, it is anticipated that raptor species, such as northern goshawk, owls, and shrikes may kill individuals.

Canada warblers are insectivorous and primarily flying insects such as mosquitoes, flies, moths, and beetles (Reitsma et al., 2020). Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Insect declines are thought to be due to several factors including habitat loss, pesticides,

pollution, introduced species, and climate change (Wagner et al., 2021). Climate change and pollution may be factors present in the study areas. A decline in aerial insect abundance and availability may negatively affect Canada warbler populations by reducing prey availability for these species.

Climate change may be creating a disjunct between peak insect emergence and migratory songbird nesting because insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects, such as Canada warbler, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow Canada warblers to adapt to climate change.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are a brood parasites of Canada warblers. Peck and James (1987) report that 20% of Canada warbler nests in Ontario are parasitized by brown-headed cowbirds. Brown-headed cowbirds were not recorded in in any of the *Ontario Breeding Bird Atlas* blocks that were surveyed during the first or second atlas surveys (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline point count surveys. As such, nest parasitism is unlikely to have had a measurable effect on Canada warbler populations in the Project study areas at existing conditions.

5.6.2 Evening Grosbeak

5.6.2.1 Habitat Availability

Evening grosbeaks are associated with mixed forests and early successional forests (6 to 30 years) created by forest harvesting or natural disturbance (Committee on the Status of Endangered Wildlife in Canada, 2016; Bale et al., 2020), while preferred habitat is open, mature, mixed forest with a relatively open canopy and dense shrub layer (Committee on the Status of Endangered Wildlife in Canada, 2016). Moderate to high suitability habitat for evening grosbeak covers approximately 16% of the Local and Regional Study Areas (**Table 5-13**).

The main disturbance affecting evening grosbeak habitat availability in the Project study areas at existing conditions is fire. Insect outbreaks may also be a factor in habitat availability. Fires and insect outbreaks are expected to decrease habitat suitability for evening grosbeaks but these effects are expected to be negligible (Committee on the Status of Endangered Wildlife in Canada, 2016).

Table 5-13: Habitat Suitability for Evening Grosbeak at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	4,400.3	34.7	41,532.9	16.8	110,182.1	16.6
Low to Poor	8,264.9	65.3	206,424.9	83.2	551,850.3	83.4

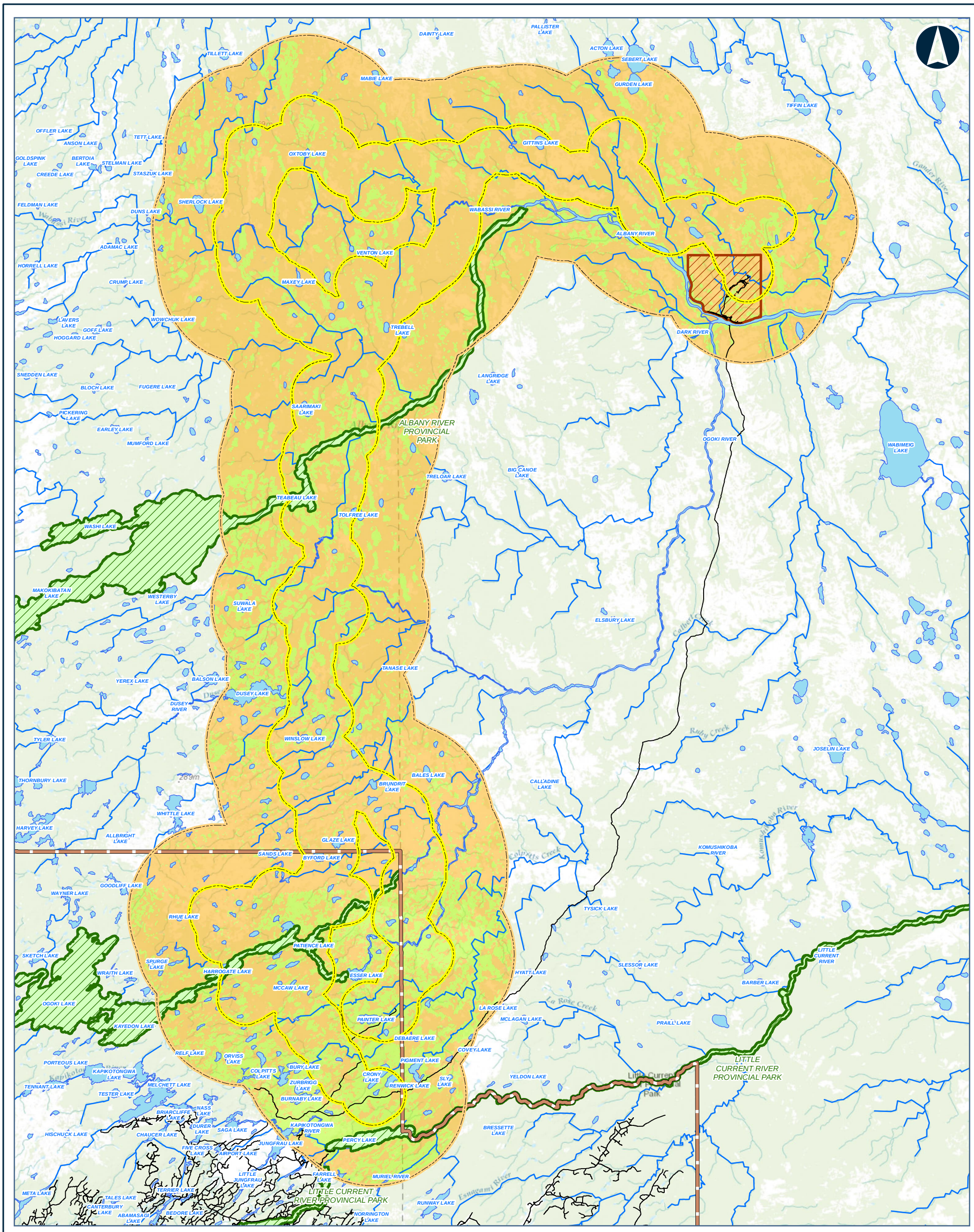
ha = hectare; % = percent.

5.6.2.2 Distribution

In Ontario, evening grosbeak is a common breeding species in the Canadian Shield and boreal forest regions of Ontario (Natural Heritage Information Centre, 2023). During field studies for the Project, evening grosbeaks were not detected during field studies for the Project (2018-2022) (**Attachment B**). Evening grosbeak is not a migratory species and may be present in the Project study areas throughout the year (Gillihan and Byers, 2020; Natural Heritage Information Centre, 2023). Moderate to high suitability habitat for evening grosbeak is most common in the southeastern portion of the Local and Regional Study Areas (**Figure 5-13**).

Evening grosbeaks appear to have low fidelity to breeding sites; in eastern Canada, 80% of birds may disperse up to 950 km from the previous year's breeding site (Gillihan and Byers, 2020). In Ontario, breeding territory estimates range from three to 15 ha; size varies depending on prey abundance (i.e., spruce budworm [*Choristoneura fumiferana*] outbreaks) with smaller territories reported in years of spruce budworm outbreaks (Committee on the Status of Endangered Wildlife in Canada, 2016).

Habitat fragmentation from linear disturbances in the Project study areas at existing conditions has likely not negatively affected evening grosbeak habitat distribution. This species is highly mobile and can establish territories in areas below carrying capacity. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest songbird species. For example, Norris and Stutchbury (2001), Fraser and Stutchbury (2004), and MacIntosh et al. (2011) report that wood thrushes and hooded warblers in a fragmented landscape generally foraged more than 150 m from their nest site and some individuals travelled over 1 km from their nest site. Similarly, Bayne and Hobson (2001) suggest that habitat fragmentation did not constrain the movements of successful breeding male ovenbirds in a boreal landscape. St. Clair et al. (1998) found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed. Bélisle and Desrochers (2002) found that birds rarely ventured greater than 25 m from a forest edge, which corresponds to a 50 m wide corridor. In contrast, Desrochers and Hannon (1997) found that certain bird species preferred travelling through woodland cover, even when travel routes were substantially longer than crossing a forest gap of 10 to 170 m.



Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

EVENING GROSBEAK HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Evening Grosbeak in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-13

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5.6.2.3 Survival and Reproduction

Evening grosbeak is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act*, 2007.

Relative abundance information is not available for evening grosbeaks as this species was not detected during point count or autonomous recording unit surveys (**Attachment B**). The density estimates for evening grosbeak in Ontario Breeding Bird Atlas Regions 44 and 37 are 0.1 and 0.7 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

Evening grosbeak populations in Bird Conservation Region 8 are predicted to have decreased by 6.6% each year from 1970 to 2021 (total decrease 96.9%). There is a "medium" reliability with this estimate and a 100.0% chance of future declines in the region (Smith et al., 2022). Population trends for evening grosbeak in Bird Conservation Region 7 are not available.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations. Evening grosbeak is a permanent resident in boreal Canada and so populations would not be affected by extreme weather events during migration.

The average lifespan, survival rates, and age of first breeding for evening grosbeaks are unknown. The longest lifespan reported for this species is 15 years (Gillihan and Byers, 2020). Females typically lay three to four eggs per brood and only raise one brood per season (Gillihan and Byers, 2020). Evening grosbeaks in Colorado have a 55% nest success rate (Gillihan and Byers, 2020).

Accipiter species, such as northern goshawk and sharp-shinned hawk, owls, and shrikes may kill adult and juveniles evening grosbeaks, while common raven is an egg predator for this species (Gillihan and Byers, 2020).

Evening grosbeaks primarily eat insects, including beetles, caterpillars, and aphids, but will also consume plant seeds and buds (Gillihan and Byers, 2020). Recently, substantial declines in aerial insect abundance and availability have been noted worldwide (Wagner et al., 2021). Insect declines are thought to be due to several factors including habitat loss, pesticides, pollution, introduced species, and climate change (Wagner et al., 2021). Climate change and pollution may be factors present in the study areas. A decline in aerial insect abundance and availability may negatively affect evening grosbeak populations by reducing prey availability for these species.

Climate change may be creating a disjunct between peak insect emergence and migratory songbird nesting because insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between

1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). However, evening grosbeaks do not migrate to neotropical locations and, so, this species is expected to be less affected by these changes.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are a brood parasites of evening grosbeaks. Brown-headed cowbirds were not recorded in in any of the *Ontario Breeding Bird Atlas* blocks that were surveyed during the first or second atlas surveys (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline point count surveys. As such, nest parasitism is unlikely to have had a measurable effect on evening grosbeak populations in the Project study areas at existing conditions.

5.6.3 Chimney Swift, Bank Swallow, and Barn Swallow

5.6.3.1 Habitat Availability for Chimney Swift

Chimney swifts are tolerant of human disturbance and have higher concentrations in urban areas where there are a large number of chimneys that can be used for nest sites (Steeves et al., 2020). In Canada, critical habitat for chimney swifts has been partially defined and is available for human-altered environments; critical habitat for natural habitats has not been defined as chimney swift use of natural habitats is not well quantified (Steeves et al., 2020; Environment and Climate Change Canada, 2023g; Government of Ontario, 2024b). Critical habitat for this species, in human-altered environments, is based on habitat occupancy and biophysical attributes of suitable habitat (Environment and Climate Change Canada, 2023g). To be considered critical habitat, the following criteria must be met (Environment and Climate Change Canada, 2023g):

- A confirmed breeding record between 2011 and 2017, or the observation of a bird entering a structure with a twig; or
- An observation of a swift entering or leaving a structure on at least two different days, including at least one day between 2011 and 2017 and one day between 2001 and 2017.

Suitable breeding habitat for this species in human-altered environments includes chimneys with interior walls constructed of masonry or other vertical structures, such as barns and silos, that have a suitable opening (Environment and Climate Change Canada, 2023g). In natural habitats, local scale breeding habitat features (e.g., hollow trees and caves) may be more important than landscape level habitat characteristics (Steeves et al., 2020). Overall, there is limited moderate to high suitability habitat present within the existing conditions Local and Regional Study Areas (**Table 5-14**).

Although effects of fire on chimney swift habitat are unknown, suitable habitat for nesting (e.g., mature and old trees with some decay) could be removed by fire. Insect outbreaks may increase potential for chimney swift breeding habitat by accelerating decay of mature and old tree species.

Table 5-14: Habitat Suitability for Chimney Swift, Bank Swallow, and Barn Swallow at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	29.8	0.0	465.8	0.2	1,224.3	0.2
Low to Poor	12,635.5	99.9	247492.1	99.8	660,808.1	99.8

ha = hectare; % = percent.

5.6.3.2 Habitat Availability for Bank Swallows

Bank swallows primarily breed in friable soils in vertical banks, cliffs, and bluffs along rivers, streams, lakes, reservoirs, and wetlands (Garrison and Turner, 2020). Riparian areas along large rivers and pits and quarries provide most of the suitable habitat for this species in the Canadian Shield (Falconer et al., 2016). There appear to be multiple threats to breeding and foraging habitat in Canada including loss from erosion and flood control projects, pits and quarries management activities, and deforestation (Committee on the Status of Endangered Wildlife in Canada, 2013a).

Bank swallows require a vertical bank for nesting; bank slopes must be at least 70° (Environment and Climate Change Canada, 2022). Average bank height in Saskatchewan was 1.8 m (range 0.5 to 6.0 m); the recovery strategy for this species in Canada defines a suitable bank face as a bank that is at least 0.5 m high (Environment and Climate Change Canada, 2022).

Critical habitat for bank swallow is currently defined in this species' recovery plan as all shoreline within five km of colonies that were active from 2001 to 2017, as well as a 500 m buffer around this shoreline area; the boundaries of critical habitat and new critical habitat units may be revised or identified in the future (Environment and Climate Change Canada, 2016). A total of 50 critical habitat locations have been identified in Ontario (Environment and Climate Change Canada, 2016). There is no critical habitat within the existing conditions Regional Study Area; the closest critical habitat location is on the Albany River approximately 200 km east of the existing conditions Regional Study Area (Environment and Climate Change Canada, 2013a). Based on a desktop review and aerial / ground reconnaissance surveys, no suitable breeding habitat for bank swallows was identified in the effects assessment Construction Disturbance Area. In Ontario, the general

habitat description for bank swallow has three categories (Ministry of the Environment, Conservation, and Parks, 2022b). Category 1 habitat is the bank swallow breeding colony, including the congregation of burrows and the substrate around them; Category 2 habitat is the area within 50 m in front of the breeding colony bank face; and Category 3 habitat is the area of suitable foraging habitat within 500 m of the outer edge of the breeding colony (Ministry of the Environment, Conservation, and Parks, 2022b). Overall, limited moderate to high suitability habitat is present within the existing conditions Local and Regional Study Areas (**Table 5-14**).

Bank swallows can tolerate human disturbance and often establish nesting colonies at aggregate sites or in material stockpiles at industrial sites (Garrison and Turner, 2020). This species may establish or use different nesting colonies among years (Garrison and Turner, 2020). Larger, more permanent colonies are typically established at natural locations where regular erosion keeps the bank suitable for burrow excavation (Falconer et al., 2016; Garrison and Turner, 2020; Environment and Climate Change Canada, 2022). As this species is highly mobile, forest fragmentation is not likely to negatively affect bank swallow habitat availability or distribution; open areas may provide suitable foraging habitat for this species (Garrison and Turner, 2020).

Some changes to existing conditions due to Project activities may favour bank swallow nesting and foraging habitat. Aggregate pits and road cuts may provide suitable breeding habitat for this species, while linear disturbances may provide suitable foraging habitat (Garrison and Turner, 2020). Open areas created by an increase in fire frequency and intensity, and insect outbreak frequency due to climate change may have increased bank swallow foraging habitat availability relative to historical conditions. However, the effects from the anticipated drying and shrinkage of wetlands are not likely to be positive (Garrison and Turner, 2020). Additionally, more frequent and intense flooding events, and increased ice scouring associated with climate change may have negative effects on bank swallow breeding habitat availability and distribution (Environment and Climate Change Canada, 2022).

5.6.3.3 Habitat Availability for Barn Swallows

Prior to European settlement in North America, barn swallow nest sites were likely confined to cliffs and caves; nests are now usually constructed on anthropogenic structures such as bridges, tunnels, culverts, and buildings (Committee on the Status of Endangered Wildlife in Canada, 2021; Brown and Brown, 2020). Barn swallows typically use open, human-modified habitat for foraging. Their home ranges are typically established in proximity to a waterbody with access to mud to form their nest structures (Committee on the Status of Endangered Wildlife in Canada, 2021; Brown and Brown, 2020). In the boreal portions of their range, where anthropogenic disturbance is low, suitable breeding habitat for barn swallows is confined to areas of recent disturbance (i.e., recent burn) and in open habitats associated with rivers, waterbodies, and marshes

(Committee on the Status of Endangered Wildlife in Canada, 2021). Overall, limited moderate to high suitability habitat is present within the existing conditions Local and Regional Study Areas (**Table 5-14**).

Barn swallows can be tolerant of human disturbance and often establish nests in urban areas (Brown and Brown, 2020). This species is highly mobile and forest fragmentation is not likely to negatively affect barn swallow habitat availability or distribution (Brown and Brown, 2020). Some changes in existing conditions may have favoured barn swallow nesting and foraging habitat. Human structures, such as buildings and bridges, may provide suitable breeding habitat for this species, while linear disturbances may provide suitable foraging habitat. Open areas created by an increase in fire frequency and intensity, and insect outbreak frequency due to climate change may have increased barn swallow foraging habitat availability relative to historical conditions. However, wetland drying and shrinkage due to climate change may have negative effects (Brown and Brown, 2020).

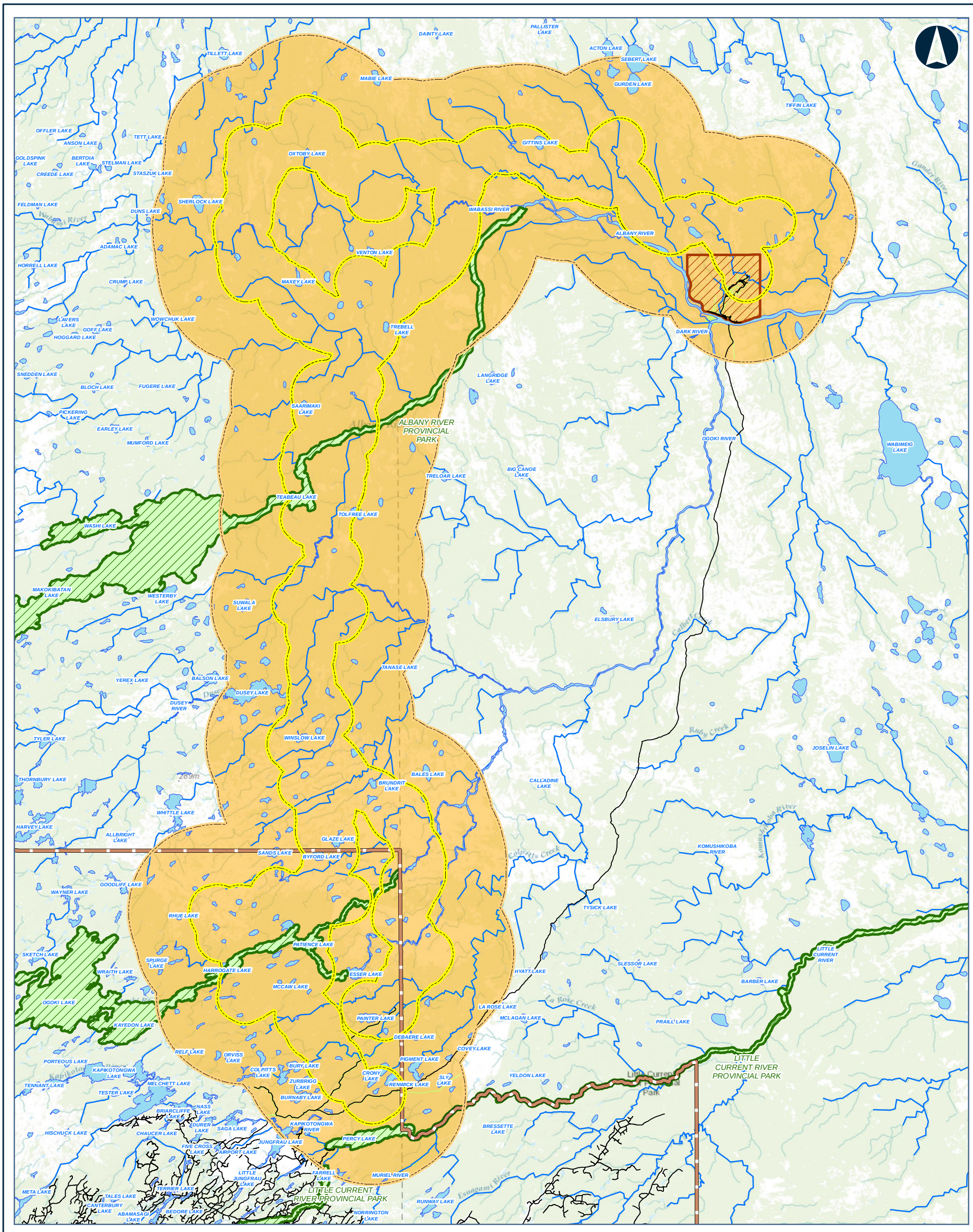
5.6.3.4 Distribution for Chimney Swift

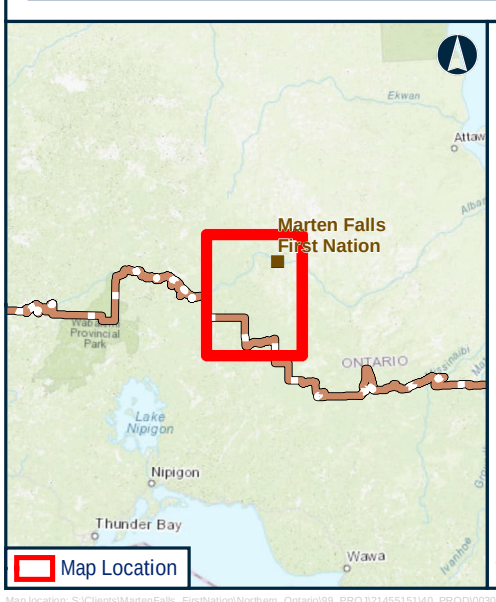
Chimney swift is an uncommon breeding species in Ontario (Natural Heritage Information Centre, 2023) and this species has not been recorded north of the 49-parallel (Government of Ontario, 2022). As such, chimney swifts are not expected to be present in the Project study areas. No chimney swifts were detected during field studies (**Attachment B**). Moderate to high suitability habitat for chimney swift is present in the Marten Falls First Nations Community (**Figure 5-14**).

Chimney swifts may be present in Ontario during the spring migration, summer breeding, and fall migration periods; this species migrates to northern South America for the winter (Steeves et al., 2020). Chimney swifts are expected to be most active during the day.

Chimney swifts have high fidelity to nesting sites; in Ohio 96% of birds that returned used the same nest site (Dexter, 1992). The home range sizes of chimney swifts are unknown; birds have been seen to forage within 6 km of their nest sites (Steeves et al., 2020).

This species is highly mobile and can establish territories in areas below carrying capacity. However, breeding habitat features in natural environments may be limiting factor for this species.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

CHIMNEY SWIFT, BANK SWALLOW, AND BARN SWALLOW HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Chimney Swift, Bank Swallow, and Barn Swallow in the Regional Study Area at Existing

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-14

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Date Saved: 2/12/2026 11:18:29 AM User Name: INBA08973

5.6.3.5 Distribution for Bank Swallow and Barn Swallow

Bank swallows and barn swallows are sparsely distributed throughout the Canadian Shield (Falconer et al., 2016; Brown and Brown, 2020). The current North American distribution of the barn swallow is believed to be much larger than pre-European levels due to the increase of open foraging habitat created by anthropogenic disturbance and the construction of barns and wooden structures in many portions of their range (Committee on the Status of Endangered Wildlife in Canada, 2013a). However, this species is absent from large portions of forested areas north of 50°N (Brown and Brown, 2020).

No observations of bank or barn swallow were made during field work from 2018 to 2022 in the Project study areas and no historical observations of bank or barn swallow were recorded in the birds existing conditions Regional Study Area by the Ontario Natural Heritage Information Centre or the *Ontario Breeding Bird Atlas* (**Attachment B**). However, a barn swallow observation recorded through eBird in 2022 was made approximately 5 km east of the existing conditions Regional Study Area at the eastern terminus of the Project (eBird, 2023). There is also a bank swallow record (2021) of possible breeding on the *Ontario Breeding Bird Atlas* located approximately 22 km northeast of the existing conditions Regional Study Area. Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope, approximately 80 km west of the Project. Moderate to high suitability habitat for bank swallow and barn swallow is present in the Marten Falls First Nations Community (**Figure 5-14**).

Both bank swallows and barn swallows may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; these species migrate to South America for the winter (Garrison and Turner, 2020; Brown and Brown, 2020).

Bank swallow presence may fluctuate among years depending on the presence of suitable breeding habitat; slopes may slump and become unsuitable for burrowing (see more details in **Section 4.1.6.2.3**). If the presence of a nesting colony is stable, bank swallows appear to have a fairly high site fidelity. One study reports that 46% of bank swallow juveniles were recaptured at natal colonies the following year (Garrison and Turner, 2020). Male bank swallows appear to have higher fidelity than females, with males having a three-times higher return rate than females (Garrison and Turner, 2020). Bank swallows generally defend a small area around their nesting colony and forage within 800 m of their nest site, which represents a functional home range of approximately 200 ha (Garrison and Turner, 2020). Distances between bank swallow burrows range from 13 to 59 cm (Garrison and Turner, 2020).

Barn swallows maintain and defend small territories immediately surrounding their nest sites during the breeding season (0.01 ha) but their functional home range, including foraging habitat, is much larger (Brown and Brown, 2020; Odsen and Pyper, 2018a). Information on home range size in the boreal portion of the range of the species is limited; however, a study in West Virginia found that individuals foraged within 1.2 km of their

nesting sites (Samuel, 1971), which would represent a functional home range of approximately 450 ha. Individuals in Europe typically forage within 500 m of their nesting sites (approximate home range size of 78.5 ha) (Møller, 1987). The species will sometimes nest in colonies with active nests as close as 10 cm apart (Brown and Brown, 2020). Barn swallows typically have low to moderate fidelity to nest sites; estimates of return rates range from 12% to 42% (Brown and Brown, 2020).

5.6.3.6 Survival and Reproduction for Chimney Swift

No chimney swifts were detected during field studies for the Project from 2018 to 2022 (**Attachment B**). Density estimates for chimney swift in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey does not have population trends for chimney swift in Bird Conservation Region 7 or 8 (Smith et al., 2022). This is a declining species in Ontario (Natural Heritage Information Centre, 2023; Government of Ontario, 2024b). Historically, in Ontario, chimney swifts were likely sparse and limited by nesting sites (e.g., tree cavities, caves) (Government of Ontario, 2022). Chimney swift populations increased dramatically after European settlement, as they started used chimneys as nest sites, but, recently, population declines have been noted (Government of Ontario, 2024b). The factors behind the current decline of this species are unknown but may be related to declining prey abundance.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as chimney swift, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008). In 2005, hurricane Wilma killed at least 727 chimney swifts and, in 2006, swift population numbers in Québec were reported have decreased by 50% compared to the previous year (Dionne et al., 2008). Cold weather on their breeding grounds can cause chimney swift mortality by reducing insect availability and resulting in starvation (Steeves et al., 2020). Exposure of nests to heavy rain can also cause mass mortality (Steeves et al., 2020).

Chimney swifts have an average lifespan of 4.6 years and individuals up to 15 years of age have been reported (Steeves et al., 2020). Several studies have reported that adults have an annual survival rate of approximately 37% (Steeves et al., 2020). Females typically lay four to five eggs per brood and only raise one brood per season (Steeves et al., 2020). Nest success estimates for this species are high and range from 86% to 90% (Steeves et al., 2020).

Sharp-shinned hawks and peregrine falcons may depredate adult chimney swifts (Steeves et al., 2020). Black rat snake (*Pantherophis alleghaniensis*), which is not present in the Project study areas, is the only known nest predator (Steeves et al., 2020).

In Ontario, chimney swifts prefer to consume beetles but will also consume other insects such as true bugs (Order Hemiptera) (Nocera et al., 2012). Worldwide insect declines may be negatively affecting chimney swift populations in the Project study areas by reducing prey availability for this species. Climate change may be creating a disjunct between peak insect emergence and migratory bird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study found that spring insect emergence in the northeastern North America has advanced by three to 12 days from 1989 to 2014 and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, chimney swifts appear to be arriving on their breeding grounds earlier than 100 years ago and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow chimney swifts to adapt to climate change.

5.6.3.7 Survival and Reproduction for Bank Swallow and Barn Swallow

No bank swallows or barn swallows were detected during field studies for the Project from 2018 to 2022. The North American Breeding Bird Survey suggests that the bank swallow population in Bird Conservation Region 7 has decreased by 3.6% each year from 1970 to 2021 (total decrease 84.4%) (Smith et al., 2022). The reliability of this estimate is considered “low” (Smith et al., 2022). There is an 88.5% chance of future population decline in the region (Smith et al., 2022). Population trends for barn swallow are not available for Bird Conservation Region 7 (Smith et al., 2022). The bank swallow population in Bird Conservation Region 8 has decreased by 12.4%, annually, from 1970 to 2021 (total decrease 99.9%) (Smith et al., 2022). The reliability of this estimate is considered “low” but there is a 100.0% chance of future population decline (Smith et al., 2022). The barn swallow population in Bird Conservation Region 8 has declined by 3.0% each year from 1970 to 2021 (total decrease 79.0%). The reliability of this estimate is considered “low” but there is a 100.0% chance of future population decline (Smith et al., 2022).

The density estimates for bank swallow in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available. The density estimates for barn swallow in *Ontario Breeding Bird Atlas* Regions 44 and 37 are <0.1 nesting territories per km^2 for both regions (Bird Studies Canada et al., 2006).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as bank swallows and barn swallows, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008). More frequent and intense flooding

events associated with climate change may have negative effects on bank swallow survival and reproduction if these events destroy nesting colonies during the breeding season (Environment and Climate Change Canada, 2022).

Bank and barn swallows both reach reproductive capacity at one year of age (Brown and Brown, 2020; Garrison and Turner, 2020). Barn swallows and bank swallows may have low survival rates with estimates of 30% to 40% reported in literature (Brown and Brown, 2020; Garrison and Turner, 2020). The oldest reported bank swallow was 15 years of age at time of capture, while the oldest known barn swallow was nine years old (Brown and Brown, 2020; Garrison and Turner, 2020). Females of both species lay four to five eggs per brood and raise one brood per season (Brown and Brown, 2020; Garrison and Turner, 2020). Nest success estimates for barn swallows range from 60% to 80% (Brown and Brown, 2020). Bank swallow nest success estimates vary widely and may be positively correlated with burrow length; nest success rates of 44% to 73% have been reported in literature (Garrison and Turner, 2020).

Barn swallows may be depredated by accipiters, hawks, owls, gulls, grackles, corvids, squirrels, weasels, raccoons, and snakes (Brown and Brown, 2020; Garrison and Turner, 2020).

Bank swallows and barn swallows almost exclusively consume flying insects such as flies, beetles, true bugs, and wasps (Brown and Brown, 2020; Garrison and Turner, 2020).

Changes in spring temperatures and the timing of bird migration may result in a disjunct between peak insect emergence and songbird nesting as insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). A study that reviewed daily insect abundance and nest-record data from 1989 to 2014 found that spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, bank swallows and barn swallows appear to be arriving on their breeding grounds earlier than 100 years ago and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow these species to adapt to climate change. Declines in aerial insect abundance and availability that have been noted worldwide could have negative effects on these species by reducing prey availability.

5.6.4 Common Nighthawk and Eastern Whip-poor-will

5.6.4.1 Habitat Availability for Common Nighthawk

In boreal environments, common nighthawks nest in a variety of open or semi-open habitats, such as forest clearings, burned areas, rocky outcrops, peat bogs, and marshes (Committee on the Status of Endangered Wildlife in Canada 2018a; Sidler, 2017; Brigham et al., 2020). Wetlands and open water are often used for foraging (Brigham et al., 2020). In Ontario, this species is most abundant in the boreal forest in areas of large burns (Natural Heritage Information Centre, 2023). Common nighthawks may be tolerant of areas with high sensory disturbance as this species will nest on rooftops in urban areas (Brigham et al., 2020). Foraging habitat for the species is variable and may be largely driven by the insect density instead of the specific habitat type (Committee on the Status of Endangered Wildlife in Canada, 2018a). Critical habitat has not yet been identified for common nighthawk due to the diversity of nesting, roosting, and foraging habitats that have been reported (Environment Canada, 2016b).

During the breeding season, common nighthawk was detected on autonomous recording units at the highest relative abundance in the coniferous forest and fen habitat types in the existing conditions Local Study Area and existing conditions Construction Disturbance Area (**Attachment B**).

According to the habitat model, common nighthawk abundance was greater in flatter areas with locally high proportions of sparse forest habitat and locally low proportions of riparian and mature forest habitats (**Attachment C**). Suitable common nighthawk habitat is abundant in the study areas and covers approximately 40% to 50% of each study area (**Table 5-15**). This value does not consider existing disturbances (e.g., roads) that may provide suitable breeding habitat for this species.

Table 5-15: Habitat Suitability for Common Nighthawk at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	3,676.9	29.0	65,034.3	26.2	163,044.3	24.6
Moderate	1,220.9	9.6	60,323.5	24.3	167,699.7	25.4
Low	1,888.0	14.9	60490.4	24.4	166,161.8	25.1
Poor	5,879.5	4.6	62,109.6	25.1	164,927.4	24.9

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent

Fires and insect outbreaks may increase common nighthawk habitat availability as this species is abundant in post-fire habitats (Committee on the Status of Endangered Wildlife in Canada, 2018a). As such, an increase in the intensity and frequency of fires and insect outbreaks due to climate change may be increasing common nighthawk habitat availability in the study areas, relative to historical conditions.

5.6.4.2 Habitat Availability for Eastern Whip-poor-will

Eastern whip-poor-wills breed in semi-open or patchy forests; wide-open spaces and dense forests are avoided (Committee on the Status of Endangered Wildlife in Canada 2009a). Forest structure seems to be more important than forest composition, but whip-poor-wills are found in dry deciduous or mixed forests throughout most of the species' range (Cink et al., 2017). Whip-poor-wills are also commonly found in rock or sand barrens with scattered trees, old burns, other disturbed sites with early forest succession, and pine plantations (Cink et al., 2017; Committee on the Status of Endangered Wildlife in Canada, 2009a). This species prefers even-aged successional habitats and is uncommon in mature forests, although individuals may use openings in mature forest areas (Committee on the Status of Endangered Wildlife in Canada, 2009a). Nests require tree cover, shade, and sparse ground cover, and they need to be close to open areas used for foraging (Cink et al., 2017). Transmission line rights-of-ways and road corridors may provide suitable foraging habitat for this species (Committee on the Status of Endangered Wildlife in Canada, 2009a).

Critical habitat for eastern whip-poor-will has been defined using habitat occupancy and habitat suitability (Environment and Climate Change Canada, 2018a). The closest critical habitat location for eastern whip-poor-will is near Ouimet Canyon, approximately 250 km southwest of the existing conditions Regional Study Area (Environment and Climate Change Canada, 2018a). In Ontario, the general habitat description for eastern whip-poor-will has three categories (Ministry of the Environment, Conservation, and Parks, 2021). Category 1 habitat is the nest and the area within 20 m of the nest; Category 2 habitat is the area between 20 and 170 m from the nest or centre of approximated defended territory; and Category 3 habitat is the area of suitable habitat between 170 and 500 m of the nest or centre of approximated defended territory (Ministry of the Environment, Conservation, and Parks 2021).

During the breeding season, autonomous recording units detected the highest relative abundance of eastern whip-poor-will in coniferous forest habitat (**Attachment B**).

Fires and insect outbreaks may increase eastern whip-poor-will habitat availability (Committee on the Status of Endangered Wildlife in Canada, 2009a). As such, an increase in the intensity and frequency of fires and insect outbreaks due to climate change may be increasing eastern whip-poor-will habitat availability in the study areas, relative to historical conditions.

Table 5-16: Habitat Suitability for Eastern Whip-poor-will at Existing Conditions

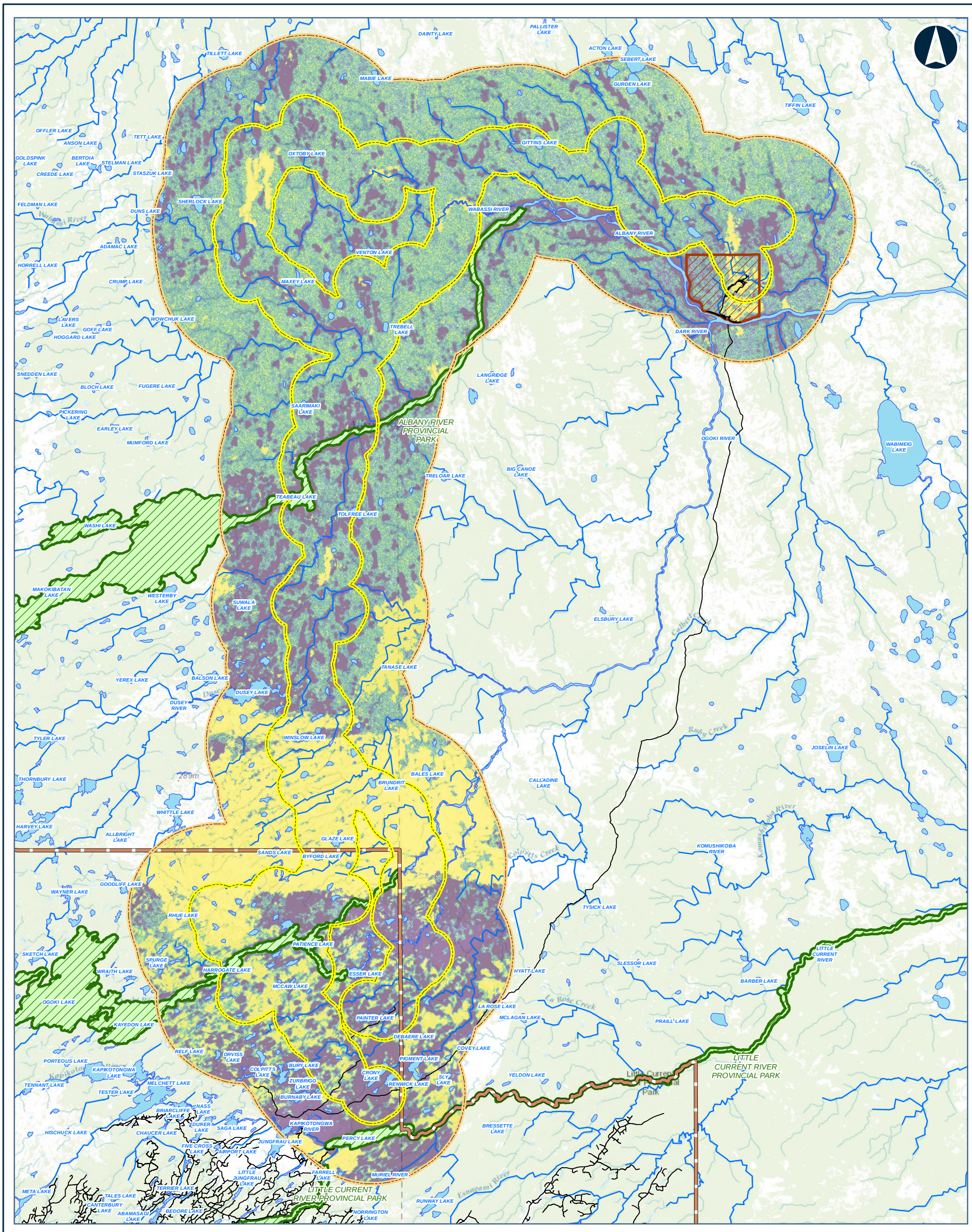
Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	1,089.2	8.6	9,529.5	3.8	24,253.5	3.7
Low to Poor	11,576.1	91.4	238,428.4	96.2	637,778.9	96.3

ha = hectare; % = percent.

5.6.4.3 Distribution

Historically, common nighthawk was a common breeding species throughout Ontario but drastic population declines have been noted, particularly in the southern portion of the province, and, currently, common nighthawk mostly occurs in the boreal forest region (Natural Heritage Information Centre, 2023). Eastern whip-poor-will generally occurs south of the boreal forest in Ontario; although dramatic population declines have been noted in southern Ontario, this species is still locally common along the southern edge of the Canadian Shield (Natural Heritage Information Centre, 2023).

Habitat fragmentation from mineral exploration and other linear disturbances present at existing conditions is not likely to have negatively affected common nighthawk and eastern whip-poor-will habitat distribution because these species are highly mobile and can use semi-open to open areas with human infrastructure (e.g., transmission lines, roads) for nesting. A large patch of high quality common nighthawk habitat is between the Ogoki River and Dusey Lake in the southern portion of the study areas (**Figure 5-15**).Most moderate to high quality eastern whip-poor-will habitat is in the southern portion of the study areas (**Figure 5-16**).



Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

COMMON NIGHTHAWK HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:

Base Data: Provided by MNRF 2023; Contains Information licensed under the Open Government Licence Ontario.
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Common Nighthawk in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-15

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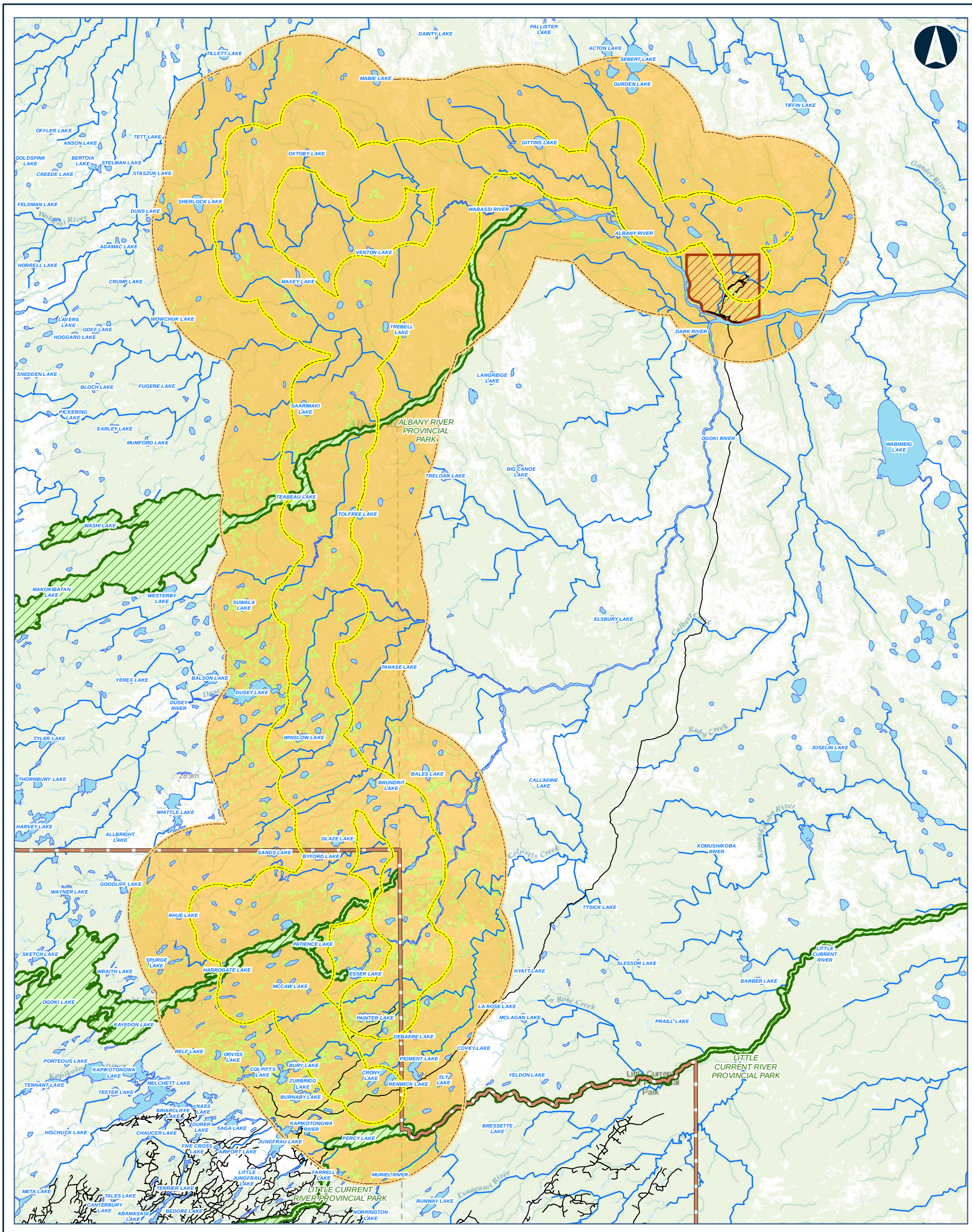



Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

EASTERN WHIP-POOR-WILL HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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MARTEN FALLS FIRST NATION
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Habitat Suitability for Eastern Whip-poor-will in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 5-16

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0018_5-16.mxd
Date Saved: 2/12/2026 11:26:56 AM User Name: INBA08973

During the breeding season, common nighthawk was recorded at three of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 37 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, and at one of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, but was not detected at any point count stations in the existing conditions Construction Disturbance Area or existing conditions Regional Study Area from 2018 to 2022 (**Attachment B**). Common nighthawk was also detected incidentally during aerial surveys in the existing conditions Local Study Area in 2022. Eastern whip-poor-will was detected at one of the 54 autonomous recording unit survey stations established during the breeding season in the existing conditions Local Study Area in 2022 and was not detected at any breeding bird point count survey locations from 2018 to 2022 (**Attachment B**).

Common nighthawk and eastern whip-poor-will may occur in the Project study areas during the spring migration, summer breeding, and fall migration periods; these species migrate to South America for the winter (Brigham et al. 2020). Autonomous recording units in the existing conditions Construction Disturbance Area and existing conditions Local Study Area detected common nighthawk during the fall and summer and the highest relative abundance occurred during the summer. Eastern whip-poor-wills were detected during the spring and summer periods, with highest abundance also reported during the summer. Daily activity of common nighthawk and eastern whip-poor-will recorded on autonomous recording units was highest at night.

Home range estimates for common nighthawk can vary widely and values of 3.7 to 259 ha have been reported (Brigham et al., 2020); average territory size in the boreal forest of Alberta is 28 ha (Odsen and Pyper, 2018b). Common nighthawk site fidelity is high. During a one-year study in the boreal forest of Alberta, 100.0% of tracked birds returned to within 1.3 km of original capture locations (Ng et al., 2018).

Eastern whip-poor-wills have an average territory of five ha (Committee on the Status of Endangered Wildlife in Canada, 2009a). This species appears to have high site fidelity to breeding locations; one study in Kansas reports a return rate of 77% (Committee on the Status of Endangered Wildlife in Canada, 2009a).

5.6.4.4 Survival and Reproduction

Common nighthawk is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Eastern whip-poor-will is a Threatened species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Eastern whip-poor-will was recently re-assessed and downlisted to Special Concern by the Committee on the Status of Endangered Wildlife in Canada and the Committee on the Status of Species at Risk in Ontario and subsequent downlisting under the *Species at Risk Act* and the *Endangered Species Act, 2007* are anticipated in the future.

During autonomous recording unit surveys completed during the breeding season in 2022, common nighthawk was detected at a higher relative abundance in the existing conditions Construction Disturbance Area than the existing conditions Local Study Area, while eastern whip-poor-will was detected at a higher abundance in the existing conditions Local Study Area than the existing conditions Construction Disturbance Area; no individuals of either species were detected in the existing conditions Regional Study Area (**Attachment B**).

The density estimate for common nighthawk in *Ontario Breeding Bird Atlas* Region 37 is 0.3 nesting territories per km^2; an estimate for this species is not available for Region 44 (Bird Studies Canada et al., 2006). Density estimates for eastern whip-poor-will in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the common nighthawk population in Bird Conservation Region 7 has decreased by 1.5% each year from 1970 to 2021 (total decrease 53.5%) (Smith et al., 2022). There is an 80.2% chance of future population decline in the region (Smith et al., 2022). A population trend for eastern whip-poor-will in Bird Conservation Region 7 is not available (Smith et al., 2022). The common nighthawk population in Bird Conservation Region 8 has decreased by 1.6%, annually, from 1970 to 2021 (total decrease 56.2%) (Smith et al., 2022). There is a 91.9% chance of future population decline (Smith et al., 2022). The eastern whip-poor-will population in Bird Conservation Region 8 has declined by 2.2% each year from 1970 to 2021 (total decline 68.2%). The reliabilities of the above estimates are “low” (Smith et al., 2022) and there is further uncertainty as these species may not be well-surveyed using breeding bird point count survey methods.

Currently, little information is available on common nighthawk and eastern whip-poor-will breeding biology; age of first breeding, annual survival rates, and nest success rates are not known (Brigham et al., 2020; Cink et al., 2017). Females of both species typically lay two eggs per brood, while common nighthawks typically raise one brood per season, eastern whip-poor-wills will often lay a second brood (Brigham et al., 2020; Cink et al., 2020). Average lifespan is unknown but common nighthawks of nine years old have been reported.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as common nighthawk and eastern whip-poor-will, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008; Environment and Climate Change Canada, 2018a).

Common nighthawk and eastern whip-poor-will are ground nesting species and are vulnerable to predation by mammalian predators like skunks, foxes (Oji-Cree translation, *waakoshag*), coyotes, and raccoons. Other species that may prey nighthawks include common raven, American crow, and American kestrel.

Both species eat a wide variety of insects but most commonly consume queen ants, beetles, caddisflies, moths, and true bugs (Brigham et al., 2020; Cink et al., 2017). Climate change may be creating a disjunct between peak insect emergence and migratory bird nesting (Radchuk et al., 2019; Shipley et al., 2022). In eastern North America, common nighthawks and eastern whip-poor-will seem to be particularly vulnerable to this change as both species appear to be arriving on breeding grounds at the same time as 100 years ago (Butler, 2003). If this trend continues, the time gap between peak insect emergence in migratory staging areas and northern breeding grounds may continue to widen and may have negative effects on these species' reproductive ability. Worldwide insect declines may be negatively affecting common nighthawk and eastern whip-poor-will populations in the Project study areas by reducing prey availability for these species.

5.6.5 Eastern Wood-Pewee

5.6.5.1 Habitat Availability

In Canada, eastern wood-pewees prefer to nest in clearings and edges in deciduous and mixed forests (Committee on the Status of Endangered Wildlife in Canada 2013a). Mixed forest habitat covers 0.2% of the existing conditions Local Study Area and comprise 0.8% of upland forest habitat in the existing conditions Local Study Area (*Vegetation Technical Support Document*, Section 5.4.3, WSP, 2026a). Deciduous forest covers 2.6% of the existing conditions Local Study Area and comprises 10.1% of upland habitat in the existing conditions Local Study Area. According to habitat suitability modelling, moderate to high suitability habitat for eastern wood-pewee covers approximately 5% of the Local and Regional Study Areas (**Table 5-17**).

During point count surveys, eastern wood-pewees were detected in coniferous forest and bog habitats (**Attachment B**). During autonomous recording unit surveys, this species was detected in deciduous forest habitat (**Attachment B**).

Fires and insect outbreaks may decrease eastern wood-pewee habitat availability as this species is more abundant in landscapes with more tree cover (Kendrick et al., 2013). As such, an increase in the intensity and frequency of fires and insect outbreaks due to climate change may be decreasing eastern wood-pewee habitat availability in the study areas, relative to historical conditions.

Table 5-17: Habitat Suitability for Eastern Wood-Pewee at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	1,845.5	14.6	13,683.5	5.5	36,096.7	5.5
Low to Poor	10,819.8	85.4	234,274.3	94.5	625,935.7	94.5

ha = hectare; % = percent.

5.6.5.2 Distribution

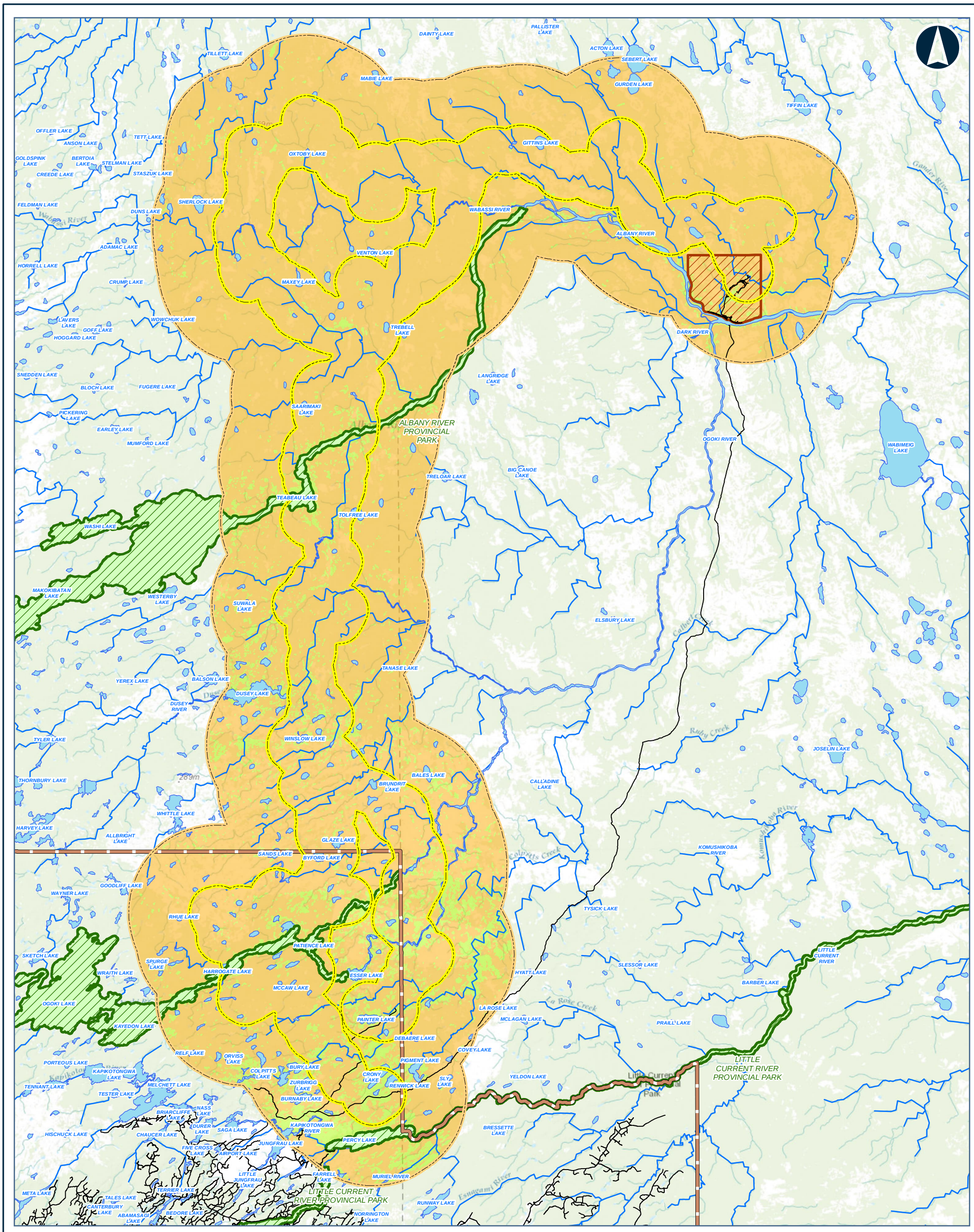
In Ontario, eastern wood-pewee is a common breeding species south of the southern portion of the boreal forest (Natural Heritage Information Centre, 2023) and this species had not historically been recorded north of Lake Nipigon (Government of Ontario, 2021); however, this species was detected in the southern and northern portions of the Project study areas during field surveys. Additionally, Indigenous Knowledge shared by Aroland First Nation has noted the presence of this species within the area of Ogoki Lake, Melchett Lake, Tennant Lake, Kapikotongwa Lake, Briarcliffe Lake, Nass Lake, and Durer Lake. (Shared Value Solutions, 2024). During the breeding season, this species was recorded on one of 54 autonomous recording unit survey stations in the southern portion of the existing conditions Local Study Area in 2022 and at two of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022; one observation was recorded in the southern portion of the existing conditions Regional Study Area and one observation was recorded in the northwest portion of the existing conditions Regional Study Area (**Attachment B**).

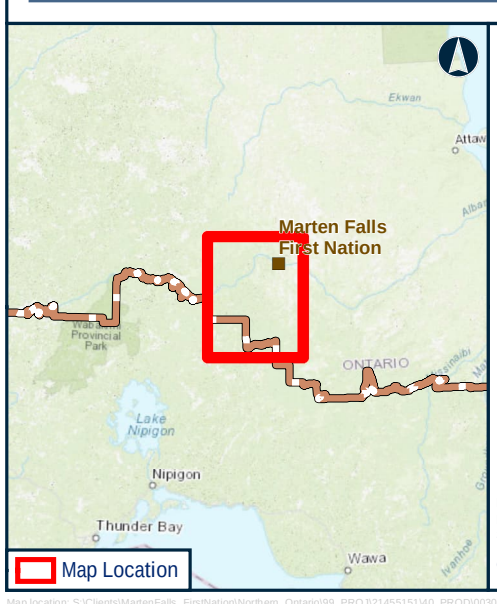
Eastern wood-pewees may occur in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to northern South America for the winter (Watt et al., 2020). Eastern wood-pewees were only detected during field surveys in the summers of 2018 and 2022. Daily wood-pewee activity recorded on autonomous recording units was highest at dawn.

Eastern wood-pewees have fairly high site fidelity with 29% to 57% of individuals returning to the same breeding area in Ohio (Watt et al., 2020). At the northern edge of their range in Ontario, territories may be 10 ha (Watt et al., 2020).

Moderate to high suitability habitat for eastern wood-pewee is primarily distributed in the southern portion of the study areas (**Figure 5-17**). Most of the large, contiguous areas of upland forest habitat that may be suitable for eastern wood-pewee occurs in the southern half of the existing conditions Local Study Area (*Vegetation Technical Support Document*, Figure 5-3.7, WSP, 2026a). Deciduous and mixed forest patches are generally absent north of Teabeau Lake, although there is a large patch of deciduous forest at the northern tip of the existing conditions Local Study Area (*Vegetation Technical Support Document*, Figure 5-3.7, WSP, 2026a).

Eastern wood-pewees are highly mobile and can establish territories in areas below carrying capacity. Several studies have found that habitat fragmentation may not impede daily movements of forest songbird species, including eastern wood-pewee. Habitat fragmentation did not constrain the movements of successful breeding male ovenbirds in a boreal landscape (Bayne and Hobson, 2001) and forest birds are likely to cross gaps of 200 m when no other choice exists (St. Clair et al., 1998). However, other studies have found that certain bird species will not cross forest gaps of 10 to 170 m (Desrochers and Hannon, 1997).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

EASTERN WOOD-PEWEE HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2023; Contains Information licensed under the Open Government Licence Ontario.
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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Eastern Wood-Pewee in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 5-17

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0030_Birds_Section4_5\21455151-0030-RT-0019_5-17.mxd
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5.6.5.3 Survival and Reproduction

Eastern wood-pewee is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*.

During point count surveys in 2018 to 2022, eastern wood-pewee was detected at the highest relative abundance at point count plots that occurred in the southern portion of the existing conditions Regional Study Area (mean relative abundance = 0.10 individuals per plot). Mean relative abundance of individuals was higher in 2018 (0.03 individuals per plot) than in 2022 (0.01 individuals per plot) (**Attachment B**). An estimate of eastern wood-pewee abundance in the Project study areas is not available because habitat modelling could not be completed for this species using data collected during baseline surveys for the Project.

The density estimate for eastern wood-pewee in *Ontario Breeding Bird Atlas* Region 37 is 0.2 nesting territories per km^2; density estimates for this species in Region 44 are not available (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the eastern wood-pewee population in Ontario portion of Bird Conservation Region 8 has decreased by 0.7% each year from 1970 to 2021 (total decrease of 29.5%) (Smith et al., 2022). The reliability of this estimate is considered “medium” and there is predicted to be an 74.4% chance of future population decrease in the region (Smith et al., 2022). Population trends for eastern wood-pewee in Bird Conservation Region 7 are not available.

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as eastern wood-pewee, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

The average lifespan of eastern wood-pewee is estimated to be 2.5 years; the maximum reported age of an individual is 8 years (Watt et al., 2020). Estimates of annual survival are not currently available (Watt et al., 2020). Eastern wood-pewees may start breeding in their first or second year (Watt et al., 2020). Females typically lay three eggs per brood and only raise one brood per season (Watt et al., 2020). Nest success estimates range from 32% to 56% (Kendrick et al., 2013; Watt et al., 2020).

Specific predators of eastern wood-pewees are unknown but potential predators include red squirrel, blue jay, owls, and American crow (Committee on the Status of Endangered Wildlife in Canada, 2013b).

Eastern wood-pewees are insectivorous and primarily consume flying insects such as flies, true bugs, butterflies, and beetles. Declines in aerial insect abundance and availability that have been noted throughout the world and may be negatively affecting eastern wood-pewee populations in the Project study areas by reducing prey availability for this species.

Climate change may be creating asynchrony between peak insect emergence and songbird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study found that spring insect emergence in the northeastern North America has advanced by three to 12 days from 1989 to 2014 and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, eastern wood-pewees appear to be arriving on their breeding grounds earlier than 100 years ago and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow eastern wood-pewees to adapt to climate change. Insect declines that have been noted throughout the world may be negatively affecting eastern wood-pewee populations in the Project study areas by reducing prey availability for this species.

Forest fragmentation can increase accessibility for brown-headed cowbirds, which are brood parasites of eastern wood-pewees. However, this species is not highly vulnerable to nest parasitism and Peck and James (1997) report that 5.5% of eastern wood-pewee nests in Ontario are parasitized by brown-headed cowbirds. Brown-headed cowbirds were not recorded in in any of the survey blocks that were surveyed in or near the bird study areas during the first or second *Ontario Breeding Bird Atlas* (Birds Canada, 2023). Additionally, no brown-headed cowbirds were detected during baseline point count surveys. As such, nest parasitism is unlikely to have had a measurable effect on eastern wood-pewee populations in the Project study areas at existing conditions.

5.6.6 Olive-sided Flycatcher

5.6.6.1 Habitat Availability

This species will nest in forested stands, however, due to foraging behaviour, are associated with high contrast habitats including burned forests, logged areas, and natural forest openings such as gaps within old-growth forest stands, meadows, rivers, and wetlands (Committee on the Status of Endangered Wildlife in Canada, 2018b; Altman and Sallabanks, 2020). The contrasting nature of these areas often provides tall trees and snags from which this species can perch on to hunt flying insects (Committee on the Status of Endangered Wildlife in Canada, 2018b; McGarigal and McComb, 1995, Altman and Sallabanks, 2020; Bale et al., 2020). Olive-sided flycatcher critical habitat has not yet been identified for protection (Committee on the Status of Endangered Wildlife in Canada, 2018b).

During point count surveys, olive-sided flycatcher was most commonly detected in fen and swamp habitat types in the existing conditions Construction Disturbance Area, bog and

marsh habitat types in the existing conditions Local Study Area, and swamp and early successional sparse treed habitat types in the existing conditions Regional Study Area (**Attachment B**). During autonomous recording unit surveys, this species was most commonly detected in fen, followed by swamp habitat types (**Attachment B**).

According to the habitat model, olive-sided flycatcher abundance was greater in landscapes with lower proportions of mixed, deciduous, and coniferous forest habitats and areas with locally low proportions of sparse forest habitat (**Attachment C**). Variables included in the habitat model were selected based on known habitat preferences and demonstrated strong relationships with count estimates during data exploration. Suitable olive-sided flycatcher habitat is abundant in the study areas and covers approximately 30% to 60% of each study area (**Table 5-18**).

Table 5-18: Habitat Suitability for Olive-sided Flycatcher at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	417.4	3.3	30,265.9	12.2	132,347.1	20.0
Moderate	3,354.0	26.5	100,626.6	40.6	264,697.3	40.0
Low	8,125.4	64.2	95,645.2	38.6	198,559.8	30.0
Poor	768.4	6.1	21,420.1	8.6	66,182.6	10.0

Note: there are 278.9 ha of unclassified (pixel error) habitat in the existing conditions Regional Study Area.
ha = hectare; % = percent

The main disturbances affecting olive-sided flycatcher habitat availability in the Project study areas at existing conditions are fire and insect outbreaks. These disturbances are expected to increase habitat suitability for olive-sided flycatcher (Committee on the Status of Endangered Wildlife in Canada, 2018b Environment Canada, 2016c). Olive-sided flycatcher abundance is positively associated with 10% to 100% tree mortality from mountain pine beetle (*Dendroctonus ponderosae*) outbreaks (Norris et al., 2021). Climate change may be increasing the frequency and intensity of fires and insect outbreaks, which may have positive effects on olive-sided flycatcher habitat availability in the Project study areas, relative to historical conditions.

5.6.6.2 Distribution

Olive-sided flycatcher is a fairly common but thinly distributed species throughout northern Ontario (Natural Heritage Information Centre, 2023). During the breeding season, this species was recorded at one of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 33 of 54 autonomous

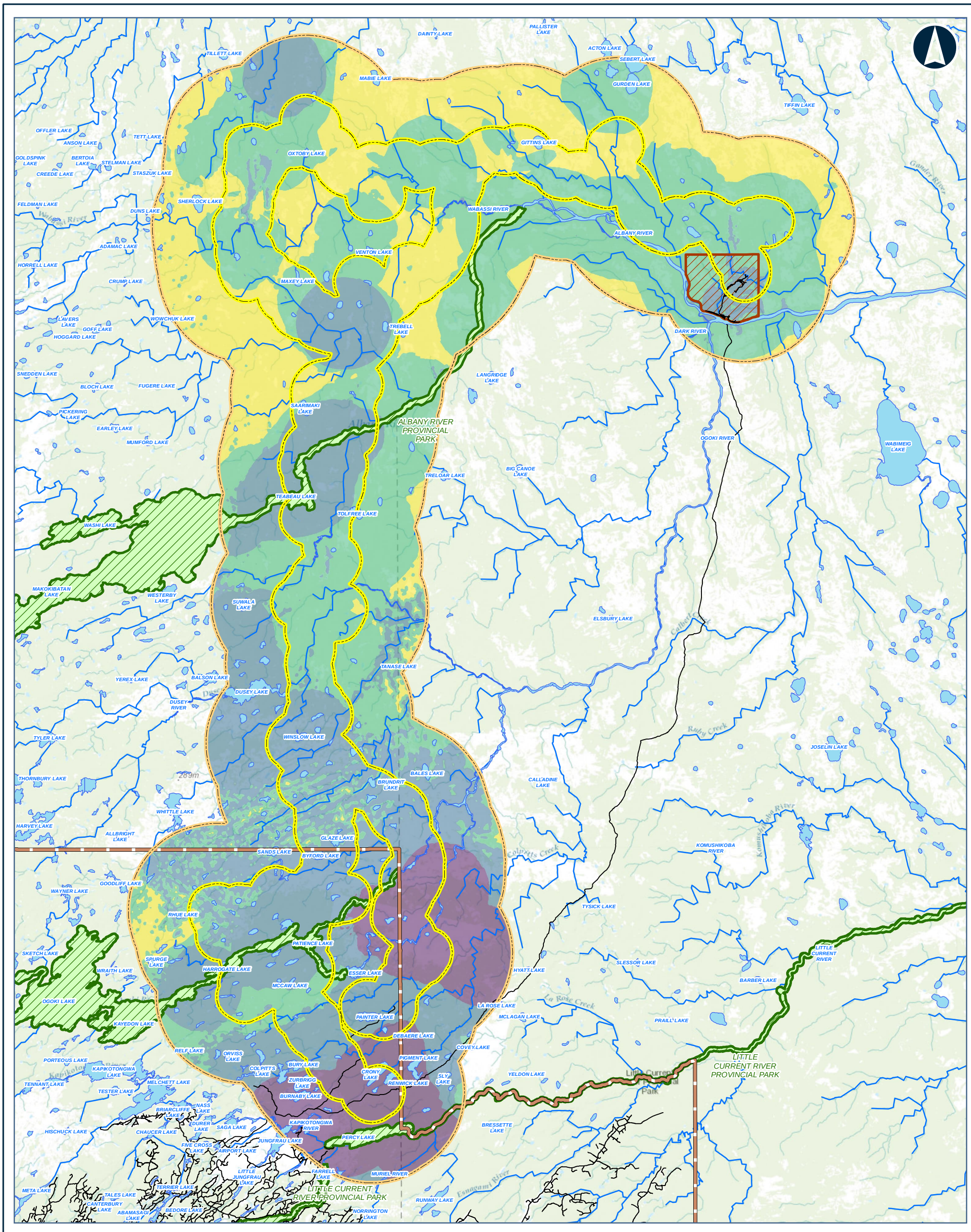
recording unit survey stations in the existing conditions Local Study Area in 2022, at seven of 31 point count stations in the existing conditions Construction Disturbance Area from 2018 to 2022, at 50 of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022, and at five of 30 point count stations in the existing conditions Regional Study Area from 2018 to 2022. Olive-sided flycatcher was detected each monitoring year from 2018 to 2022 (**Attachment B**). This species was detected at sites throughout the study areas during field surveys.

The olive-sided flycatcher is a migratory species that breeds throughout forested areas of Canada and arrives in Canada between April and June (Committee on the Status of Endangered Wildlife in Canada, 2018b); this species overwinters in Central America and northern South America (Altman and Sallabanks, 2020). Olive-sided flycatchers were detected on autonomous recording units during the spring, summer, and fall periods. Daily olive-sided flycatcher activity recorded on autonomous recording units was highest at dawn.

Olive-sided flycatchers require large territories; most estimates are 10 to 20 ha (Altman and Sallabanks, 2020). Although data are limited, they suggest that this species has strong site fidelity to breeding site (Altman and Sallabanks, 2020).

High and moderate olive-sided flycatcher habitat is present throughout the study areas but is more abundant in the northern portion of the study areas (**Figure 5-18**).

As an edge-adapted species, this species may benefit from habitat fragmentation (Altman and Sallabanks, 2020; Norris et al., 2021). Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest songbird species (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011; Bayne and Hobson, 2001; St. Clair et al., 1998).



Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

OLIVE-SIDED FLYCATCHER HSI SCORE

- High
- Moderate
- Low
- Poor

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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Habitat Suitability for Olive-sided Flycatcher in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-18

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5.6.6.3 Survival and Reproduction

During point count surveys, mean relative abundance of olive-sided flycatcher was highest in 2022 (0.35 individuals per plot) and lowest in 2019 (0.05 individuals per plot). During point count surveys from 2018 to 2022, olive-sided flycatcher was detected at the highest relative abundance at plots that occurred in the existing conditions Regional Study Area (0.27 individuals per plot) (**Attachment B**). During autonomous recording unit surveys completed in 2022, olive-sided flycatcher was only detected in the existing conditions Local Study Area (0.77 individuals per plot) (**Attachment B**).

The density estimates for olive-sided flycatcher in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 1.4 and 1.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Survey suggests that the olive-sided flycatcher population in Bird Conservation Region 7 has decreased by 1.8% per year from 1970 to 2021 (total decrease of 60.0%) (Smith et al., 2022). The reliability of this estimate is “low.” There is an 86.5% chance of future population decrease in the region (Smith et al., 2022). Population trends for olive-sided flycatcher in Bird Conservation Region 8 indicate that this species has declined by 2.7% each year from 1970 to 2021 (total decrease of 74.8%); the confidence in this estimate is “medium” (Smith et al., 2022). There is a 100.0% chance of future population decline in the region. The long-term objective presented in the federal recovery strategy for this species is to help to ensure a positive 10-year population trend after 2025, and the distribution objective is to maintain the extent of occurrence of the population, as determined in 2016 (Environment Canada, 2016c).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as olive-sided flycatcher, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Olive-sided flycatcher has life history traits that may this species vulnerable to changes in survival and reproduction. This species has a lengthy nesting period (egg laying through fledging of hatchlings can be 36 to 46 days) (Robertson and Hutto, 2007; Altman and Sallabanks, 2020). Long nesting periods also increase risk of nest predation. This lengthy nesting period limits the reproductive capacity of this species, especially as olive-sided flycatchers are one of the last species to return to breeding grounds in the spring, and one of the first species to leave in the fall (Environment Canada, 2016c). As a result of the previous limitations, olive-sided flycatchers have one of the lowest reproductive rates of passerines in North America (Altman and Sallabanks, 2020).

Predation of adult olive-sided flycatcher is likely by accipiters, and documented predators of eggs and young included squirrels, Steller's jay (*Cyanocitta stelleri*), common raven, peregrine falcon, and Canada jay (Altman and Sallabanks, 2020). Information provided by Marten Falls First Nation has noted that species including Canada Jay, and common raven are common in the northern extent of the Project study area (Marten Falls First Nation, n.d.).

Climate change may be creating a disjunct between peak insect emergence and migratory songbird nesting because insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in the Eastern Great Lakes, Hudson Bay Lowlands, and Upper Appalachian Plateau has advanced by three to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). Olive-sided flycatcher appears vulnerable to this timing disjunct because this species is arriving on breeding grounds at the same time as 100 years ago (Butler, 2003). Insect declines that have been noted worldwide may be negatively affecting olive-sided flycatcher populations in the Project study areas by reducing prey availability for this species.

Forest fragmentation can increase accessibility for brown-headed cowbirds, but olive-sided flycatchers are a rare host species for cowbirds (Altman and Sallabanks, 2020). Brown-headed cowbirds are not expected to occur in the Project study areas at existing conditions.

5.6.7 Bald Eagle

5.6.7.1 Habitat Availability

Bald eagles are found in association with aquatic habitats (e.g., coastal areas, rivers, lakes, and reservoirs) with forested shorelines or cliffs (Buehler, 2020; Armstrong, 2014). Bald eagles often use perches within 500 m of open water when foraging at or near the surface of the water (Buehler, 2020). Shallow water and near shore emergent vegetation increase the likelihood that live fish prey will be available near the surface (Buehler, 2020; Armstrong, 2014). Foraging area quality may also be higher in areas not subject to human disturbance (Buehler, 2020). Shoreline urban and industrial activities have the greatest potential to limit habitat availability because it overlaps with the highest quality habitat for bald eagles (Buehler, 2020). Moderate to high suitability habitat for bald eagle covers approximately 10% of the Local Study Area and 5% of the Regional Study Area at existing conditions (**Table 5-19**).

Table 5-19: Habitat Suitability for Bald Eagle at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	1,737.9	13.7	23,978.5	9.7	26,917.7	4.1
Low to Poor	10,927.3	86.3	223,979.3	90.3	635,114.7	95.9

ha = hectare; % = percent.

While bald eagles have clear nest tree preferences, they are also flexible in nest site selection (Grier and Guinn, 2003). Bald eagles prefer nesting in mature or old growth forests with 30% to 50% canopy cover that have large trees suitable for nests and perching (Anthony and Isaacs, 1989). Nests are generally established in the largest available trees, typically 20 to 60 m in height (Buehler, 2020).

Bald eagles were frequently detected at large waterbodies and watercourses during aerial surveys for the Project. The autonomous recording unit surveys recorded bald eagle in fen habitat, while this species was detected in swamp habitat during point count surveys (**Attachment B**). Additionally, Indigenous Knowledge provided by Marten Falls First Nation and Kingfisher Lake First Nation has also noted the presence of bald eagles within the Project study areas, and within the area of Pipestone River Provincial Park (Marten Falls First Nation, 2023; Ontario Parks, 2002).

The main disturbances in the existing conditions Regional Study Area at baseline characterization are forestry, fire and fire suppression activities, and other linear disturbances. Bald eagle typically nests in areas of low human disturbance. However, more recent evidence indicates that some bald eagles are becoming tolerant of human modifications to the landscape and will nest closer to urban areas (Armstrong, 2014).

Some changes at existing conditions may have favoured bald eagle breeding habitat. The forest industry has increased fire suppression, which has resulted in an increase in average forest age. An increase in fire frequency and intensity, and insect outbreak frequency due to climate change may reduce bald eagle habitat availability relative to historical conditions. Additionally, the effects from the anticipated drying and shrinkage of wetlands are not likely to be positive (Chu and Fischer, 2012).

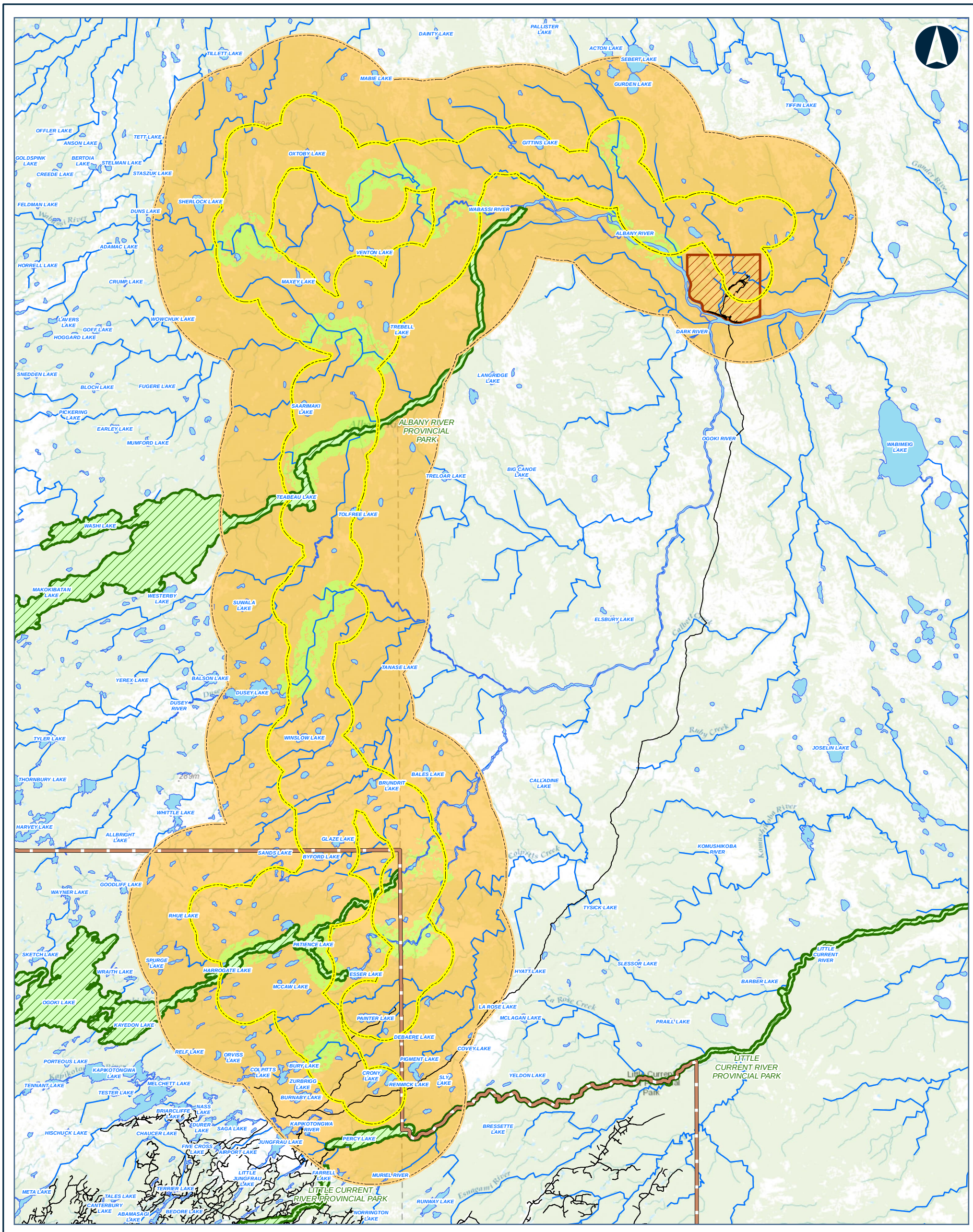
5.6.7.2 Distribution

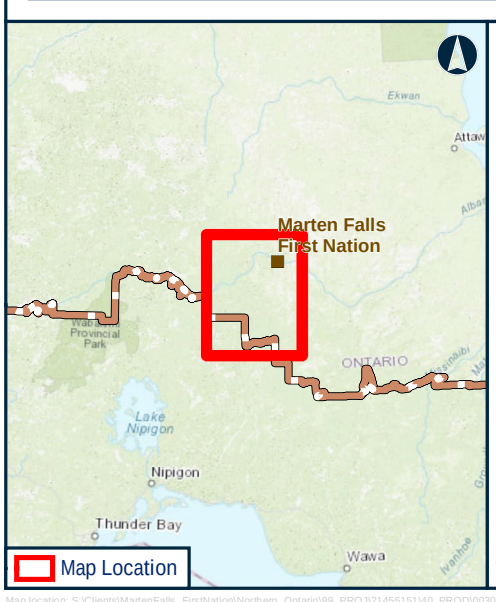
Bald eagle is a widespread and common breeding species throughout Ontario (Natural Heritage Information Centre 2023). This species was frequently detected during all rounds of waterfowl and waterbird aerial surveys, was detected at one point count station in the existing conditions Local Study Area in 2022 and was detected on one autonomous recording unit in the existing conditions Local Study Area in 2022 (**Attachment B**). Bald eagles were detected throughout the existing conditions Local Study Area, but detections were more frequent in the southern portion of the existing conditions Local Study Area, particularly around the Ogoki River (**Attachment B**). Bald eagle sightings relate locations with modelled moderate to high quality bald eagle habitat (**Figure 5-19**).

Bald eagles may occur throughout the Project study areas during the spring migration, summer breeding, and fall migration periods; this species generally migrates to southern North America for the winter (Buehler, 2022). During field surveys for the Project, bald eagles were detected during the spring migration, summer breeding, and fall migration periods. Bald eagles are primarily active during the day.

Bald eagle breeding territory size can vary greatly and is related to breeding status and food availability (Buehler, 2022). Minimum territory size for breeding adults in the boreal forest region of Saskatchewan was 7 km^2 (Mougeot, 2013). Bald eagles have strong fidelity to breeding sites; some individuals may use the same nest for up to 13 consecutive years (Jenkins and Jackman, 1993).

Bald eagles are likely not negatively influenced by forest fragmentation as they are a highly mobile species and forest tract size may be unimportant if the tract is isolated from human activities and / or infrastructure (Buehler, 2022). Nest trees are more accessible in areas with habitat discontinuity, or edge, or relatively open canopies (McEwan and Hirth, 1979; Anthony and Isaacs, 1989; Livingston et al., 1990; Buehler, 2022).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- **BALD EAGLE HSI SCORE**
  - MODERATE TO HIGH
  - LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
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Habitat Suitability for Bald Eagle in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-19

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5.6.7.3 Survival and Reproduction

A total of 45 adults were observed during waterfowl and waterbird aerial spring migration, breeding, and fall migration surveys (**Attachment B**). Additionally, five active bald eagle nests were recorded during 2022 aerial surveys, and two nests were incidentally detected during surveys in 2018 (**Attachment B**).

The density estimates for bald eagle in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.4 and <0.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The bald eagle population in North America is increasing (Oleyar et al., 2021). The North American Breeding Bird Survey suggests that the bald eagle population in Bird Conservation Region 7 has increased by 4.5% and the population in Bird Conservation Region 8 has increased by 10.0% each year from 1970 to 2021 (Smith et al., 2022). However, the reliability of these estimates is “low” (Smith et al., 2022) and there is further uncertainty as this species is not well-surveyed using breeding bird point count survey methods.

Bald eagles are capable of breeding during their fifth year of life (Buehler, 2020). Bald eagle survival is lowest during their first year of life and increases over time (Buehler, 2020). Average adult survival is greater than 80% (Buehler ,2020). In Ontario, the oldest reported bald eagle was 30 years of age at time of capture (Buehler, 2020). Females lay an average of two eggs per brood and raise one brood per season (Buehler, 2020). Nest success for bald eagles is generally greater than 50% (Buehler, 2020).

Adult bald eagles have limited natural predators however, eggs and nestlings may be depredated by corvids, black bears (Oji-Cree translation, *makwa’ang*), foxes, and raccoons (Buehler, 2022).

Bald eagles may feed on captured live prey or eat carrion. Live fish often taken includes gizzard shad (*Dorosoma cepedianum*), threadfin shad (*Dorosoma petenense*), and white bass (*Morone chrysops*), while benthic-dwelling species such as catfish (*Ictalurus* spp.) are often taken when dead and floating on the surface. Other species such as American coots, gulls, and great blue herons may also be eaten. Carrion of mammals may also be consumed (Buehler, 2022).

Spawning areas for large-bodied fish Valued Component species (i.e., lake sturgeon [*Acipenser fulvescens*], lake whitefish [*Coregonus clupeaformis*], brook trout [*Salvelinus fontinalis*], walleye [*Sander vitreus*], northern pike [*Esox lucius*], and burbot [*Lota lota*]) were found in Patience Lake and the Albany and Ogoki rivers (*Fish and Fish Habitat Existing Conditions Report*, Section 3.1.1.1, WSP, 2026c). Spawning areas for brook trout, burbot, northern pike, and walleye were also found in the Dusey River. Additional spawning areas noted at unnamed watercourse RA1-WC-17 (brook trout and walleye), unnamed watercourse RA4-WC-22 (lake sturgeon, burbot), Gourlie Creek (burbot and

walleye), Colpitts Creek (northern pike), unnamed watercourse RA1-WC-57 (burbot), Wabassi River (northern pike), and unnamed watercourse RA1-WC-13 (walleye). Potential spawning habitat for other large-bodied fish species (e.g., suckers [*Catostomus* spp.]) was also identified at multiple crossings in the existing conditions Construction Disturbance Area and Aquatics existing conditions Local Study Area (*Fish and Fish Habitat Existing Conditions Report*, Section 3.1.1.1, WSP, 2026c).

Climate change may be causing a change in available food resources for bald eagle throughout much of their range. Changes in water temperatures could affect fish communities, including their distribution, growth, survival and reproduction (Dove-Thompson et al., 2018).

5.6.8 Peregrine Falcon

5.6.8.1 Habitat Availability

In natural environments, peregrines require cliffs that have open gulfs of air for nesting (White et al., 2020). Cliffs of eight to 400 m in height can be used but cliffs of 50 to 200 m in height are preferred (White et al., 2020). This species also nests in urban environments and so can tolerate human activities (White et al., 2020).

There is limited high to moderate suitability habitat for peregrine falcon in the study areas (**Table 5-20**). Steep slopes are uncommon in the existing conditions Local Study Area (Physiography, Terrain, and Soils Existing Conditions Report, Section 3.1.6.5, WSP, 2026f). Larger areas of steep slopes are present at extreme southern portion of the existing conditions Local Study Area, and other areas of steep slopes are generally associated with rivers in the existing conditions Local Study Area (e.g., Albany River) (*Physiography, Terrain, and Soils Existing Conditions Report,* Section 3.1.6.5, WSP, 2026f).

Table 5-20: Habitat Suitability for Peregrine Falcon at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	15.5	0.1	29.5	0.1	44.9	0.1
Low to Poor	12,649.8	99.9	247,928.4	99.9	661,987.4	99.9

ha = hectare; % = percent.

5.6.8.2 Distribution

Peregrine falcon is one of the most widely distributed bird species and can be found in all climate types from tundra to tropical areas (White et al., 2020). This species was noted as important based on information shared by Fort Albany First Nation (Fort Albany First Nation, 2020). Peregrine falcon is a rare to uncommon breeding species throughout Ontario (Natural Heritage Information Centre, 2023). This species was not detected during field studies for the Project (**Attachment B**). Peregrine falcons are only anticipated to be present in the Project study areas during the breeding season; this species migrates to Central and South America for the winter (White et al., 2020). There is a small patch of moderate to high suitability habitat for peregrine falcon in the western portion of the Regional Study Area, near the northern boundary of the Regional Study Area, north of the Ogoki River (**Figure 5-20**).

Peregrine falcons have strong site fidelity. A two-year study in Canada reported that only one female changed their nest location; all males returned to the same nest (White et al., 2020). Peregrines typically only defend an area within 200 m of their nest (White et al., 2020). In northern environments, peregrine falcon nests are generally spaced three to five km from each other (White et al., 2020). Breeding adults may travel 15 to 43 km from their nest to find prey (White et al., 2020). However, peregrines are highly mobile and can establish territories in areas below carrying capacity.

5.6.8.3 Survival and Reproduction

The peregrine falcon population in Ontario is increasing (Natural Heritage Information Centre, 2023). According to the Raptor Population Index project, peregrine falcon populations in eastern Canada have a positive trend index over the last 40 years of monitoring (Oleyar et al., 2021). Density estimates for peregrine falcon in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006). Peregrine falcon home range size can fluctuate with prey abundance; mean home range in Colorado ranged from 358 to 1,508 km^2 (White et al., 2020).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as peregrine falcon, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Peregrine falcon age of first breeding varies and depends on sex and territory availability. Generally, females start breeding earlier than males, as do individuals in populations where territory availability is not limited (White et al., 2020). In landscapes where territory availability is not limited, such as the birds existing conditions Regional Study Area, individuals generally start breeding at two to three years of age but can start breeding at

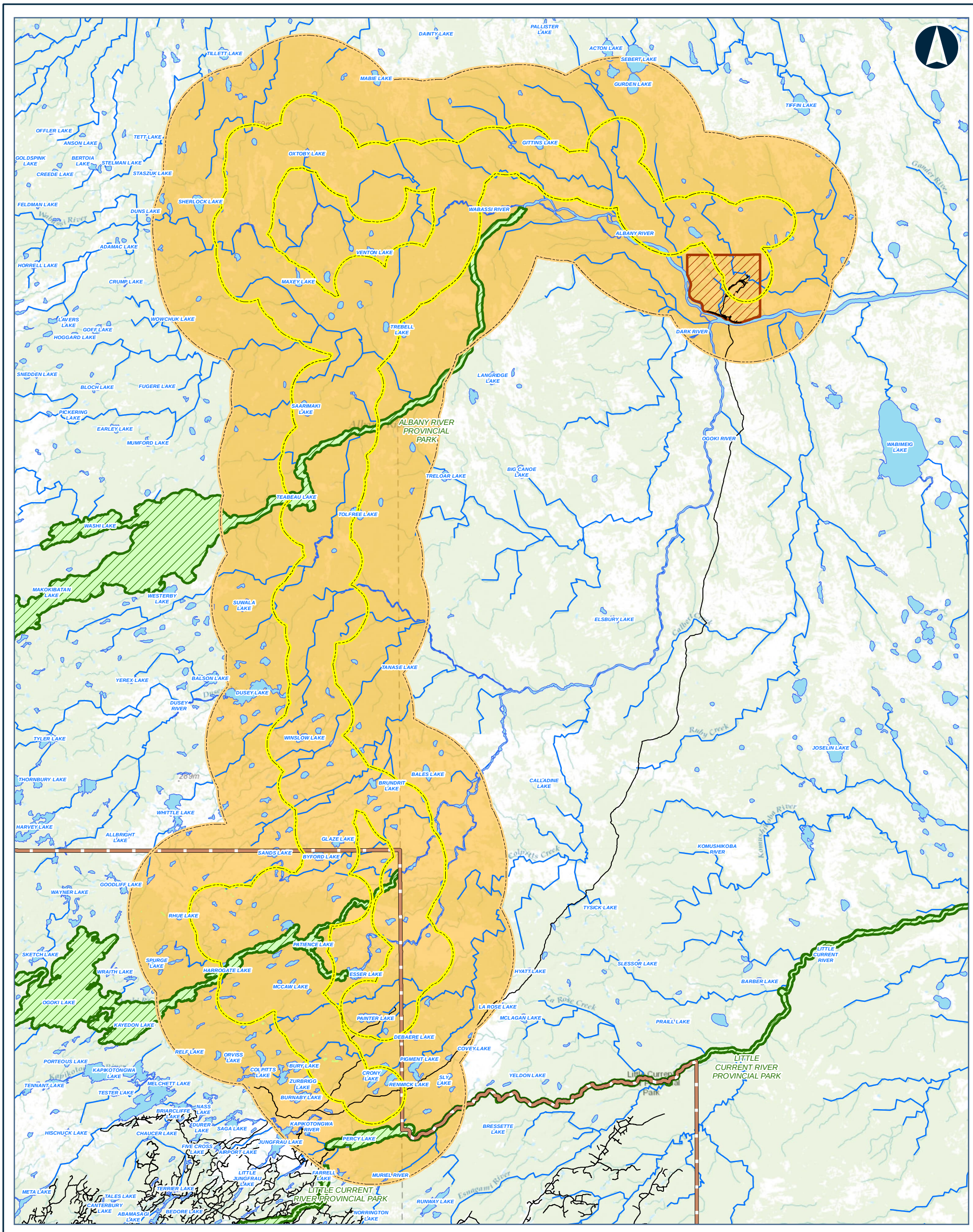
one year (White et al., 2020). This species has a survival rate of 40% to 50% for their first year of life and this increases to 60% to 70% for each year thereafter (White et al., 2020). Peregrine falcons are a long-lived species and birds may live 16 to 20 years (White et al., 2020).

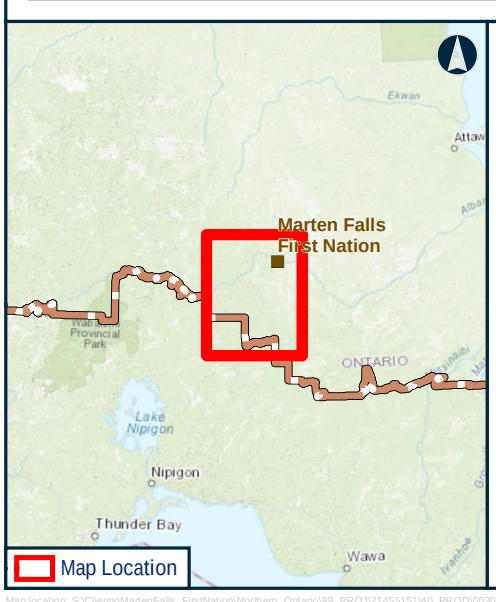
Females lay an average of three eggs per brood and typically raise one brood per season (White et al., 2020). Fledgling success typically ranges from one to two birds per nest (White et al., 2020). Nest success rates of 59% to 93% have been reported and nest success is positively related to food availability and negatively related to inclement weather conditions during the spring (White et al., 2020). Cold, wet, late springs can be a major factor in egg and chick mortality (White et al., 2020). Climate change may increase the North Atlantic Oscillation and, as such, extreme spring weather fluctuations, which could have a negative effect on peregrine falcon nest success (Carlzon et al., 2018). Increases in the North Atlantic Oscillation may also have negative effects on peregrine falcon survival during their fall migration (Franke et al., 2011).

Large avian predators such as eagles, gyrfalcons, and great horned owls may hunt peregrine falcons (White et al., 2020). Nestlings and immatures may be depredated by other peregrine falcons, bears (*Ursus* spp.), gray wolves (*Canis lupus*), foxes (*Vulpes* spp.), and wolverines (Oji-Cree translation, *wishkobishag, wiingwa'waakeg*) (*Gulo gulo*) (White et al., 2020).

Peregrines primarily hunt birds, but bats and other mammal species will also be depredated (White et al., 2020). Many bird species are hunted by this species, but shorebirds, passerines, and waterfowl are preferred (White et al., 2020). Females tend to catch larger prey (100-1,000 grams) than males (20–300 grams) (White et al., 2020). Birds as large as sandhill crane (Oji-Cree translation, *ojihjak*) (*Antigone canadansis*) and Canada goose (*Branta canadensis*) have been successfully killed by peregrine falcons (White et al., 2020).

Because this species is a generalist predator, effects from climate change on prey availability are anticipated to be within the adaptability limits for this species.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

PEREGRINE FALCON HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Peregrine Falcon in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-20

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5.6.9 Short-eared Owl

5.6.9.1 Habitat Availability

Short-eared owls nest in a variety of open grassland and wetland habitats that usually have short (<60 cm), dense grass or small willows (Oji-Cree translation, *wiisihkobihmagoonnatikog*) (*Salix* spp.), which provide concealment for nesting females (Wiggins et al., 2020). In wetland areas, nest sites are often located on drier microsites, such as small knolls or hummocks (Wiggins et al., 2020). Some authors suggest that short-eared owls require habitat patches of at least 100 ha for nesting (Dechant et al., 1998), but nesting has been reported in smaller habitat patches (e.g., 28 ha; Herkert et al., 1999). Although habitat conversion for agriculture or livestock grazing has contributed to population declines in southern Canada, habitat conversion in central and northern Canada has been negligible (Committee on the Status of Endangered Wildlife in Canada, 2008b). Fragmentation of large expanses of suitable habitat as a result of human activities (e.g., roads) has also been identified as a threat to short-eared owl, but direct effects are unknown (Environment and Climate Change Canada, 2018b). Moderate to high suitability covers approximately 35% of the Local and Regional Study Areas (**Table 5-21**).

Fire is the main natural disturbance in the existing conditions Regional Study Area at existing conditions. Habitats may be most suitable for short-eared owls within two to eight years following a fire (Swengel and Swengel, 2014). This may be similar for habitats affected by insect outbreaks.

Table 5-21: Habitat Suitability for Short-eared Owl at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	2,349.8	18.6	86,706.6	35.0	245,101.8	37.0
Low to Poor	10,315.5	81.4	161,251.2	65.0	416,930.7	63.0

ha = hectare; % = percent.

5.6.9.2 Distribution

Short-eared owl is one of the most widely distributed owls in the world (Wiggins et al., 2020). Short-eared owl is an uncommon to rare breeding species in Ontario and most individuals occur in the Hudson Bay Lowlands (Natural Heritage Information Centre, 2023). This species was not detected during field studies for the Project from 2018 to 2022. Climate change may be increasing the nesting range for this species; in 2000, a nesting individual was reported on Banks Island, Northwest Territories for the first time (Smith et al., 2013), while a territorial individual was reported for the first time on Bylot

Island, Northwest Territories in 2008 (Therrien, 2010). Moderate to high suitability for short-eared owl is distributed throughout the study aeras but is most common in the northeastern portion of the study areas (**Figure 5-21**).

Short-eared owls may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; most individuals migrate to southern United States and Mexico for the winter, but some species may stay in southern Canada (Wiggins et al., 2020). In North America, short-eared owls are most active at dusk and at night (Wiggins et al., 2020).

Short-eared owls are naturally nomadic and presence in the Project study areas is likely to fluctuate among years due to fluctuating prey base for this species (Wiggins et al., 2020). This species can disperse up to 145 km between breeding years (White et al., 2020). As such, this species can establish territories in areas below carrying capacity.

Territory size also varies with prey abundance. In Manitoba, mean territory size was 74 and 121 ha in successive years; smaller territories corresponded to years with greater food abundance (Committee on the Status of Endangered Wildlife in Canada, 2008b).

5.6.9.3 Survival and Reproduction

No short-eared owls were detected during field studies for the Project from 2018 to 2022 (**Attachment B**).

Density estimates for short-eared owl in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006). The minimum area requirement of about 50-100 ha is consistent with the average home range size for short-eared owl reported in Manitoba is 82 ha (Wiggins et al., 2020).

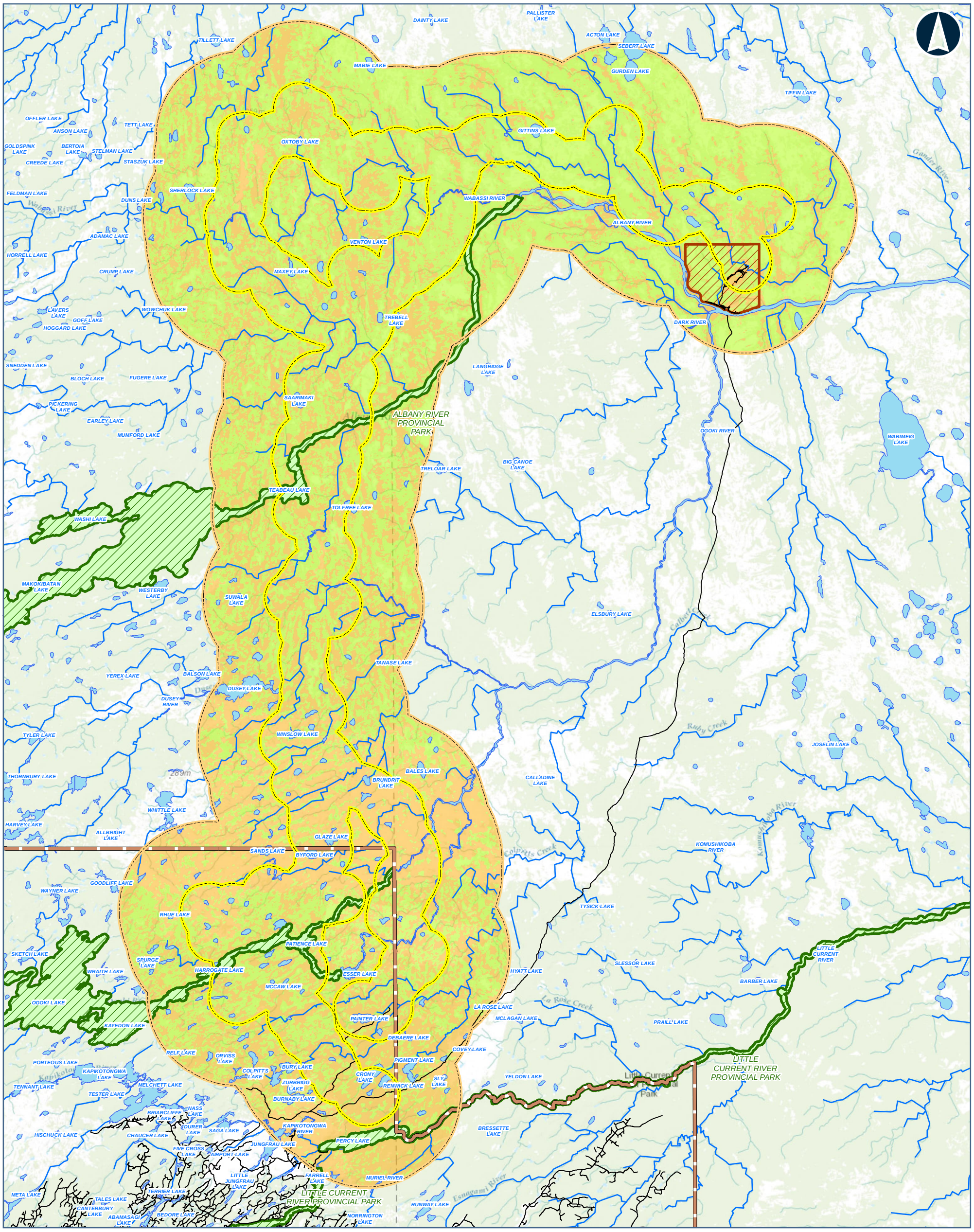
Population trends for short-eared owls are difficult to determine because this species is nomadic, and abundance varies with prey abundance (Committee on the Status of Endangered Wildlife in Canada, 2008b; Wiggins et al., 2020). Christmas Bird Count data suggest that short-eared owl populations in North America have declined by approximately 3% per year over the last 40 years but data for northern areas are lacking (Committee on the Status of Endangered Wildlife in Canada, 2008b).

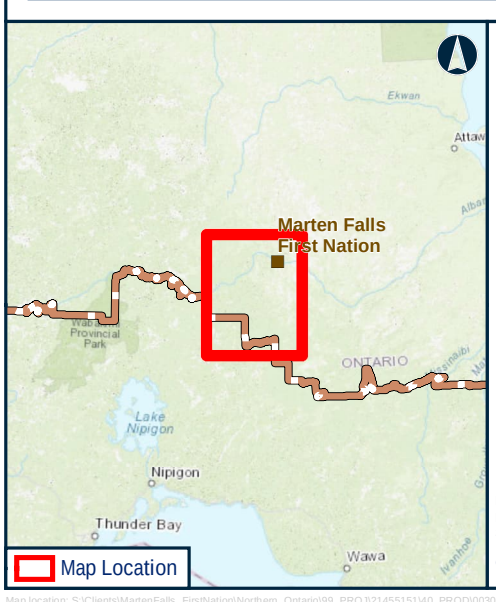
Data on the average lifespan of short-eared owls are limited but this appears to be a short-lived species as the oldest individual reported in the wild was four years old (Wiggins et al., 2020). Annual adult survival rates are not available. Individuals can start breeding at less than one year of age (Wiggins et al., 2020). Females can lay 1 to 11 eggs per brood; the average is 5.6 eggs, but this increases significantly with latitude (Wiggins et al., 2020). Females only raise one brood per season (Wiggins et al., 2020). Nest success estimates for this species are high and range from 75% to 90% (Wiggins et al., 2020). Nest success may vary due to annual fluctuations in prey abundance and extreme weather events. Because short-eared owls are a low-flying species, individuals may be killed by collisions with vehicles or entanglement in barbed wire fences (Wiggins et al., 2020).

Increases in extreme weather fluctuations due to climate change, especially during the early nesting season, could increase short-eared owl egg and hatchling mortality (Wiggins et al., 2020).

Because short-eared owls nest on the ground in open habitat, this species is particularly vulnerable to predation by mammalian predators such as red fox and striped skunk during the nesting period (Wiggins et al., 2020). Avian species such as gulls, eagles, hawks, and owl may also depredate short-eared owl eggs.

Short-eared owls primarily consume small mammals. Voles make up most of their diet and this is complemented by other small mammals such as shrews, mice, and rabbits (Wiggins et al., 2020). Although fire and insect outbreaks may initially increase small mammal abundance, small mammal populations typically start declining three years post disturbance (Wiggins et al., 2020). Climate change may be causing a decrease in small mammal abundance and collapse of small mammal population fluctuation cycles (Mysterud, 2016). However, not all areas have shown these trends and the effects of climate change on small mammal populations is unclear (Mysterud, 2016).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

SHORT-EARED OWL HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Short-eared Owl in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-21

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Date Saved: 2/12/2026 11:45:05 AM User Name: INBA08973

5.6.10 Black Tern

5.6.10.1 Habitat Availability

Black terns nest on shallow waterbodies and in peat bogs and marshes that have dense emergent vegetation cover, which provides protection from waves (Heath et al., 2020; Shephard et al., 2023). This species prefers large marshes and marsh complexes and habitat suitability for this species may be influenced by landscape structure rather than local wetland conditions (Heath et al., 2020; Shephard et al., 2023). As such, habitat loss and fragmentation from human activities may have negative effects on black tern breeding habitat availability.

There is limited high to moderate suitability habitat for black tern modelled in the study areas (**Table 5-22**). However, the amount of human disturbance in the Project study areas is low and habitat for this species in the existing conditions Local Study Area is not limiting. Water habitat covers approximately 3.8% of the existing conditions Local Study Area and marsh habitats cover 2.0% of existing conditions Local Study Area (*Vegetation Technical Support Document: Existing Conditions and Effects Assessment*, WSP, 2026a). Black tern breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

Table 5-22: Habitat Suitability for Black Tern at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	0.0	0.0	14.5	<0.1	14.5	<0.1
Low to Poor	12,665.3	100	247,943.3	99.9	662,017.9	99.9

ha = hectare; % = percent; < = less than.

5.6.10.2 Distribution

Historically, black terns were widespread in the boreal forest and Hudson Bay Lowlands, but currently, this species is mostly restricted to the southern portion of Ontario (Natural Heritage Information Centre, 2023). Black terns were not detected during field studies for the Project.

Black terns may be present in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to Central America and northern South America for the winter (Heath et al., 2020). Black terns are most active during the day.

Black tern fidelity to breeding sites can vary and return rates of 27% and 40% were reported in Ontario and Wisconsin, respectively (Heath et al., 2020). Black terns will defend an area of approximately two metres around their nest but do not typically maintain or defend structured breeding territories. This species is a semicolonial nester and nests are typically two to 30 m from each other (Heath et al., 2020).

Marsh, which may provide suitable breeding habitat for this species, is typically associated with waterbodies and watercourses, which are patchily distributed within the Project study areas (**Figure 5-22**).

Black terns are highly mobile and regularly forage several kilometres from their nest site (Salter, 2010). As such, it is expected that this species can establish territories in areas below carrying capacity.

5.6.10.3 Survival and Reproduction

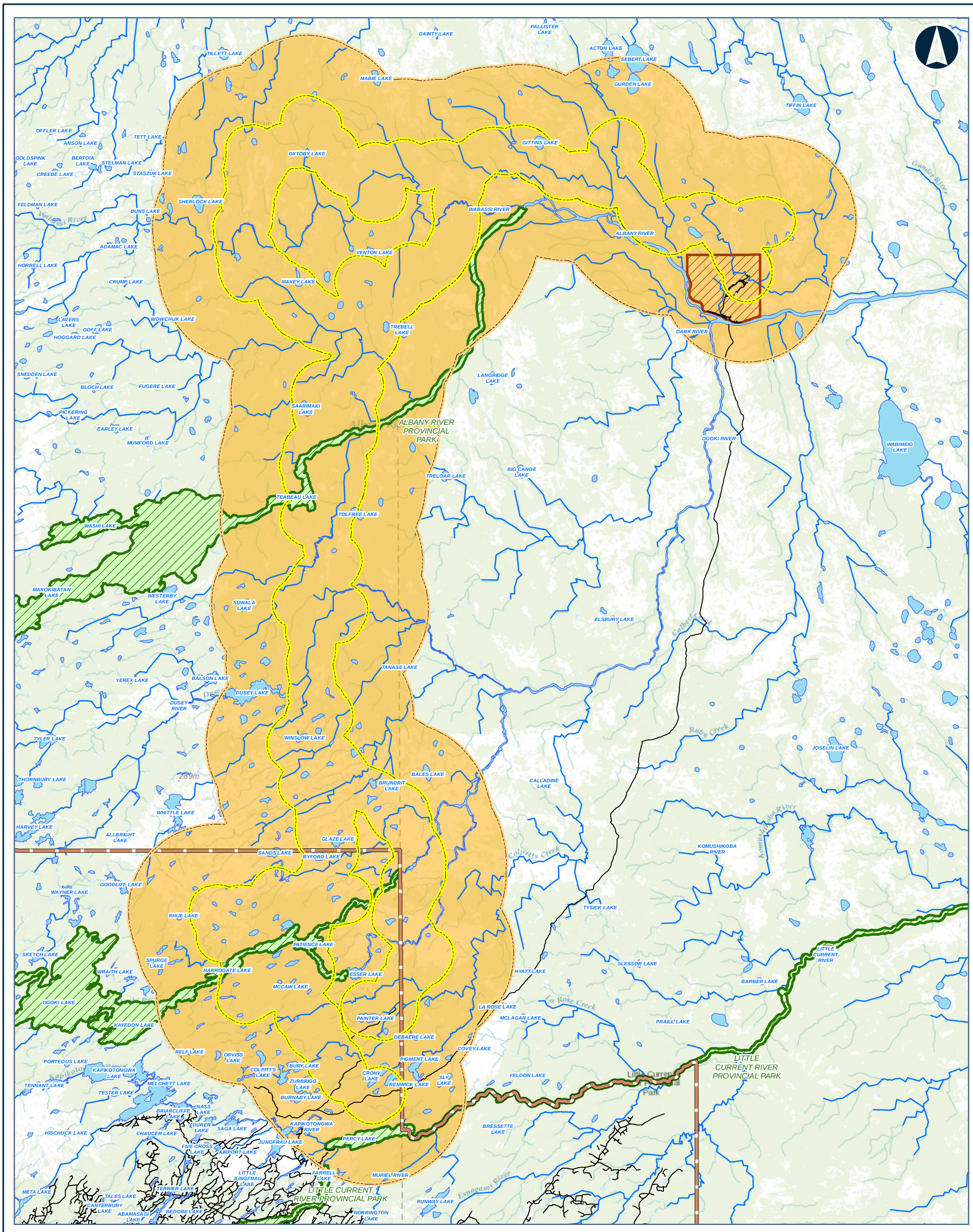
Black tern is a declining species in Ontario (Natural Heritage Information Centre, 2023). Population trends using North American Breeding Bird Survey data are not available for black tern in Bird Conservation Region 7 or Bird Conservation Region 8 (Smith et al., 2022).

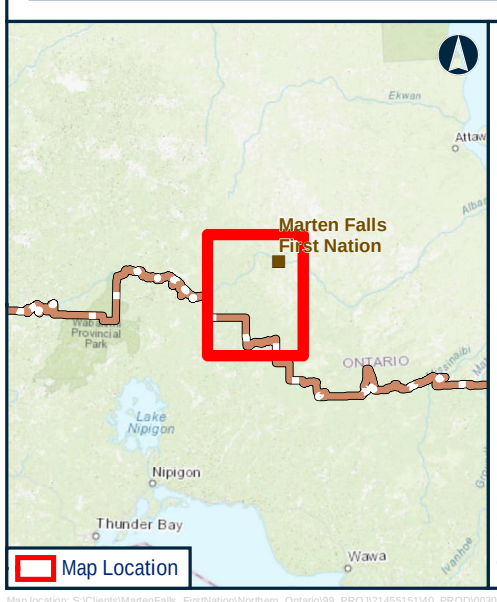
The density estimate for black tern in *Ontario Breeding Bird Atlas* Region 44 is 0.3 nesting territories per km^2; a density estimate for Region 37 is not available (Bird Studies Canada, et al. 2006).

Black terns do not breed before their second summer (Heath et al., 2020). This species may breed every year or may skip breeding occasionally (Heath et al., 2020). Average lifespan is unknown but annual adult survival is estimated at greater than 70% (Heath et al., 2020). Individuals up to 17 years of age have been reported (Heath et al., 2020). Females lay two to three eggs per brood and raise one brood per season (Heath et al., 2020). Estimates of nest success are low and range from 20% to 40% (Heath et al., 2020).

As this species nests on open water, bad weather and extreme wind and waves can result in nest mortality (Heath et al., 2020). Increases in storm intensity due to climate change may increase black tern nest loss in the Project study areas. Additionally, increases in the intensity of extreme weather events (e.g., hurricanes) from climate change can have an effect on migratory bird populations, such as black terns, during their fall migration. Birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Predators of black tern adults are not well documented but incidents of predation by common raven, northern harrier, and large fish have been reported. Great horned owl, great blue heron (*Ardea herodias*), mink, and raccoon may depredate black tern nests.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- **BLACK TERN HSI SCORE**
  - MODERATE TO HIGH
  - LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Black Tern in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-22

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Black terns primarily consume aerial insects such as dragonflies, mayflies, caddisflies, and moths (Heath et al., 2020). Small fish will be consumed during the summer. Climate change may be creating a disjunct between peak insect emergence and migratory bird nesting (Radchuk et al., 2019; Shipley et al., 2022). A study found that spring insect emergence in the northeastern North America has advanced by 3 to 12 days from 1989 to 2014 and is generally outpacing egg laying advancement for songbirds by three to seven days (Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects, such black terns, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Butler, 2003; Strode, 2003). Although trends are not available for black tern, common tern (*Sterna hirundo*) has a significant positive relationship with advancement of breeding season and warmer spring temperatures in northeastern North America (Butler, 2003). This plasticity in timing of migration and breeding may allow black terns to adapt to climate change.

5.6.11 Lesser Yellowlegs

5.6.11.1 Habitat Availability

Lesser yellowlegs nesting areas generally contain a mix of shallow wetlands, trees or shrubs, and open areas; burned over areas with a high density of fallen trees that are near to peat wetlands are also used (Tibbitts and Moskoff, 2020). Lesser yellowlegs was only detected in fen habitat during autonomous recording unit surveys (**Attachment B**).

Moderate to high quality habitat for lesser yellowlegs covers approximately 30% of the Local and Regional Study Areas (**Table 5-23**). Wetlands cover most of the existing conditions Local Study Area. Fen habitats are the most common wetland habitat types in the existing conditions Local Study Area, covering 37.7% of the existing conditions Local Study Area and comprising 53.3% of wetland habitats in the existing conditions Local Study Area (*Vegetation Technical Support Document*, Section 5.4.5, WSP, 2026a). Swamp habitats are the second most common habitats in the existing conditions Local Study Area, covering 29.7% of the existing conditions Local Study Area and comprising 42.3% of wetland habitats. Marshes cover 2.0% of the existing conditions Local Study Area and bogs cover 1.0% of the existing conditions Local Study Area.

Lesser yellowlegs breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

Table 5-23: Habitat Suitability for Lesser Yellowlegs at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	4,597.9	36.3	75,437.8	30.4	202,088.8	30.5
Low to Poor	8,067.3	63.7	172,520.1	69.6	459,943.6	69.5

ha = hectare; % = percent.

5.6.11.2 Distribution

Lesser yellowlegs is a common breeding species in the northern third of Ontario (Natural Heritage Information Centre, 2023). Lesser yellowlegs was recorded at four of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022; no detections were made in the existing conditions Construction Disturbance Area. This species was not detected during point count surveys from 2018 to 2022 (**Attachment B**). This species was detected in the northern and southern portions of the existing conditions Local Study Area. Moderate to high quality habitat for lesser yellowlegs is patchily distributed throughout the study areas (**Figure 5-23).**

Lesser yellowlegs may occur in Project study areas during the breeding and spring and fall migration periods; this species migrates to southern North America, Central America, and South America for the winter (Tibbitts and Moskof, 2020). Lesser yellowlegs were detected on autonomous recording units during the spring and summer periods. Daily lesser yellowlegs activity recorded on autonomous recording units was highest at dawn.

Lesser yellowlegs only defend a small area around the nest, but home ranges may be several dozen square kilometres (Committee on the Status of Endangered Wildlife in Canada, 2020b). Lesser yellowlegs have some fidelity to breeding sites, but rates of return are not available (Committee on the Status of Endangered Wildlife in Canada, 2020b). Lesser yellowlegs are highly mobile and regularly forage several kilometres from their nest site (Tibbitts and Moskoff, 2020). As such, it is expected that this species can establish territories in areas below carrying capacity.

5.6.11.3 Survival and Reproduction

During autonomous recording unit surveys completed during the breeding season in 2022, lesser yellowlegs had the highest relative abundance in the existing conditions Local Study Area; no individuals were recorded in the existing conditions Construction Disturbance Area (**Attachment B**).

The density estimate for lesser yellowlegs in *Ontario Breeding Bird Atlas* Regions 44 is 0.8 nesting territories per km^2; a density estimate for Region 37 is not available (Bird Studies Canada et al., 2006).

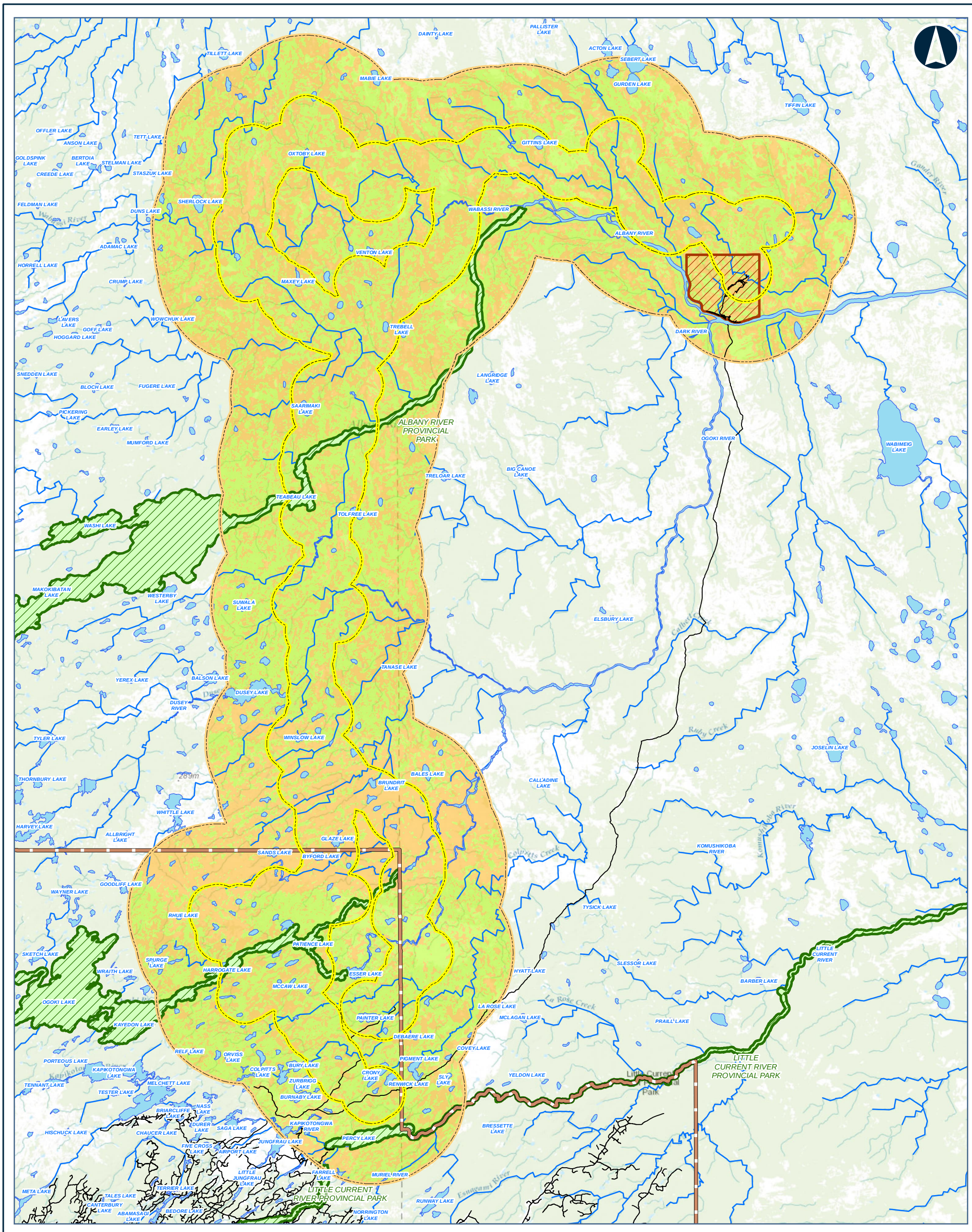
The North American Breeding Bird Survey suggests that the lesser yellowlegs population in Bird Conservation Region 7 has decreased by 2.1% per year from 1970 to 2021 (total decrease of 66.1%) (Smith et al., 2022). The reliability of this estimate is “medium.” There is a 93.9% chance of future population decrease in the region (Smith et al., 2022). Population trends for lesser yellowlegs in Bird Conservation Region 8 are not available. There is uncertainty around North American Breeding Bird Survey population trends for this species as shorebirds are not a target species during breeding bird point count survey methods.

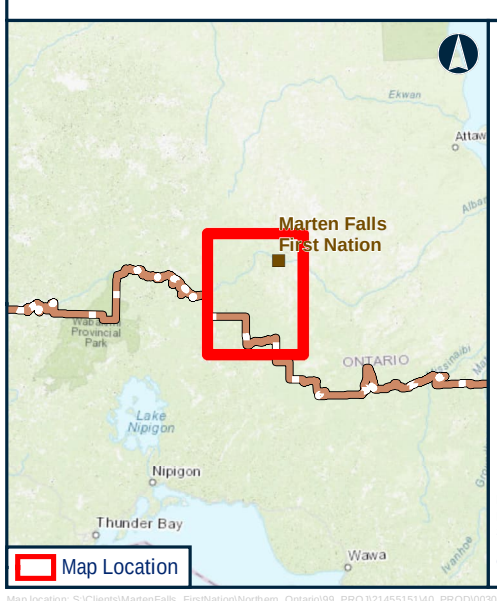
Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as lesser yellowlegs, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Lesser yellowlegs can start breeding at two years of age. Average lifespan is unknown; individuals up to five years of age have been reported (Tibbitts and Moskoff, 2020). Annual survival rates are unknown (Tibbitts and Moskoff, 2020). Females usually lay four eggs per brood and raise one brood per season (Tibbitts and Moskoff, 2020). Fledging success estimates range from 27% to 34% (Tibbitts and Moskoff, 2020).

Peregrine falcon, merlins, northern harriers, sharp-shinned hawks, and short-eared owls may prey on lesser yellowlegs (Tibbitts and Moskoff, 2020).

Lesser yellowlegs are primarily insectivorous and consume a wide variety of terrestrial and aquatic species (Tibbitts and Moskoff, 2020). The worldwide declines in aerial insect abundance and availability could have a negative effect on this species in the Project study by reducing insect abundance and availability. Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting lesser yellowlegs by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019). Worldwide insect declines may be negatively affecting lesser yellowlegs populations in the Project study areas by reducing prey availability for this species.





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

LESSER YELLOWLEGS HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Lesser Yellowlegs in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-23

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Date Saved: 2/12/2026 11:52:14 AM User Name: INBA08973

5.6.12 Rusty Blackbird

5.6.12.1 Habitat Availability

Rusty blackbirds usually select wooded wetlands for breeding habitat, preferring peat bogs, treed fens, swamps, sedge meadows, and marshes (Committee on the Status of Endangered Wildlife in Canada, 2017; Avery, 2020; Bale et al., 2020). Rusty blackbirds breed in isolated, low-elevation wetlands in coniferous and mixed forest habitats across the boreal region to the northern edge of the tundra. The species will also use shrubby riparian areas along the edges of lakes, beaver impoundments, rivers, and other watercourses in coniferous and mixed forests, as well as early successional habitats created by natural disturbances such as fire (Committee on the Status of Endangered Wildlife in Canada, 2017; Avery, 2020). Open water may be important for foraging, and nests are typically built near or over water in the branches of living or dead trees or among emergent vegetation (Shaw, 2006; Avery, 2020). Rusty blackbirds may use wetlands that have lower proportion mud cover and higher aquatic invertebrate abundance (Pachomski et al., 2021). Moderate to high quality habitat for rusty blackbird covers approximately 60% of the study areas at existing conditions (**Table 5-24**).

This species was detected at equal relative abundance in fen and swamp habitat types during point count surveys and was detected at the highest relative abundance within fen habitats during autonomous recording unit surveys (**Attachment B**).

The main disturbances affecting rusty blackbird habitat availability in the Project study areas at existing conditions are fire and insect outbreaks. Recently burned habitats may not provide suitable habitat for rusty blackbirds (Hobson and Schieck, 1999). Similarly, forested areas affected by insect outbreaks do not appear to provide suitable habitat for this species and large defoliation events may be contributing to this species' population declines (Greenberg et al., 2011).

Table 5-24: Habitat Suitability for Rusty Blackbird at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	4,977.9	39.3	158,545.9	63.9	424,663.1	64.1
Low to Poor	7,687.4	60.7	89,411.9	36.1	237,369.3	35.9

ha = hectare; % = percent.

5.6.12.2 Distribution

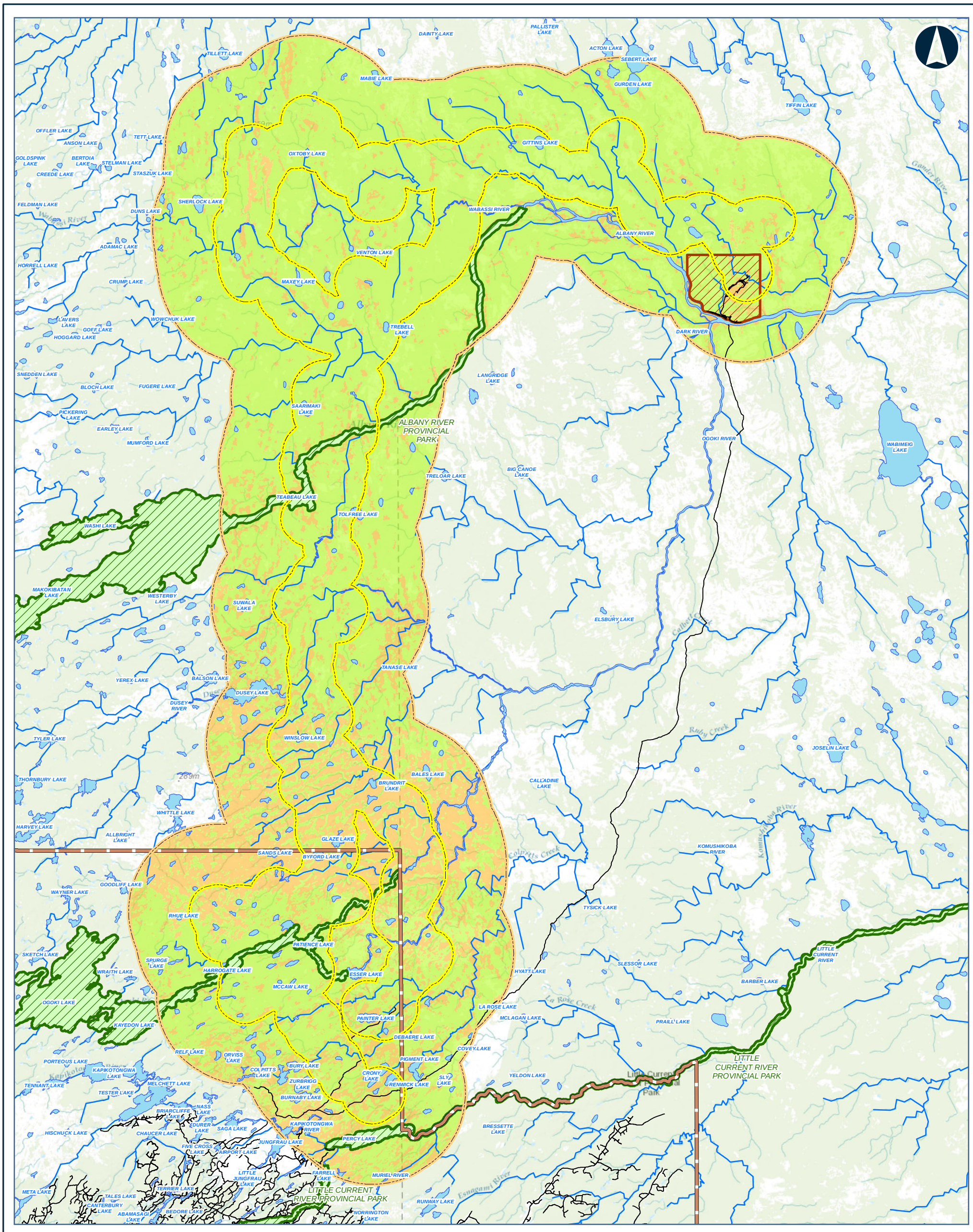
Rusty blackbirds are a migratory species that arrive in Canada between March and May (Avery, 2020). In Ontario, the breeding range is found in the Hudson Bay Lowlands and northern Boreal Shield ecozones (Natural Heritage Information Centre, 2023). Climate change may be causing a range retraction along the southern boundary of this species' range (McClure et al., 2012). Most threats to the rusty blackbird are within their stopover and wintering habitats (Committee on the Status of Endangered Wildlife in Canada, 2017).

This species was recorded at two of four autonomous recording unit survey stations in the existing conditions Construction Disturbance Area in 2022, at 18 of 54 autonomous recording unit survey stations in the existing conditions Local Study Area in 2022, and at four of 210 point count stations in the existing conditions Local Study Area from 2018 to 2022; no detections were recorded at any point count stations in the existing conditions Construction Disturbance Area or existing conditions Regional Study Area from 2018 to 2022. Rusty blackbird was detected throughout the existing conditions Local Study Area and existing conditions Construction Disturbance Area (**Attachment B**).

Rusty blackbirds may occur in the Project study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to the southeastern United States for the winter (Altman and Sallabanks, 2020). Rusty blackbirds were detected on autonomous recording units during the spring, summer, and fall seasons; highest detection was during the fall. Daily rusty blackbird activity recorded on autonomous recording units was highest at night during the fall migration period and highest at dawn during the spring and summer seasons. High to moderate suitability habitat for rusty blackbird is distributed throughout the Local and Regional Study Areas but is more common in the northern half of the study areas (**Figure 5-24**).

Rusty blackbirds have some breeding site fidelity, but rates of return are not known (Avery, 2020). Average home range size for individuals in Maine was 37.5 ha (Avery, 2020).

Rusty blackbirds may be sensitive to habitat fragmentation. A five-year study in New York found that rusty blackbirds were more likely to colonize larger, more connected wetlands and this species avoided sites near human infrastructure, such as roads (McNulty et al., 2015). Rusty blackbird was recently found to have restricted regional gene flow among location populations in North America. This restricted dispersal among populations may limit this species' ability to respond to climate change (Wilson et al., 2021).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA

RUSTY BLACKBIRD HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Rusty Blackbird in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-24

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Date Saved: 2/12/2026 11:59:35 AM User Name: INBA08973

5.6.12.3 Survival and Reproduction

Rusty blackbird is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Most threats to the rusty blackbird are within their stopover and wintering habitats (Committee on the Status of Endangered Wildlife in Canada, 2017). Threats to its breeding habitat in Ontario include the negative effects of climate change and industrial landscape-level activities on forest and wetland habitats.

During point count surveys, mean relative abundance of rusty blackbird was highest in 2022 and 2019 (0.02 individuals per plot), and lowest in 2018 (0.1 individuals per plot) (**Attachment B**). During autonomous recording unit surveys, rusty blackbird was only detected in the existing conditions Local Study Area (**Attachment B**).

The density estimates for rusty blackbird in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.9 and 0.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006).

The North American Breeding Bird Surveys suggests that the rusty blackbird population in Bird Conservation Region 7 has decreased by 3.2% per year from 1970 to 2021 (total decrease of 80.5%) (Smith et al., 2022). Even though the reliability of this estimate is considered “low,” there is a 95.5% chance of future population decrease in the region (Smith et al., 2022). The North American Breeding Bird Survey suggests that the rusty blackbird population in Ontario portion of Bird Conservation Region 8 has decreased by 3.9% each year from 1970 to 2021 (total decrease of 86.6%) (Smith et al., 2022). The reliability of this estimate is considered “medium” and there is predicted to be an 99.9% chance of future population decrease in the region (Smith et al., 2022).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as rusty blackbird, during fall their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

The average lifespan of rusty blackbird is unknown; the maximum reported age of an individual is eight years (Avery, 2020). Estimates of annual survival are not currently available (Avery, 2020). Rusty blackbirds may start breeding in their first year (Avery, 2020). Females typically lay four eggs per brood and only raise one brood per season (Avery, 2020). Nest success appears to be high (77% to 98%) (Avery, 2020; Wohner et al., 2020) and this is not likely a contributing factor to long-term and range-wide declines of this species (Avery, 2020).

Adult rusty blackbirds are preyed upon by accipiters, falcons, and owls. Nest predators include accipiters, corvids, red squirrel, bald eagle, northern harrier, red-tailed hawk, and merlin (Avery, 2020).

Rusty blackbirds predominately feed on aquatic insects, crustaceans, and fresh water snails (Avery, 2020; Pachomski et al., 2021). Climate change may be creating a disjunct between peak insect emergence and migratory songbird nesting because insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Between 1989 and 2014, spring insect emergence in northeastern North America has advanced by 3 to 12 days and is outpacing egg laying advancement for several songbird species by three to seven days (Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects, such as rusty blackbird, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow rusty blackbirds to adapt to climate change. Worldwide insect declines may be negatively affecting rusty blackbird populations in the Project study areas by reducing prey availability for this species.

Forest fragmentation can increase accessibility for brown-headed cowbirds, but rusty blackbirds are a rare host species for cowbirds (Altman and Sallabanks, 2020). Additionally, brown-headed cowbirds are not expected to occur and were not recorded in the Project study areas at existing conditions.

5.6.13 Yellow Rail

5.6.13.1 Habitat Availability

Yellow rails primarily nest in wet sedge meadows that are dominated by slender sedge (*Carex lasiocarpa*), but this species may also nest in sites dominated by other sedges or rushes. Water depth is an important habitat parameter, and this species requires water less than 15 cm deep during initial nesting (Committee on the Status of Endangered Wildlife in Canada, 2009b). Wetland size does not appear to be a limiting factor for yellow rails; this species has been found in wetlands as small as 0.5 ha (Committee on the Status of Endangered Wildlife in Canada, 2009b). Habitat suitability mapping indicates that high to moderate suitability habitat for yellow rail covers approximately 18% of the Local and Regional Study Areas (**Table 5-25**).

The main natural disturbance in the existing conditions Regional Study Area at baseline characterization is fire. Habitats may be most suitable for yellow rails at 2 to 5 years following a fire as this species requires a dense grass mat for nest concealment but avoids shrubby habitats (Austin and Buhl, 2013).

Yellow rails may be particularly vulnerable to changes to water levels from increasing drought or precipitation due to climate change as this species' breeding habitat is constrained by water levels and availability of overlying dry, dead mats of grassy vegetation, which is only found in wetlands with shallow water (Leston and Bookhout, 2020).

Table 5-25: Habitat Suitability for Yellow Rail at Existing Conditions

Habitat Suitability	Construction Disturbance Area		Local Study Area		Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	2,349.8	18.5	45,179.8	18.2	121,473.8	18.3
Low to Poor	10,315.5	81.5	202,778.1	81.8	540,558.6	81.7

ha = hectare; % = percent.

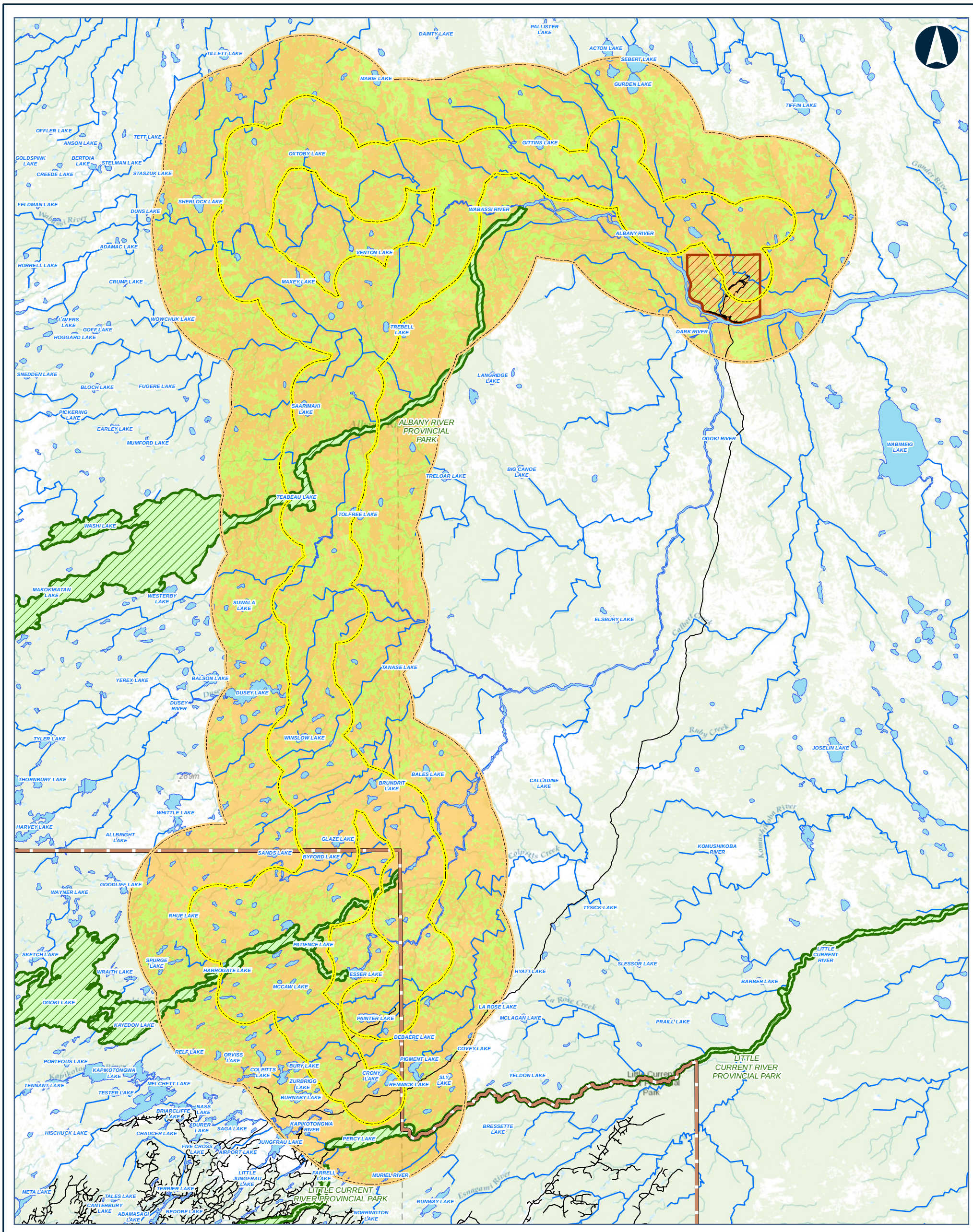
5.6.13.2 Distribution

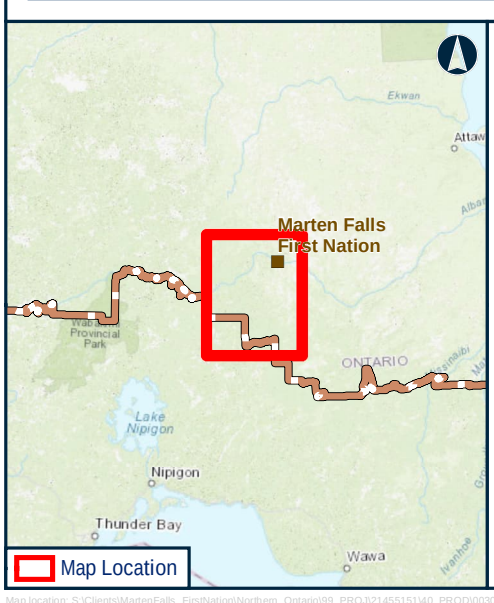
Yellow rail is a locally common breeding species that occurs primarily in the James Bay (Oji-Cree translation, *Wee-nee-peg-kook*) and Hudson Bay Lowlands, in Ontario (Natural Heritage Information Centre, 2023). Yellow rail was recorded on one of 54 autonomous recording unit survey stations in the southern portion of the existing conditions Local Study Area in 2022; this species was not detected during point count surveys from 2018 to 2022, which is not unexpected given that the species is nocturnally active (**Attachment B**).

Yellow rail may occur in Project study areas during the breeding and spring and fall migration periods; this species migrates to the southeastern United States for the winter (Leston and Bookhout, 2020). Yellow rail was only detected on autonomous recording units at dawn during the summer period. This species is primarily nocturnal (Leston and Bookhout, 2020). High to moderate suitability habitat for yellow rail is patchily distributed throughout the Local and Regional Study Areas (**Figure 5-25**).

Yellow rail home ranges in Michigan were found to average 7.8 ha for males and 1.3 ha for females (Leston and Bookhout, 2020). Densities of yellow rails in Alaska ranged from one bird per 25 to 86 ha (Committee on the Status of Endangered Wildlife in Canada, 2009b). This species appears to have low fidelity to breeding sites; in Michigan only 2 of 134 banded males were recaptured among survey years (Committee on the Status of Endangered Wildlife in Canada, 2009b, 2020b).

There is currently a lack of information on the effect of habitat fragmentation on yellow rail; however, the degradation of habitat due to human activity is anticipated to be the most serious factor affecting the species (Leston and Bookhout, 2020). Yellow rails are expected to have the capacity to adapt and be resilient to existing human-related disturbances and natural variations in habitat availability in the Project study areas. This species is highly mobile and can establish territories in areas below carrying capacity; movements of 125 km within the breeding season have been recorded (Leston and Bookhout, 2020).





Legend

- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- **YELLOW RAIL HSI SCORE**
- MODERATE TO HIGH
- LOW TO POOR
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Yellow Rail in the Regional Study Area at Existing Conditions

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 5-25

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5.6.13.3 Survival and Reproduction

During autonomous recording unit surveys completed during the breeding season in 2022, yellow rail was only detected in the existing conditions Local Study Area at one autonomous recording unit survey station; no individuals were recorded in the existing conditions Construction Disturbance Area (**Attachment B**).

The density estimate for yellow rail in *Ontario Breeding Bird Atlas* Region 37 is <0.1 nesting territories per km^2; a density estimate for Region 44 is not available (Bird Studies Canada et al., 2006).

Population trends for yellow rails are difficult to determine because this species is cryptic and does not have high site fidelity (Committee on the Status of Endangered Wildlife in Canada, 2009b). In 2009, there were estimated to be a few thousand breeding pairs of yellow rails in Canada; most of these breeding pairs are in the James Bay and Hudson Bay Lowlands (Committee on the Status of Endangered Wild life in Canada, 2009b). However, a recent study in the Northwest Territories suggests that the population and range of yellow rails in Canada may be much larger than currently reported (McLeod et al., 2021). A large population of yellow rails (estimated 906 ± 146 individuals) was discovered approximately 150 km north of their previously known distribution in the Northwest Territories and further study is required to determine population size and distribution in Canada (McLeod et al., 2021).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can have an effect on migratory bird populations, such as yellow rail, during their fall migration as birds can be killed directly by hurricanes or carried to locations far from their traditional wintering grounds, which may cause reduced fitness or mortality due to being in unfamiliar or unsuitable environments (Dionne et al., 2008).

Currently, little information is available on yellow rail breeding biology; annual survival rates, average and maximum lifespan, and nest success rates are not known (Leston and Bookhout, 2020). Yellow rails likely start breeding at one year of age (Leston and Bookhout, 2020). Females usually lay eight eggs per brood and raise one brood per season (Leston and Bookhout, 2020).

Few data are available on yellow rail predators. This is a ground nesting species and so may be vulnerable to mammalian predators; raptors may also depredate this species (Leston and Bookhout, 2020).

Yellow rails are omnivorous and consume invertebrates, fresh water snails, and plant seeds (Leston and Bookhout, 2020). The worldwide declines in aerial insect abundance and availability could have a negative effect on this species in the Project study by reducing insect abundance and availability. Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting yellow rail by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019). Worldwide insect declines may be negatively affecting yellow rail populations in the study areas by reducing prey availability for this species.

6 Selection of the Preferred Route

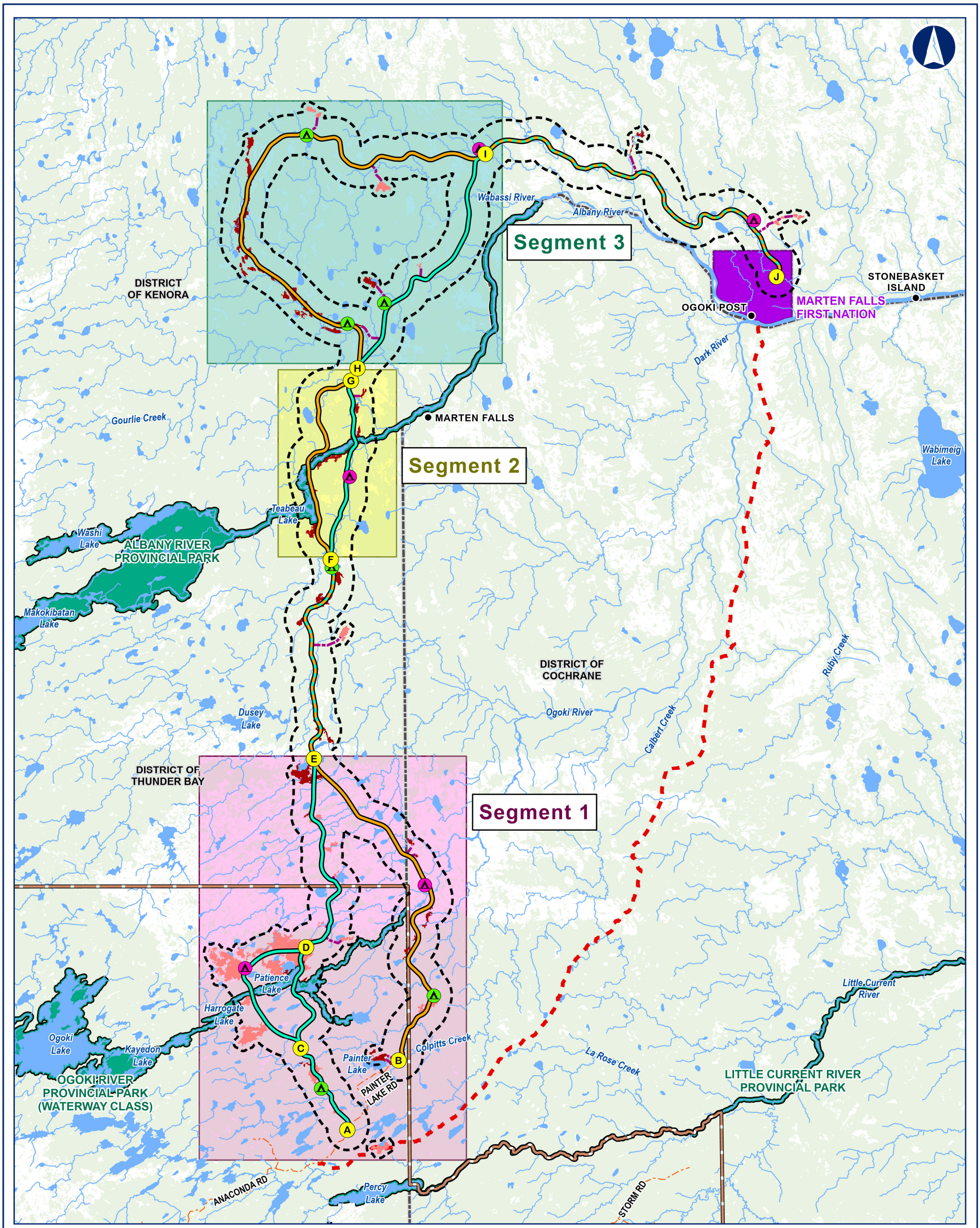
Following the collection of existing conditions information on the existing conditions study areas described in **Section 5**, the Project Team undertook an exercise to select a Preferred Route. The methodology and detailed results of this exercise are described in the *Environmental Assessment / Impact Statement Report* and are summarized at a high level in the following section. The Preferred Route includes the footprint of any ancillary features such as pits and quarries, temporary access roads, and worker camps associated with the construction of that route (i.e., the Construction Disturbance Area). The effects assessment will be completed using the identified Preferred Route.

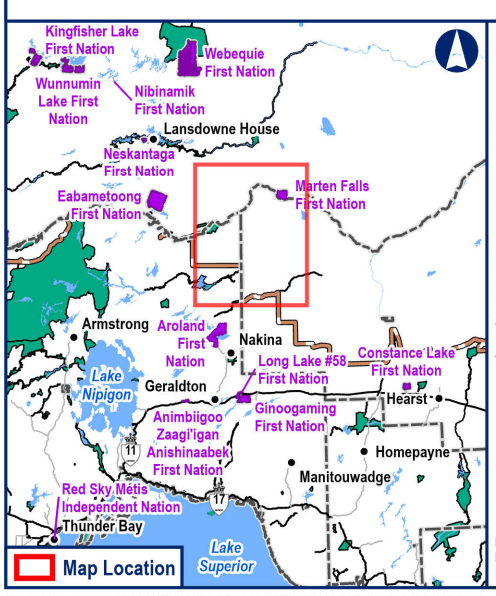
6.1 Alternative Segments and Routes Within Each Segment

To simplify the evaluation of the alternatives, they were divided into three separate segments based on their geographical locations. The segments were determined so that any alternative route in one segment could connect with any alternative route in the next segment, allowing for decisions to be made based on the environment in each segment and not based on the whole. This approach considers the variable environmental conditions within the Project area, allowing for flexibility to avoid sensitive natural features encountered within the Project disturbance area for each segment instead of requiring decision makers to balance trade-offs of one long route versus the other (**Figure 6-1**).

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Route Alternatives and Segments





Legend

- Segment Node
- Project Study Area
- Segment 1
- Segment 2
- Segment 3

Construction Disturbance Area

Route Alternatives (100 m Right-of-Way)

- Alternative 1
- Alternative 4

Potential Camp Site

- 50 Persons (108 m x 150 m)
- 200 Persons (108 m x 150 m)
- Approximate Access Road to Potential Construction Camp (10 m Width)

Potential Aggregate Source

- Bedrock
- Sand and gravel
- Approximate Access Road to Potential Aggregate Site (10 m Width)

General Features

- Resource / Recreation Road
- MFFN Existing Winter Access Road
- Watercourse
- Waterbody
- First Nation Reserve
- District Municipal Boundary
- Far North Boundary
- Provincial Park

Data Source:
Base Data: Provided by MNRF 2023; Route Infrastructure - Provided by AECOM 2021. Contains Information licensed under the Government Licence Ontario.

Notes:
First Nation Reserves of MFFN CAR Neighboring Indigenous Communities are shown within the inset extent.

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

January 2026 | 1:450,000 * when printed 11"x17"

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Figure 6-1

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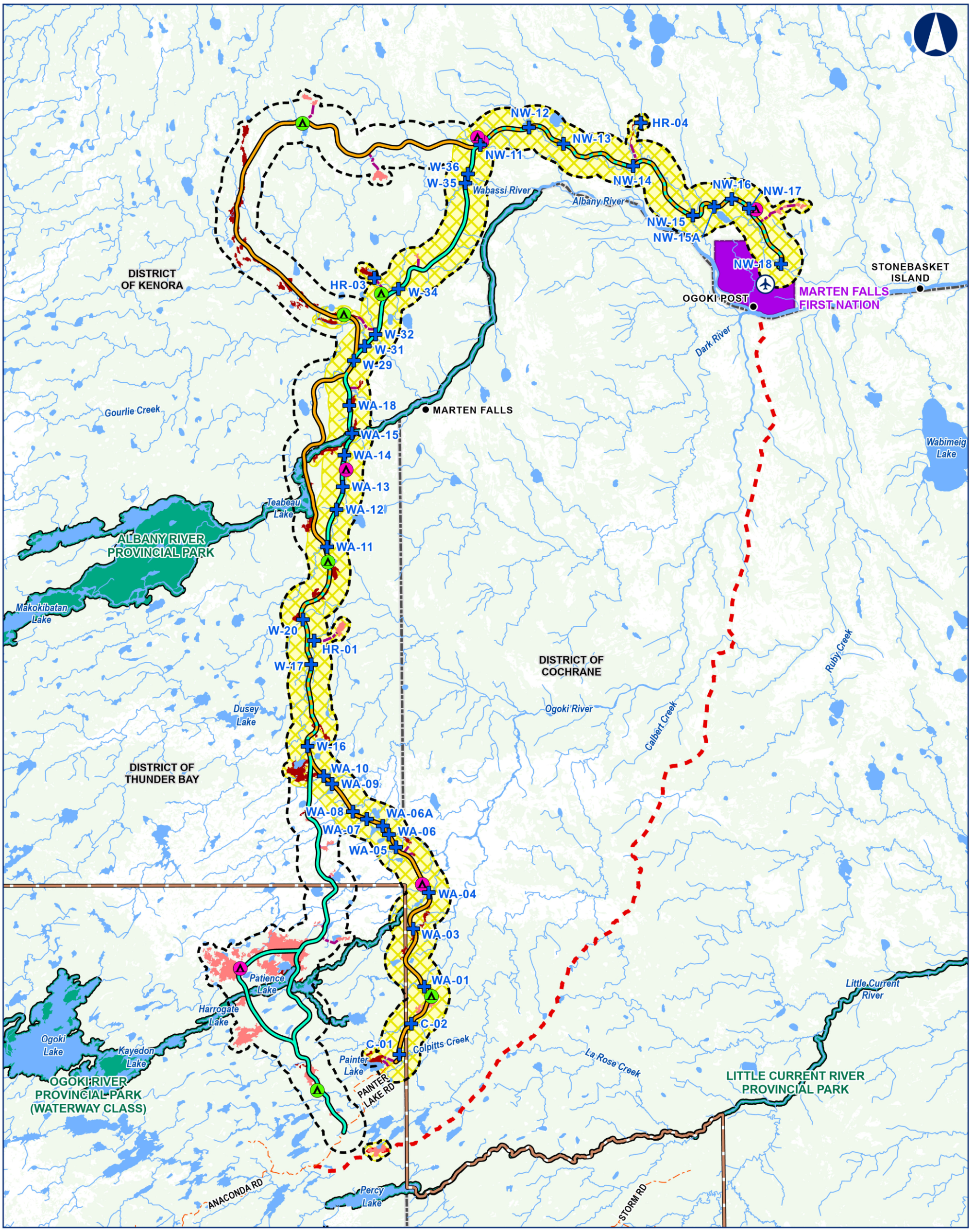
6.2 Preferred Route

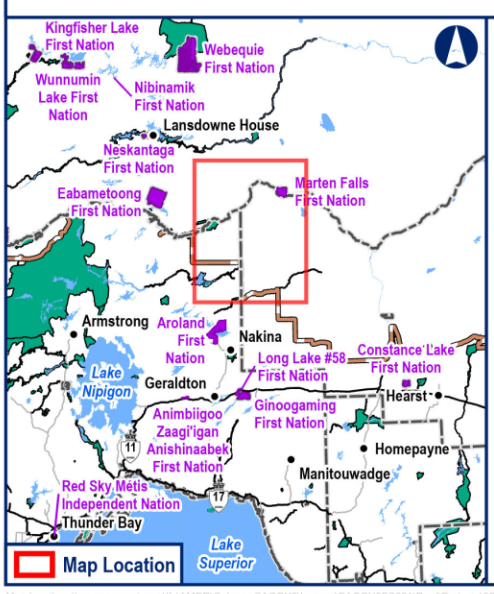
The selection of the preferred route within each segment involved a thorough analysis of technical, economic, natural, social, and cultural factors. The route alternative evaluation considered the potential effects and standard or known mitigation approaches to determine the net positive or negative effects of each alternative; it was completed using the reasoned argument (trade-off) method. The reasoned argument method qualitatively compares the advantages and disadvantages of each alternative including the relative significance of the potential residual effects.

After completing the steps outlined previously, obtaining direction from the communities of Marten Falls First Nation and Aroland First Nation, and collecting input from the public and regulators, the Proponent identified a preferred route alignment for each segment.

- Segment 1 – Ogoki Crossing: Alternative 1;
- Segment 2 – Albany Crossing: Alternative 4; and
- Segment 3 – North of the Albany: Alternative 4.

The combination of Segments 1, 2 and 3 create the final Preferred Route (**Figure 6-2**).





Legend

- Water Crossing
- Project Study Area
- Final Route Recommendation

Construction Disturbance Area

Route Alternatives (100 m Right-of-Way)

- Alternative 1
- Alternative 4

Potential Camp Site

- 50 Persons (108 m x 150 m)
- 200 Persons (108 m x 150 m)
- Approximate Access Road to Potential Construction Camp (10 m Width)

Potential Aggregate Source

- Bedrock
- Sand and gravel
- Approximate Access Road to Potential Aggregate Site (10 m Width)

General Features

- Resource / Recreation Road
- MFFN Existing Winter Access Road
- Watercourse
- Waterbody
- First Nation Reserve
- District Municipal Boundary
- Far North Boundary
- Provincial Park
- Airport

Data Source:
Base Data: Provided by MNRF 2023; Route Infrastructure - Provided by AECOM 2021. Contains Information licensed under the Government Licence Ontario.

Notes:
First Nation Reserves of MFFN CAR Neighboring Indigenous Communities are shown within the inset extent.

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Preferred Route

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

February 2026 | 1:450,000 * when printed 11"x17"

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Figure 6-2

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7 Residual Effects Assessment

Effects assessment results are provided for the Preferred Route , with consideration of the temporal boundaries of the Project as described in **Section 4.2**. This includes the potential effects (positive and negative), mitigation and enhancement measures, and an assessment of residual effects.

7.1 Summary of the Existing Environment Within the Effects Study Areas

7.1.1 Forest Birds

7.1.1.1 Red-eyed Vireo

7.1.1.1.1 Habitat Availability

Habitat suitability for red-eyed vireo was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-1**.

High and moderate habitats cover approximately 40% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. Habitat suitability results for red-eyed vireo are provided in **Table 7-1**.

Table 7-1: Habitat Suitability for Red-eyed Vireo at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	29,268.6	19.7	99,602.4	19.7
Moderate	30,846.6	20.7	101,477.9	20.0
Low	40,350.8	27.1	131,948.0	26.1
Poor	48,392.1	32.5	173,536.9	34.3

Note: There are 190.6 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.1.1.2 Distribution

Red-eyed vireos were detected most frequently in the southern portion of the effects assessment Local Study Area and near the Albany River.

The amount of high and moderate suitability red-eyed vireo habitat is greater in the southern half of the effects assessment Local Study Area and effects assessment Regional Study Area (**Figure 5-1**). Small patches of moderate and high suitability habitat are present in the eastern and northern portions of the effects assessment Local Study Area and effects assessment Regional Study Area and generally associated with riparian areas along watercourses (**Figure 5-1**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.1.1.3 Survival and Reproduction

Red-eyed vireo is one of the most abundant breeding songbirds in the forests of eastern North America (Cimprich et al., 2020). This species was also one of the most abundant forest songbird species detected during field surveys from 2018 to 2022.

The Project is located in *Ontario Breeding Bird Atlas* Regions 44 and 37. The *Ontario Breeding Bird Atlas* provides abundance estimates for unlimited distance point count surveys. These abundance estimates were converted to density estimates by assuming a 100 m survey distance or 3.14 ha survey area. The density estimates for red-eyed vireo in these regions are 10.8 and 23.8 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-1**) there are estimated to be between 21,639 and 47,888 red-eyed vireo nesting territories in the effects assessment Regional Study Area at existing conditions, if high and moderate suitability habitat is fully occupied and at carrying capacity.

7.1.1.2 Ovenbird

7.1.1.2.1 Habitat Availability

Habitat suitability for ovenbird was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-2**.

High and moderate habitats cover approximately 60% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for ovenbird is provided in **Table 7-2**.

Table 7-2: Habitat Suitability for Ovenbird at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	57,147.7	38.4	184,560.9	36.4
Moderate	35,517.5	23.8	100,294.9	19.7
Low	12,587.1	8.5	41,290.5	8.2
Poor	43,605.7	29.3	180,396.0	35.6

Note: There are 213.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.1.2.2 Distribution

Ovenbirds were detected every monitoring year from 2018 to 2022. During the breeding season, ovenbird was recorded at three autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 12 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and six autonomous recording unit survey stations in the effects Regional Study Area. The species was recorded at two point count stations within the effects assessment Construction Disturbance Area in 2022, at 20 point count stations in the effects assessment Local Study Area, and at 16 point count stations in the effects Regional Study Area.

The amount of high and moderate suitability ovenbird habitat is scattered in distinct pockets throughout the effects assessment Local Study Area and effects assessment Regional Study Area, with high quality habitat generally associated with the Albany River (**Figure 5-2**). Smaller patches of moderate and high suitability habitat is present throughout the Effects Local and Regional Study Areas in proximity to riparian areas along watercourses (**Figure 5-2**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.1.2.3 Survival and Reproduction

Ovenbirds were commonly detected during field surveys in the effects study areas. The density estimates for ovenbird in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 4.7 and 14.3 nesting territories per km^2, respectively (Bird Studies Canada et al. 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-2**) there are estimated to be between 13,263 and 40,651 ovenbird nesting territories in the effects assessment Regional Study Area at existing conditions, if high and moderate suitability habitat is fully occupied and at carrying capacity.

7.1.1.3 Dark-eyed Junco

7.1.1.3.1 Habitat Availability

Habitat suitability for dark-eyed junco was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-3**.

High and moderate habitats cover approximately 30% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for dark-eyed junco is provided in **Table 7-3**.

Table 7-3: Habitat Suitability for Dark-eyed Junco at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	44,692.7	30.0	145,883.3	28.8
Low to Poor	104,165.3	70.0	360,863.7	71.2

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.1.3.2 Distribution

Dark-eyed juncos were detected every monitoring year from 2018 to 2022. During the breeding season, dark-eyed junco was recorded at two autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 24 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and ten autonomous recording unit survey stations in the effects assessment Regional Study Area. The species was recorded at four point count stations within the effects assessment Construction Disturbance Area in 2022, at 68 point count stations in the effects assessment Local Study Area, and at 32 point count stations in the effects assessment Regional Study Area.

The amount of high and moderate suitability dark-eyed junco habitat is greater in the southern half of the effects assessment Local Study Area and effects assessment Regional Study Area (**Figure 5-3**). Small patches of moderate and high suitability habitat are present throughout the northern portions of the effects assessment Local Study Area and effects assessment Regional Study Area and are generally associated with areas of elevated topography (**Figure 5-3**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 336.4 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.04 km/km^2 in the effects assessment Local Study Area and 0.08 km/km^2 in the effects assessment Regional Study Area.

7.1.1.3.3 Survival and Reproduction

Dark-eyed juncos were commonly detected during field surveys in the effects study areas. The density estimates for dark-eyed junco in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 8.8 and 4.0 nesting territories per km^2, respectively (Bird Studies Canada et al. 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-3**) there are estimated to be between 5,845and 12,772 dark-eyed junco nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.2 Raptors

7.1.2.1 Osprey

7.1.2.1.1 Habitat Availability

Habitat suitability for osprey was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-4**.

High and moderate habitats cover approximately 32% of the effects assessment Local Study Area and 18% of the effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for osprey is provided in **Table 7-4**.

Table 7-4: Habitat Suitability for Osprey at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	47,301.9	31.8	92,696.8	18.3
Low to Poor	101,556.0	68.2	414,050.2	81.7

Note: there are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.2.1.2 Distribution

Osprey is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). This species was detected on one autonomous recording unit survey stations in the effects assessment Local Study Area in 2022 and at one location in the effects assessment Local Study Area during point count surveys in 2022. Ospreys were detected sporadically throughout the effects assessment Local Study Area. One osprey nest was found during field surveys. This nest was located along a tributary of the Ogoki River in the effects assessment Regional Study Area, approximately five kilometres northwest of Dusey Lake.

Ospreys were only detected in the effects study areas during the summer; this species was not detected during the spring and fall migration periods or during the winter (**Figure 5-4**). The effects assessment Local Study Area has a larger amount of high to moderate suitability osprey habitat (31.8% of the study area) than the effects assessment Regional Study Area (18.3% of the study area).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.2.1.3 Survival and Reproduction

A total of three ospreys were detected on two autonomous recording units during surveys in 2022 and one active nest that contained three hatchlings was found during aerial surveys in 2022.

The density estimates for osprey in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.2 and 0.02 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-4**) there are estimated to be between 18 and 227 osprey nesting territories in the effects assessment Regional Study

Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.2.2 Boreal Owl

7.1.2.2.1 Habitat Availability

Habitat suitability for boreal owl was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-5**.

High and moderate habitats cover approximately 40% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for boreal owl is provided in **Table 7-5**.

Table 7-5: Habitat Suitability for Boreal Owl at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	26,666.5	17.9	77,065.0	15.2
Moderate	32,772.4	22.0	118,812.6	23.5
Low	44,572.8	29.9	146,413.0	28.9
Poor	44,846.2	30.1	164,288.7	32.4

Note: There are 3.7 ha of over-classified habitat in the effects assessment Regional Study Area due to pixel error.
ha = hectare; % = percent.

7.1.2.2.2 Distribution

Boreal owls were detected in 2018 and 2022 and were most frequently detected on autonomous recording units during the spring season, which correlates to the species calling period (Hayward and Hayward, 2020). The species was detected at three autonomous recording unit survey stations in effects assessment Construction Disturbance Area in 2022, at 19 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and six autonomous recording unit survey stations in the effects assessment Regional Study Area.

Large patches of moderate and high suitability habitat for boreal owl are present along most of the southern, central, and northwestern portions of the effects assessment Regional Study Area, although habitat suitability in the extreme south portion of the effects assessment Regional Study Area is poor (**Figure 5-5**). In the northeastern portion of the effects assessment Regional Study Area, there is a large patch of suitable boreal owl habitat northwest of Marten Falls First Nation.

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.2.2.3 Survival and Reproduction

Density estimates for boreal owl in *Ontario Breeding Bird Atlas* Regions 37 and 44 are not available (Bird Studies Canada et al., 2006). The average home range size for boreal owls reported in literature is 82 ha (Hayward and Hayward et al., 2020). Based on the density reported in literature and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-5**) there are estimated to be 1,194 boreal owl nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.3 Shorebirds

7.1.3.1 Wilson's Snipe

7.1.3.1.1 Habitat Availability

Habitat suitability for Wilson's snipe was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-6**.

High and moderate habitats cover approximately 50% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for Wilson's snipe is provided in **Table 7-6**.

Table 7-6: Habitat Suitability for Wilson's Snipe at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	24,858.8	16.7	98,068.2	19.4
Moderate	42,169.2	28.3	150,237.5	29.7
Low	19,372.4	13.0	45,115.1	8.9
Poor	62,457.6	41.9	213,151.2	42.1

Note: There are 183.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.3.1.2 Distribution

Wilson's snipes were detected every monitoring year from 2018 to 2022. This species was recorded at three autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 13 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and nine autonomous recording unit survey stations in the effects assessment Regional Study Area in 2022. The species was not recorded at any point count stations within the effects assessment Construction Disturbance Area; however, it was recorded at six point count stations from 2018 to 2022 in the effects assessment Local Study Area, and at five point count stations from 2018 to 2022 in the effects assessment Regional Study Area. Wilson's snipes were detected more frequently south of Dusey Lake within the effects study areas.

High and moderate suitability Wilson's snipe habitat is widely distributed throughout the southwest two thirds of the effects assessment Regional Study Area (**Figure 5-6**). Suitable Wilson's snipe habitat is generally absent in the northeastern third of the of the effects assessment Regional Study Area.

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.3.1.3 Survival and Reproduction

Density estimates for Wilson's snipe in *Ontario Breeding Bird Atlas* Regions 37 and 44 are not available (Bird Studies Canada et al., 2006). The average home range size for Wilson's snipe reported in literature in Ontario is 14.8 ha (Mueller, 2020). Based on the density reported in literature and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-6**) there are estimated to be 8,389 Wilson's snipe nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.4 Waterfowl and Waterbirds

7.1.4.1 Mallard

7.1.4.1.1 Habitat Availability

Habitat suitability for mallard was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-7**.

High and moderate habitats cover approximately 87% of the Effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for mallard is provided in **Table 7-7**.

Table 7-7: Habitat Suitability for Mallard at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	128,754.4	86.5	440,237.0	86.9
Low to Poor	20,103.5	13.5	66,509.9	13.1

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.4.1.2 Distribution

Mallard was detected every monitoring year from 2018 to 2022. Mallard was recorded on 5 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and at three autonomous recording unity survey stations in the effects assessment Regional Study Area in 2022; no detections were recorded in the effects assessment

Construction Disturbance Area. Mallard was not detected at any point count stations from 2018 to 2022. Mallards were detected throughout the effects study areas, although detections were absent in the northwestern portion of the effects study areas. Mallards were more frequently detected south of Dusey Lake than in the northern portions of the effects assessment Regional Study Area.

The amount of high and moderate suitability mallard habitat is relatively evenly distributed throughout the effects study areas (**Figure 5-7**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.4.1.3 Survival and Reproduction

Mallard is the most abundant duck species in North America (Drilling et al., 2020) and this species was among the most common waterfowl and waterbird species observed during field surveys in 2018 to 2022.

The density estimate for mallard in *Ontario Breeding Bird Atlas* Regions 44 is 0.4 nesting territories per km^2; a density estimate for this species for Region 37 is not available (Bird Studies Canada et al., 2006). Based on the density estimate for *Ontario Breeding Bird Atlas* Region 44 and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-7**) there are estimated to be 1,682 mallard nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.5 Bog / Fen Birds and Other Wetland Birds

7.1.5.1 Palm Warbler

7.1.5.1.1 Habitat Availability

Habitat suitability for palm warbler was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-8**.

High and moderate habitats cover approximately 65% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for palm warbler is provided in **Table 7-8**.

Table 7-8: Habitat Suitability for Palm Warbler at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	49,490.0	33.2	184,638.5	36.5
Moderate	43,855.6	29.5	156,989.2	30.9
Low	40,572.8	27.3	109,234.8	21.6
Poor	14,939.5	10.0	55,703.3	10.9

Note: There are 189.9 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.5.1.2 Distribution

Palm warblers were detected every monitoring year from 2018 to 2022. During the breeding season, this species was recorded at two autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 19 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, at 9 autonomous recording unit survey stations in the effects assessment Regional Study Area in 2022, at one point count station in the effects assessment Construction Disturbance Area, 40 point count stations in the effects assessment Local Study Area from 2018 to 2022, and at 31 point count stations in the effects assessment Regional Study Area from 2018 to 2022. During field studies, palm warblers were spatially distributed evenly throughout the effects study areas.

High and moderate suitability palm warbler habitat generally extends throughout the effects assessment Regional Study Area (**Figure 5-8**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.5.1.3 Survival and Reproduction

The density estimates for palm warbler in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 6.4 and 1.7 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-8**) there are estimated to be between 5,864 and 21,988 palm warbler nesting territories in the effects assessment Regional Study Area at existing conditions, if high and moderate suitability habitat is fully occupied and at carrying capacity.

7.1.5.2 Common Yellowthroat

7.1.5.2.1 Habitat Availability

Habitat suitability for common yellowthroat was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-9**.

High and moderate habitats cover approximately 64% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for common yellowthroat is provided in **Table 7-9**.

Table 7-9: Habitat Suitability for Common Yellowthroat at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	58,498.0	39.3	201,169.7	39.7
Moderate	37,140.2	24.9	131,753.5	26.0
Low	36,181.5	24.3	119,368.0	23.6
Poor	17,038.2	11.5	54,356.2	10.7

Note: There are 109.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.5.2.2 Distribution

Common yellowthroats were detected every monitoring year from 2018 to 2022. During the breeding season, common yellowthroat was recorded at two autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 17 autonomous recording unit survey stations in the effects assessment Local Study Area in 2022, and eight autonomous recording unit survey stations in the effects assessment Regional Study Area. The species was recorded at two point count stations within the effects assessment Construction Disturbance Area in 2022, at 37 point count stations in the effects assessment Local Study Area, and at 19 point count stations in the Regional Study Area from 2018 to 2022. Common yellowthroats were detected most frequently in the southern portion of the effects assessment Local Study Area and were generally absent from the northwestern portion of the Effects Region Study Area.

High and moderate common yellowthroat habitat is evenly distributed throughout the effects study areas (**Figure 5-9**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.5.2.3 Survival and Reproduction

The density estimates for common yellowthroat in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.7 and 7.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-9)** there are estimated to be between 2,439 and 23,665 common yellowthroat nesting territories in the effects assessment Regional Study Area at existing conditions, if high and moderate suitability habitat is fully occupied and at carrying capacity.

7.1.5.3 Northern Waterthrush

7.1.5.3.1 Habitat Availability

Habitat suitability for northern waterthrush was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-10**.

High and moderate habitats cover approximately 40% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for northern waterthrush is provided in **Table 7-10**.

Table 7-10: Habitat Suitability for Northern Waterthrush at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	30,595.9	20.6	101,281.9	19.9
Moderate	32,079.5	21.6	102,837.9	20.3
Low	46,111.2	30.9	153,675.4	30.3
Poor	40,071.4	26.9	148,764.1	29.4

Note: There are 196.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.5.3.2 Distribution

Northern waterthrushes were detected every monitoring year from 2018 to 2022. During the breeding season, northern waterthrush was recorded at two autonomous recording unit survey stations in the effects assessment Construction Disturbance Area in 2022, at 17 autonomous recording unit survey stations in the effects assessment Local Study Area

in 2022, and eight autonomous recording unit survey stations in the effects assessment Regional Study Area. The species was recorded at two point count stations within the effects assessment Construction Disturbance Area in 2022, at 34 point count stations from 2018 to 2022 in the effects assessment Local Study Area, and at 22 point count stations from 2018 to 2022 in the effects assessment Regional Study Area. During field studies, northern waterthrushes were detected evenly throughout the effects study areas.

High and moderate northern waterthrush habitat is patchily distributed throughout the effects study areas and is primarily associated with riparian areas along watercourses (**Figure 5-10**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.5.3.3 Survival and Reproduction

The density estimates for northern waterthrush in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 7.1 and 0.8 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-10**) there are estimated to be between 1,619 and 14,451 northern waterthrush nesting territories in the effects assessment Regional Study Area at existing conditions, if high and moderate suitability habitat is fully occupied and at carrying capacity.

7.1.5.4 Sora

7.1.5.4.1 Habitat Availability

Habitat suitability for sora was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-11**.

High and moderate habitats cover approximately 20% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for sora is provided in **Table 7-11**.

Table 7-11: Habitat Suitability for Sora at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	27,171.3	18.3	93,993.5	18.5
Low to Poor	121,686.6	81.7	412,753.5	81.5

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.5.4.2 Distribution

Sora is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). This species was detected on six autonomous recording unit survey stations in the effects assessment Local Study Area in 2022 and at one location in the effects assessment Regional Study Area during autonomous recording unit surveys in 2022. Sora were detected sporadically throughout the effects assessment Local Study Area. This species was detected throughout the effects assessment Local Study Area, north of Sands Lake during field surveys.

Soras are only anticipated to be present in the effects study areas during the spring and fall migration and breeding seasons (**Figure 5-11**). The effects assessment Local Study Area and effects assessment Regional Study Areas have roughly equal amounts of high to moderate habitats (18.3% and 18.5% respectively).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.5.4.3 Survival and Reproduction

The density estimate for sora in *Ontario Breeding Bird Atlas* Region 44 is 0.1 nesting territories per km^2; a density estimate for Region 37 is not available for this species (Bird Studies Canada et al. 2006). Based on the density estimate for *Ontario Breeding Bird Atlas* Region 44 and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-11**) there are estimated to be up to 66 sora nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6 Species at Risk Birds

7.1.6.1 Canada Warbler

7.1.6.1.1 Habitat Availability

Habitat suitability for Canada warbler was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-12**.

High and moderate habitats for Canada warbler cover approximately 50% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for Canada warbler is provided in **Table 7-12**.

Table 7-12: Habitat Suitability for Canada Warbler at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	76,880.7	51.6	257,403.3	50.8
Low to Poor	71,977.2	48.4	249,343.3	49.2

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.1.2 Distribution

Canada warblers were detected every monitoring year from 2018 to 20222. During baseline surveys from 2018 to 2022, Canada warblers were recorded on one autonomous recording unit in the effects assessment Construction Disturbance Area, 8-point count stations and 5 autonomous recording units in the effects assessment Local Study Area,

and four point count stations and two autonomous recording units in the effects assessment Regional Study Area. Most detections were made during the breeding season, with some detections during the spring migration period.

High and moderate suitability Canada warbler habitat generally extends throughout the entire effects assessment Regional Study Area, with the exception of the northeastern portion of the effects assessment Regional Study Area (**Figure 5-12**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.1.3 Survival and Reproduction

The density estimates for Canada warbler in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.2 and 1.0 nesting territories per km^2, respectively (Bird Studies Canada et al. 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-12**) there are estimated to be between 541 and 2,467 Canada warbler nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.2 Evening Grosbeak

7.1.6.2.1 Habitat Availability

Habitat suitability for evening grosbeak was modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-13**.

High and moderate habitats for evening grosbeak cover approximately 20% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for evening grosbeak is provided in **Table 7-13.**

Table 7-13: Habitat Suitability for Evening Grosbeak at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	26,766.2	17.9	89,759.2	17.7
Low to Poor	122,091.8	82.1	416,987.8	82.3

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.2.2 Distribution

Evening grosbeaks were not detected during field studies for the Project.

High and moderate suitability evening grosbeak habitat is generally found throughout the entire effects assessment Regional Study Area, with a high concentration located in the southern third of the effects assessment Regional Study Area (**Figure 5-13**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.2.3 Survival and Reproduction

The number of evening grosbeak nesting territories removed by the Project was not estimated as this species is highly nomadic and can nest in small groups (Committee on the Status of Endangered Wildlife in Canada, 2016; Gillihan and Byers, 2020).

7.1.6.3 Chimney Swift, Bank Swallow and Barn Swallow

7.1.6.3.1 Habitat Availability

Habitat suitability for chimney swift, bank swallow, and barn swallow were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-14**.

High and moderate habitats cover approximately 0.2% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for chimney swift, bank swallow, and barn swallow is provided in **Table 7-14**.

Table 7-14: Habitat Suitability for Chimney Swift, Bank Swallow, and Barn Swallow at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	329.4	0.2	1,112.1	0.2
Low to Poor	148,528.6	99.8	505,634.4	99.8

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.3.2 Distribution

No chimney swifts, bank swallows, or barn swallows were detected during baseline surveys from 2018 to 2022. Suitable habitats for these species were not identified during species-specific baseline surveys.

High and moderate suitability chimney swift, bank swallow, and barn swallow habitat is found very rarely throughout the entire effects assessment Regional Study Area (**Figure 5-14**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent

disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.3.3 Survival and Reproduction

Density estimates for chimney swift and barn swallow in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006). The density estimates for barn swallow in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.04 nesting territories per km^2 for both regions (Bird Studies Canada et al., 2006). Based on these estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area **(Table 7-14)** there is estimated to be less than one barn swallow nesting territory in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity. Population estimates for chimney swift and bank swallow were not completed, however, the population for barn swallow is anticipated to be an accurate surrogate for these species.

7.1.6.4 Common Nighthawk and Eastern Whip-poor-will

7.1.6.4.1 Habitat Availability

Habitat suitability for common nighthawk and eastern whip-poor-will were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-15** and **Figure 5-16**.

High and moderate habitats for common nighthawk cover approximately 45% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for common nighthawk is provided in **Table 7-15.**

Table 7-15: Habitat Suitability for Common Nighthawk at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	31,909.6	21.4	116,546.6	23.0
Moderate	36,540.9	24.6	125,750.1	24.8
Low	39,435.5	26.5	128,347.5	25.3
Poor	40,971.9	27.5	135,974.6	26.8

Note: There are 137.0 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

High and moderate habitats for eastern whip-poor-will cover approximately 5% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for eastern whip-poor-will is provided in **Table 7-16**.

Table 7-16: Habitat Suitability for Eastern Whip-poor-will at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	6,132.2	4.1	19,450.4	3.8
Low to Poor	142,725.8	95.9	487,296.6	96.2

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.4.2 Distribution

During baseline surveys from 2018 to 2022, common nighthawks were recorded on 2 autonomous recording units in the effects assessment Construction Disturbance Area, 1 point count station and 24 autonomous recording units in the effects assessment Local Study Area, and 8 autonomous recording units in the effects assessment Regional Study Area; this species was not detected during point count surveys in the effects assessment Regional Study Area. Detections primarily occurred during the breeding season, with some detections during the fall migration period. Most detections of common nighthawks were at night, but some detections were recorded at dawn.

Most patches of high suitability common nighthawk habitat are present in the southern half of the effects assessment Local Study Area and effects assessment Regional Study Area (**Figure 5-15**). Small patches of moderate and high suitability habitat are present in the eastern and northern portions of the effects assessment Local Study Area and effects assessment Regional Study Area and generally associated with riparian areas along watercourses (**Figure 5-15**).

Indigenous Knowledge shared by Marten Falls First Nation within the *Indigenous Knowledge Land Use and Occupancy Study* has noted the presence of common nighthawk within the area of Washi Lake.

During baseline surveys from 2018 to 2022, eastern whip-poor-wills were recorded on one autonomous recording unit in the effects assessment Local Study Area; this species was not detected during point count surveys in the effects assessment Construction Disturbance Area or effects assessment Local Study Area, or during autonomous recording unit surveys in the effects assessment Construction Disturbance Area or effects

assessment Regional Study Area. All detections occurred during the breeding season at night.

High and moderate suitability eastern whip-poor-will habitat is generally found throughout the entire effects assessment Regional Study Area, with a higher concentration located in the southern third of the effects assessment Regional Study Area (**Figure 5-16**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.4.3 Survival and Reproduction

The density estimate for common nighthawk in *Ontario Breeding Bird Atlas* Region 37 is 0.3 nesting territories per km^2; an estimate for this species is not available for Region 44 (Bird Studies Canada et al., 2006). Density estimates for eastern whip-poor-will in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006), however, the average eastern whip-poor-will territory size is 5.1 ha (Cink et al., 2017).

Based on the density estimate from Region 37 of the *Ontario Breeding Bird Atlas* for common nighthawk and the density reported in literature for eastern whip-poor-will and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-15** and **Table 7-16**), there are estimated to be 625 common nighthawk and 3,814 eastern whip-poor-will nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.5 Eastern Wood-Pewee

7.1.6.5.1 Habitat Availability

Habitat suitability for eastern wood-pewee were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-17**.

High and moderate habitats cover approximately 5% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for eastern wood-pewee is provided in **Table 7-17**.

Table 7-17: Habitat Suitability for Eastern Wood-Pewee at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	9,002.8	6.1	30,836.9	6.1
Low to Poor	139,855.1	93.9	475,910.1	93.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.5.2 Distribution

During baseline surveys from 2018 to 2022, eastern wood-pewees were recorded on 1 autonomous recording unit in the effects assessment Local Study Area and 2 point count stations in the effects assessment Regional Study Area; this species was not detected during autonomous recording unit or point count surveys in the effects assessment Construction Disturbance Area, during point count surveys in the effects assessment Local Study Area, or during autonomous recording unit surveys in the effects assessment Local Study Area or the effects assessment Regional Study Area. All detections of eastern wood-pewee occurred during the breeding season at dawn.

High and moderate suitability eastern wood-pewee habitat is generally found throughout the entire effects assessment Regional Study Area, with a high concentration located in the southern half of the effects assessment Regional Study Area (**Figure 5-17**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at

existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.5.3 Survival and Reproduction

The density estimate for eastern wood-pewee in *Ontario Breeding Bird Atlas* Region 37 is 0.2 nesting territories per km^2; a density estimate for this species in Region 44 is not available (Bird Studies Canada et al., 2006). Based on the density estimate for *Ontario Breeding Bird Atlas* Region 37 and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-17**) there are estimated to be 51 eastern wood-pewee nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.6 Olive-sided Flycatcher

7.1.6.6.1 Habitat Availability

Habitat suitability for olive-sided flycatcher were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-18**.

High and moderate habitats cover approximately 50% to 60% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for olive-sided flycatcher is provided in **Table 7-18**.

Table 7-18: Habitat Suitability for Olive-sided Flycatcher at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High	17,702.2	11.9	83,952.7	16.6
Moderate	60,706.5	40.8	214,334.9	42.3
Low	52,059.8	34.9	144,274.5	28.5
Poor	18,389.4	12.4	64,016.3	12.6

Note: There are 177.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
ha = hectare; % = percent.

7.1.6.6.2 Distribution

During baseline surveys from 2018 to 2022, olive-sided flycatchers were recorded on 1 autonomous recording unit and 2 point count surveys in the effects assessment Construction Disturbance Area, 23 autonomous recording unit and 46 point count surveys in the effects assessment Local Study Area, and six autonomous recording units and 20 point count stations in the effects assessment Regional Study Area. Most detections of olive-sided flycatcher occurred during the breeding season at dawn but there were some detections during the spring and fall migration periods and at night.

Large patches of high suitability olive-sided flycatcher habitat are present in the northern third of the effects assessment Local Study Area and effects assessment Regional Study Area (**Figure 5-18**). Patches of moderate-quality habitat are present throughout the effects study areas.

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.6.3 Survival and Reproduction

The density estimates for olive-sided flycatcher in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 1.4 and 1.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-18**) there are estimated to be between 3,410 and 4,056 olive-sided flycatcher nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.7 Bald Eagle

7.1.6.7.1 Habitat Availability

Habitat suitability for bald eagle were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-19**.

High and moderate habitats cover approximately 5% to 10% of the effects assessment Local Study Area and 4% of the effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for bald eagle is provided in **Table 7-19**.

Table 7-19: Habitat Suitability for Bald Eagle at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	14,178.1	9.5	21,956.1	4.3
Low to Poor	134,679.9	90.5	484,790.9	95.7

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.7.2 Distribution

Bald eagles were frequently detected during all rounds of waterfowl and waterbird aerial surveys and one bald eagle was detected at one point count survey in the effects assessment Local Study Area. During aerial surveys, bald eagles were detected throughout the effects assessment Local Study Area, but detections were more frequent around the Ogoki River.

High and moderate suitability bald eagle habitat is generally found throughout the entire effects assessment Regional Study Area, however, higher concentrations are found along the Albany and Ogoki Rivers and their larger tributaries within the effects assessment Regional Study Area (**Figure 5-19**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent

disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.7.3 Survival and Reproduction

A total of 45 adults were observed during waterfowl and waterbird aerial spring migration, breeding, and fall migration surveys. Additionally, five active bald eagle nests were recorded during 2022 aerial surveys and two nests were incidentally detected during surveys in 2018.

The density estimates for bald eagle in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.4 and 0.02 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-19**) there are estimated to be between four and 92 bald eagle nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.8 Peregrine Falcon

7.1.6.8.1 Habitat Availability

Habitat suitability for peregrine falcon were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-20**.

There is no high and moderate habitat in the effects assessment Local Study Area. High and moderate habitats cover <0.1% of the effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for peregrine falcon is provided in **Table 7-20**.

Table 7-20: Habitat Suitability for Peregrine Falcon at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	0.0	0.0	24.4	<0.1
Low to Poor	148,857.9	100.0	506,722.6	>99.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
< = less than; > = greater than; ha = hectare; % = percent.

7.1.6.8.2 Distribution

No peregrine falcons were detected during baseline surveys from 2018 to 2022. Suitable habitat for this species was not identified during baseline surveys.

High and moderate suitability peregrine falcon habitat is generally quite rare within the effects assessment Regional Study Area, with a high concentration located south of Painter Lake in the effects assessment Regional Study Area (**Figure 5-20**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.8.3 Survival and Reproduction

The peregrine falcon population in Ontario is increasing (Natural Heritage Information Centre, 2023).

Density estimates for peregrine falcon in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006). Peregrine falcon home range size can fluctuate with prey abundance; mean home range in Colorado ranged from 358 to 1,508 km^2 (White et al., 2020). Based on these mean home range sizes and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area **Table 7-20** there is estimated to be one peregrine falcon nesting territory in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.9 Short-eared Owl

7.1.6.9.1 Habitat Availability

Habitat suitability for short-eared owl were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-21**.

High and moderate habitats cover approximately 35% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for short-eared owl is provided in **Table 7-21**.

Table 7-21: Habitat Suitability for Short-eared Owl at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	55,187.9	37.1	191,141.8	37.8
Low to Poor	93,669.9	62.9	315,605.2	62.3

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.9.2 Distribution

No short-eared owls were detected during field studies for the Project from 2018 to 2022.

High and moderate suitability short-eared owl habitat is generally found throughout the entire effects assessment Regional Study Area, with a higher concentration located in the northern half of the effects assessment Regional Study Area (**Figure 5-21**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.9.3 Survival and Reproduction

Density estimates for short-eared owl in *Ontario Breeding Bird Atlas* Regions 44 and 37 are not available (Bird Studies Canada et al., 2006). The average home range size short-eared owl reported in Manitoba is 82 ha for (Wiggins et al., 2020). Based on an average of 82 ha for breeding territories (Wiggins et al., 2020) and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-21**) there are estimated to be up to 2,331 short-eared owl nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.10 Black Tern

7.1.6.10.1 Habitat Availability

Habitat suitability for black tern were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-22**.

High and moderate habitats cover <0.1% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for black tern is provided in **Table 7-22**.

Table 7-22: Habitat Suitability for Black Tern at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	14.5	<0.1	14.5	<0.1
Low to Poor	148,843.4	>99.9	506,732.5	>99.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
< = less than; > = greater than; ha = hectare; % = percent.

7.1.6.10.2 Distribution

Black tern was not detected during Project field studies from 2018 to 2022.

High and moderate suitability black tern habitat is generally quite rare in the entire effects assessment Regional Study Area, with small concentrations located scattered throughout the effects assessment Regional Study Area (**Figure 5-22**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.10.3 Survival and Reproduction

Black tern is a declining species in Ontario (Natural Heritage Information Centre, 2023). Population trends using North American Breeding Bird Survey data are not available for black tern in Bird Conservation Region 7 or Bird Conservation Region 8 (Smith et al., 2022).

The density estimate for black tern in *Ontario Breeding Bird Atlas* Region 44 is 0.3 nesting territories per km^2; a density estimate for Region 37 is not available (Bird Studies Canada et al., 2006). Based on the density estimate from Atlas Region 44 from the *Ontario Breeding Bird Atlas* and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-22**) there is estimated to be less than one black tern nesting territory in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.11 Lesser Yellowlegs

7.1.6.11.1 Habitat Availability

Habitat suitability for lesser yellowlegs were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-23**.

High and moderate habitats cover approximately 30% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for lesser yellowlegs is provided in **Table 7-23.**

Table 7-23: Habitat Suitability for Lesser Yellowlegs at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	46,492.4	31.2	158,599.9	31.3
Low to Poor	102,365.6	68.8	348,147.1	68.7

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.11.2 Distribution

During baseline surveys from 2018 to 2022, lesser yellowlegs were recorded on 2 autonomous recording units in the effects assessment Local Study Area and 2 autonomous recording units in the effects assessment Regional Study Area. This species was not detected during point count surveys or in the effects assessment Construction Disturbance Area. Detections of lesser yellowlegs were made during the spring migration and breeding periods at dawn.

High and moderate suitability lesser yellowlegs habitat is generally found throughout the entire effects assessment Regional Study Area, with a high concentration located in the southern third and northern half of the effects assessment Regional Study Area (**Figure 5-23**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.11.3 Survival and Reproduction

The density estimate for lesser yellowlegs in *Ontario Breeding Bird Atlas* Regions 44 is 0.8 nesting territories per km^2; a density estimate for Region 37 is not available (Bird Studies Canada et al., 2006). Based on the density estimate from Atlas Region 44 from the *Ontario Breeding Bird Atlas* and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-23**) there are estimated to be 1,217 lesser yellowlegs nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.12 Rusty Blackbird

7.1.6.12.1 Habitat Availability

Habitat suitability for rusty blackbird were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on **Figure 5-24**.

High and moderate habitats cover approximately 65% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for rusty blackbird is provided in **Table 7-24**.

Table 7-24: Habitat Suitability for Rusty Blackbird at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	96,032.1	64.5	324,257.2	64.0
Low to Poor	52,825.9	35.5	182,489.8	36.0

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.12.2 Distribution

During baseline surveys from 2018 to 2022, rusty blackbirds were recorded on 2 autonomous recording units in the effects assessment Construction Disturbance Area, 11 autonomous recording units and two point count surveys in the effects assessment Local Study Area, and 4 autonomous recording units in the effects assessment Regional Study Area. This species was not detected during point count surveys in the effects assessment Construction Disturbance Area or effects assessment Regional Study Area. Detections of rusty blackbird were made during the spring migration, fall migration, and breeding periods. Most detections were at dawn, but a couple detections were at night.

High and moderate suitability rusty blackbird habitat is generally found throughout the entire effects assessment Regional Study Area, with a high concentration located in the southern third and northern half of the effects assessment Regional Study Area (**Figure 5-24**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.12.3 Survival and Reproduction

The density estimates for rusty blackbird in *Ontario Breeding Bird Atlas* Regions 44 and 37 are 0.9 and 0.1 nesting territories per km^2, respectively (Bird Studies Canada et al., 2006). Based on these density estimates and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-24**) there are estimated to be between 423 and 2,943 rusty blackbird nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.1.6.13 Yellow Rail

7.1.6.13.1 Habitat Availability

Habitat suitability for yellow rail were modelled under existing conditions using ecosite mapping in the effects assessment Local Study Area and landcover classes in the effects assessment Regional Study Area. The resultant habitat mapping is described in **Attachment B** and **Attachment C** and shown on Error! Reference source not found..

High and moderate habitats cover approximately 20% of the effects assessment Local Study Area and effects assessment Regional Study Area at existing conditions. The total area of suitable habitat for yellow rail is provided in **Table 7-25**.

Table 7-25: Habitat Suitability for Yellow Rail at Existing Conditions

Habitat Suitability	Effects Assessment Local Study Area		Effects Assessment Regional Study Area	
	Area (ha)	Proportion (%)	Area (ha)	Proportion (%)
High to Moderate	27,171.3	18.3	93,993.5	18.5
Low to Poor	121,686.6	81.7	412,753.5	81.5

Note: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area
ha = hectare; % = percent.

7.1.6.13.2 Distribution

During baseline surveys from 2018 to 2022, one yellow rail was detected on one autonomous recording unit in the effects assessment Regional Study Area. This species was not detected on autonomous recording units in the effects assessment Construction Disturbance Area or effects assessment Local Study Area, or during point count surveys in the effects assessment Construction Disturbance Area, effects assessment Local Study Area, or effects assessment Regional Study Area.

High and moderate suitability yellow rail habitat is generally found throughout the entire effects assessment Regional Study Area, with a high concentration located in the northern half of the effects assessment Regional Study Area (**Figure 5-25**).

At existing conditions, there are 29.6 km of linear disturbance in the effects assessment Local Study Area and 223.3 km of linear disturbance in the effects assessment Regional Study Area. Most of the linear disturbances in the effects assessment Local Study Area are permanent disturbances (e.g., highway, winter road, utility line, and railroad) that are present in the southern portion of the study area. There are 26.3 km of permanent disturbance (88.9% of all disturbance) in the effects assessment Local Study Area at existing conditions. Most of the linear disturbances in the effects assessment Regional Study Area are non-permanent disturbances (i.e., trails and forestry roads) that are present in the southern portion of the study area. There are 144.9 km of non-permanent disturbance (64.9% of all disturbance) in the effects assessment Regional Study Area at existing conditions.

At existing conditions, the linear disturbance density for permanent and non-permanent linear disturbances is 0.02 km/km^2 in the effects assessment Local Study Area and 0.04 km/km^2 in the effects assessment Regional Study Area.

7.1.6.13.3 Survival and Reproduction

The density estimate for yellow rail in *Ontario Breeding Bird Atlas* Region 37 is 0.04 nesting territories per km^2; a density estimate for Region 44 is not available (Bird Studies Canada et al., 2006). Based on the density estimate from Atlas Region 37 and the amount of high to moderate suitability habitat in the effects assessment Regional Study Area (**Table 7-25**) there are estimated to be 36 yellow rail nesting territories in the effects assessment Regional Study Area at existing conditions, if high to moderate quality habitat is fully occupied and at carrying capacity.

7.2 Project–Environment Interactions

The analysis of Project–environment interactions for birds that are likely to have a potential effect is provided in **Table 7-26.**

Table 7-26: Project–Environment Interactions

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Introduction and spread of invasive plant species—**can affect plant community composition, which in turn can affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Introduction and spread of invasive plant species—**can affect plant community composition, which in turn can affect bird habitat availability and distribution.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Emissions of criteria air contaminants—**deposition of particulates in criteria air contaminant emissions (e.g., potential acid inputs) may change soil and vegetation quality and affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Emissions of criteria air contaminants—**deposition of particulates in criteria air contaminant emissions (e.g., potential acid inputs) may change soil and vegetation quality and affect bird habitat availability and distribution.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Fugitive dust emissions—**deposition of dust particulates may change soil and vegetation quality and affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Fugitive dust emissions—**deposition of dust particulates may change soil and vegetation quality and affect bird habitat availability and distribution.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Erosion and sedimentation**—can alter surface water, groundwater, soil, and vegetation quality and affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Erosion and sedimentation**—can alter surface water, groundwater, soil, and vegetation quality and affect bird habitat availability and distribution.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Changes to surface water quantity—**alteration of surface water drainage patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Surface water quantity—**alteration of surface water drainage patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Surface water quality—**changes in surface water quality from Project activities could adversely affect bird habitat availability and distribution
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Surface water quality—**changes in surface water quality from Project activities could adversely affect bird habitat availability and distribution

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Changes to groundwater —**alteration of groundwater drainage and infiltration patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution	**Changes to groundwater—**alteration of groundwater drainage and infiltration patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ Mallard ■ Wilson's snipe	■ Survival and Reproduction	**Increase in public access—**could affect bird survival and reproduction through legal and illegal hunting.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ Mallard ■ Wilson's snipe	■ Survival and Reproduction	**Increase in public access—**could affect bird survival and reproduction through legal and illegal hunting.
Construction Phase	■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Survival and Reproduction	**Incidental take—**vegetation removal and soil alterations during site preparation for Construction and Operations and Maintenance activities, and infrastructure (e.g., camp buildings) removal during decommissioning may result in destruction of nests, eggs, and individuals of birds.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Operation and Maintenance Phase	■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Incidental take—**vegetation removal and soil alterations during site preparation for Construction and Operations and Maintenance activities, and infrastructure (e.g., camp buildings) removal during decommissioning may result in destruction of nests, eggs, and individuals of birds.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Survival and Reproduction	**Collision with vehicles and equipment—**collisions of birds with vehicles or heavy equipment may cause injury or mortality to individual birds.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Collision with vehicles and equipment—**collisions of birds with vehicles or heavy equipment may cause injury or mortality to individual birds.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Survival and Reproduction	**Wildlife attractants—**attraction of wildlife to the Project can affect bird survival and reproduction through increased mortality risk and changes to predator-prey relationships.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Wildlife attractants—**attraction of wildlife to the Project can affect bird survival and reproduction through increased mortality risk and changes to predator-prey relationships.
Construction Phase	■ Pits and quarries ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	■ All bird Valued Components	■ Survival and Reproduction	**Blasting and fly rock—**may result in injury or mortality to birds.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Operation and Maintenance Phase	■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Blasting and fly rock—**may result in injury or mortality to birds.
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Survival and Reproduction	**Chemical or hazardous material stored on the Project site, or spills—**(e.g., petroleum products, ammonium nitrate) can affect bird habitat availability and distribution.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Chemical or hazardous material stored on the Project site, or spills—**(e.g., petroleum products, ammonium nitrate) can affect bird habitat availability and distribution.
Construction Phase	■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution ■ Survival and Reproduction	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution ■ Survival and Reproduction	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.

Project Phase	Project Activities	Valued Component	Indicator	Description of Project–Environment Interaction
Construction Phase	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution ■ Survival and Reproduction	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Habitat Availability ■ Habitat Distribution ■ Survival and Reproduction	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction
Construction Phase	■ Temporary construction staging areas ■ Temporary access roads and trails ■ Temporary construction camps ■ Right-of-way clearing and grubbing ■ Pits and quarries ■ Temporary concrete batch plants ■ Drilling / blasting / aggregate production ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration	■ Ovenbird ■ Palm warbler ■ Northern waterthrush ■ Common nighthawk ■ Eastern whip-poor-will	■ Habitat Availability ■ Habitat Distribution ■ Survival and Reproduction	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.
Operation and Maintenance Phase	■ Operate the Preferred Route ■ Maintain the Preferred Route	■ All bird Valued Components	■ Survival and Reproduction	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.

7.3 Assessing Residual Effects

This section presents the potential effects, appropriate mitigation and enhancement measures, and predicted residual Project effects for birds. Following the sections for each Valued Component, a summary of the potential effects, mitigation and enhancement measures and residual effects are presented in **Section 7.3.1.26** and **Table 7-72** Residual effects are brought forward for characterization into **Section 7.3.2** and into the cumulative effects assessment in **Section 8**.

7.3.1 Potential Effects, Mitigation and Enhancement Measures, and Predicted Residual Effects

The potential effects of the Project on birds are presented in the following sections for each Valued Component. **Section 7.3.1.1** presents the potential effects, appropriate mitigation and enhancement measures, and predicted residual effects common to all bird Valued Components. Subsequent sections (**7.3.1.2** through **7.3.1.26**) detail the Valued Component-specific potential effects, appropriate mitigation and enhancement measures, and predicted residual effects. **Section 7.3.2** characterizes the residual effects on each bird Valued Component.

7.3.1.1 All Bird Valued Components

7.3.1.1.1 Introduction and Spread of Invasive Plant Species

7.3.1.1.1.1 Potential Effects

Habitat Availability and Distribution

Construction

Invasive plant species often establish in fragmented landscapes along edge habitats, such as cleared areas adjacent to roads (Lafortezza et al., 2010). Most non-native invasive plant species are introduced through various forms of human transport (Mack et al., 2000; Reichard and White, 2001). The regular movement of vehicles, equipment, and personnel associated with the Project could transport invasive plant seeds or plant parts into new areas in the effects assessment Construction Disturbance Area. Additionally, land clearing in the effects assessment Construction Disturbance Area will remove vegetation and disturb soils, increasing the potential for invasive plant species to establish and spread along the right-of-way and other areas of edge habitats in the effects assessment Construction Disturbance Area.

Invasive plant species thrive in areas with recently disturbed soils and a high ratio of edge habitat as this improves their ability to establish and spread (Honnay et al., 2002). As discussed in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and *Peatlands Technical Support Document: Existing*

Conditions and Effects Assessment (WSP, 2026d, the introduction of invasive plant species into new areas can alter vegetation species diversity and the community plant structure through competition with native species, and by changing soil conditions (e.g., nutrients, moisture) (Mack et al., 2000; Carlson and Shepherd, 2007; Truscott et al., 2008). These changes could have negative effects on bird habitat availability and distribution.

Operation and Maintenance

During the Operation and Maintenance Phase, regular vehicle traffic on the Community Access Road could transport invasive plant seeds or plant parts into the effects assessment Construction Disturbance Area. Effects from the introduction and spread of invasive plants during Operation and Maintenance would be the same as for Construction (see section above). If invasive plant species are introduced and spread within the effects assessment Construction Disturbance Area, this could degrade the quality of habitats used by birds (e.g., suitable foraging habitat), ultimately reducing the availability and distribution of suitable habitat during the Operation and Maintenance Phase.

7.3.1.1.1.2 Mitigation and Enhancement Measures

Habitat Availability

Construction

A Project-specific environmental monitoring program will be developed and will contain mitigation measures to control invasive plant species. Herbicides will not be used during Construction. A comprehensive list of mitigation measures to control invasive plant species during Construction of the Project is provided in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Mitigation measures to limit the introduction and spread of invasive plants are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

As per the Ministry of Transportation's *Weed Control Maintenance Best Practice (MBP-320),* invasive plant species in the effects assessment Construction Disturbance Area will be controlled using a combination of biological, cultural, manual, and mechanical control methods during Operation and Maintenance (Ministry of Transportation, 2003). Herbicides will not be used during maintenance.

A comprehensive list of mitigation measures to control invasive plant species during Operation and Maintenance is provided in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d).

7.3.1.1.1.3 Predicted Residual Effects

Habitat Availability

Invasive plant species may occasionally be introduced within the effects assessment Construction Disturbance Area during Construction and Operation and Maintenance. Best management practices and mitigation measures for controlling the spread of invasive species that will be implemented during Construction are well understood, and the methods have been demonstrated to be effective. However, introduction of invasive plant species could still occur during Construction, even following mitigation. Additionally, introduction of invasive plant species may be higher during Operation and Maintenance due to public use of the Community Access Road. As such, the Project is expected to have net residual effects on birds and their habitats, relative to existing conditions and this interaction was carried forward into the residual effects characterization **Section 7.3.2**.

7.3.1.1.2 Emissions of Criteria Air Contaminants

7.3.1.1.2.1 Potential Effects

Habitat Availability and Distribution

Construction

Construction of the Project are expected to generate air particulate emissions, including carbon monoxide, sulphur oxides (including sulphur dioxide), nitrogen oxides, and particulate matter. Construction activities are expected to produce air emissions from the use of construction vehicles, motorized equipment and machinery, power generators (to be used at temporary construction camps and temporary aggregate areas), the use of explosives (blasting), and the burning of non-hazardous waste materials (e.g., food garbage at temporary construction camps).

The deposition of criteria air contaminant emissions can result in changes to soil and surface water quality, which has the potential to alter plant community structure, composition, and diversity by modifying the pH, nutrient content, and abundance and diversity of living organisms. Contamination of water, soil, and vegetation quality from deposition of Project air emissions has the potential to negatively affect birds if it reduces the quality of suitable forage and habitat, which could ultimately affect the distribution of bird populations. This was also a concern that was also noted by Indigenous communities including Mushkegowuk Council, Kingfisher Lake First Nation, and Animbiigoo Zaagi'igan Anishinaabek First Nation (NextBridge Infrastructure, 2018; SNC Lavallin, 2020; Stantec, 2017b). The concern was noted through shared Indigenous Knowledge particularly relating to effects on birds as a result exposure / ingestion of contaminants due to emissions.

Air quality modelling was used to predict maximum ground-level concentrations of criteria air contaminant emissions during Construction and Operation and Maintenance. The methods and results for air quality modelling are presented in detail in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026). During Construction, most air criteria contaminants were predicted to be below Canadian Ambient Air Quality Standards and / or Ontario Ambient Air Quality Criteria thresholds. However, threshold exceedances were noted for nitrogen dioxide and sulphur dioxide, carbon monoxide, acrolein, and benzo(a)pyrene emissions. Most threshold exceedances were limited to less than 760 m from the emission source. The exceptions are nitrogen dioxide, sulphur dioxide, carbon monoxide emissions during quarry blasting. During quarry blasting, nitrogen dioxide and sulphur dioxide emissions thresholds may be exceeded by up to 12.3 km, while carbon monoxide emissions may exceed the Ontario Ambient Air Quality Criteria threshold out to 1.5 km.

It should be noted that the *Air Quality* modelling incorporated conservative assumptions (i.e., using worst-case scenarios) to make sure that effects were not underestimated.

Operation and Maintenance

During the Operation and Maintenance Phase of the Project, emissions would be generated mainly from the use of fossil fuels associated with vehicle use of the Project and road maintenance (general, seasonal, and special maintenance). As discussed in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026), air criteria contaminants were predicted to be below Canadian Ambient Air Quality Standards and / or Ontario Ambient Air Quality Criteria thresholds during the Operation and Maintenance Phase.

7.3.1.1.2.2 Mitigation and Enhancement Measures

Habitat Availability and Distribution

Construction

Potential mitigation measures outlined in the Ontario Ministry of Transportation *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions for Provincial Transportation Projects* (Ontario Ministry of Transportation, 2020) may be implemented, if feasible. A Project-specific environmental monitoring program will be developed and will contain mitigation measures to control dust and air emissions during Construction. Mitigation measures to limit emissions of criteria air contaminants are well understood and the methods have been demonstrated to be effective. A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).

Operation and Maintenance

A Project-specific environmental monitoring program will be developed and will contain mitigation measures to control dust and air emissions during Maintenance. A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).

7.3.1.1.2.3 Predicted Residual Effects

Habitat Availability and Distribution

Construction and Operation and Maintenance

As discussed in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d), emissions of criteria air contaminants are anticipated to have negligible, possible effects on vegetation ecosystems, and, ultimately, bird habitat. As such, this interaction was determined to have no residual effects on bird habitat availability and distribution and is not carried forward in the assessment.

7.3.1.1.3 Fugitive Dust Emissions

7.3.1.1.3.1 Potential Effects

Habitat Availability and Distribution

Construction

Fugitive dust emissions were a concern that was highlighted by Indigenous communities including Marten Falls First Nation, Weenusk First Nation, and Aroland First Nation (Marten Falls First Nation, 2023; MNP LPP, 2024b; Shared Value Solutions, 2024). Fugitive dust emissions are expected to be produced during Project Construction activities such as land clearing, blasting, and infrastructure implementation (*Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* [Dillon, 2026]). Accumulation of airborne dust produced from the Project may result in direct, localized changes to vegetation. For example, deposition of airborne dust onto vegetation can smother plant tissues, hinder gas exchange, and reduce photosynthesis by physically blocking sunlight (Farmer 1993). Consequently, the deposition of dust can and alter plant species composition, structure, and biomass. As a result, dust generated by Project Construction activities could adversely affect birds by degrading habitat quality and forage availability and distribution.

Air quality modelling was used to predict maximum ground-level concentrations of criteria air contaminant emissions during Construction (*Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* [Dillon, 2026]). Threshold exceedances for the Project during Construction are predicted for total suspended particulate, particulate matter less than 2.5 micrometres ($PM_{2.5}$) and particulate matter less than ten micrometres (PM_{10}) emissions. Threshold exceedances for dust emissions are predicted to be reached at less than 300 m from the emission source.

It should be noted that the *Air Quality* modelling incorporated conservative assumptions (i.e., using worst-case scenarios) to make sure that effects were not underestimated.

Operation and Maintenance

Fugitive dust emissions are expected to be produced during Project Operation and Maintenance from activities such as travel on the gravel Community Access Road. Potential effects from fugitive dust emissions on bird habitat availability and distribution are outlined in the Construction section above.

During Operation and Maintenance, threshold exceedances for the Project are predicted for $PM_{2.5}$, PM_{10} and total suspended particulate. The $PM_{2.5}$ levels are predicted to reach the 24-hour and annual criteria thresholds at 115 m and 134 m from the road, respectively. Levels of PM_{10} are predicted to reach the 24-hour threshold at 1,986 m from the road. Emissions of total suspended particulate are predicted to reach the 24-hour and annual thresholds at 3,004 m and 899 m from the road, respectively.

7.3.1.1.3.2 Mitigation and Enhancement Measures

Habitat Availability and Distribution

Construction

Potential mitigation measures outlined in the Ontario Ministry of Transportation *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions for Provincial Transportation Projects* (Ontario Ministry of Transportation, 2020) may be implemented, if feasible. A Project-specific environmental monitoring program will be developed and will contain mitigation measures to control dust and air emissions during Construction. A comprehensive list of mitigation measures that will be implemented to limit dust deposition during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026). Mitigation measures to limit dust deposition are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

A Project-specific environmental monitoring program will be developed and will contain mitigation measures to control dust and air emissions during Maintenance. A comprehensive list of mitigation measures that will be implemented to limit dust deposition during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).

7.3.1.1.3.3 Predicted Residual Effects

Habitat Availability and Distribution

Effects on bird habitat availability and distribution from dust emissions are predicted to be larger during Operation and Maintenance than during Construction due to continuous use of the road by several hundred vehicles per day. Additionally, mitigation measures to limit dust emissions are predicted to be more effective during Construction than during Operation and Maintenance as Construction traffic and equipment will be managed by contractors and more easily controlled, while, during Operation and Maintenance, the Community Access Road will be used by public vehicles. Dust deposition, particularly during Operation and Maintenance, is predicted to result in negligible but certain changes to vegetation quality in the effects assessment Local Study Area (*Vegetation Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026a]; *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026d]). As such, there is predicted be a net residual effect on bird habitat availability and distribution from the Construction Phase through the Operation and Maintenance Phase. The residual effects from dust emissions were carried forward into the residual effects assessment characterization (**Section 7.3.2**).

7.3.1.1.4 Erosion and Sedimentation

7.3.1.1.4.1 Potential Effects

Habitat Availability and Distribution

Construction

Project Construction activities such as watercourse crossings, vegetation clearing, earth moving, pit and quarry development and other Construction activities can result in exposure of vulnerable banks or slopes resulting in increased release of sediment. Sediment release into adjacent retained natural areas can have an effect on the composition and function of peatland and vegetation communities (*Vegetation Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026a]; *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026d]). These changes can reduce or degrade bird habitat through localized changes in ecosystem composition. The effects on vegetation would be expected to be localized and

occur intermittently during Construction but could include vegetation smothering and changes to drainage patterns and infiltration in the area of sediment deposits.

Operation and Maintenance

Erosion and release of sediments in watercourses and adjacent terrestrial habitat may also occur during Operation and Maintenance. Large precipitation events may lead to run-off from the road and sedimentation in low lying areas such as wetland and riparian habitats. Similar to Construction, the effects would be localized, intermittent and variable throughout the year.

7.3.1.1.4.2 Mitigation and Enhancement Measures

Construction

An environmental monitoring program will be developed and implemented during Construction and will contain mitigation measures to control erosion and sedimentation. Erosion and sediment control measures will be developed and implemented in accordance with *Ontario Provincial Standard Specifications for erosion and sediment control measures* (OPSS.PROV.804 and OPSS.MUNI.805). Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.

A comprehensive list of mitigation measures that will be implemented during Construction is provided in *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and outlined in **Table 7-20**. Mitigation measures to limit erosion and sedimentation are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

An environmental monitoring program will be developed and implemented during Maintenance and will contain mitigation measures to control erosion and sedimentation. Similar to Construction, erosion and sediment control measures will be developed and implemented in accordance with *Ontario Provincial Standard Specifications for erosion and sediment control measures* (OPSS.PROV.804 and OPSS.MUNI.805) during Maintenance. Additionally, mitigation identified in the Ministry of Transportation's *Maintenance Quality Standards and Maintenance Best Practices* for highway maintenance (Ministry of Transportation, 2003) will be implemented to minimize erosion and sedimentation during Operation and Maintenance. The mitigation measures established

and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance.

A comprehensive list of mitigation measures that will be implemented during Operation and Maintenance is provided in *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and outlined in **Table 7-20**.

7.3.1.1.4.3 Predicted Residual Effects

Habitat Availability and Distribution

As discussed in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b), Construction of the Project could result in localized increase in erosion-sedimentation processes at locations upstream or downstream of watercourse crossings and at receiving waterbodies. Environmental protection and monitoring plans developed for the Project Construction are expected to limit erosion and sedimentation. Localized increases in erosion-sedimentation processes at locations upstream or downstream of watercourse crossings and at receiving waterbodies could also occur during Operation and Maintenance. After implementing mitigation, the Project is not predicted to result in residual effects bird habitat, relative to existing conditions. As such, this interaction was not carried forward in the assessment.

7.3.1.1.5 Surface Water Quantity

7.3.1.1.5.1 Potential Effects

Habitat Availability and Distribution

Construction

Construction activities such as constructing watercourse crossings, vegetation clearing, short-term water takings, and discharge of Construction water can cause changes to stream flows and / or water levels within or immediately upstream and downstream of the work area. Changes in the volume or rate of surface water during Construction of the Project may adversely affect soils, peatland, wetland, and riparian ecosystems through desiccation or inundation. Peatland, wetland, and riparian ecosystems experience water level fluctuations as part of natural variability and riparian ecosystems can recover relatively quickly from flooding.

Fluctuating surface water levels typically influence plant species composition, community structure, and species richness, and preventing changes in wetland water levels can cause a decrease in aquatic plant community diversity. Alternatively, changes in the amplitude, frequency, and timing of flood or drought compared to historical levels can

cause adverse effects on wetlands, riparian areas, and peatlands. These changes can alter bird habitat availability and distribution through localized changes in ecosystem composition, particularly peatland, wetland, and riparian areas.

Operation and Maintenance

Removal of forested and peatland habitat during Project Construction, and subsequent conversion of treed and peatland habitats to open or shrubby habitats could result in changes to surface water quantity during Operation and Maintenance of the Project (*Surface Water Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026b]). Potential effects from changes to surface water quantity on bird habitat availability and distribution are discussed in the Construction section, above.

7.3.1.1.5.2 Mitigation and Enhancement Measures

Habitat Availability and Distribution

Construction

Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. A comprehensive list of mitigation measures to limit changes to surface water quantity during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment*(WSP, 2026b). Mitigation measures to limit changes to surface water quantity are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. Follow *Ontario Provincial Standard Specification 411* and regularly inspect and maintain culverts and bridges. Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. A comprehensive list of mitigation measures to limit changes to surface water quantity during Operation and Maintenance is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).

7.3.1.1.5.3 Predicted Residual Effects

Habitat Availability and Distribution

As discussed in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b), changes to surface water quantity during Construction and Operation and Maintenance are anticipated to be of negligible magnitude. As such, no net residual effects on bird habitat availability and distribution are predicted and this interaction is not carried forward into the assessment.

7.3.1.1.6 Surface Water Quality

7.3.1.1.6.1 Potential Effects

Habitat Availability and Distribution

Construction

During Construction, surface water may become contaminated if chemicals or substances (e.g., petroleum products, sediments, and garbage) from Project equipment, vehicles, road surfaces, or blasting sites are transported into surface water during precipitation events (*Surface Water Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026b]). This includes contamination of surface water from wash-off of organic debris during vegetation maintenance activities. Changes to surface water quality could have negative effects vegetation on bird habitat availability and distribution.

Operation and Maintenance

During Operation and Maintenance, contamination of surface water may occur from garbage (*Surface Water Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026b]).

7.3.1.1.6.2 Mitigation and Enhancement Measures

Habitat Availability and Distribution

Construction

Mitigation measures during Construction of the Project include adherence to federal and provincial regulations and guidelines regarding collection and storage of explosives and solid waste, such as the federal *Explosives Act*. Additionally, during the winter periods of Construction, sand will be used on the Community Access Road for de-icing instead of road salt, if required. Herbicides will not be used during Construction. Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario

Ministry of Natural Resources, will be followed during Construction. A comprehensive list of mitigation measures to limit changes to surface water quality during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b). Mitigation measures to limit changes to surface water quality are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. During the winter periods, sand will be used on the Community Access Road for de-icing instead of road salt. Herbicides will not be used during Operation and Maintenance. The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. A comprehensive list of mitigation measures to limit changes to surface water quality during Operation and Maintenance is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).

7.3.1.1.6.3 Predicted Residual Effects

Habitat Availability and Distribution

As discussed in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2024c), changes to surface water quality during Construction and Operation and Maintenance are anticipated to be of negligible magnitude. As such, no net residual effects on bird habitat availability and distribution are predicted and this interaction is not carried forward into the assessment.

7.3.1.1.7 Changes to Groundwater

7.3.1.1.7.1 Potential Effects

Habitat Availability and Distribution

Construction

If aggregates are extracted from below the water table at pits or quarries the local groundwater levels would be lowered either by active dewatering or dredging. Active dewatering of aggregate pits or quarries would likely take place using a sump to collect water in the bottom of the pit or quarry and pumping the water out of the sump to discharge outside the pit / quarry area. Dredging would lower groundwater levels to a lesser degree than dewatering.

Pit dewatering and dredging may result in changes to groundwater levels of more than 50% of the natural seasonal variability (i.e., high magnitude effect; *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026e]). Effects are considered probable to occur (*Groundwater Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026e]). However, effects are anticipated to be reversible soon after Construction ends (i.e., medium term) and confined to the Groundwater effects assessment Local Study Area (i.e., one km from centreline of Preferred Route and associated construction areas; *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026e]).

Road construction using “floating” techniques to cross areas of peatland will be designed with a pervious road base structure to allow for the flow of groundwater beneath and through the road base. However, there is potential for settlement of the road base structure and underlying peat material or sediment accumulation in the road base material to restrict the flow of groundwater. If the groundwater flow is restricted to a substantial degree, then the road may cause a damming effect with elevated groundwater levels on the upgradient side of the road and lowered groundwater levels on the downgradient side.

Settlement of the road base structure and underlying peat material or sediment accumulation in the road base material may result in changes to groundwater quantity that are between 20% and 50% higher / lower than existing condition values (i.e., medium magnitude effect) (*Groundwater Technical Support Document: Existing Conditions and Effects Assessment*; WSP, 2026e). Effects from road settlement or sediment accumulation during Construction are possible to occur, anticipated to be confined to the Groundwater effects assessment Local Study Area, and anticipated to be reversible in the long term with implementation of mitigation (*Groundwater Technical Support Document: Existing Conditions and Effects Assessment*; WSP, 2026e).

Alteration of groundwater levels due to Project activities could have negative effects on bird habitat availability and distribution, particularly for wetland-dependent birds. Changes to vegetation communities are anticipated to be of medium magnitude and probable to occur (*Vegetation Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026a]; *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026d]).

Operation and Maintenance

Effects from changes to groundwater levels on bird habitat availability and distribution from the potential settlement of the road base structure and underlying peat material, and from potential sediment accumulation in the road base material restricting the flow of groundwater, may continue through Operation and Maintenance of the Project.

7.3.1.1.7.2 Mitigation and Enhancement Measures

Habitat Availability and Distribution

Construction

Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. A comprehensive list of mitigation measures to limit changes to groundwater quantity during Construction is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e). The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. As discussed in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e), the mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. It is expected that a robust monitoring program will be undertaken, and adaptive management measures implemented, as required. This monitoring program is described in more detail in the *Peatlands Existing Conditions and Effects Assessment Report* (WSP, 2026d).

7.3.1.1.7.3 Predicted Residual Effects

With the implementation of the recommended mitigation measures, changes to groundwater regimes will be minimized and effects on retained vegetation communities and bird habitat availability and distribution should be minimal. However, there are still anticipated to be measurable changes to vegetation due to change to groundwater quantity, which are predicted to result in a residual effect on bird habitat availability and distribution. As such, this interaction is carried forward to the residual effects characterization (**Section 7.3.2**).

7.3.1.1.8 Increase in Public Access

7.3.1.1.8.1 Potential Effects

Survival and Reproduction

Construction

Roads and access provide increased opportunities for humans to use an area, which can result in increased bird mortality from hunters and poachers and increased mortality of bird food sources (e.g., fish) because linear features allow ease of access into previously inaccessible areas (Jalkotzy et al., 1997; Trombulak and Frissell, 2001). Indigenous Knowledge provided by Marten Falls First Nation, Weenusk First Nation, and Aroland First Nation included concerns related to effects on birds, bird habitat, and bird food sources as a result of increased public access and anthropogenic activities (e.g., angling) (Marten Falls First Nation, 2023; MNP LPP, 2024b; Shared Value Solutions, 2024). One community member from Aroland First Nation noted the following regarding this potential effect,

> *"The first thing I thought about was the wilderness, the animals would be disturbed. If the road goes through there, they're travelling routes would be disrupted. And also, their feeding might be disrupted. As for the fish, I think if they build bridges and all that, it's easier access for humans to go harvest. To me, that would be very destructive for the wildlife and fishery."* (Shared Value Solutions, 2024).

Concerns shared by Marten Falls First Nation discussed how increased commercial and recreational fishing in the study areas might affect the food sources of bird species in the region (Marten Falls First Nation, 2023).

There is anticipated to be limited increase in public access during Construction. However, a few individuals may illegally use constructed portions of the effects assessment Construction Disturbance Area to access areas that were previously inaccessible or more difficult to access for hunting or fishing.

Operation and Maintenance

During Operation and Maintenance of the Project, the Community Access Road is likely to increase access for hunters and anglers in the Birds effects assessment Local and Regional Study Areas.

There is a hunting season for waterfowl (e.g., ducks and geese), grouse and allies (e.g., ptarmigan [Oji-Cree translation, *wabihse*] [*Lagopus* spp.]), American coot (*Fulica americana*), and Wilson's snipe (*Gallinago delicata*) in the Effects Local and Regional Study Areas. The hunting of waterfowl, Wilson's snipe, and American coot is regulated by Environment and Climate Change Canada under the *Migratory Birds Conservation Act*,

while the hunting of grouse and allies is regulated by the Ontario Ministry of Natural Resources.

Indigenous Knowledge shared by communities including Aroland First Nation, Constance Lake First Nation, Fort Albany First Nation, and Marten Falls First Nation have identified that birds including geese, duck, ruffed grouse are traditional food sources and are hunted by community members (Fort Albany First Nation, 2020; LeBlanc, 2014; Marten Falls First Nation, 2023; Stantec, 2017b). Aroland First Nation has also noted that there has been a shift from local to processed foods, as well as from harvested to purchased foods in recent years (LeBlanc, 2014).

Within Marten Falls First Nation, a cultural week-long break is often taken each year (usually at the end of April), by community members to participate in hunting activities and celebrations surrounding the harvest of waterfowl (Dillon, 2024a). Indigenous Knowledge provided by Constance Lake First Nation and Marten Falls First Nation also identified that Kenogamisis Lake, Kenogamisis River, Goldfield Lake, the Albany River rapids, and nearby connecting waterbodies are areas of importance for some bird species, in particular, ducks and ruffed grouse (Marten Falls First Nation, 2023; Stantec, 2017a,b).

Waterfowl populations in Canada increased 150% from 1970 to 2016 (Environment and Climate Change Canada, 2019), which suggests that populations of hunted waterfowl that are in the effects assessment Regional Study Area are stable or increasing at existing conditions and will likely be able to tolerate increases in harvest rates. Similarly, Wilson's snipe, American coot, sharp-tailed grouse (Oji-Cree translation, *ahgusk*) (*Tympanuchus phasianellus*), spruce grouse (Oji-Cree translation, *mijikozhe / mijikobenni / mitikobenni*) (*Falcipennis canadensis*), and ruffed grouse (*Bonasa umbellus*) populations in Canada are increasing or stable (Environment and Climate Change Canada, 2019) and are likely to tolerate increases in hunting pressure. However, willow ptarmigan (*Lagopus lagopus*) populations are decreasing (Environment and Climate Change Canada, 2019), which makes this species vulnerable to increased mortality from hunting.

The ruffed grouse, spruce grouse, sharp-tailed grouse, and willow ptarmigan hunting season in Wildlife Management Unit 1D is September 15 to March 31 (Government of Ontario, 2023). The falconry season for hunting ruffed grouse, spruce grouse, sharp-tailed grouse, and willow ptarmigan in Wildlife Management Unit 1D is September 1 to March 31 (Government of Ontario, 2023).

In the Hudson Bay Lowlands Region of Ontario, the hunting season for ducks and geese is September 1 to December 16 (Environment and Climate Change Canada, 2023e). The season for Wilson's snipe and American coot is September 1 to December 16 (Environment and Climate Change Canada, 2023e). In the Northern Region of Ontario, the hunting season for ducks is September 10 to December 25, while the hunting season for geese is September 1 to December 16 (Environment and Climate Change

Canada, 2023e). The season for Wilson's snipe and American coot is September 10 to December 25 (Environment and Climate Change Canada, 2023e).

During Operation and Maintenance, increased fish harvest may decrease the productivity of fish populations, but it is not likely to disrupt overall population dynamics and fish populations are anticipated to remain functional, self-sustaining, and ecologically effective (*Fish and Fish Habitat Existing Conditions & Effects Assessment Report* [WSP, 2026c]). Due to the remoteness of the area and small population of people in northern Ontario, minor changes to the harvest of fish in individual waterbodies are anticipated (*Fish and Fish Habitat Existing Conditions & Effects Assessment Report* [WSP, 2026c]). Increase in harvest pressure is mainly expected to be on larger waterbodies with known productive fisheries (*Fish and Fish Habitat Existing Conditions & Effects Assessment Report* [WSP, 2026c]). Smaller waterbodies may experience periodic fishing activity and may be vulnerable to overharvesting, but locations with higher value fisheries offer more appeal to recreational fishers (Hunt and Lester, 2009). As such, changes to prey resources from the Project are not predicted have a measurable effect on the survival and reproduction of fish-dependent bird species (e.g., osprey and bald eagle).

There is currently a small risk of human-caused mortality or changes to bird food resources from increased public access / hunting of birds in the effects study areas due to the isolation of the Project and the small human population in northern Ontario. The Project is likely to facilitate human access to the Local and Regional Effects Study Areas, which may result in increased fishing, and hunting and illegal harvesting of birds. However, the distance of the Project from the nearest large urban centre, inaccessible terrain, and the lack of roads and trails throughout most of the effects assessment Local Study Area and Regional Study Area is expected to limit increases in the number of anglers, hunters, and poachers that may access the study areas via the Project.

7.3.1.1.8.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

The following mitigation measures will be implemented during Construction to limit effects from increases in public access:

- Restrict access to the effects assessment Construction Disturbance Area to construction personnel and prohibit firearms;
- Monitor central access corridors or have manned gate / security in place, during periods of high activity;
- Block winter roads and temporary access routes and trails that are no longer required; and

- Install access controls (e.g., gates and boulders) to control public vehicle travel on some temporary access routes and trails.

The effectiveness of mitigation measures will be evaluated during and mitigation measures will be modified or enhanced as necessary through adaptive management.

Marten Falls First Nation continues to engage in discussions with the Province regarding the ownership and future operations and maintenance of the Community Access Road. Access and ownership including gating security/ID system will require further dialogue between the communities and the Province.

Operation and Maintenance

The following mitigation measures will be implemented during Operation and Maintenance to limit effects from increases in public access:

- Potential changes in hunter and angler pressure, and fish and bird harvest will continue to be managed by Environment and Climate Change Canada, Ministry of Natural Resources, and Fisheries and Oceans Canada through licensing requirements and by establishing rules in terms of season length, bag / catch limits, and catch-and-release rules for waterbodies near the Project. Local communities will be responsible for managing their resources by limiting fish catch to a sustainable level for each species.

7.3.1.1.8.3 Predicted Residual Effects

Survival and Reproduction

Construction

Mitigation measures will be implemented to limit increases in public access during Construction, and any increases in angler and hunting pressure during Construction are anticipated to have no to minor effect on birds and their food resources in the effects assessment Local and Regional Study Areas. As such, there is predicted to be no residual effect from increased access during the Construction Phase.

Operation and Maintenance

The Project may increase hunting, fishing, and poaching during Project Operation and Maintenance, relative to existing conditions. There are currently no plans to decommission the Community Access Road and effects from increased public access are expected over the life of the Project. As such, there is predicted be a net residual effect on bird survival and reproduction, relative to existing conditions and this interaction was carried forward into the residual effects characterization (**Section 7.3.2**).

7.3.1.1.9 Incidental Take

7.3.1.1.9.1 Potential Effects

Survival and Reproduction

Construction

The federal *Migratory Birds Convention Act, 1994* and attendant *Migratory Birds Regulation* protect most migratory birds, their eggs, and nests. The modernized *Migratory Birds Regulation*, 2022 came into effect July 30, 2022, and protects nests of some species year-round, including pileated woodpecker. Pileated woodpecker nests are protected year-round for 36 months after last being used by any migratory bird that is protected under the *Migratory Birds Regulation*.

Raptors (e.g., hawks and owls) are not protected under the *Migratory Birds Convention Act*, 1994; however, the *Fish and Wildlife Conservation Act* and attendant Wildlife Schedules protect several raptor species. Some raptor stick nests are protected from destruction as long as the nest is present; the nest does not have to be active to be protected.

Some birds are also protected under the federal *Species at Risk Act* and / or Ontario's *Endangered Species Act, 2007* and regulations. These acts protect residences (i.e., nests) and individuals of species that are listed as "Extirpated," "Endangered," or "Threatened." Recommendations for listing under the *Species at Risk Act* come from the Committee on the Status of Endangered Wildlife in Canada, while recommendations for listing under the *Endangered Species Act, 2007* come from the Committee on the Status of Species at Risk in Ontario.

Eight species detected during baseline surveys are listed under the *Species at Risk Act* and / or the *Endangered Species Act, 2007*:

- Canada warbler ("Special Concern" under the *Endangered Species Act, 2007*; "Threatened" under the *Species at Risk Act* but under consideration for a status change);
- Common nighthawk ("Special Concern" under the *Endangered Species Act, 2007* and the *Species at Risk Act*);
- Eastern whip-poor-will ("Threatened" under the *Endangered Species Act, 2007* and the *Species at Risk Act* but under consideration for a status change under the *Species at Risk Act*);
- Eastern wood-pewee ("Special Concern" under the *Endangered Species Act, 2007* and the *Species at Risk Act*);

- Olive-sided flycatcher ("Special Concern" under the *Endangered Species Act, 2007* and the *Species at Risk Act*);
- Rusty blackbird ("Special Concern" under the *Endangered Species Act, 2007* and the *Species at Risk Act*);
- Yellow rail ("Special Concern" under the *Endangered Species Act, 2007* and the *Species at Risk Act*); and
- Lesser yellowlegs ("Threatened" under the *Endangered Species Act, 2007* and under consideration for listing under the *Species at Risk Act*).

Bird nests, eggs, and / or birds could be destroyed during land clearing and site preparation for Construction. The ability of Valued Components to avoid or move away from construction activities can be extremely constrained during certain life history periods or stages. For example, although all adult bird Valued Components are extremely mobile, their nests, eggs, and fledglings are not. Direct removal of habitat during the nesting period can increase the risk of injury or mortality to adults and their young.

Removal of vegetation during Project Construction may affect the survival and reproduction of a variety of bird species, as forested, wetland, shrub, and open habitats are anticipated to be disturbed during vegetation clearing activities.

Operation and Maintenance

Bird nests, eggs, and / or birds could be destroyed during vegetation control activities in roadside ditches and rest areas during Project Operation and Maintenance. As per the Ministry of Transportation's *Brush Control Maintenance Quality Standard (MQS-324)* and *Grass Control Maintenance Quality Standard (MQS-326),* for roads with an 80 km per hour speed limit, such as that proposed for the Project, mowing and brush clearing are required within 185 m of road signs and other objects that need to be seen (e.g., guide rails) (Ministry of Transportation, 2003). During operation of the Project, inspections of the road and rest areas will occur two days of each week and, based on these inspections, mowing will be completed to maintain vegetation below two metres in height (Ministry of Transportation, 2003). As per the Ministry of Transportation's *Rest Area/Picnic Site Maintenance Best Practice (MBP-325)* and *Tree Control Maintenance Best Practice (MBP-321),* the weekly highway and rest area inspections will also note any trees that may need to be pruned or remove to maintain road and rest area safety.

Tree pruning and removal will occur throughout spring, summer, and fall, while mowing is expected to start in June or July and continue through September. Pruning and removal of hazardous trees during Project maintenance may negatively affect the survival and reproduction of tree-nesting species. Mowing of roadside ditches and rest areas is predicted to primarily affect the survival and reproduction of ground-nesting birds that require open, grassy habitats (e.g., mallard).

7.3.1.1.9.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

The migratory bird nesting season and timing of construction activities should be considered during Detailed Design and Construction. It is estimated that 90% of species in nesting zones C5 and C6 will be actively nesting between April 28 and August 14 (Environment and Climate Change Canada, 2023c). Raptors, such as owls, nest earlier in year (from February through April). As such, during Construction, clearing activities will occur between August 15 and April 27, outside the breeding season for most bird species, where possible. If any vegetation clearing is required during the migratory bird nesting season (April 28 to August 14; Environment and Climate Change Canada, 2023c), non-intrusive pre-clearing nest surveys will occur within seven days prior to clearing. If any areas are found to have birds exhibiting breeding behaviour, these areas, including an activity disturbance buffer, will be flagged and protected from disturbance until the fledglings have left the nest. **Attachment D – Pre-Clearing Nest Sweep Protocol** provides a synopsis of the protocol for bird nest sweeps.

Prior to site clearing, wildlife sweeps will also be completed outside of the nesting season to look for and document pileated woodpecker nesting cavities and raptor stick nests. Wildlife sweeps will be focused on mature and old growth forest dominated by deciduous trees as these habitats are most likely to have large trees that can support raptor stick nests and pileated woodpecker nests. Wildlife sweeps will be completed within ten days prior to vegetation clearing. Raptor stick nests found during Construction will be marked and isolated as Environmentally Sensitive Sites and setbacks from construction activities and / or staged construction activities will be implemented. If pileated woodpecker nest cavities are found during wildlife sweeps, the nests will be registered in the Abandoned Nest Registry and monitored for a minimum of 36 months to determine if the nests are actively being used by migratory birds. Any trees with pileated woodpecker nests will not be removed until they are determined to be inactive for at least 36 months after discovery.

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The migratory bird nesting season and timing of activities should be considered during Maintenance. As per the Ministry of Transportation's *Environmental Protection for Migratory Birds (EP-4)* (Ministry of Transportation, 2003), bridges and culverts will be inspected for the presence of birds and / or nests prior to maintenance activities commencing. If an active nest is found on a culvert or bridge, a Migratory Bird (Damage)

Permit must be obtained for the nest. Depending on the species and if there are no young birds in the nest, the nest may be removed under the Permit after it is obtained.

7.3.1.1.9.3 Predicted Residual Effects

Survival and Reproduction

The implementation of mitigation is anticipated to limit but not eliminate incidental take of migratory birds that may be nesting in the effects assessment Construction Disturbance Area. This is because it may not be possible to detect 100% of nests, particularly in complex forested habitat prior to site clearing for Project Construction. There is also potential for incidental take of migratory birds if vegetation clearing or mowing during Operation and Maintenance is completed during the migratory bird nesting season. As such there is a predicted net residual effect from the Project, and residual effects from incidental take were carried forward into the residual effects characterization (**Section 7.3.2**).

7.3.1.1.10 Collisions with Vehicles and Equipment

7.3.1.1.10.1 Potential Effects

Survival and Reproduction

Construction

Birds may be killed by collisions with construction vehicles and equipment. Low-flying species, such as grouse, owls, eastern whip-poor-will, and common nighthawk, or species that forage on and near roads (e.g., short-eared owl and bald eagle) may have higher risk of collisions with vehicles and equipment (Silva et al., 2012; Foley, 2018; Mathieu et al., 2021). Construction traffic levels, and therefore mortality risk, will be much lower than during Project Operation and Maintenance.

Operation and Maintenance

Individuals of many species of birds are often killed on roads (Jalkotzy et al., 1997; Calvert et al., 2013). Frequency of road mortality is often related to specific locations, traffic volume, and speed (Jalkotzy et al., 1997). Although all bird species whose habitat is bisected with roads are vulnerable to road mortalities to some extent, specific levels of the effect are not commonly reported, and it is anticipated that vehicle-related mortality would be low for high-flying species of birds (e.g., birds that typically fly at a height above vehicles). Low-flying species or species that forage on and near roads may have higher risk of collisions with vehicles (Silva et al., 2012; Foley, 2018; Mathieu et al., 2021).

The creation of a linear disturbance may cause birds in the effects assessment Local Study Area to shift their territories and movements away from the effects assessment Construction Disturbance Area, which may reduce collision risk. A study in the boreal

forest of the Northwest Territories found that some passerine bird species move their territories away from human linear disturbance features (Machtans, 2006). The effects assessment Construction Disturbance Area may act also as a barrier to bird movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009).

A total of 700 vehicles per day have been modelled to be using the north-south (to the Ring-of-Fire) segment of the Project, and 100 vehicles per day have been modelled to be using the east-west segment (to Marten Falls First Nation) (AECOM, 2024a). Most vehicular traffic on the north-south segment of the Project will be medium and heavy truck usage, consisting of 71% of traffic (AECOM, 2024a). Most traffic on the east-west section of the Project is expected to be light vehicle traffic (77% of all traffic) (AECOM, 2024a). The increase in Project-related traffic during Operation and Maintenance may increase the number of bird-vehicle collisions relative to existing conditions.

7.3.1.1.10.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Mitigation measures that will reduce potential collisions with construction vehicles and equipment are:

- Incorporating standard safe road design configurations in the detailed Project design;
- Micrositing the Project to avoid high quality habitats and sensitive areas, to the extent feasible;
- Avoiding high quality habitats and sensitive areas for migratory bird species at risk, to the extent feasible;
- Providing wildlife awareness training for road construction workers to reduce vehicle speeds;
- Restricting access to the Project to construction personnel during Construction;
- Restricting construction traffic to designated areas; and
- Blocking winter roads and temporary access routes and trails no longer required as construction proceeds.

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation measures that will reduce potential bird-vehicle collisions during Operation and Maintenance are:

- Posting and enforcement of an 80 km/hr speed limit during Project Operation and Maintenance; and
- As per the Ministry of Transportation's *Brush Control Maintenance Quality Standard (MQS-324)* and *Grass Control Maintenance Quality Standard (MQS-326)*, mowing will be completed regularly to maintain vegetation at rest areas and within 185 m of road signs and other objects that need to be seen (e.g., guide rails) below two metres in height (Ministry of Transportation, 2003). The maintenance of low vegetation heights which will reduce chance of birds nesting in and crossing the Project right-of-way and rest areas.

Mitigation measures will be modified or enhanced as necessary through adaptive management.

7.3.1.1.10.3 Predicted Residual Effects

Survival and Reproduction

The implementation of mitigation is anticipated to limit Project-related changes to the survival and reproduction of birds from increased collision risk with vehicles and equipment. However, there is a predicted residual effect from this interaction and, so, residual effects were carried forward into the residual effects characterization (**Section 7.3.2**).

7.3.1.1.11 Wildlife Attractants

7.3.1.1.11.1 Potential Effects

Survival and Reproduction

Construction

Food smells and other aromatic compounds such as petroleum-based chemicals, grey water, and sewage could attract carnivores to temporary construction camps (Beckmann and Lackey, 2008; Canadian Wildlife Service, 2007; Peirce and Van Daele, 2006). Corvids and raptors may also be attracted to structures that can be used as hunting perches (e.g., buildings and material stockpiles), and anthropogenic food sources at temporary construction staging areas and temporary construction camps (Baxter and Allan, 2008; Marzluff and Neatherlin, 2006; Restani et al., 2001; Fleming and Bateman, 2018).

Additionally, some bird species may use Project construction infrastructure and equipment as nesting habitat. For example, some bird species (e.g., barn swallow) may use buildings that are present during Construction (e.g., camp buildings) and bridges as nesting habitat. Other species (e.g., bank swallow) may use material stockpiles (e.g., sand stockpiles) as nesting habitat. The use of infrastructure or equipment for nesting could result in inadvertent disturbance or destruction of bird nests by Project staff.

Operation and Maintenance

As discussed in the Constructions section, above, some bird species may use material stockpiles and other permanent Project infrastructure (e.g., bridges) as nesting habitat. The use of material stockpiles and infrastructure for nesting could result in inadvertent disturbance or destruction of bird nests by Project staff.

Raptors and other scavengers may be attracted to animals killed by collisions with vehicles (Forbes, 2009). Wildlife may also be attracted to roadside litter (Forbes, 2009). Attraction of carnivores and predatory birds (e.g., ravens and gulls) to the Project during Operation and Maintenance can increase predation pressure on prey bird species and may cause local population declines for these species (Canadian Wildlife Service, 2007; Liebezeit et al., 2009).

7.3.1.1.11.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

The following mitigation will be implemented to deter birds from nesting on Project infrastructure during Project Construction:

- Keeping building and storage container doors closed;
- Tarping or fully wrapping structures that have nesting potential (e.g., camp buildings and shipping containers). It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality;
- Sealing cracks and holes where birds can enter structures;
- Place pallets and other small pieces of equipment low to the ground;
- Keeping heavy equipment free of mud, as mud can attract birds, particularly swallows, which use mud to build nests;
- Conducting frequent inspections of structures and equipment for evidence of birds, ideally every day during the nesting season, at dawn and dusk when birds are most active;

- The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting;
- Hanging brightly coloured strips of fabric over slope faces to deter birds. These must be well secured and weighted at the bottom; and
- Placing geotextile, plastic covers, or tarping over slope faces or stockpiles to prevent access by birds. It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality.

Prepare an environmental monitoring program that will include policies and actions for handling and storage of waste as well as management of materials and stockpiles. The effects assessment Construction Disturbance Area would be kept clear of any attractants such as food scraps and food containers. Food waste will be collected and temporarily stored in wildlife-proof containers. The containers will be transported off site for recycling or disposed at a licensed disposal facility.

Mitigation measures to remove wildlife attractants are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. The following mitigation will be implemented to deter birds from nesting on Project material stockpiles during Project Operation and Maintenance:

- The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting;
- Hanging brightly coloured strips of fabric over slope faces to deter birds. These must be well secured and weighted at the bottom; and
- Placing geotextile, plastic covers, or tarping over slope faces or stockpiles to prevent access by birds. It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality.

If material stockpiles or Project infrastructure that may support nesting migratory birds need to be disturbed during the nesting season (April 28 to August 14; Environment and Climate Change Canada, 2023c), non-intrusive pre-clearing nest surveys will occur within seven days prior to maintenance activities beginning. If any areas are found to have birds exhibiting breeding behaviour, these areas, including an activity disturbance buffer, will be flagged and protected from disturbance until the fledglings have left the nest.

During operation of the Project, inspections of the road and rest areas will occur two days of each week and, based on these inspections, debris and litter will be collected when detected (Ministry of Transportation, 2003). Additionally, as per the Ministry of Transportation's *Debris Control Maintenance Quality Standard (MQS-331)*, debris less than 1 m in diameter, including roadkill, will be removed within 48 hours; debris greater than one m in diameter will be removed as detected (Ministry of Transportation, 2003). Generally, roadkill will be removed from the effects assessment Construction Disturbance Area and relocated to adjacent brush areas, as per the *Waste and Excess Materials Management Environmental Protection (EP-9)* requirements in the Ministry of Transportation's *Maintenance Manual* (Ministry of Transportation, 2003). As per the Waste and Excess Materials Management Environmental Protection requirements in the *Maintenance Manual*, depending on the location and weather at the time of roadkill removal, burial of small mammals occur in the roadside ditches, if this activity is permitted under a Certificate of Approval for Waste Management System (Ministry of Transportation, 2003).

Rest areas will be available every 50 km along the road during Operation and Maintenance. The rest areas will be staggered every 25 km, alternating on each side of the highway. These rest areas will contain waste receptacles. As per the Ministry of Transportation's *Rest Area/Picnic Site Maintenance Best Practice (MBP-325)*, during the rest areas operating season (i.e., months during the year when temperatures remain above 0°C and closing no sooner than October 15), litter in waste receptacles will be removed from rest areas when waste receptacles are 75% full (Ministry of Transportation, 2003).

7.3.1.1.11.3 Predicted Residual Effects

Survival and Reproduction

Mitigation should limit wildlife attractants and attraction of birds and their predators to the Project. However, attraction to the Project could still occur. As such, this Project-environment interaction was predicted to have a net residual effect on bird populations and was carried forward into the residual effects characterization (**Section 7.3.2**).

7.3.1.1.12 Blasting and Fly Rock

7.3.1.1.12.1 Potential Effects

Survival and Reproduction

Construction

During Construction, explosives will be used at quarry sites to excavate materials for use during Construction and to remove bedrock or large boulders in the right-of-way. Blasting activities may produce fly rock that has the potential to strike birds in the vicinity and cause injury or death. The risk of mortality from being struck by fly rock would be greatest for

birds who occupy territories that overlap blasting sites, or for birds that are flying over blasting sites when blasting occurs.

Operation and Maintenance

Explosives may be used at quarry sites to excavate materials to be used for maintenance of the Community Access Road. Blasting activities may produce fly rock that has the potential to strike birds in the vicinity and cause injury or death. The risk of mortality from being struck by fly rock would be greatest for birds who occupy territories that overlap blasting sites, or for birds that are flying over blasting sites when blasting occurs.

Best management practices for blasting activities will include:

- *Ontario Provincial Standard Specification* (OPSS.PROV 120) – *General Specification for the Use of Explosives;*
- Ministry of Transportation Ontario *Environmental Reference for Highway Design;*
- *Ontario Regulation 244/97* (*Aggregate Resources Act*);
- Ministry of Transportation Ontario *Noise Protocol and Environmental Guide for Noise; and*
- Department of Fisheries and Oceans *Guidelines for the Use of Explosives in or Near Canadian Fisheries Waters.*

7.3.1.1.12.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

The presence of operating equipment, people, noise, and lights during Construction is expected to result in some avoidance of the effects assessment Construction Disturbance Area by birds. An **Environmental Protection Plan** and **Blasting Management Plan** will be prepared and implemented during Construction and will include policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife including birds. Industry best practices will be used for blasting activities, including adherence to *Ontario Provincial Standard Specification 120* and *NPC-119* (*Acoustic and Vibration Technical Support Document: Existing Conditions and Effects Assessment* [WSP, 2026g]). Blasting will be completed as quickly as possible to shorten the duration of disturbance.

Quarry blasting and other construction activities will be suspended within 10 km of known or potential High Use Areas for caribou during sensitive seasons (nursery areas: May 1 to July 14 very low tolerance, July 15 to September 15 low tolerance; winter use areas: December 1 to March 31; MNR, 2013a,b). If adherence to the timing windows and

restrictions is not possible, the Owner will develop site-specific mitigation and monitoring in consultation with appropriate regulatory agencies. This may include implementation of a buffer zone survey around the perimeter of blasting activities and surrounding forested habitat, whereby blasting will be prohibited if large mammals (i.e., moose and / or caribou) or raptor stick nests are observed within 500 m from the blasting location. This mitigation will also reduce mortality to birds as most migratory birds will be present in the effects assessment Construction Disturbance Area from April 28 to August 14 (Environment and Climate Change Canada, 2023c).

An environmental monitoring program will be prepared and implemented during Construction and will include policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife including birds. Best management practices will be included in the environmental monitoring program and at a minimum will include recommendations for pre-blast surveys for migratory birds, bird nest sweeps, habitat assessments for migratory birds, and noise and vibration control (e.g., using smaller, more controlled charges, or staggering blasting).

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Maintenance. An environmental monitoring program will be implemented during Maintenance and will include policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife. During Operation and Maintenance, quarry blasting will be suspended within ten kilometres of known or potential High Use Areas for caribou during sensitive seasons (nursery areas: May 1 to July 14 very low tolerance, July 15 to September 15 low tolerance; winter use areas: December 1 to March 31; Ministry of Natural Resources, 2013a,b). If adherence to the timing windows and restrictions is not possible, the Owner will develop site-specific mitigation and monitoring in consultation with appropriate regulatory agencies. This may include implementation of a buffer zone survey around the perimeter of blasting activities and surrounding forested habitat, whereby blasting will be prohibited if large mammals (i.e., moose and / or caribou) or raptor stick nests are observed within 500 m from the blasting location. This mitigation will also reduce mortality to birds as most migratory birds will be present in the effects assessment Construction Disturbance Area from April 28 to August 14 (Environment and Climate Change Canada, 2023c).

7.3.1.1.12.3 Predicted Residual Effects

Survival and Reproduction

Due to the infrequent timing of blasting, and with the implementation of mitigation, blasting and fly rock from the Project during Construction and Operation and Maintenance is not expected to result in injury or mortality to birds. There is no residual effect predicted for this Project–environment interaction on bird survival and reproduction. Therefore, this interaction was not carried forward in the assessment.

7.3.1.1.13 Chemical or Hazardous Material Spills

7.3.1.1.13.1 Potential Effects

Survival and Reproduction

Construction

During Construction of the Project, there is the potential for accidental spills of fuels and other materials resulting in the release of deleterious substances and soil contamination from malfunctions of equipment such as hydraulic and fluid leaks, spills during equipment or vehicle refuelling, and from vehicle collisions. Spills that occur in high enough concentrations can contaminate soils and affect aquatic organisms, soil organisms, vegetation, and wildlife, including birds. Direct exposure to the chemical through ingestion of contaminated water, soil or vegetation could result in acute or chronic illness or death. As a result, there is potential that construction of the Project could cause chemical / hazardous material spills that could negatively affect the survival and reproduction of bird populations in the Bird effects assessment Local Study Area. More information on potential effects from chemical or hazardous material spills on surface water and groundwater quality is presented in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e).

Operation and Maintenance

There is the potential for accidental spills of fuels and other materials from malfunctions of equipment or spills during equipment or vehicle refuelling during maintenance activities or through fuel and hazardous material releases from vehicle collisions. Effects from spills on water, soil, and vegetation quality, and subsequent effects on bird survival and reproduction, during Operation and Maintenance are the same as discussed in the Construction section, above.

7.3.1.1.13.2 Mitigation and Enhancement Measures

Construction

Mitigation measures during Construction of the Project include adherence to federal and provincial regulations and guidelines regarding fuel and residue, chemical product, petroleum product, and hazardous substance collection and storage, use and handling, and disposal and treatment, such as the federal *Transportation of Dangerous Goods Act,* Ontario *Dangerous Goods Transportation Act* (Government of Ontario, 1990a), and the Ontario *Environmental Protection Act* (Government of Ontario, 1990b). Additionally, an environmental monitoring program will be developed and implemented and will include policies and actions for limiting effects from spills on bird habitat.

A comprehensive list of mitigation measures to limit changes to surface water and groundwater quality from spills during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e). Mitigation measures to limit chemical or hazardous material spills are well understood and the methods have been demonstrated to be effective. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Maintenance. During Operation and Maintenance, mitigation measures will include a posting and enforcement of an 80 km/hr speed limit on the highway, which should reduce potential for chemical or hazardous material spills by reducing vehicle collision risk. It is anticipated that commercial vehicles that are transporting dangerous goods on the Community Access Road should be adhering to the federal *Transportation of Dangerous Goods Act* and Ontario *Dangerous Goods Transportation Act*.

A comprehensive list of mitigation measures to limit changes to surface water and groundwater quality from spills during Operation and Maintenance is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e). Mitigation measures will be modified or enhanced as necessary through adaptive management.

7.3.1.1.13.3 Predicted Residual Effects

As discussed in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a), *Peatlands Existing Conditions and Effects Assessment* (WSP, 2026d), *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b), *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e), and *Physiography, Terrain, and Soils Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026f), there are predicted to be no residual effects from chemical or hazardous material spills on surface water quality, groundwater, soil, or vegetation quality during Construction and Operation and Maintenance. As such there was predicted to be no residual effect on bird survival and reproduction, relative to existing conditions. Therefore, the potential effects of chemical or hazardous material spills were not carried forward in the assessment.

7.3.1.2 Red-eyed Vireo

7.3.1.2.1 Habitat Loss and Alteration

7.3.1.2.1.1 Potential Effects

Habitat Availability

Construction

Vegetation clearing for the Project during Construction is predicted to remove 1,240.2 ha of high suitability and 1,096.8 ha of moderate suitability red-eyed vireo breeding habitat. This represents a change of 4.2% and 3.6% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions (**Table 7-27**). At the scale of the effects assessment Regional Study Area, the Project will remove 1.3% and 1.1% of high and moderate suitability habitat, respectively, relative to existing conditions (**Table 7-27**). High and moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 98,362.2 and 100,38 1.1 ha of high and moderate suitability habitat available for red-eyed vireos, respectively (**Table 7-27**).

Loss of low and poor suitability breeding habitat is estimated at 2,363.2 ha, combined, which represents 1.2% of its availability in the effects assessment Regional Study Area (**Table 7-27**). Baseline surveys confirmed that red-eyed vireos occupy low and poor suitability habitats (**Attachment B, Annex B**).

Table 7-27: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Red-eyed Vireo in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	29,268.1	28,028.4	-1,240.2	-4.2	99,602.4	98,362.2	-1,240.2	-1.3
Moderate	30,846.4	29,749.7	-1,096.8	-3.6	101,477.9	100,381.1	-1,096.8	-1.1
Low	40,350.8	38,677.0	-1,673.8	-4.1	131,948.0	130,274.2	-1,673.8	-1.3
Poor	48,392.1	47,702.7	-689.4	-1.4	173,536.9	172,847.5	-689.4	-0.4

Notes: There are 190.6 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bird habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for red-eyed vireo within five to ten years after the establishment of vegetation and would likely reduce the residual effects on red-eyed vireo habitat availability caused by the Project.

Distribution

Construction

There is a higher proportion of high suitability habitat for red-eyed vireo in the effects assessment Construction Disturbance Area (approximately 50% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 40% of each study area). This is due to the selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with the majority of high suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area associated with deciduous, mixedwood, and riparian areas (**Figure 7-1**).

It is anticipated that moderate and high suitability habitat in the effects assessment Regional Study Area is below carrying capacity for red-eyed vireos. As such, during Construction of the Project, individuals returning during spring migration that previously used habitats in the effects assessment Construction Disturbance Area are expected to establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area.

In addition to the change in location of some breeding territories, the creation of a linear disturbance may cause red-eyed vireos in the effects assessment Local Study Area to shift their territories away from the effects assessment Construction Disturbance Area. A study in the boreal forest of the Northwest Territories found that some passerine bird species move their territories away from human linear disturbance features (Machtans, 2006).

After implementation of the Project, there are 252.2 km of linear disturbance in the effects assessment Local Study Area and 309.0 km of linear disturbance in the effects assessment Regional Study Area. Permanent components of the Project are the Community Access Road and the access roads to aggregate pits (total 249.4 km); non-permanent components are camp access roads (total 2.8 km).

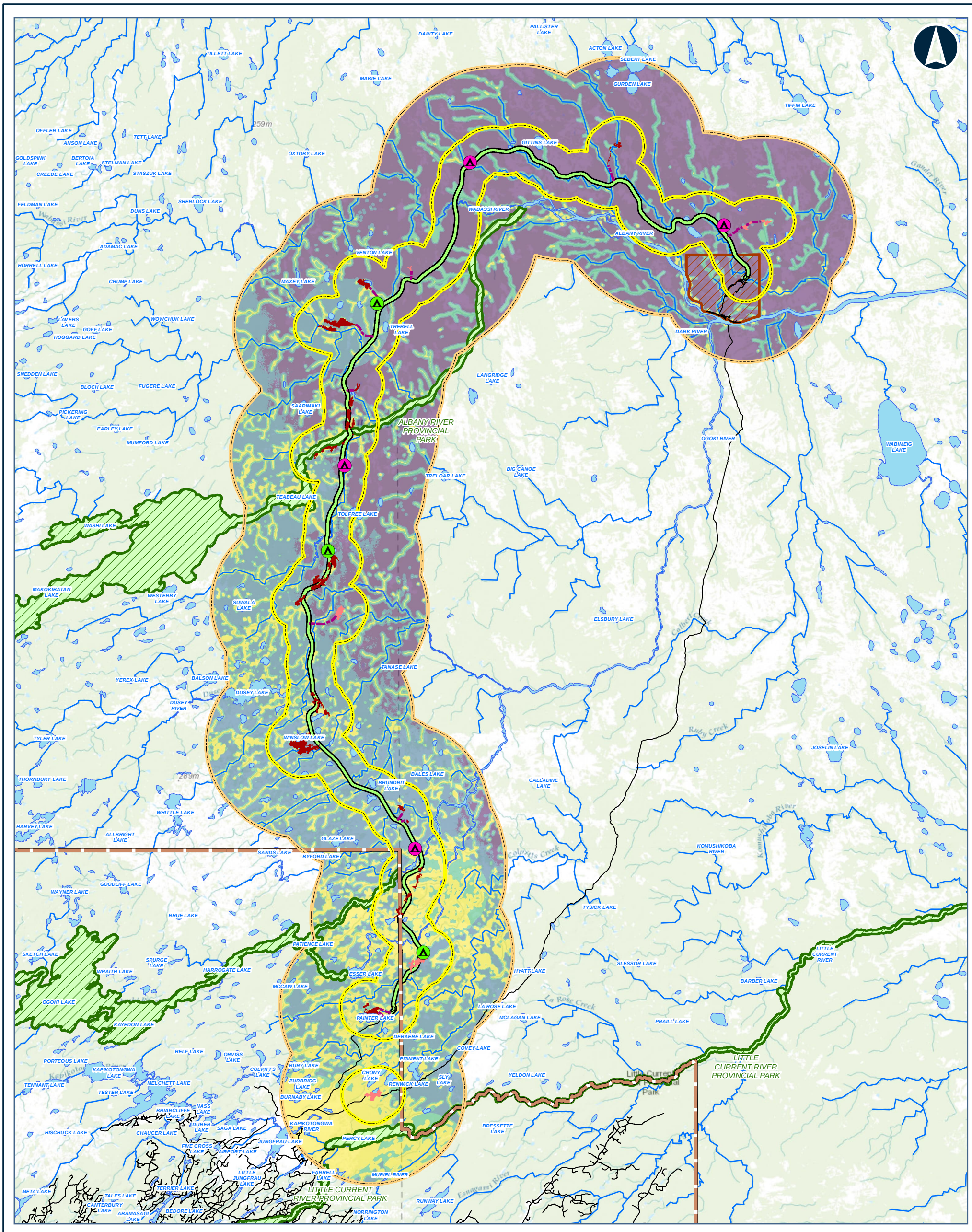
After implementation of the Project, the linear disturbance density for permanent and non-permanent linear disturbances (combined) in the effects assessment Local Study Area increases from is 0.17 km/km^2 (existing conditions) to <0.00 km/km^2. Linear disturbance density in the effects assessment Regional Study Area increases from and 0.04 km/km^2 (existing conditions) to 0.06 km/km^2.

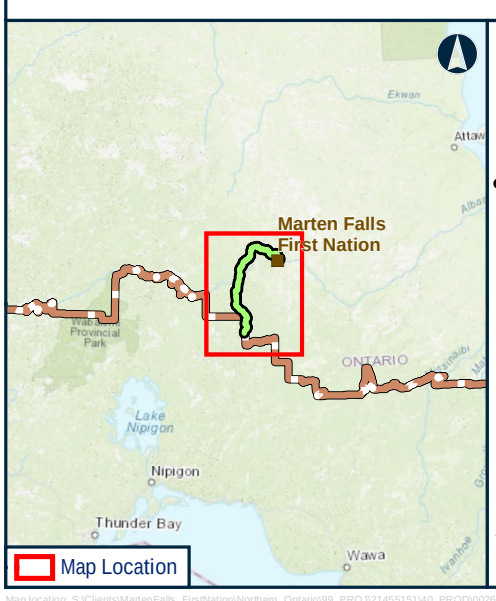
The effects assessment Construction Disturbance Area may act also as a barrier to red-eyed vireo movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The effects assessment Construction Disturbance Area is assumed to be 100 m wide. One study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). However, the effects assessment Construction Disturbance Area is assumed to be wider than the proposed corridor; vegetation will be permanently cleared within a 60 m wide corridor. Also, there is a large amount of undisturbed habitat in the effects assessment Regional Study Area that remains available for red-eyed vireos. As such, overall movement patterns of red-eyed vireos in the effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project.

The removal of habitat due to the Construction of the Project is predicted to result in a change to the distribution of red-eyed vireo breeding territories and movements in the effects assessment Regional Study Area.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bird distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for red-eyed vireo within five to ten years after the establishment of vegetation and would likely reduce the residual effects on red-eyed vireo distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

RED-EYED VIREO HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Red-eyed Vireo in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-01

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0026_Bird_Section7_ResidualEffects\21455151-0026-RT-0022_7-01.mxd
Date Saved: 2/12/2026 2:40:33 PM User Name: INBA08973

Survival and Reproduction

Construction

Habitat loss from Construction of the Project could affect red-eyed vireo survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 2,336.9 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 23.8 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 557 nesting territories from the effects assessment Construction Disturbance Area, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bird habitat survival and reproduction from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for red-eyed vireo five to ten years after the establishment of vegetation and would likely reduce the residual effects on red-eyed vireo survival and reproduction caused by the Project.

7.3.1.2.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to red-eyed vireo habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). These mitigations include:

- Limit the Project footprint to the extent feasible;
- Use existing access roads where possible; and
- Where possible, decommission and rehabilitate temporary access roads, staging areas, camps, and debris and / or timber stockpiles following Construction.

Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources will be followed during Construction. The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources will be followed during Operation and Maintenance.

7.3.1.2.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential red-eyed vireo breeding habitat will be removed by the Project. Habitat loss will initially occur during Construction, but effects will occur in perpetuity (i.e., throughout Operation and Maintenance). The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on red-eyed vireo habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.2.2 Sensory Disturbance

7.3.1.2.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance (e.g., presence of workers and noise from construction equipment) during Project Construction could result in the indirect loss or degradation of suitable red-eyed vireo habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by red-eyed vireo due to sensory disturbance is not known, habitat that was within 300 m of the Project was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 9,479.2 ha of high and moderate suitability red-eyed vireo habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 15.7% and 4.7% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, during existing conditions **Table 7-28**.

During Construction, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of Construction of each road segment). Additionally, effects from sensory disturbance during Project Construction will be confined to when red-eyed vireos are present in the effects assessment Local Study Area (i.e., during the migration and breeding seasons).

Table 7-28: Changes to Red-eyed Vireo Habitat Availability from Project-induced Sensory Disturbance.

Habitat Suitability	Local Study Area				Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	29,268.6	24,789.3	-4,479.3	-15.3	99,602.4	95,123.1	-4,479.3	-4.5
Moderate	30,846.4	25,846.5	-4,999.9	-16.2	101,477.9	96,477.9	-4,999.9	-4.9
Low	40,350.9	33,478.4	-6,872.4	-17.0	131,948.0	125,075.6	-6,872.4	-5.2
Poor	48,392.1	43,258.6	-5,133.5	-10.6	173,536.9	168,403.3	-5,133.5	-3.0

Notes: There are 190.6 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats)
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Effects from sensory disturbance will be greater during Operation and Maintenance than during Construction of the Project. During Operation and Maintenance, even though traffic levels will vary throughout the day, traffic is expected to use the Community Access Road throughout the day and night and traffic can be present along the full length of the Community Access Road at any given time.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on red-eyed vireo movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects during Construction will be lower than during Operation and Maintenance. During Construction, sensory disturbance is expected to primarily occur during the day and will occur for relatively short durations at one location (i.e., confined to the start and end of construction of road segments). After construction of a road segment is complete, sensory disturbance at that location will be relatively low until road Operation and Maintenance commence.

Operation and Maintenance

During Operation and Maintenance, there are predicted to be a maximum of 700 vehicles per day for the north-south section and 100 vehicles per day for the east-west section of the Community Access Road (AECOM, 2024a). Although there may be intervals between vehicles passing along one location on the Community Access Road, vehicles may be using the road through the day and night and there may not be a substantial interval without sensory disturbance.

Survival and Reproduction

Construction

The effects of noise on the survival and reproduction of red-eyed vireos are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). Environment and Climate Change Canada (2023d) indicates that noise levels greater than 50 decibels or ten decibels above ambient (background) noise can negatively affect birds.

Results from the Acoustic Environment report (*Acoustic and Vibration Environment Existing Conditions & Effects Assessment Report* [WSP, 2026g]) were reported in decibels weighted towards human hearing (A-weighted decibels), which accounts for the decrease in hearing sensitivity for frequencies lower than one kilohertz. Birds experience similar decreases in hearing sensitivity for frequencies lower than one kilohertz (Hashino and Okanoya, 1989) and so A-weighted decibels are appropriate for determining effects on birds (Corbani et al., 2021).

Noise levels (baseline + Project) will reach 50 A-weighted decibels at 600 m from the edge of the effects assessment Construction Disturbance Area during road and bridge construction (*Acoustic and Vibration Environment Existing Conditions & Effects Assessment Report* [WSP, 2026g]). Noise levels at quarries during Construction will reach 50 A-weighted decibels at 1,000 m from the edge of the effects assessment Construction Disturbance Area (*Acoustic and Vibration Environment Existing Conditions and Effects Assessment Report* [WSP, 2026g]).

During Construction, sensory disturbance will primarily occur during the day; nighttime construction will be limited. Sensory disturbance during Construction will occur for relatively short durations at one location (i.e., confined to the start and end of construction of road segment). After construction of a road segment is complete, sensory disturbance at that location will be relatively low until road Operation and Maintenance commence.

Operation and Maintenance

During Operation and Maintenance, noise is predicted to reach 50 A-weighted decibels at 100 metres from the edge of the effects assessment Construction Disturbance Area (*Acoustic and Vibration Environment Existing Conditions and Effects Assessment Report* [WSP, 2026g]). Sensory disturbance can occur along the entire length of the Community Access Road and can occur at any time of day during Operation and Maintenance.

7.3.1.2.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

The following mitigation measures will be implemented to limit effects from sensory disturbance during Construction on red-eyed vireo:

- Complete work as quickly as possible to shorten the duration of disturbance;
- The migratory bird nesting season and timing of activities should be considered during Construction. Clearing activities should occur from August 15 to April 27 (outside the migratory bird nesting season); if any clearing is required during the breeding bird season, non-intrusive pre-clearing nest surveys will occur within seven days of the clearing; buffers will be established around each nest, and clearing activities will be restricted near active bird nests or pileated woodpecker nest cavities;
- Follow guidance as outlined in Environment and Climate Change Canada's *Avoidance Guidelines for Migratory Birds*;
- Surveys will be conducted for ecologically sensitive sites prior to Construction; marking, isolation and setbacks implemented if these sites are found;
- Control lighting required for Construction of the Project, including direction (e.g., focused on work areas and away from undisturbed areas) and timing (e.g., minimize work at night) to minimize effects on birds, while meeting health and safety requirements;
- Wildlife awareness training will be provided for road construction workers to reduce vehicle speeds and associated noise and dust emission levels;
- Restricting construction traffic to designated areas;
- Industry best practices will be used for blasting activities, including scheduling outside of sensitive periods when in the vicinity of sensitive wildlife sites;
- Multi-passenger vehicles (e.g., buses) will be used to transport workers to site when practicable; and

- Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The following mitigation measures will be implemented to limit effects from sensory disturbance during Operation and Maintenance on red-eyed vireo:

- The migratory bird nesting season and timing of activities should be considered during Maintenance;
- Complete Maintenance work as quickly as possible to shorten the duration of disturbance;
- Posting and enforcement of an 80 km/hr speed limit to reduce vehicle speeds and associated noise and dust emission levels; and
- Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.

Additionally, a *Preliminary Biodiversity Offset Plan* (*Appendix AB*) has been developed to achieve no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.2.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after implementation of mitigation, potential red-eyed vireo breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on red-eyed vireo habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.3 Ovenbird

7.3.1.3.1 Habitat Loss and Alteration

7.3.1.3.1.1 Potential Effects

Habitat Availability

Construction

During Construction, approximately 2,170.4 ha of high suitability and 1,037.1 ha of moderate suitability ovenbird habitat is expected to be directly removed by the effects assessment Construction Disturbance Area. This represents a change of 3.8% and 2.9% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions (**Table 7-29**). At the scale of the effects assessment Regional Study Area, the Project will remove 1.2% and 1.0% of high and moderate suitability habitat, respectively, relative to existing conditions (**Table 7-29**). A total of 182,390.5 ha of high and 99,257.9 ha of moderate suitability habitat remain available for ovenbirds in the effects assessment Regional Study Area (**Table 7-29**).

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 1,492.7 ha, representing 0.7% of its availability in the effects assessment Regional Study Area (**Table 7-29**). Low to poor quality habitats may support ovenbirds during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B, Annex B**).

Table 7-29: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Ovenbird in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Application Case (ha)	Change in Area (ha)[a,b]	Change (%)	Existing Conditions (ha)	Application Case (ha)	Change in Area (ha)[a,b]	Change (%)
High	57,147.7	54,977.3	-2,170.4	-3.8	184,560.9	182,390.5	-2,170.4	-1.2
Moderate	35,517.5	34480.4	-1,037.1	-2.9	100,294.9	99,257.9	-1,037.1	-1.0
Low	12,587.1	12,256.5	-330.6	-2.6	41,290.5	40,959.9	-330.6	-0.8
Poor	43,605.7	42,443.6	-1,162.1	-2.7	180,396.0	179,233.9	-1,162.1	-0.6

Notes: There are 213.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on ovenbird habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for ovenbird within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on ovenbird habitat availability caused by the Project.

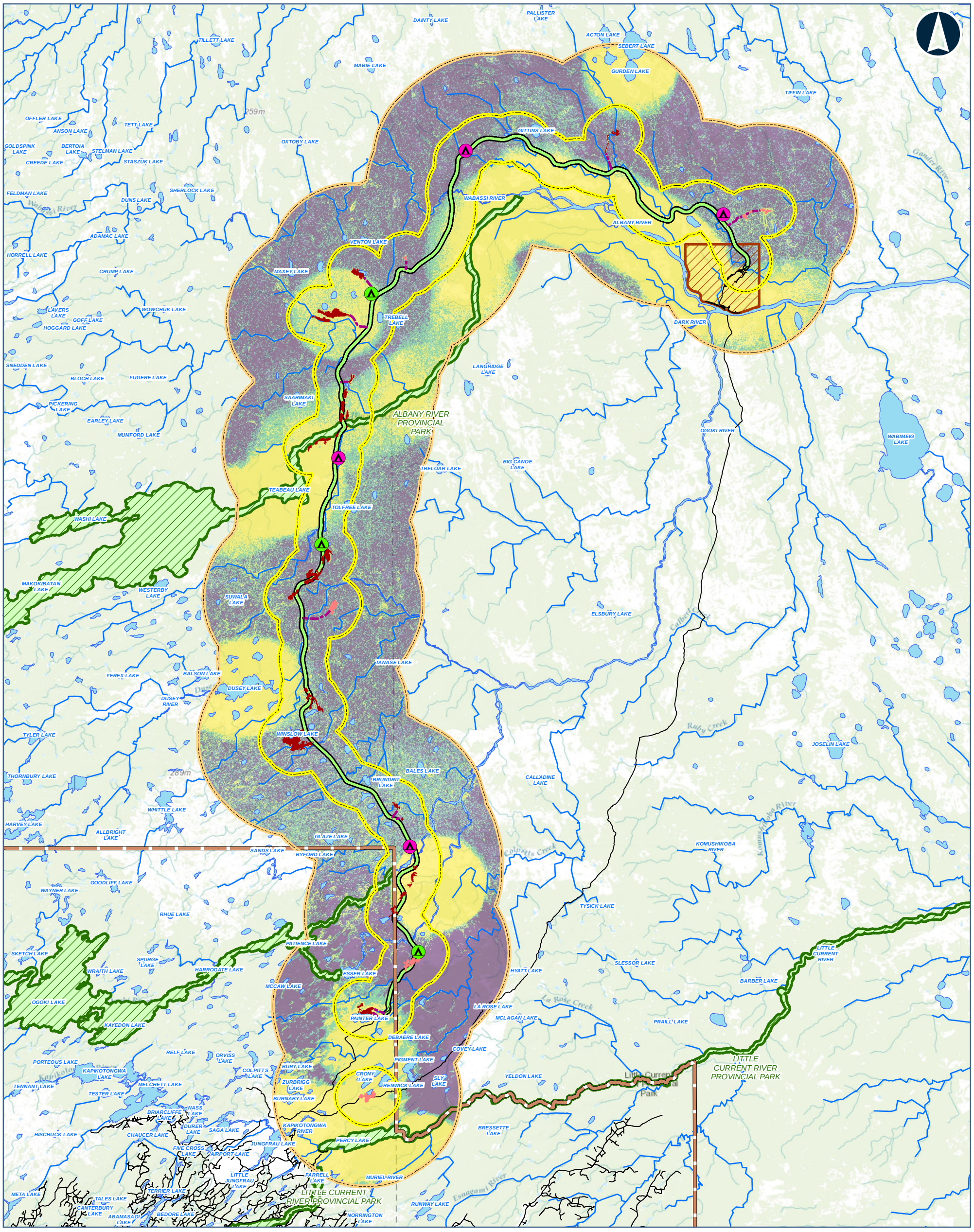
Distribution

Construction

Ovenbirds generally require large tracts of undisturbed forest for breeding, and this species is sensitive to patch size when patches are isolated from each other (Villard et al., 1993; Burke and Nol, 1998; Bayne and Hobson, 2001). Ovenbird pairing success was higher for individuals greater than 250 m from a forest edge compared to those closer than 250 m (Villard et al., 1993; Burke and Nol, 1998; Bayne and Hobson, 2001). As such, the Project may cause shifts in ovenbird territory distribution and changes to ovenbird movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. Additionally, the effects assessment Construction Disturbance Area may act as a barrier to ovenbird movements during foraging and dispersal. More details are presented in **Section 7.3.1.2.1.1**.

There is a higher proportion of high suitability habitat for ovenbird in the effects assessment Construction Disturbance Area (approximately 68% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (56% to 61% of each study area). This is due to selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with large patches of mixedwood and deciduous habitat and watercourses and waterbodies in the effects assessment Regional Study Area (**Figure 7-2**).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OVENBIRD HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Ovenbird in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-02

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Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on ovenbird distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for ovenbird within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on ovenbird distribution caused by the Project.

Survival and Reproduction

Construction

Habitat loss during Construction of the Project could affect ovenbird survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 3,207.5 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 14.3 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 458 nesting territories from the effects assessment Construction Disturbance Area, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on ovenbird survival and reproduction from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for ovenbird within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on ovenbird survival and reproduction caused by the Project.

7.3.1.3.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to ovenbird habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize

direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2.**

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term (i.e., during Project Operation and Maintenance), measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.3.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential ovenbird breeding habitat will be removed by the Project during Construction and effects of this habitat loss will continue through Operation and Maintenance. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss on ovenbird. However, there are predicted net residual effects on ovenbird habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**Table 7-**.**

7.3.1.3.2 Sensory Disturbance

7.3.1.3.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable ovenbird habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by ovenbird due to

sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 12,523.4 ha of high and moderate suitability ovenbird habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 13.4% and 4.4% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, during existing conditions (**Table 7-30**).

Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-30: Changes to Ovenbird Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Local Study Area				Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	57,147.7	49,175.5	-7,990.2	-13.9	184,560.9	176,570.8	-7,990.2	-4.3
Moderate	35,517.5	30,984.2	-4,533.3	-12.8	100,294.9	95,761.7	-4,533.3	-4.5
Low	12,587.1	11,133.6	-1,453.5	-11.6	41,290.5	39,837.0	-1,453.5	-3.5
Poor	43,605.7	38,719.5	-4,886.2	-11.2	180,396.0	175,509.9	-4,886.2	-2.7

Notes: There are 213.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Effects from sensory disturbance will be greater during Operation and Maintenance than during Construction of the Project. During Operation and Maintenance, even though traffic levels will vary throughout the day, traffic is expected to use the Community Access Road throughout the day and night and traffic can be present along the full length of the Community Access Road at any given time.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on ovenbird movements and habitat connectivity (distribution). Sensory disturbance effects will occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have negative effects on ovenbird distribution. Effects from sensory disturbance during Operation and Maintenance are predicted to be greater than during Construction. More details are provided in **Section 7.3.1.2.2.1.**

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on ovenbird survival and reproduction (e.g., by reducing the ability of individuals to hear approaching predators) (Ortega, 2012). Sensory disturbance effects will occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1.**

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on ovenbird movements and habitat connectivity. Effects from sensory disturbance during Operation and Maintenance are predicted to be greater than during Construction. More details are provided in **Section 7.3.1.2.2.1.**

7.3.1.3.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures that will be implemented to limit effects from sensory disturbance on ovenbird habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**.

Operation and Maintenance

Mitigation measures that will be implemented to limit effects from sensory disturbance on ovenbird habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.3.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential ovenbird breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on ovenbird habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.3.3 Increase in Edge Habitat

7.3.1.3.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of vegetation during Construction of the Project will increase edge habitat in forested areas, which could change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). Interior-forest nesting birds, such as ovenbird, may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased forest edge habitat (Keyser et al., 1998).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for ovenbird within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on ovenbird survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.3.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in increased edge habitat in forested areas and could have negative effects on ovenbird survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of forested vegetation communities, and therefore limit increases in edge habitat, are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment*

(WSP, 2026a). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2.**

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat and associated creation of edge habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term (i.e., during Project Operation and Maintenance), measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat, which is anticipated to result in a net increase in migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.3.3.3 Predicted Residual Effects

Survival and Reproduction

The Construction of the Project will increase the amount of edge habitat, relative to existing conditions, and effects from changes to predator communities and increased predation risk will occur throughout the Construction and Operation and Maintenance Phases. The implementation of mitigation and enhancement measures is expected to limit negative effects but there is a predicted net residual effect on ovenbird survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.4 Dark-eyed Junco

7.3.1.4.1 Habitat Loss and Alteration

7.3.1.4.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 2,716.7 ha of high to moderate suitability dark-eyed junco habitat. This represents a change of 6.1% and 1.9% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-31**). A total of 143,166.6 ha of high to moderate suitability habitat remain available for dark-eyed junco in the effects assessment Regional Study Area (**Table 7-31**).

Loss of low to poor suitability breeding habitat from the Project is estimated at 1,983.6 ha, representing 1.9% and 0.6% of its availability in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-31**). Low to poor quality habitats may support dark-eyed juncos during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B**).

Table 7-31: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Dark-eyed Junco Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	44,692.7	41,975.9	-2,716.7	-6.1	145,883.3	143,166.6	-2,716.7	-1.9
Low to Poor	104,165.3	102,181.7	-1,983.6	-1.9	360,863.7	358,880.2	-1,983.6	-0.6

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after Construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bird habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for dark-eyed junco within zero to five years after the establishment of vegetation and would likely reduce the residual effects on dark-eyed junco habitat availability caused by the Project.

Distribution

Construction

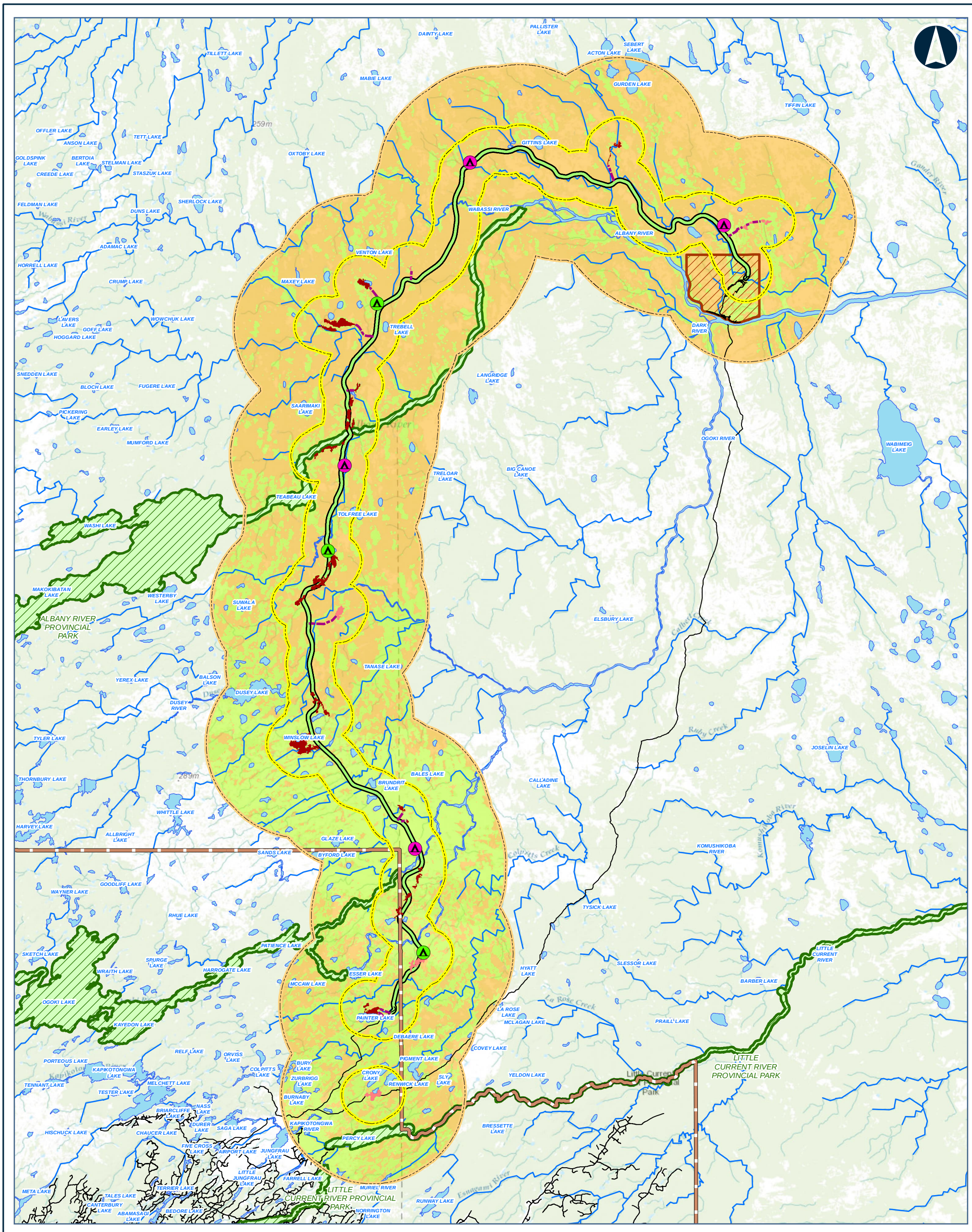
The Project may cause shifts in dark-eyed junco territory distribution and changes to dark-eyed junco movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. The effects assessment Construction Disturbance Area may act as a barrier to dark-eyed junco movements during foraging and dispersal, however, this species was found to cross forest gaps more readily than forest specialists (Rail et al. 1997). More details on how the Project may change dark-eyed junco distribution are presented in **Section 7.3.1.2.1.1**.

There is a higher proportion of high suitability habitat for dark-eyed junco in the effects assessment Construction Disturbance Area (approximately 58% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 30% of each study area). This is due to the selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability remains similar as described during existing conditions with most high to moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area associated with upland coniferous, mixedwood, and early successional / sparse treed habitats **Figure 7-3**.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bird survival and reproduction from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for dark-eyed junco within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on dark-eyed junco distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

DARK-EYED JUNCO HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Dark-eyed Junco in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-03

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Survival and Reproduction

Construction

Habitat loss from Construction of the Project could affect dark-eyed junco survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 2,716.7 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 8.8 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 238 nesting territories from the effects assessment Construction Disturbance Area, or 1.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on ovenbird survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for dark-eyed junco within zero to five years after the establishment of vegetation and would likely reduce the residual effects on dark-eyed junco survival and reproduction caused by the Project.

7.3.1.4.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, and upland vegetation communities and result in changes to dark-eyed junco habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatlands and wetland and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document:: Existing Conditions and Effects Assessment* (WSP, 2026d). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2.** The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat function. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat or migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.4.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential dark-eyed junco breeding habitat will be removed by the Project during Construction and effects of this habitat loss will continue through Operation and Maintenance. Habitat loss will initially occur during Construction, but effects will occur in perpetuity (i.e., throughout Operation and Maintenance). As such, there are predicted net residual effects on dark-eyed junco habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.4.2 Sensory Disturbance

7.3.1.4.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable dark-eyed junco habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. Traffic noise was found to be predict dark-eyed junco detections, with fewer detections during noisy periods than quiet periods (McClure et al., 2013). Sensory disturbance effects will occur intermittently during the Construction.

As the precise threshold of avoidance by dark-eyed junco due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 8,852.7 ha of high to moderate quality dark-eyed junco habitat may be indirectly affected

within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 19.8% and 6.1% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions.

Table 7-32: Changes to Dark-eyed Junco Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Local Study Area				Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	44,692.7	35,840.0	-8,852.7	-19.8	145,883.3	137,030.7	-8,852.7	-6.1
Low to Poor	104,165.3	91,532.8	-12,632.5	-12.1	360,863.7	348,231.2	-12,632.5	-3.5

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance Project Operation and Maintenance may have a negative effect on dark-eyed junco habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.1.2**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on dark-eyed junco movements and habitat connectivity (distribution) if individuals avoid areas with sensory disturbance. Sensory disturbance effects will occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.1.2**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on dark-eyed junco distribution. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.1.2.**

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on dark-eyed junco survival and reproduction by reducing the ability of individuals to hear approaching predators and interfering with communication (Ortega, 2012). Sensory disturbance effects are predicted to occur intermittently throughout the Construction Phase. More details are provided in **Section 7.3.1.2.1.2.**

Operation and Maintenance

Sensory disturbance effects on dark-eyed junco survival and reproduction during Project Operation and Maintenance are predicted to occur continuously throughout the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.1.2.**

7.3.1.4.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures that will be implemented to limit effects from sensory disturbance on dark-eyed junco habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on dark-eyed junco habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.4.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential dark-eyed junco breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on dark-eyed

junco habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.5 Osprey

7.3.1.5.1 Habitat Loss and Alteration

7.3.1.5.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 3,013.9 ha of high to moderate suitability osprey habitat. This represents a change of 6.4% and 3.3% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-33**). A total of 89,682.9 ha of high to moderate suitability habitat remain available for osprey in the effects assessment Regional Study Area with the addition of the Project (**Table 7-33**).

Table 7-33: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Osprey Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	47,301.9	44,287.9	-3,013.9	-6.4	92,696.8	89,682.9	-3,013.9	-3.3
Low to Poor	101,556.0	99,869.8	-1,686.3	-1.7	414,050.8	412,363.9	-1,686.3	-0.4

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on osprey habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for osprey within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on osprey habitat availability caused by the Project.

Distribution

Construction

There is a substantially higher proportion of high suitability habitat for osprey in the effects assessment Construction Disturbance Area (approximately 64% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 18% to 32% of each study area). This is due to the selection of upland habitat for the Project route.

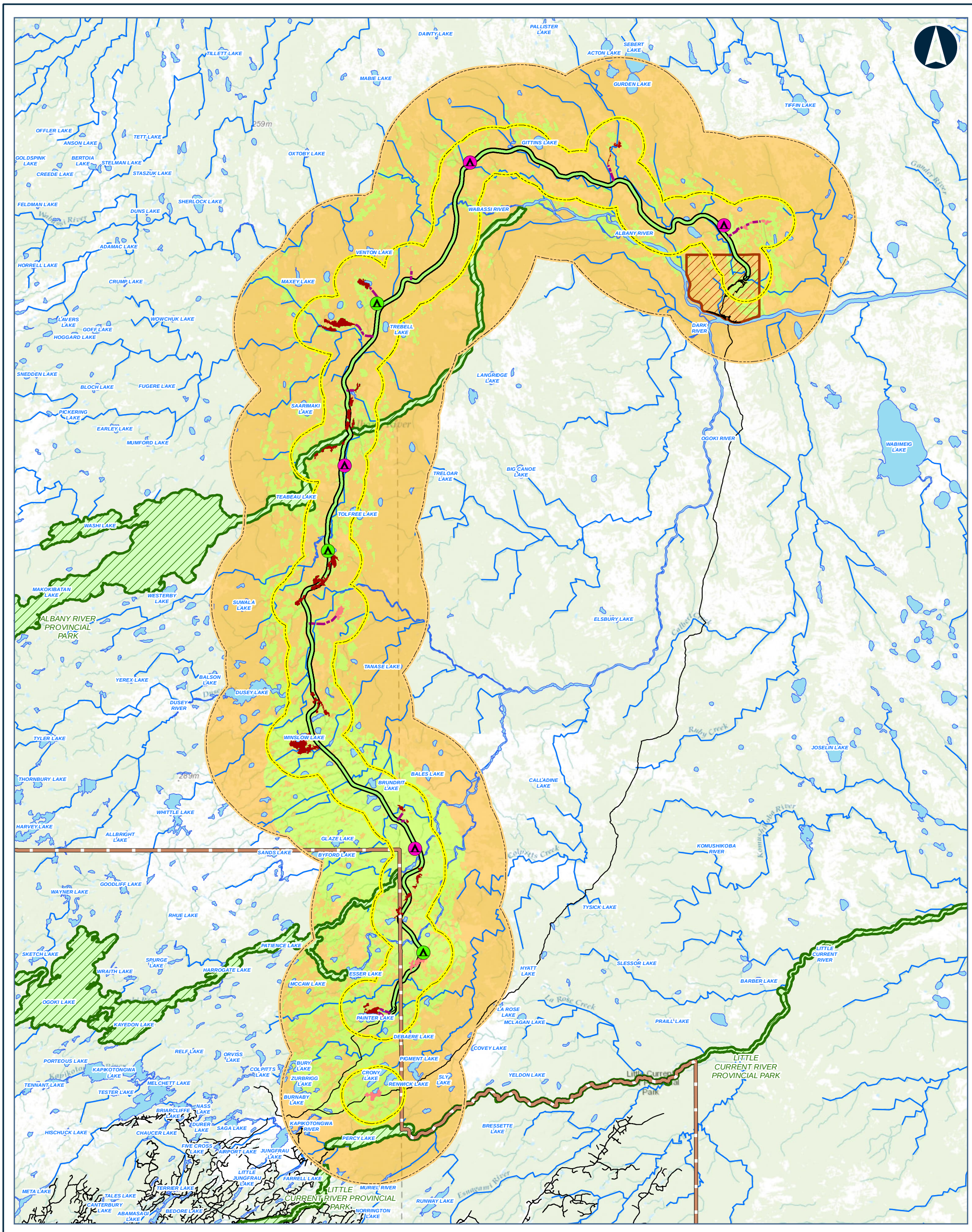
Changes to habitat distribution due to the Project may result in shifts in osprey territory distribution. However, habitat fragmentation is not a threat to osprey populations (Ewins, 1997).

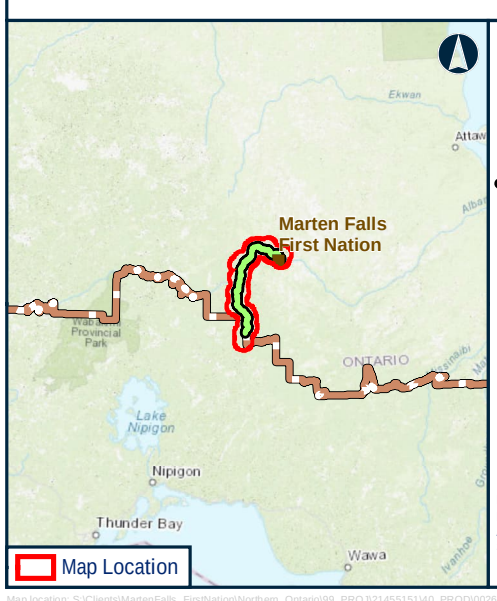
After the addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with most high suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area associated with upland forest habitats near large waterbodies and watercourses (**Figure 7-4)**

Overall, the removal of habitat and creation of gaps in forest cover due to the effects assessment Construction Disturbance Area is predicted to have an effect on local distribution, habitat connectivity, territory spacing, and movement patterns of osprey in the effects assessment Regional Study Area.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on osprey distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project, which is expected to remain in perpetuity. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for osprey within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on osprey distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OSPREY HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Osprey in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-04

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect osprey survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 3,013.9 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.2 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to seven nesting territories from the effects assessment Construction Disturbance Area, or 3.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on osprey survival and reproduction from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for osprey within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on osprey survival and reproduction caused by the Project.

7.3.1.5.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to osprey habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**.

The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.5.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential osprey breeding habitat will be removed by the Project during Construction and effects of this habitat loss will continue through Operation and Maintenance. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss on osprey. However, there are predicted net residual effects on osprey habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73.**

7.3.1.5.2 Sensory Disturbance.

7.3.1.5.2.1 Potential Effects

Habitat Availability

Construction

Although ospreys often nest in areas with human presence (Bierregard et al., 2014), including near roads, habitat that was within 400 m of human developments was assumed to be negatively affected by sensory disturbance based on the Stand and Site Guide (Ministry of Natural Resources, 2010) (**Attachment B**). A total of 20,335.2 ha of high to moderate quality osprey habitat may be indirectly affected within 400 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction (**Table 7-33**). This is 43.0% and 21.9% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-34: Changes to Osprey Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Local Study Area				Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	47,301.9	26,966.8	-20,335.2	-43.0	92,696.8	72,361.6	-20,335.2	-21.9
Low to Poor	101,556.0	65,711.2	-35,844.8	-35.3	414,050.2	378,205.3	-35,844.8	-8.7

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on osprey habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction is unlikely to have a negative effect on osprey territory placement, movements, and habitat connectivity (distribution). In fact, permanent roads may have a positive effect on the likelihood of osprey nest occupancy (Naylor, 2009). However, the recommended setback from osprey nests in the Stand and Site Guide is 400 m (Ministry of Natural Resources, 2010). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Similar to the Construction Phase, sensory disturbance during Project Operation and Maintenance and may have negative effects on osprey distribution. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have negative effects on osprey survival and reproduction and, in Ontario, activities with high levels of sensory disturbance are not allowed within 400 m of osprey nests during the nesting period (Ministry of Natural Resources, 2010). However, Van Daele and Van Daele (1982) found that osprey nests within 1.5 km of well-travelled roads had higher productivity than nests greater than 1.5 km from roads. Likewise, productivity at osprey nests that were disturbed by highway traffic was similar to nests located away from highways (Levenson and Koplin, 1984).

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance and may have negative effects on osprey survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2**.

7.3.1.5.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures will be implemented to limit effects from sensory disturbance on osprey habitat availability, distribution, and survival and reproduction as much as possible. The effectiveness of mitigation measures will be evaluated during Construction and post-Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management. Mitigation measures that will be implemented to limit effects from sensory disturbance are outlined in **Section 7.3.1.2.1.2**.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on osprey habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.1.2**.

7.3.1.5.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential osprey breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. However, several studies suggest this species is not sensitive to sensory disturbance and roads may increase osprey distribution and survival and reproduction. Additionally, the implementation of mitigation measures is expected to limit negative effects. However, there are predicted net residual effects on osprey habitat availability, distribution, and survival and reproduction, as a precautionary approach. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.6 Boreal Owl

7.3.1.6.1 Habitat Loss and Alteration

7.3.1.6.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 1,228.9 ha of high suitability and 1,310.5 ha of moderate suitability boreal owl habitat. This represents a change of 4.6% and 4.0% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions (**Table 7-35**). At the scale of the effects assessment Regional Study Area, the

Project will remove 1.6% and 1.1% of high and moderate suitability habitat, respectively, relative to existing conditions (**Table 7-35**). A total of 75,836.2 ha of high and 117,502.1 ha of moderate suitability habitat remain available for boreal owl in the effects assessment Regional Study Area (**Table 7-35**).

Loss of low and poor suitability habitat from the Project is estimated to be 2,160.8 ha, representing 0.7% of its availability in the effects assessment Regional Study Area (**Table 7-35**). Low to poor quality habitats may support boreal owl during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B**).

Boreal owls are not sensitive to habitat loss and fragmentation from human developments (Shonfield and Bayne 2017, 2023).

Table 7-35: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Boreal Owl in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	26,666.5.2	25,437.7	-1,228.9	-4.6	77,065.0	75,836.2	-1,228.9	-1.6
Moderate	32,772.4	31,461.9	-1,310.5	-4.0	118,812.6	117,502.1	-1,310.5	-1.1
Low	44,572.8	43,300.7	-1,272.2	-2.9	146,413.0	145,140.8	-1,272.2	-0.9
Poor	44,846.2	43,957.5	-888.7	-2.0	164,288.7	163,400.1	-888.7	-0.5

Notes: There are 176.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on boreal owl habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for boreal owl within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on boreal owl habitat availability caused by the Project.

Distribution

Construction

Habitat fragmentation due to habitat removal during Construction may have negative effects on boreal owl distribution. Some studies suggest that the density of linear features at the landscape scale may have negative effects on boreal owl distribution (Domahidi et al., 2019). While other studies suggest that the presence of boreal owls is not influenced by habitat fragmentation from human developments (Shonfield and Bayne, 2017, 2023). After the addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions; large patches of habitat remain in the southern, central, and northeastern portions of the effects assessment Regional Study Area (**Figure 7-5**).

There is a higher proportion of high suitability habitat for boreal owl in the effects assessment Construction Disturbance Area (approximately 54% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 40% of each study area). This is due to the selection of upland habitat for the Project route.

Boreal owl is a highly mobile species and population connectivity is not influenced by human disturbance; across North America, highly isolated populations are connected via gene flow (Koopman et al., 2007).

There are few linear features in the effects assessment Regional Study Area at existing conditions and the effects assessment Construction Disturbance Area will not substantially increase linear feature density at the regional scale. As such, habitat fragmentation due to the effects assessment Construction Disturbance Area is predicted to have a no effects on local habitat connectivity, territory spacing, or movement patterns of boreal owls in effects assessment Regional Study Area.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on boreal owl distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for boreal owl within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on boreal owl distribution caused by the Project.

Survival and Reproduction

Construction

Habitat removal from Construction of the Project are not expected to result in changes to boreal owl survival and reproduction. This species is highly mobile and appears to be tolerant of human disturbance within their home ranges (Koopman et al., 2007; Shonfield and Bayne, 2017, 2023).

To be conservative, the Project is predicted to remove 2,539.4 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the average home range size, 82 ha (Hayward and Hayward et al., 2020), this amounts to the potential loss of up to 31 nesting territories from the effects assessment Construction Disturbance Area, or up to 1.3% of nesting territories that are available in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the potential effects on boreal owl survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for boreal owl within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on boreal owl survival and reproduction caused by the Project.

7.3.1.6.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to boreal owl habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**.The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

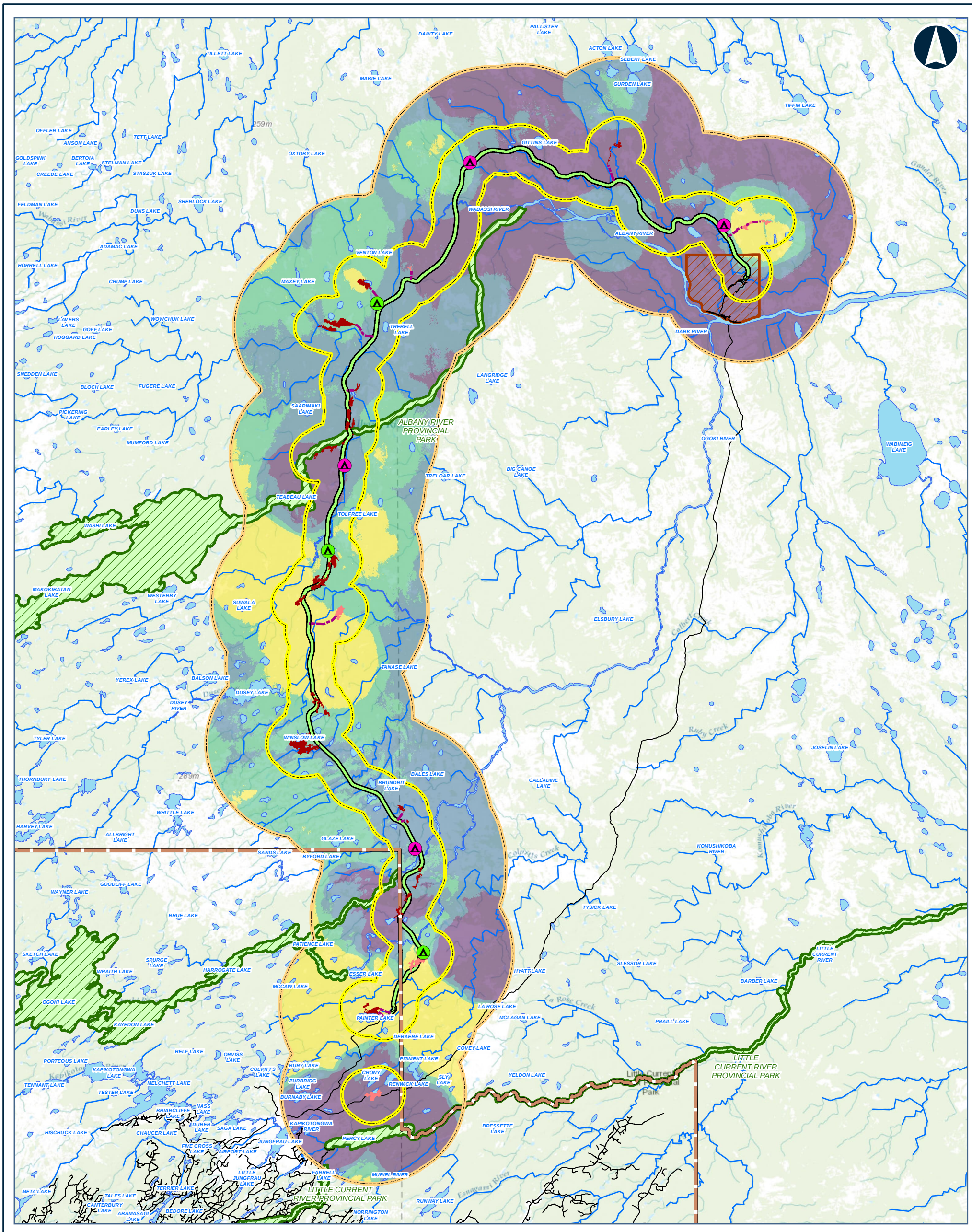
Operation and Maintenance

Mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.6.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential boreal owl year-round habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss and alteration. However, there are predicted net residual effects on boreal owl habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BOREAL OWL HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Boreal Owl in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 7-5

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7.3.1.6.2 Sensory Disturbance.

7.3.1.6.2.1 Potential Effects

Habitat Availability

Construction

No changes to boreal owl habitat availability from sensory disturbance during Project Construction are anticipated as this species is not influenced by industrial noise (Shonfield and Bayne 2017, 2023).

Operation and Maintenance

No changes to boreal owl habitat availability from sensory disturbance during Project Operation and Maintenance are anticipated as this species is not influenced by industrial noise (Shonfield and Bayne, 2017, 2023).

Distribution

Construction

Sensory disturbance from Construction of the Project is not expected to affect the distribution of boreal owls and boreal owl habitat in the effects assessment Regional Study Area. This species is equally likely to occupy sites with high industrial noise levels as sites with little noise (Shonfield and Bayne, 2017).

Operation and Maintenance

Sensory disturbance from Operation and Maintenance of the Project is not expected to affect the boreal owl distribution in the effects assessment Regional Study Area as this species appears to be tolerant of high noise levels (Shonfield and Bayne, 2017).

Survival and Reproduction

Construction

No changes to boreal owl survival and reproduction from sensory disturbance due to Construction of the Project are anticipated as a study in the boreal forest of Alberta found that anthropogenic noise has minimal effects on boreal owls and is unlikely to result in population change (Shonfield and Bayne 2017, 2023).

Operation and Maintenance

No changes to boreal owl survival and reproduction from sensory disturbance during Operation and Maintenance of the Project are anticipated as anthropogenic noise has been found to have minimal effects on boreal owls and is unlikely to result in population change (Shonfield and Bayne 2017, 2023).

7.3.1.6.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures to limit effects from sensory disturbance during Construction on boreal owl habitat availability, distribution, and survival and reproduction are not required as this species is not sensitive to sensory disturbance.

Operation and Maintenance

Mitigation measures to limit effects from sensory disturbance during Operation and Maintenance on boreal owl are not required as this species is not sensitive to sensory disturbance.

7.3.1.6.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Sensory disturbance during Construction and Operation and Maintenance of the Project is predicted to have no net residual effects on boreal owls in the effects assessment Regional Study Area. As such, this interaction was not carried forward in the assessment.

7.3.1.7 Wilson's Snipe

7.3.1.7.1 Habitat Loss and Alteration

7.3.1.7.1.1 Potential Effects

Habitat Availability

Construction

During Construction, the effects assessment Construction Disturbance Area is predicted to directly remove 715.2 ha of high suitability and 1,885.4 ha of moderate suitability Wilson's snipe habitat. This represents a change of 2.9% and 4.5% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions **Table 7-36**. At the scale of the effects assessment Regional Study Area, the Project will remove 0.7% and 1.3% of high and moderate suitability habitat, respectively (**Table 7-36**). A total of 97,353.0 ha of high and 148,352.2 ha of moderate suitability habitat remain available for Wilson's snipe in the effects assessment Regional Study Area (**Table 7-36**).

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 2,099.7 ha in the effects assessment Regional Study Area (**Table 7-36**). Low to poor quality habitats may support Wilson's snipe during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B, Annex B**).

Table 7-36: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Wilson's Snipe in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	24,858.8	24,143.6	-715.2	-2.9	98,068.2	97,353.0	-715.2	-0.7
Moderate	42,169.2	40,283.8	-1,885.4	-4.5	150,237.5	148,352.2	-1,885.4	-1.3
Low	19,372.4	18,642.2	-730.1	-3.8	45,115.1	44,384.9	-730.1	-1.6
Poor	62,457.6	61,088.0	-1,369.5	-2.2	213,151.2	211,781.6	-1,369.5	-0.6

Notes: There are 183.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare**; % = percent; - = negative.**

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Wilson's snipe habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project, which is expected to remain in perpetuity. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Wilson's snipe within zero to five years after the establishment of vegetation and would likely reduce the residual effects on Wilson's snipe habitat availability caused by the Project.

Distribution

Construction

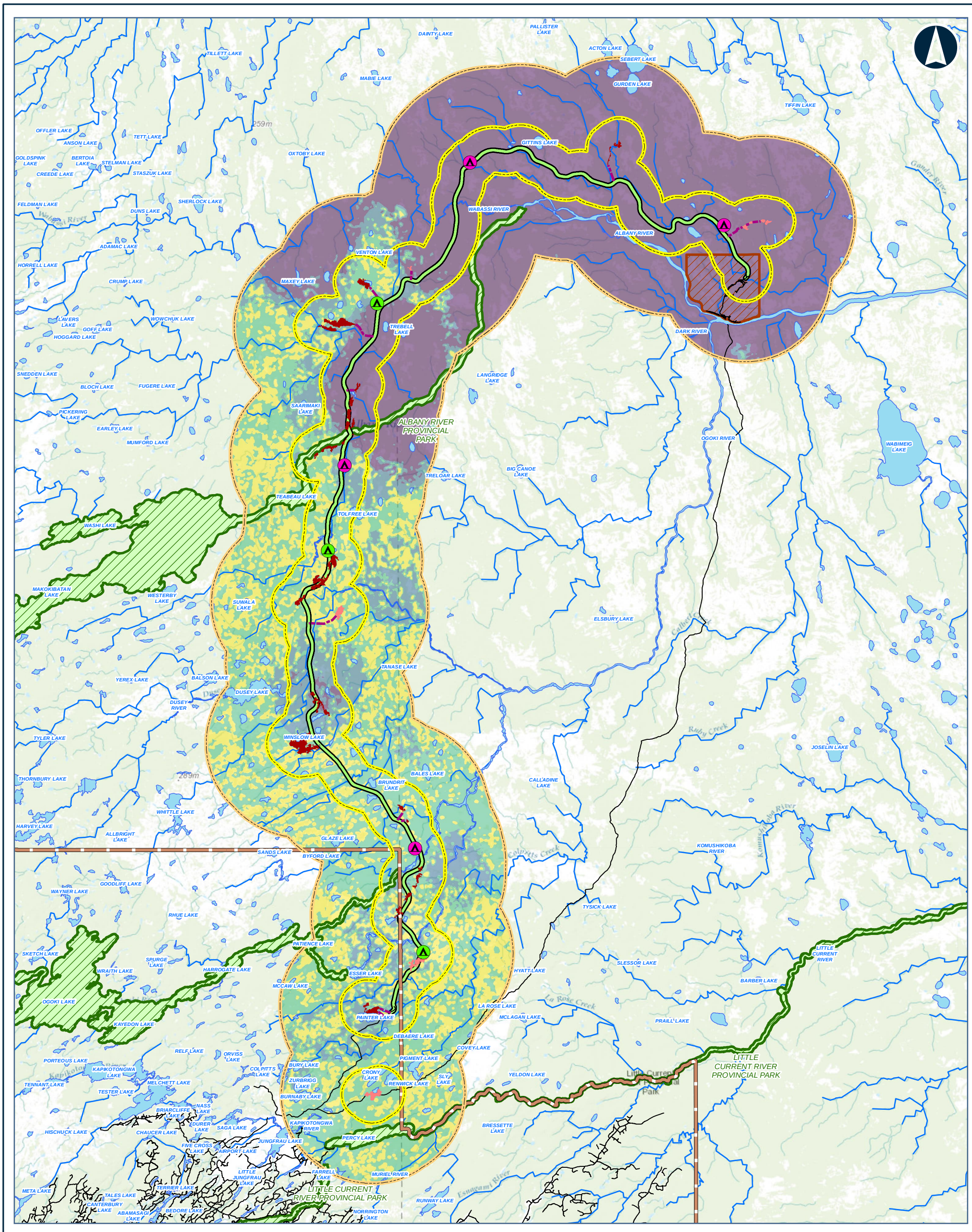
Wilson's snipe is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). Wilson's snipes are predicted to occur throughout the effects study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to southern North America, Central America, and northern South America for the winter (Mueller et al., 2020).

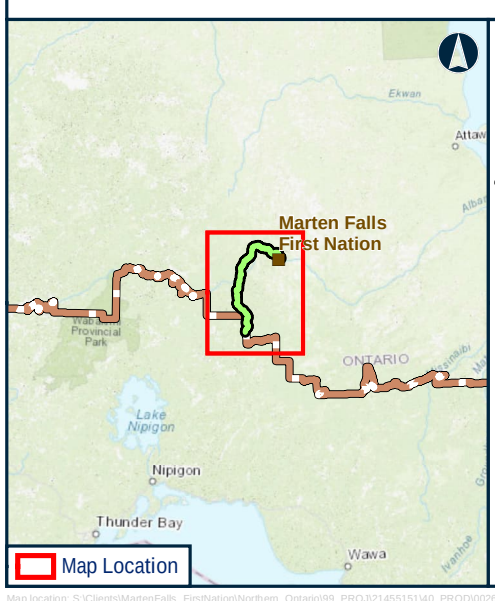
There is a higher proportion of high suitability habitat for Wilson's snipe in the effects assessment Construction Disturbance Area (approximately 55% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 45% to 48% of each study area).

High and moderate suitability Wilson's snipe habitat is widely distributed throughout the southwest two thirds of the effects assessment Regional Study Area (**Figure 7-6**). Suitable snipe habitat is generally absent in the northeastern third of the of the effects assessment Regional Study Area. Wilson's snipe may periodically explore new foraging areas during the summer, but most movements occur in discrete confined areas that are revisited throughout the summer (Cline and Haig, 2011). Construction of the Project may cause shifts in Wilson's snipe territory distribution and changes to Wilson's snipe movements. More details are presented in **Section 7.3.1.2.1.1**.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Wilson's snipe distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Wilson's snipe within zero to five years after the establishment of vegetation and would likely reduce the residual effects on Wilson's snipe distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

WILSON'S SNIPE HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Wilson's Snipe in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-06

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Survival and Reproduction

Construction

Habitat loss during Construction of the Project could affect Wilson's snipe survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 2,600.5 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the average area requirements of 14.8 ha (Mueller et al., 2020), this amounts to the potential loss of up to 176 Wilson's snipe nesting territories from the effects assessment Construction Disturbance Area, or 2.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Wilson's snipe survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Wilson's snipe within zero to five years after the establishment of vegetation and would likely reduce the residual effects on Wilson's snipe survival and reproduction caused by the Project.

7.3.1.7.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, and riparian communities and result in changes to Wilson's snipe habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, and riparian vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan (**Appendix AB**) would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.7.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential Wilson's snipe breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on Wilson's snipe habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.7.2 Sensory Disturbance

7.3.1.7.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable Wilson's snipe habitat in the Effects Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by Wilson's snipe due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 10,060.2 ha of high and moderate suitability Wilson's snipe habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This represents 14.8% and 4.1% of high and moderate suitability habitat (combined) that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance

effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-37: Changes to Wilson's Snipe Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	24,858.8	21,357.7	-3,501.1	-14.1	98,068.2	94,567.1	-3,501.1	-3.6
Moderate	42,169.2	35,610.1	-6,559.1	-15.6	150,237.5	143,678.4	-6,559.1	-4.4
Low	19,372.4	16,438.3	-2,934.1	-15.1	45,115.1	42,180.9	-2,934.1	-6.5
Poor	62,457.8	53,966.7	-8,490.9	-13.6	213,151.2	204,660.3	-8,490.9	-4.0

Notes: There are 183.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on Wilson's snipe habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on Wilson's snipe distribution if individuals avoid areas with sensory disturbance. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Similar to Construction, sensory disturbance during Project Operation and Maintenance may have a negative effect on Wilson's snipe distribution. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on Wilson's snipe survival and reproduction through changes to the ability to hear species' communications and predators (Ortega, 2012). Sensory disturbance effects will occur intermittently throughout the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance are expected to have similar negative effects on Wilson's snipe survival and reproduction as predicted for during Construction. Sensory disturbance effects will occur continuously throughout the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.7.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on Wilson's snipe habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.1.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on Wilson's snipe habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.1.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.7.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential Wilson's snipe breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on Wilson's snipe habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.8 Mallard

7.3.1.8.1 Habitat Loss and Alteration

7.3.1.8.1.1 Potential Effects

Habitat Availability

Construction

During Construction, the effects assessment Construction Disturbance Area is predicted to directly remove 3,685.3 ha of high to moderate suitability mallard habitat. This represents a change of 2.9% and 0.8% of high and moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-38**). A total of 436,551.7 ha of high to moderate suitability habitat remain available for mallard in the effects assessment Regional Study Area (**Table 7-38**).

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 1,014.9 ha in the effects assessment Regional Study Area (**Table 7-38**). Low to poor quality habitats may support mallards during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B, Annex B**).

Table 7-38: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Mallard in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	128,754.4	125,069.1	-3,685.3	-2.9	440,237.0	436,551.7	-3,685.3	-0.8
Low to Poor	20,103.5	19,088.6	-1,014.9	-5.0	66,509.9	65,495.7	-1,014.9	-1.5

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after Construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare**; % = percent; - = negative.**

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on mallard habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for mallard within zero to five years after the establishment of vegetation and would likely reduce the residual effects on mallard habitat availability caused by the Project.

Distribution

Construction

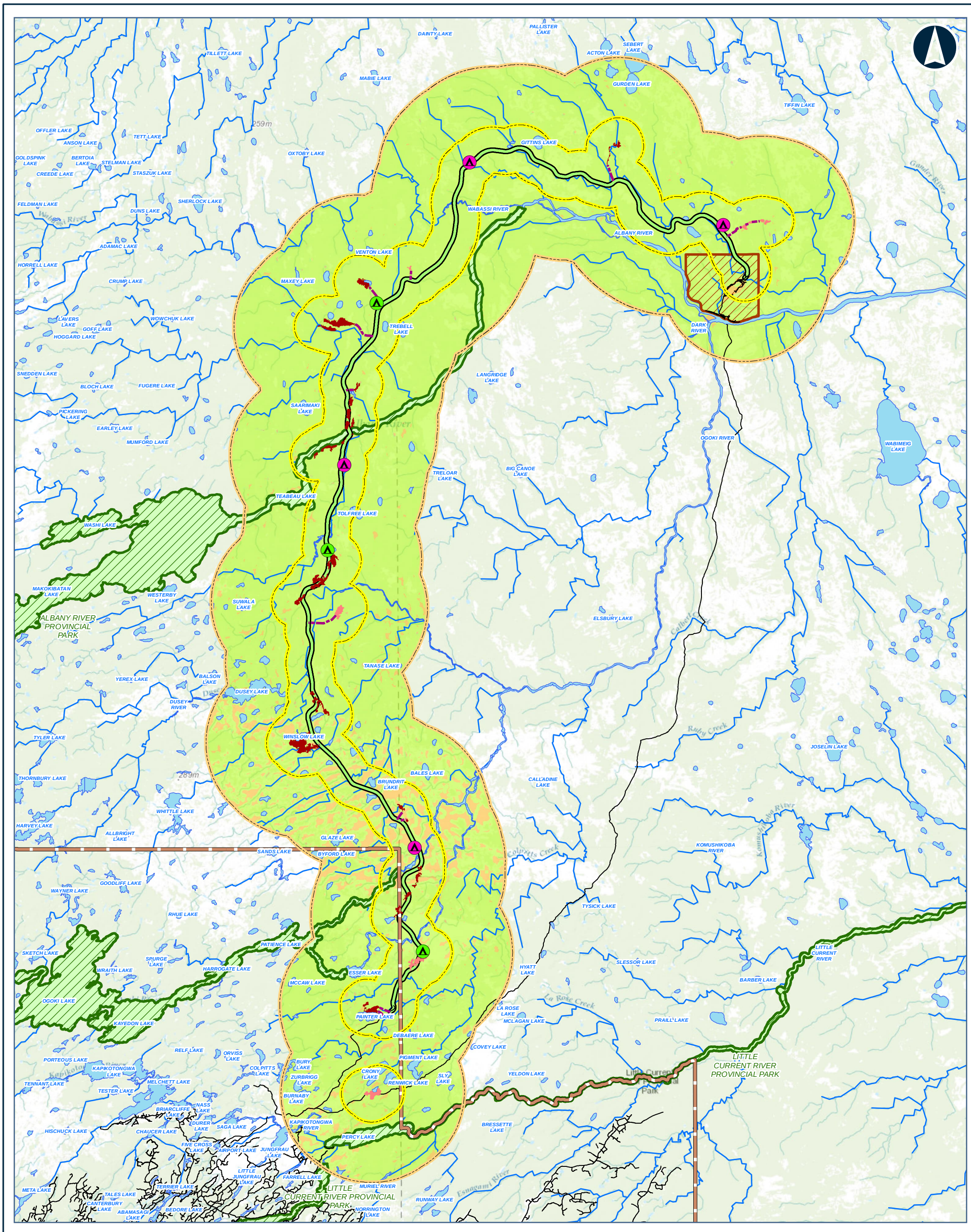
Mallard is a widespread and common breeding species throughout Ontario (Natural Heritage Information Centre 2023). Mallards were among the most common waterfowl and waterbird species observed during field surveys in 2018 to 2022. Mallards may be present in the effects study areas during the spring migration, summer breeding, and fall migration periods; this species migrates to southern North America for the winter (Drilling et al. 2020).

There is a lower proportion of high suitability habitat for mallard in the effects assessment Construction Disturbance Area (approximately 78% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 86% of each study area). This is due to the avoidance of wetland habitat for the Project route.

Construction of the Project may cause shifts in mallard territory distribution and changes to mallard movements. More details are presented in **Section 7.3.1.2.1.1**. However, mallards are highly mobile. As such, it is expected that this species can establish territories in areas below carrying capacity. High to moderate quality mallard habitat is ubiquitous within the effects assessment Regional Study Area **Figure 7-7**.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on mallard distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project as the Project will remain in perpetuity. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for mallard within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on mallard distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

MALLARD HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Mallard in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-07

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Date Saved: 2/12/2026 1:52:27 PM User Name: INBA08973

Survival and Reproduction

Construction

Habitat loss during Project Construction could affect mallard survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 3,685.3 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 14 mallard nesting territories from the effects assessment Construction Disturbance Area, or 0.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on mallard survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for mallard within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on mallard survival and reproduction caused by the Project.

7.3.1.8.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of wetland and riparian vegetation communities and result in changes to mallard habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of wetland and riparian vegetation communities are discussed in detail in the *Vegetation Technical Support Document:Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been

developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.8.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential mallard breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on mallard habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.8.2 Sensory Disturbance

7.3.1.8.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable mallard habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. However, this species is considered not sensitive to sensory disturbance (Drilling et al. 2020) and a zone of influence was not considered for this species in the habitat model.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance is not expected to result in the indirect removal of suitable mallard habitat in the effects assessment Local Study Area (Drilling et al. 2020).

Distribution

Construction

Sensory disturbance during Project Construction is not anticipated to result in changes to mallard distribution relative to existing conditions.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance is not anticipated to result in changes to mallard distribution relative to existing conditions.

Survival and Reproduction

Construction

Noise during Project Construction may result in changes to mallard survival and reproduction, relative to existing conditions (Ortega, 2012). As the precise threshold of effects from noise on the ability of mallard to detect species communications and approaching predators is not known, individuals that nest within 300 m of human developments were assumed to be negatively affected by noise as a precautionary approach. Sensory disturbance effects will occur intermittently throughout the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Noise during Project Operation and Maintenance may result in changes to mallard survival and reproduction through changes to the ability to hear species' communications and predators. Sensory disturbance effects are predicted to occur continuously throughout the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.8.2.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on mallard survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on mallard and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.8.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Sensory disturbance is not predicted to have residual effects on mallard habitat availability and distribution. However, there is a predicted net residual effect from sensory disturbance on mallard survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.9 Palm Warbler

7.3.1.9.1 Habitat Loss and Alteration

7.3.1.9.1.1 Potential Effects

Habitat Availability

Construction

During Construction, the effects assessment Construction Disturbance Area is predicted to directly remove 1,178.1 ha of high suitability and 923.5 ha of moderate suitability palm warbler habitat. This represents a change of 2.4% and 2.1% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions (**Table 7-39**). At the scale of the effects assessment Regional Study Area, the Project will remove 0.6% of both high and moderate suitability habitat, relative to existing conditions (**Table 7-39**). A total of 183,460.4 ha of high and 156,065.7 ha of moderate suitability habitat remain available for palm warbler in the effects assessment Regional Study Area (**Table 7-39**).

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 2,598.6 ha representing 1.6% of its availability in the effects assessment Regional Study Area (**Table 7-39**). Low to poor quality habitats may support palm warblers during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B, Annex B**).

Table 7-39: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Palm Warbler in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High	49,490.0	48,311.9	-1,178.1	-2.4	184,638.5	183,460.4	-1,178.1	-0.6
Moderate	43,855.6	42,932.1	-923.5	-2.1	156,989.2	156,065.7	-923.5	-0.6
Low	40,572.8	38,987.5	-1,585.3	-3.9	109,234.8	107,649.5	-1,585.3	-1.5
Poor	14,939.5	13,926.3	-1,013.2	-6.8	55,703.3	54,690.0	-1,013.2	-1.8

Notes: There are 238.6 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on palm warbler habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for palm warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on palm warbler habitat availability caused by the Project.

Distribution

Construction

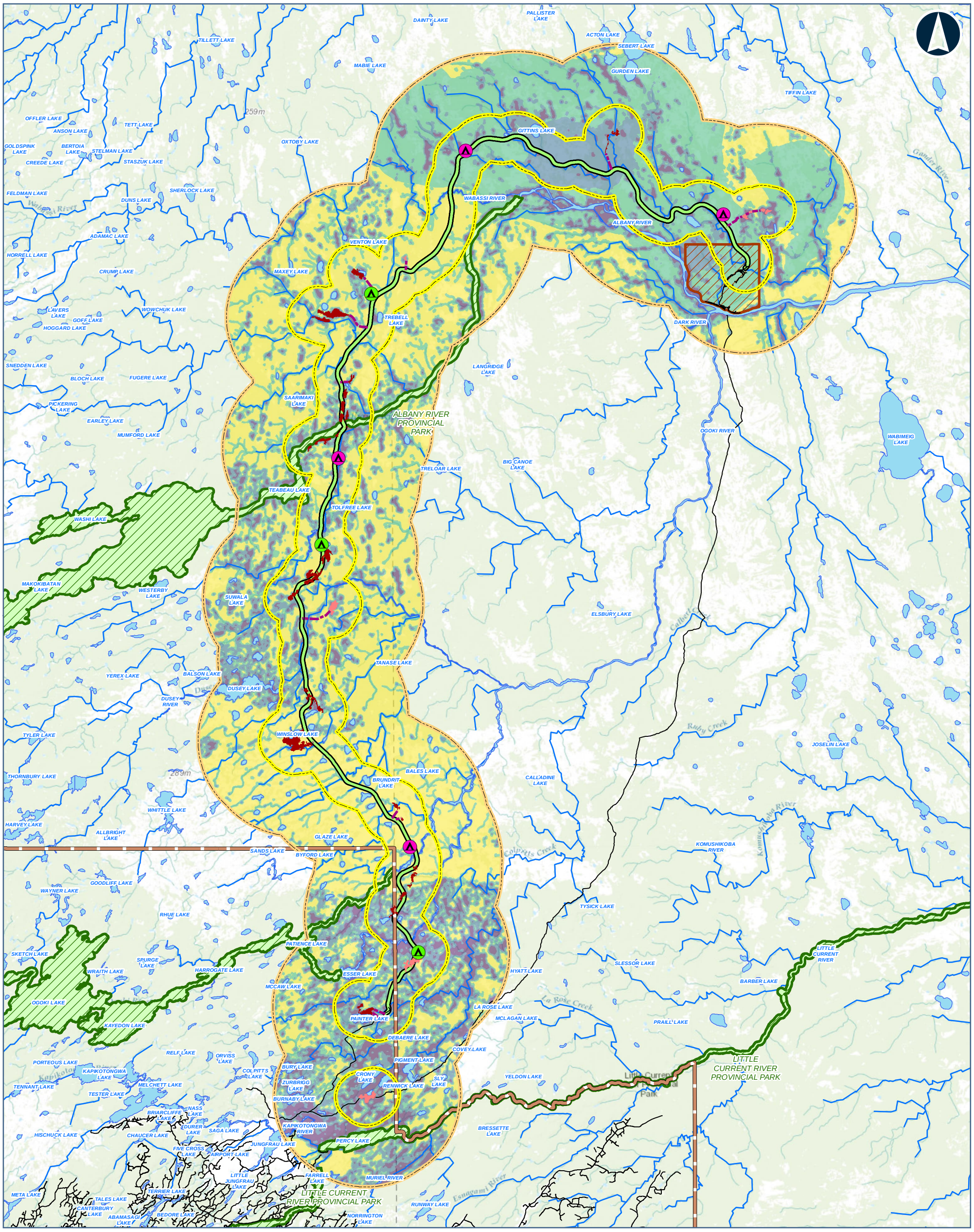
Palm warblers are sensitive to patch size and isolation. Large peatland areas are preferred over small, isolated patches (Calmé and Desrochers, 2000; Poulin et al., 2006). As such, individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. More details on how the Project may change palm warbler distribution are presented in **Section 7.3.1.2.1.1**.

There is a lower proportion of high suitability habitat for palm warbler in the effects assessment Construction Disturbance Area (approximately 45% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 62% to 67% of each study area). This is due to the avoidance of wetland habitat for the Project route.

After construction of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with high and moderate suitability habitat patches generally extending throughout the effects assessment Regional Study Area (**Figure 7-8**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on palm warbler distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for palm warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on palm warbler distribution caused by the Project.



Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

PALM WARBLER HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Palm Warbler in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-08

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect palm warbler survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 2,101.6 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 6.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 135 palm warbler nesting territories from the effects assessment Construction Disturbance Area, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on palm warbler survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for palm warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on palm warbler survival and reproduction caused by the Project.

7.3.1.9.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, riparian, and upland vegetation communities and result in changes to palm warbler habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document:: Existing Conditions and Effects Assessment* (WSP, 2026d). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan has been developed (**Appendix AB**) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.9.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential palm warbler breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on palm warbler habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.9.2 Sensory Disturbance

7.3.1.9.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable palm warbler habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by palm warbler due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 11,554.5 ha of high and moderate suitability palm warbler habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This represents 12.3% and 3.4% of high and moderate suitability habitat (combined) that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance

effects are anticipated to occur intermittently during the Construction Phase; more details are provided in **Section 7.3.1.2.2.1**.

Table 7-40: Changes to Palm Warbler Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	49,490.0	43,293.7	-6,196.3	-12.5	184,638.5	178,442.2	-6,196.3	-3.4
Moderate	43,855.6	38,497.4	-5,358.2	-12.2	156,989.2	151,630.9	-5,358.2	-3.4
Low	40,572.8	33,565.4	-7,007.4	-17.3	109,234.8	102,227.4	-7,007.4	-6.4
Poor	14,939.5	12,016.3	-2,923.2	-19.6	55,703.3	52,780.1	-2,923.2	-5.3

Notes: There are 238.6 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on palm warbler habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on palm warbler movements and habitat connectivity if individuals avoid areas with sensory disturbance. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have negative effects on palm warbler distribution. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have negative effects on palm warbler survival and reproduction through changes to the ability to hear species communications and approaching predators. Sensory disturbance effects will occur intermittently throughout the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have negative effects on palm warbler survival and reproduction (Ortega, 2012). Sensory disturbance effects are expected to occur continuously throughout the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.9.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on palm warbler habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on palm warbler habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2,** offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.9.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential palm warbler breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on palm warbler habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73.**

7.3.1.9.3 Increase in Edge Habitat

7.3.1.9.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of vegetation during Construction of the Project will increase edge habitat in forested areas, which could change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). Interior-forest nesting birds, such as palm warbler, may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased forest edge habitat (Keyser et al., 1998).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for palm warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on palm warbler survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.9.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in increased edge habitat in forested areas and could have negative effects on palm warbler survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of forested vegetation communities, and therefore limit increases in edge habitat, are discussed in detail in the

Vegetation Technical Support Document: Existing Conditions and Effects Assessment (WSP, 2026a). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2**.

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat and associated creation of edge habitat as much as practical, but a Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term (i.e., during Project Operation and Maintenance), measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat, which is anticipated to result in a net increase in migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.9.3.3 Predicted Residual Effects

Survival and Reproduction

The construction of the Project will increase the amount of edge habitat, relative to existing conditions, and effects from changes to predator communities and increased predation risk will occur throughout the Construction and Operation and Maintenance Phases. The implementation of mitigation and enhancement measures is expected to limit negative effects but there is a predicted net residual effect on palm warbler survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.10 Common Yellowthroat

7.3.1.10.1 Habitat Loss and Alteration

7.3.1.10.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 1,152.6 ha of high suitability and 766.3 ha of moderate suitability common yellowthroat habitat. This represents a change of 2.1% of high and moderate suitability habitat (combined) at the scale of the effects assessment Local Study Area, relative to existing conditions **Table 7-41**. At the scale of the effects assessment Regional Study Area, habitat loss from the Project is predicted to remove 0.6% of high and moderate suitability habitat (combined), relative to existing conditions **Table 7-41**. A total of 200,017.1 ha of high and 130,987.2 ha of moderate suitability habitat remain available for common yellowthroat in the effects assessment Regional Study Area **Table 7-41**.

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 1,204.2 ha and 1,577.2 ha respectively, representing 1.0% and 2.9% of its availability in the effects assessment Regional Study Area, respectively **Table 7-41**. Low to poor quality habitats may support common yellowthroats during the breeding season, as survey data showed use of this habitat during the breeding season **Attachment B, Annex B**.

Table 7-41: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Common Yellowthroat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	58,498.0	57,345.4	-1,152.6	-2.0	201,169.7	200,017.1	-1,152.6	-0.6
Moderate	37,140.2	36,373.9	-766.3	-2.1	131,753.5	130,987.2	-766.3	-0.6
Low	36,181.5	34,977.3	-1,204.2	-3.3	119,368.0	118,163.9	-1,204.2	-1.0
Poor	17,038.2	15,461.0	-1,577.2	-9.2	54,356.2	52,778.9	-1,577.2	-2.9

Notes: There are 108.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common yellowthroat habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common yellowthroat within zero to five years after the establishment of vegetation and would likely reduce the residual effects on common yellowthroat habitat availability caused by the Project.

Distribution

Construction

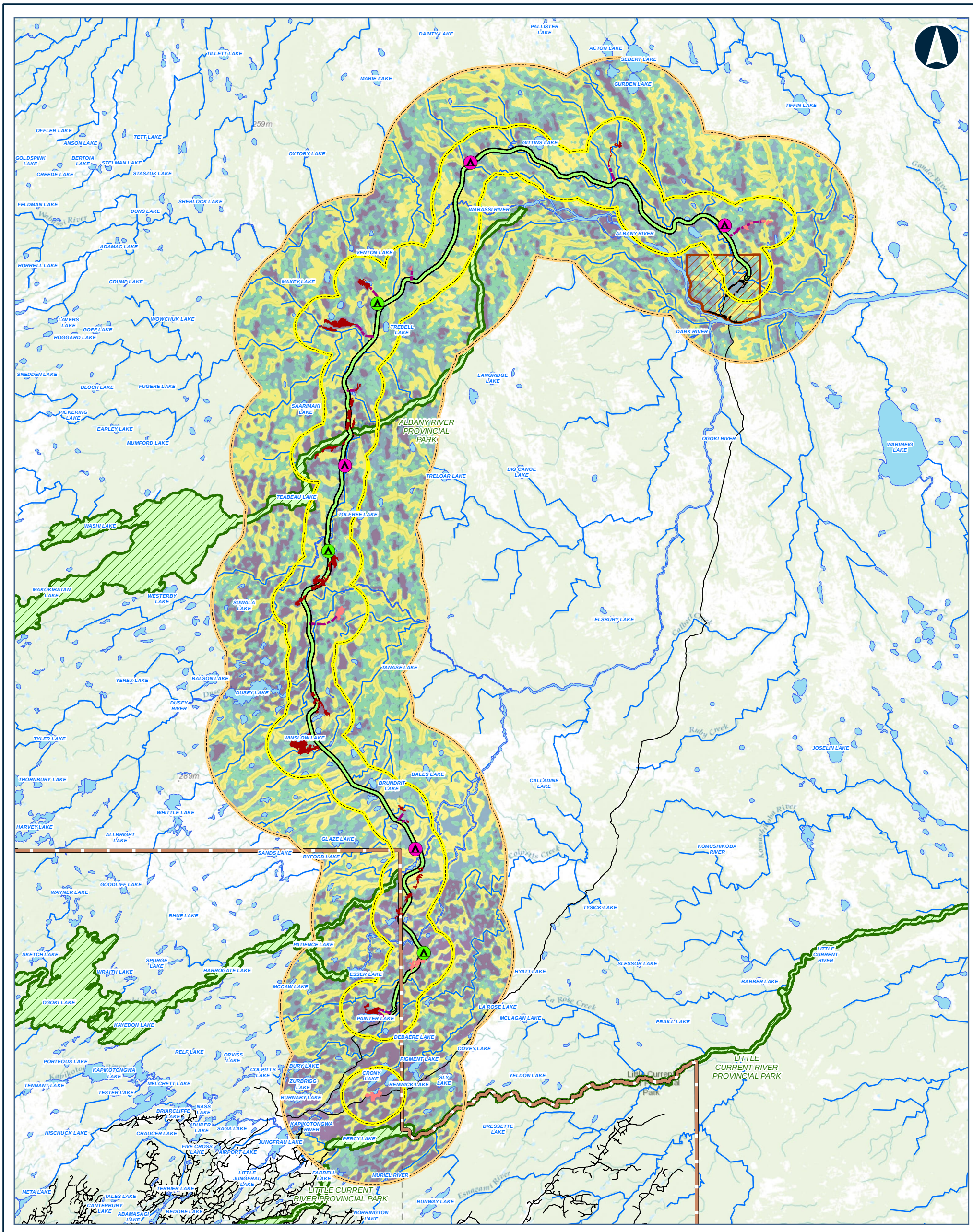
Some studies report that common yellowthroats may be sensitive to habitat loss at a landscape level but may not be sensitive to habitat patch size at a local scale (Betts et al., 2007; Lehnen and Rodewald, 2009). Conversely, other studies report that common yellowthroats may select landscapes with higher fragmentation (Koper and Schmiegelow, 2006). Rush et al., (2009) found that habitat loss may not affect this species unless more than 20% of habitat is removed at the landscape scale. More details on how the Project may change common yellowthroat distribution are presented in **Section 7.3.1.2.1.1**.

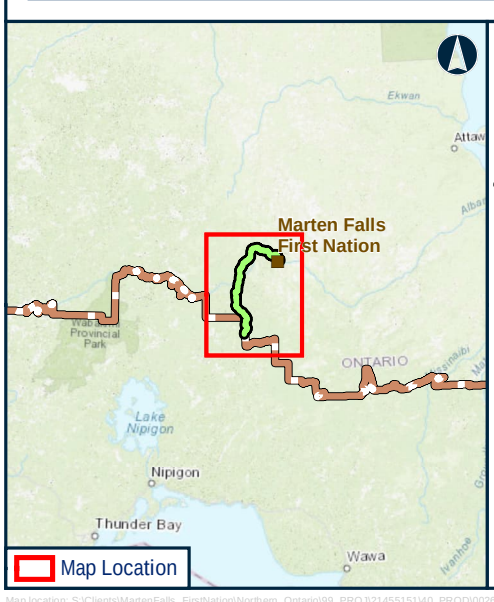
There is a lower proportion of high suitability habitat for common yellowthroat in the effects assessment Construction Disturbance Area (approximately 40% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 65% of each study area). This is due to the avoidance of wetland and riparian habitat for the Project route.

After the addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with interspersed patches of riparian habitat along watercourses and waterbodies throughout the effects assessment Regional Study Area **Figure 7-9**.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common yellowthroat distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common yellowthroat within zero to five years after the establishment of vegetation and would likely reduce the residual effects on common yellowthroat distribution caused by the Project.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

COMMON YELLOWTHROAT HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Common Yellowthroat in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-9

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect common yellowthroat survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 1,918.9 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 7.1 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 136 common yellowthroat nesting territories from the effects assessment Construction Disturbance Area, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common yellowthroat survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common yellowthroat within zero to five years after the establishment of vegetation and would likely reduce the residual effects on common yellowthroat survival and reproduction caused by the Project.

7.3.1.10.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of wetland, riparian, and upland vegetation communities and result in changes to common yellowthroat habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of wetland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.10.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential common yellowthroat breeding habitat will be removed by the Project during Construction and effects of this habitat loss will continue through Operation and Maintenance. The implementation of mitigation and enhancement measures is expected to limit negative effects habitat loss and alteration on common yellowthroat. However, there are predicted net residual effects on common yellowthroat habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.10.2 Sensory Disturbance

7.3.1.10.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable common yellowthroat habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by common yellowthroat due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 11,481.3 ha of high and moderate suitability common yellowthroat habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This represents 12.0% and 3.5% of high

and moderate suitability habitat (combined) that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are presented in **Section 7.3.1.2.2.1**.

Table 7-42: Changes to Common Yellowthroat Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High	58,498.0	51,454.3	-7,043.8	-12.0	201,169.7	194,125.9	-7,043.7	-3.5
Moderate	37,140.2	32,702.7	-4,437.5	-12.0	131,753.5	127,315.9	-4,437.5	-3.4
Low	36,181.5	30,368.5	-5,812.9	-16.1	119,368.0	113,555.0	-5,812.9	-4.9
Poor	17,038.2	12,847.3	-4,190.9	-24.6	54,356.2	50,165.3	-4,190.9	-7.7

Notes: There are 108.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common yellowthroat habitat availability movements and habitat connectivity survival and reproduction if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on common yellowthroat movements and habitat connectivity if individuals avoid areas with sensory disturbance.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common yellowthroat distribution. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on common yellowthroat survival and reproduction through changes to ability to hear communications and approaching predators (Ortega, 2012). Sensory disturbance effects will occur intermittently throughout the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common yellowthroat survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.10.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on common yellowthroat habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on common yellowthroat habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.10.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential common yellowthroat breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on common yellowthroat habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.11 Northern Waterthrush

7.3.1.11.1 Habitat Loss and Alteration

7.3.1.11.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 606.4 ha of high suitability and 847.9 ha of moderate suitability northern waterthrush habitat. This represents a change of 2.0% and 2.6% of high and moderate suitability habitat, respectively at the scale of the effects assessment Local Study Area, relative to existing conditions **Table 7-43**. At the scale of the effects assessment Regional Study Area, habitat loss from the Project is predicted to remove 0.6% of high and 0.8% of moderate suitability habitat, respectively, relative to existing conditions **Table 7-43**. A total of 100,675.6 ha of high and 101,990.0 ha of moderate suitability habitat remain available for northern waterthrush in the effects assessment Regional Study Area **Table 7-43**.

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 901.9 and 2,343.9 ha respectively, representing 0.6% and 1.6% of its availability in the effects assessment Regional Study Area, respectively **Table 7-43**. Low to poor quality habitats may support northern waterthrushes during the breeding season, as survey data showed use of this habitat during the breeding season **Attachment B**, **Annex B**.

Table 7-43: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Northern Waterthrush in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	30,595.9	29,989.5	-606.4	-2.0	101,281.9	100,675.6	-606.4	-0.6
Moderate	32,079.5	31,231.5	-847.9	-2.6	102,837.9	101,990.1	-847.9	-0.8
Low	46,111.2	45,209.3	-901.9	-2.0	153,675.4	152,773.4	-901.9	-0.6
Poor	40,071.4	37,727.5	-2,343.9	-5.9	148,764.2	146,420.3	-2,343.9	-1.6

Notes: There are 196.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on northern waterthrush habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for northern waterthrush within five to ten years after the establishment of vegetation and would likely reduce the residual effects on northern waterthrush habitat availability caused by the Project.

Distribution

Construction

Northern waterthrush is sensitive to habitat changes at the landscape scale (Leonard et al. 2008). This species has higher density in areas greater than 100 m from forest edges (Whitaker and Eaton 2020). This species appears to be more sensitive to landscape effects than local patch size as individuals can be found in patches as small as one ha (Golet et al. 2001).

Several studies have found that habitat fragmentation may not impede daily movements of forest songbird species, such as northern waterthrush (Norris and Stutchbury 2001; Fraser and Stutchbury 2004; MacIntosh et al. 2011; St. Clair et al. 1998). Northern waterthrushes regularly cross large openings such as lakes and clearcuts (Leonard et al. 2008). More

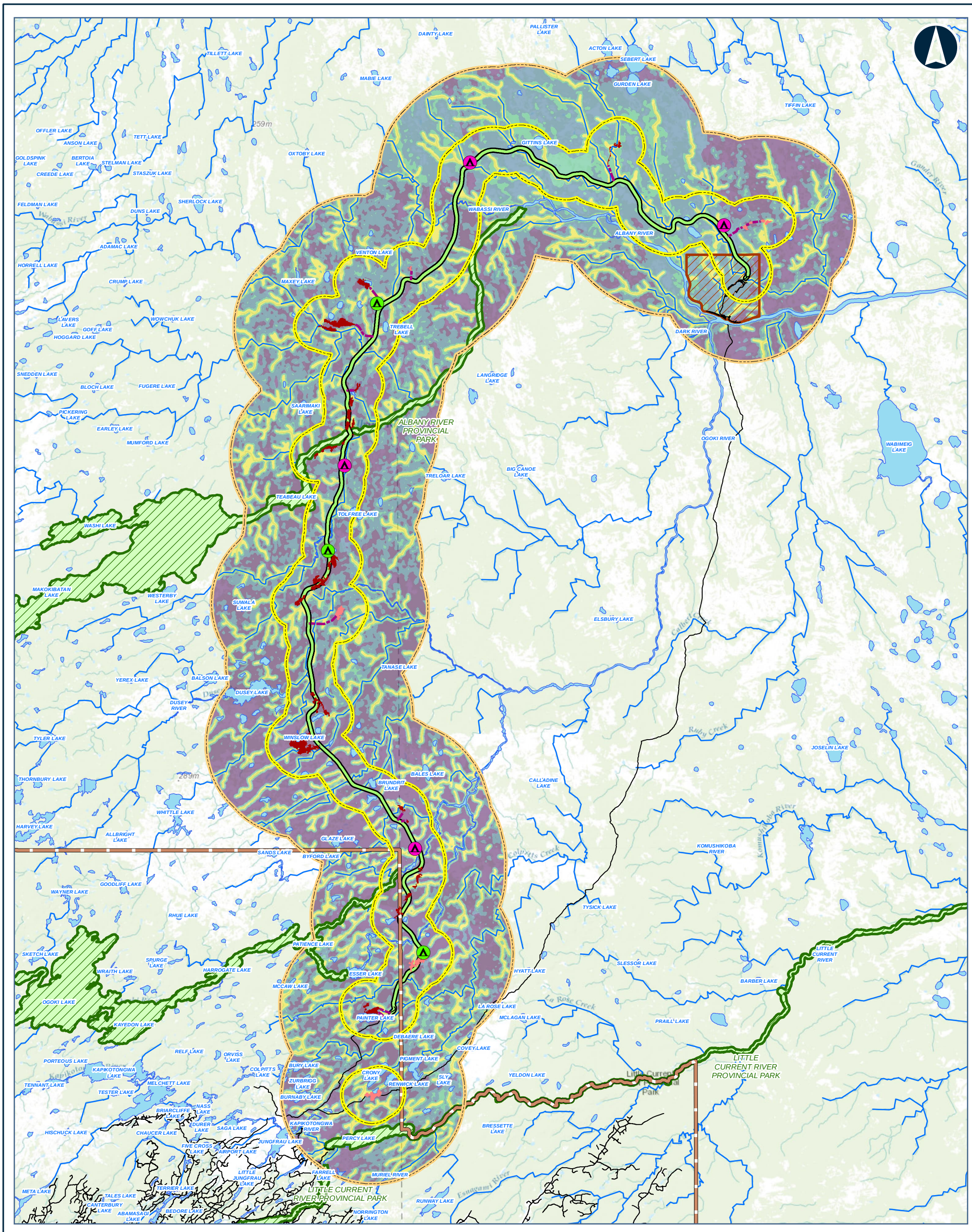
details on how the Project may change northern waterthrush distribution are presented in **Section 7.3.1.2.1.1**.

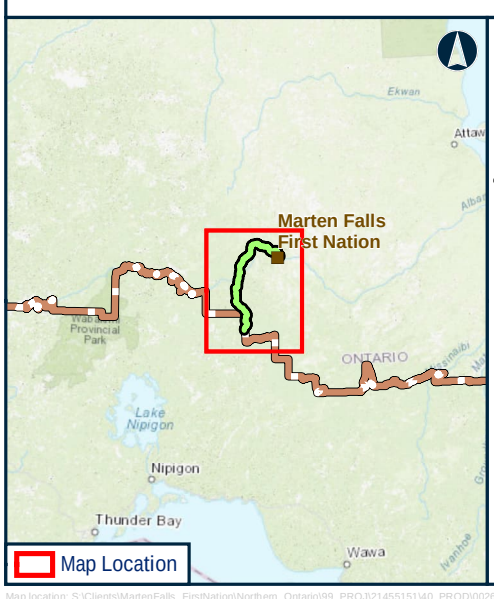
There is a lower proportion of high suitability habitat for northern waterthrush in the effects assessment Construction Disturbance Area (approximately 30% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 40% of each study area). This is due to the avoidance of wetland habitat for the Project route.

After the addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with interspersed patches of riparian habitat along watercourses and waterbodies throughout the effects assessment Regional Study Area **Figure 7-10**.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on northern waterthrush distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for northern waterthrush within five to ten years after the establishment of vegetation and would likely reduce the residual effects on northern waterthrush distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

NORTHERN WATERTHRUSH HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Northern Waterthrush in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 7-10

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0026_Bird_Section7_ResidualEffects\21455151-0026-RT-0016_7-10.mxd
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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect northern waterthrush survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 1,454.3 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 7.1 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 103 northern waterthrush nesting territories from the effects assessment Construction Disturbance Area, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on northern waterthrush survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for northern waterthrush within five to ten years after the establishment of vegetation and would likely reduce the residual effects on northern waterthrush survival and reproduction caused by the Project.

7.3.1.11.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, and riparian vegetation communities and result in changes to northern waterthrush habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, and riparian vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.11.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential northern waterthrush breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss and alteration on northern waterthrush. However, there are predicted net residual effects on northern waterthrush habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.11.2 Sensory Disturbance

7.3.1.11.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable northern waterthrush habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by northern waterthrush due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 8,487.8 ha of high and moderate suitability northern waterthrush habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This represents 13.5% and 4.2% of high and moderate suitability habitat (combined) that is available in the effects assessment

Local Study Area and effects assessment Regional Study Area, respectively, during existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-44: Changes to Northern Waterthrush Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	30,595.9	26,578.9	-4,016.9	-13.1	101,281.9	97,264.9	-4,016.9	-4.0
Moderate	32,079.5	27,608.6	-4,470.8	-13.9	102,837.9	98,367.2	-4,470.8	-4.4
Low	46,111.2	40,382.1	-5,729.1	-12.4	153,675.4	147,946.3	-5,729.1	-3.7
Poor	40,071.4	32,803.2	-7,268.2	-18.1	148,764.2	141,496.0	-7,268.2	-4.9

Notes: There are 196.2 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after Construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on northern waterthrush habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on northern waterthrush movements and habitat connectivity if individuals avoid areas with sensory disturbance. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on northern waterthrush distribution. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on northern waterthrush survival and reproduction through changes to the ability to hear approach predators and communication calls (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on northern waterthrush survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.11.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on northern waterthrush habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on northern waterthrush habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.11.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential northern waterthrush breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on northern waterthrush habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.11.3 Increase in Edge Habitat

7.3.1.11.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of habitat during Construction of the Project will increase edge habitat. The creation of edge habitat in forested areas may change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). Interior-forest nesting birds, such as northern waterthrush, may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased forest edge habitat (Keyser et al., 1998).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for northern waterthrush within five to ten years after the establishment of vegetation and would likely reduce the residual effects on northern waterthrush survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.11.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in increased edge habitat and could change northern waterthrush habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of forested vegetation communities, and therefore limit increases in edge habitat, are

discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat and associated creation of edge habitat as much as practical, but a Preliminary Biodiversity Offset Plan has been developed (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) to have no net loss of bird habitat. Over the long term (i.e., during Project Operation and Maintenance), measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat, which is anticipated to result in a net increase in migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.11.3.3 Predicted Residual Effects

Survival and Reproduction

The construction of the Project will increase the amount of edge habitat, relative to existing conditions, and effects will occur throughout the Operation and Maintenance Phase. The implementation of mitigation and enhancement measures is expected to limit negative effects from increased edge habitat on northern waterthrush. However, there is a predicted net residual effect on northern waterthrush survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.12 Sora

7.3.1.12.1 Habitat Loss and Alteration

7.3.1.12.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 557.5 ha of high to moderate suitability sora habitat. This represents a change of 2.1% and 0.6% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-45**). A total of 93,435.9 ha of high to moderate suitability habitat remain available for sora in the effects assessment Regional Study Area (**Table 7-45**).

Loss of low to poor suitability breeding habitat from the Project is estimated at a total of 4,142.7 ha respectively, representing 1.0% of its availability in the effects assessment Regional Study Area (**Table 7-45**). Low to poor quality habitats may support soras during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B, Annex B**).

Table 7-45: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Sora in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	27,171.3	26,613.8	-557.5	-2.1	93,993.5	93,435.9	-557.5	-0.6
Low to Poor	121,686.6	117,543.9	-4,142.7	-3.4	412,753.5	408,610.8	-4,142.7	-1.0

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on sora habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project (i.e., the Project is predicted to remain in perpetuity). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for sora within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on sora habitat availability caused by the Project.

Distribution

Construction

Mean sora territory size during the breeding season in Arizona was 0.19 ha (Melvin and Gibbs 2020). Soras are highly territorial against conspecifics (e.g., Virginia rail [*Rallus limicola*]) but can nest within 1.2 m of other soras (Melvin and Gibbs, 2020). Currently, there is no information available on sora fidelity to breeding sites.

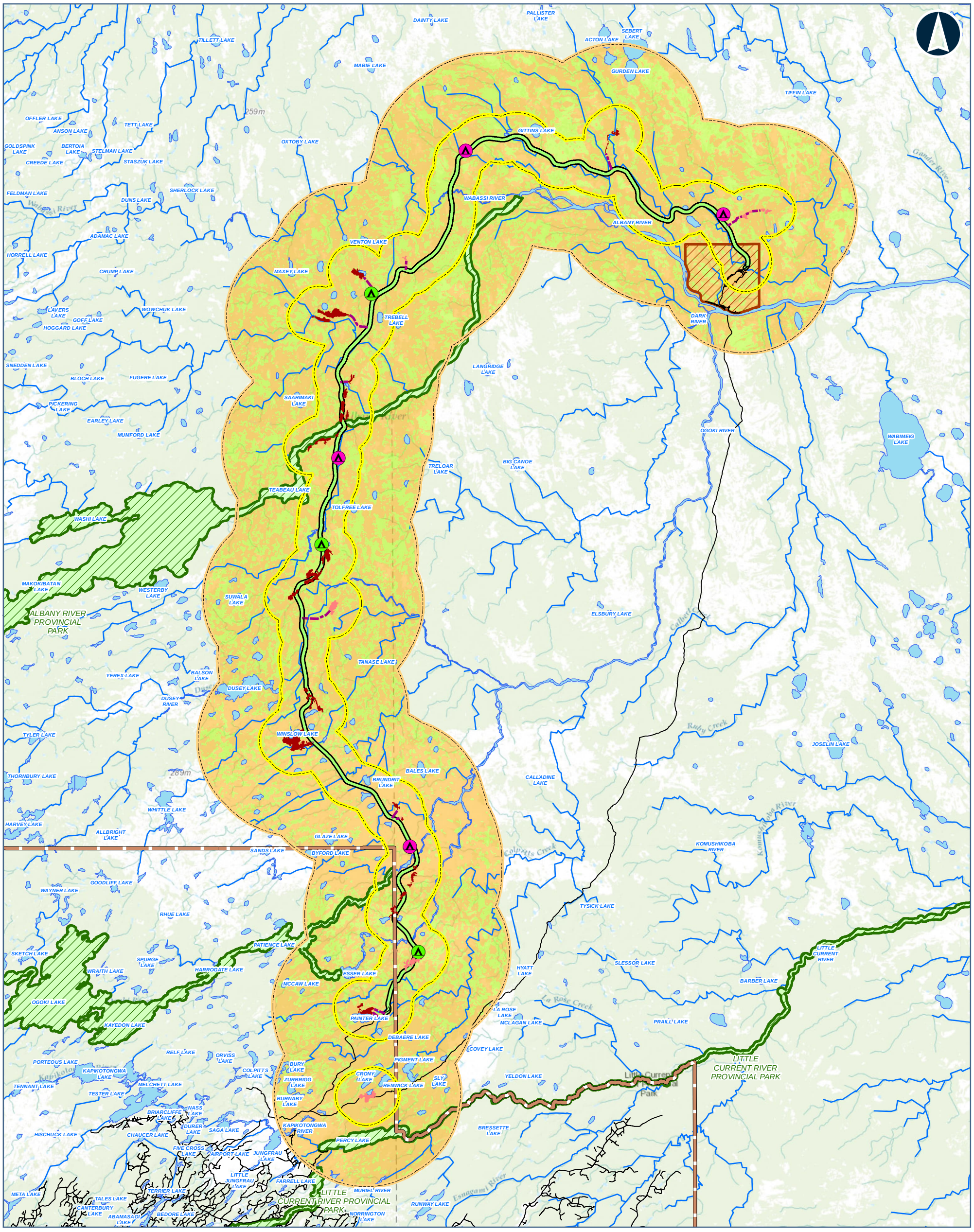
The sensitivity of sora to habitat fragmentation is unknown. However, the amount of human disturbance in the effects study areas is low and soras are highly mobile and can establish territories in areas below carrying capacity. More details on how the Project may change sora distribution are presented in **Section 7.3.1.2.1.1**.

There is a lower proportion of high suitability habitat for sora in the effects assessment Construction Disturbance Area (approximately 12% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 20% of each study area). This is due to the avoidance of wetland habitat for the Project route.

After the addition of the Project, the distribution of high to moderate suitability habitat remains similar as described during existing conditions with patches widely interspersed throughout the study areas (**Figure 7-11**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on sora distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for sora within zero to five years after the establishment of vegetation and would likely reduce the residual effects on sora distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

SORA HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Sora in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-11

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect sora survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a total of 557.5 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the density estimate from *Ontario Breeding Bird Atlas* Region 44 (i.e., 0.1 nesting territories per km^2), this amounts to the potential loss of less than one sora nesting territory from the effects assessment Construction Disturbance Area, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on sora survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for sora within zero to five years after the establishment of vegetation and would likely reduce the residual effects on sora survival and reproduction caused by the Project.

7.3.1.12.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of wetland vegetation communities and result in changes to sora habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of wetland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**.

The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as

part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.12.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential sora breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss and alteration on sora. However, there are predicted net residual effects on sora habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.12.2 Sensory Disturbance

7.3.1.12.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable sora habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by sora due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 4,159.2 ha of high and moderate suitability sora habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This represents 15.3% and 4.4% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions (**Table 7-46**). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-46: Changes to Sora Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	27,171.3	23,012.1	-4,159.2	-15.3	93,993.5	89,834.2	-4,159.2	-4.4
Low to Poor	121,686.6	99,194.0	-22,492.6	-18.5	412,753.5	390,260.9	-22,492.6	-5.5

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on sora habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on sora movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on sora movements and habitat connectivity. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on sora survival and reproduction (e.g., by reducing the ability of individuals to hear approaching predators) (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on sora survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.12.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on sora habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on sora habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.12.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential sora breeding habitat may be indirectly removed or degraded due to sensory disturbance during Construction and Operation and Maintenance of the Project. As such, there are predicted net residual effects on sora habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.13 Canada Warbler

7.3.1.13.1 Habitat Loss and Alteration

7.3.1.13.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to reduce Canada warbler habitat availability. Construction of the Project is predicted to remove 2,885.9 ha of high to moderate suitability Canada warbler habitat. This represents a change of 3.8% and 1.1% at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-47**). High to moderate suitability habitat remains abundant in the effects assessment Regional Study Area with 254,517.4 ha of suitable habitat available for Canada warbler after addition of the Project (**Table 7-47**).

Loss of low to poor habitats due to the Project is estimated at 1,814.3 ha, representing 0.7% of its availability in the effects assessment Regional Study Area (**Table 7-47**). Low to poor quality habitats may support Canada warblers during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B**).

Table 7-47: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Canada Warbler in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	76,880.7	73,994.8	-2,885.9	-3.8	257,403.3	254,517.4	-2,885.9	-1.1
Low to Poor	71,977.2	70,162.9	-1,814.3	-2.5	249,343.7	247,529.3	-1,814.3	-0.7

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Canada warbler habitat availability from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Canada warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on Canada warbler habitat availability caused by the Project.

Distribution

Construction

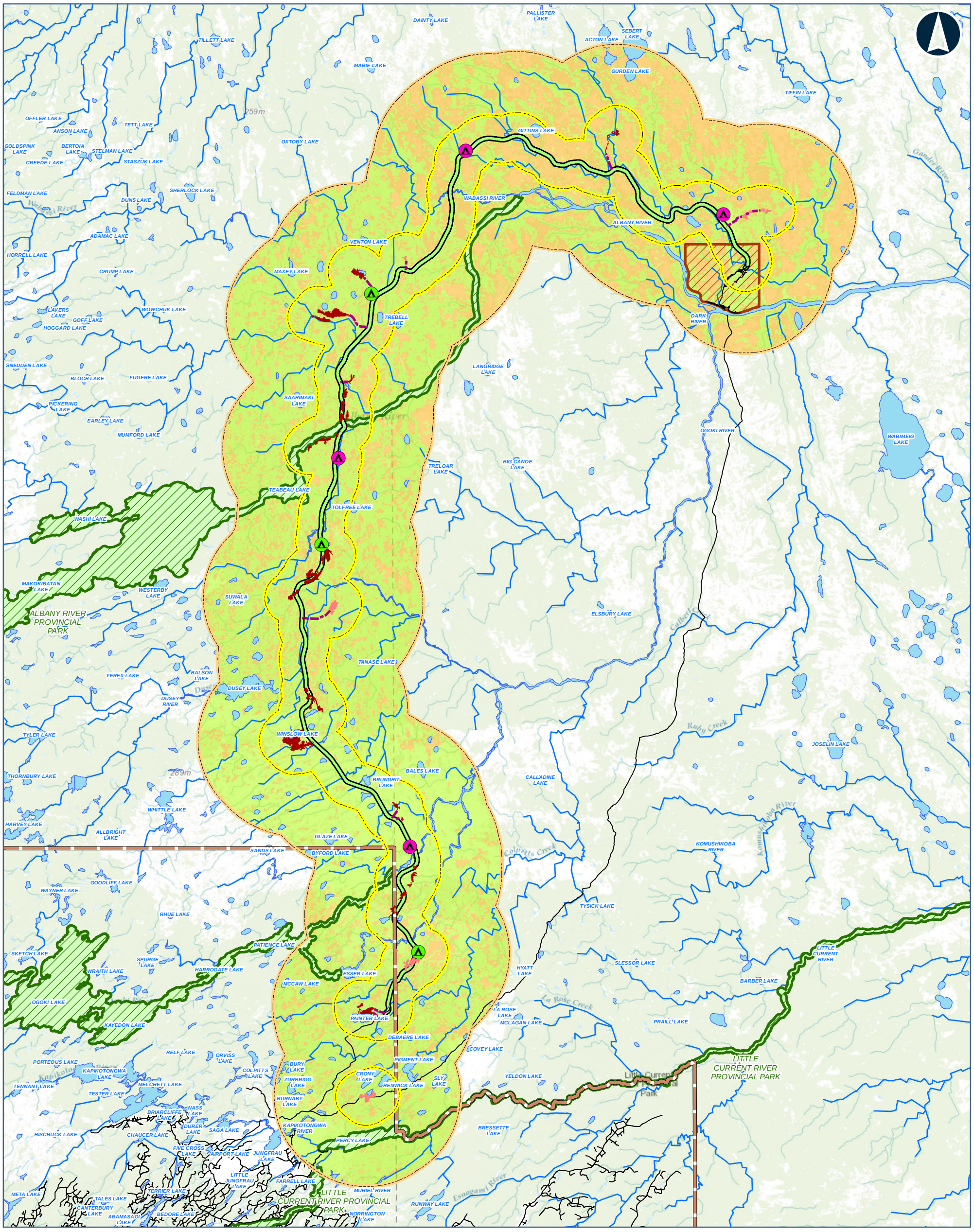
Construction of the Project may cause shifts in Canada warbler territory distribution and changes to Canada warbler movements. More details are presented in **Section 7.3.1.2.1.1**. However, habitat fragmentation does not appear to have negative effects on Canada warbler abundance (Ball et al., 2016; Schmiegelow et al., 1997).

There is a higher proportion of high suitability habitat for Canada warbler in the effects assessment Construction Disturbance Area (approximately 60% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 50% of each study area). This is due to the selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability Canada warbler habitat remains similar as described during existing conditions with high suitability habitat patches present throughout most of the effects assessment Regional Study Area except in the northeastern portion where there is more low to poor suitability habitat (**Figure 7-12**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Canada warbler distribution from habitat loss and alteration will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Canada warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on Canada warbler distribution caused by the Project.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

CANADA WARBLER HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Canada Warbler in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-12

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect Canada warbler survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 2,885.9 ha of high to moderate suitability Canada warbler breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest Canada warbler density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 1.0 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 28 nesting territories from the effects assessment Construction Disturbance Area, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on Canada warbler survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for Canada warbler within five to ten years after the establishment of vegetation and would likely reduce the residual effects on Canada warbler survival and reproduction caused by the Project.

7.3.1.13.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of riparian and upland vegetation communities and result in changes to Canada warbler habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of riparian and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Mitigation specific to birds is presented in more detail in **Section 7.3.1.2.1.2**. An additional mitigation that will be implemented for bird species at risk is:

- The Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible.

The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.13.1.3 Predicted Residual Effects

Even after mitigation, potential Canada warbler breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects habitat loss and alteration on Canada warbler. However, there are predicted net residual effects on Canada warbler habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.13.2 Sensory Disturbance

7.3.1.13.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable Canada warbler habitat if individuals avoid areas with sensory disturbance (Bayne et al., 2008). One study found that Canada warbler densities near transportation infrastructure were approximately ten times lower than that in high suitability, undisturbed habitat (McClure et al., 2013).

As the precise threshold of avoidance by Canada warbler due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 12,033.5 ha of high to moderate quality Canada warbler habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 15.7% and 4.7% of

high and moderate suitability Canada warbler habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions (**Table 7-48**). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-48: Changes to Canada Warbler Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	76,880.7	64,847.2	-12,033.5	-15.7	257,403.3	245,369.0	-12,033.5	-4.7
Low to Poor	71,977.2	62,525.6	-9,451.6	-13.1	249,343.7	239,892.8	-9,451.6	-3.8

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on Canada warbler habitat availability. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on Canada warbler movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on Canada warbler distribution. Sensory disturbance effects are anticipated to occur

continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on Canada warbler survival and reproduction (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on Canada warbler survival and reproduction (e.g., by reducing the ability of individuals to hear approaching predators). More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.13.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on Canada warbler habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

An additional mitigation that will be implemented for bird species at risk is the Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on Canada warbler habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures

in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.13.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential Canada warbler breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. As such, there are predicted net residual effects on Canada warbler habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.14 Evening Grosbeak

7.3.1.14.1 Habitat Loss and Alteration

7.3.1.14.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to reduce evening grosbeak habitat availability. Construction of the Project is predicted to remove 1,857.3 ha of high to moderate suitability evening grosbeak habitat. This represents a change of 6.9% and 2.1% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-49**). High to moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 87,901.9 ha of suitable habitat available for evening grosbeak after addition of the Project (**Table 7-49**).

Loss of low to poor habitats is estimated at 2,842.9 ha, representing 0.7% of its availability in the effects assessment Regional Study Area (**Table 7-49**). No evening grosbeaks were recorded during baseline surveys. However, given the nomadic nature of this species and their large territories, it is expected that low and poor suitability habitats would support some level of evening grosbeak use.

Table 7-49: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Evening Grosbeak in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	26,766.2	24,908.8	-1,857.3	-6.9	89,759.2	87,901.9	-1,857.3	-2.1
Low to Poor	122,091.8	119,248.8	-2,842.9	-2.3	416,987.8	414,144.9	-2,842.9	-0.7

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project

(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on evening grosbeak habitat availability from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for evening grosbeak within 5 to 10 years after the establishment of vegetation and would likely reduce the residual effects on evening grosbeak habitat availability caused by the Project.

Distribution

Construction

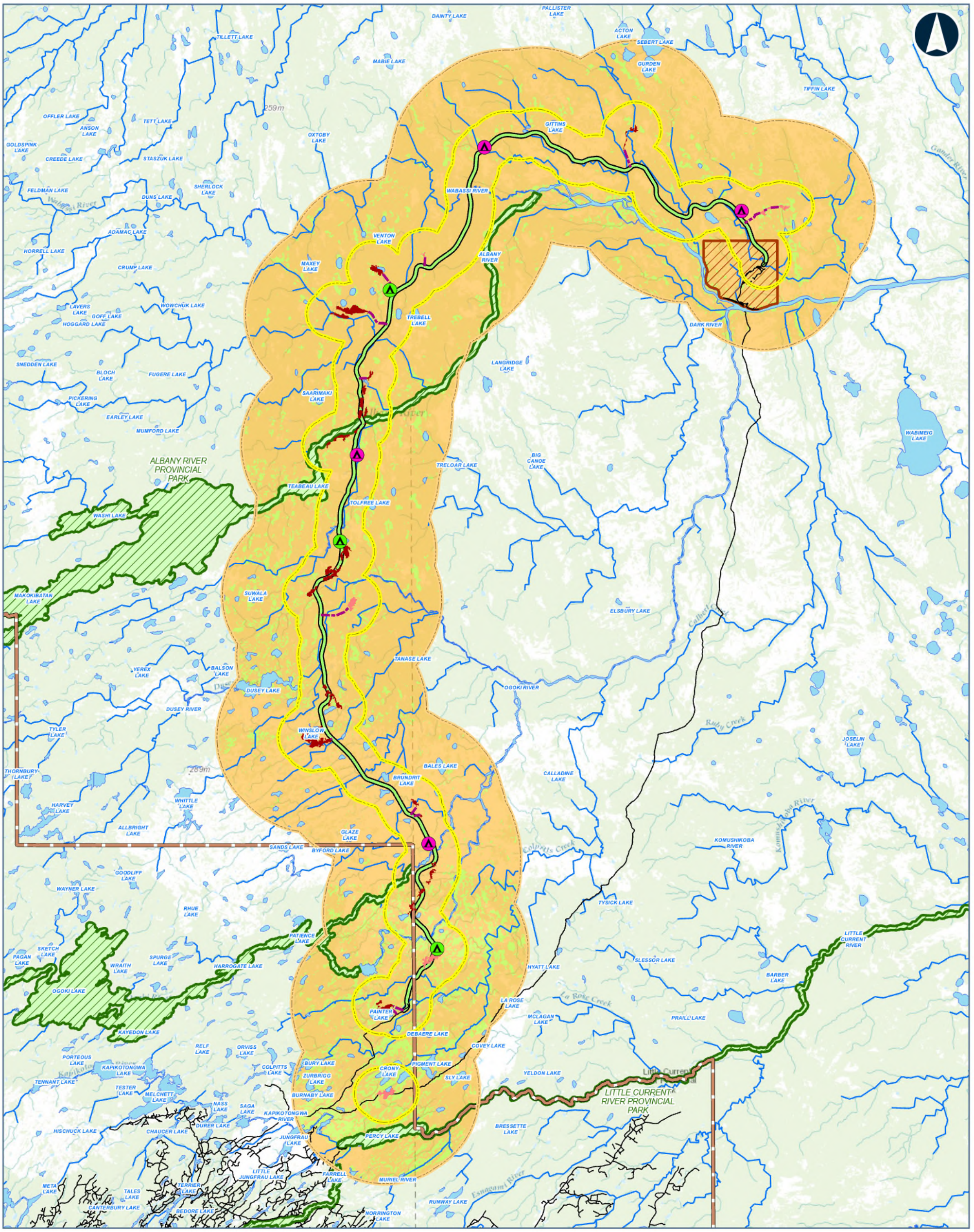
Project Construction may cause shifts in evening grosbeak territory distribution and changes to evening grosbeak movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. Additionally, the effects assessment Construction Disturbance Area may act as a barrier to grosbeak movements during foraging and dispersal. More details are presented in **Section 7.3.1.2.1.1**. However, changes to evening grosbeak distribution are expected to be minimum given the nomadic nature of this species and their large territories.

There is a substantially higher proportion of high suitability habitat for evening grosbeak in the effects assessment Construction Disturbance Area (approximately 40% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 17% of each study area). This is due to the selection of upland habitat for the Project route.

After addition of the Project, the distribution of high to moderate suitability evening grosbeak habitat remains similar as described during existing conditions with most high to moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area (**Figure 7-13**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on evening grosbeak distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for evening grosbeak within five to ten years after the establishment of vegetation and would likely reduce the residual effects on evening grosbeak distribution caused by the Project.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

EVENING GROSBEAK HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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Habitat Suitability for Evening Grosbeak in the Effects Regional Study Area after implementation of the Project

0 2.75 5.5 11 16.5 22

Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-13

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect evening grosbeak survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Evening grosbeak is not territorial during the breeding season, is highly nomadic, and can nest in small groups and loose colonies (Gillihan and Byers, 2020; Committee on the Status of Endangered Wildlife in Canada, 2016). As such, the number of potential nesting territories removed by the Project could not be accurately determined.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on evening grosbeak survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for evening grosbeak within 5 to 10 years after the establishment of vegetation and would likely reduce the residual effects on evening grosbeak survival and reproduction caused by the Project.

7.3.1.14.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to evening grosbeak habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as

part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.**

7.3.1.14.1.3 Predicted Residual Effects

Even after mitigation, potential evening grosbeak breeding habitat will be removed by the Project. As such, there are predicted net residual effects on evening grosbeak habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.14.2 Sensory Disturbance

7.3.1.14.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable evening grosbeak habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance (Bayne et al., 2008). As the precise threshold of avoidance by evening grosbeak due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 5,630.6 ha of high to moderate evening grosbeak habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 21.0% and 6.3% of high to moderate evening grosbeak habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions **Table 7-50**.

Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-50: Changes to Evening Grosbeak Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	26,766.2	21,135.5	-5,630.6	-21.0	89,759.2	84,128.5	-5,630.6	-6.3
Low to Poor	122,091.8	106,237.3	-15,854.5	-13.0	416,987.2	401,133.3	-15,854.5	-3.8

Notes:
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on evening grosbeak habitat availability. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on evening grosbeak movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on evening grosbeak movements and habitat connectivity (distribution). Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on evening grosbeak survival and reproduction (e.g., by reducing the ability of individuals to hear interspecies communications) (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on evening grosbeak survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.14.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on evening grosbeak habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on evening grosbeak habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.14.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential evening grosbeak breeding habitat that may be indirectly removed or degraded due to sensory disturbance from the Project. As such, there are predicted net residual effects on evening grosbeak habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.15 Chimney Swift, Barn Swallow, and Bank Swallow

7.3.1.15.1 Habitat Loss and Alteration

7.3.1.15.1.1 Potential Effects

Habitat Availability

Construction

Construction of the Project is predicted to remove 20.4 ha of high to moderate suitability chimney swift, bank swallow, and barn swallow habitat. This represents a change of 6.2% and 1.8% high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions **Table 7-51**. High to moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 1,091.8 ha of suitable habitat available for these species after addition of the Project **Table 7-51**. The amount of predicted habitat loss is a conservative estimate because chimney swifts, bank swallows, and barn swallows require site-specific natural habitat features (e.g., hollow trees, caves, or steep, sandy banks).

It is unlikely that this habitat loss will have negative effects on chimney swift, bank swallow, and barn swallow because these species were not detected during baseline surveys. Moreover, loss of nesting sites is not a primary factor limiting chimney swift populations in Ontario (Fitzgerald et al., 2013). Similarly, bank swallow and barn swallow population declines are associated with habitat loss in the southern portions of these species' ranges or in their wintering ranges; habitat loss is not a large concern in the boreal forest where agriculture and erosion control projects are not present (Environment and Climate Change Canada, 2022; Committee on the Status of Endangered Wildlife in Canada, 2011). Additionally, road cuts and sand / gravel pits created by the Project may provide suitable nesting habitat for bank swallows. Large culverts installed for the Project may provide suitable nesting habitat for barn swallows.

Table 7-51: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Chimney Swift, Bank Swallow, and Barn Swallow in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	329.4	309.0	-20.4	-6.2	1,112.1	1,091.8	-20.4	-1.8
Low to Poor	148,528.6	143,848.8	-4,679.8	-3.2	505,634.9	500,55.0	-4,679.8	-0.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, potential effects on chimney swift, bank swallow, and barn swallow habitat availability from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for chimney swift, bank swallow, and barn swallow within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on chimney swift, bank swallow, and barn swallow habitat availability caused by the Project.

Distribution

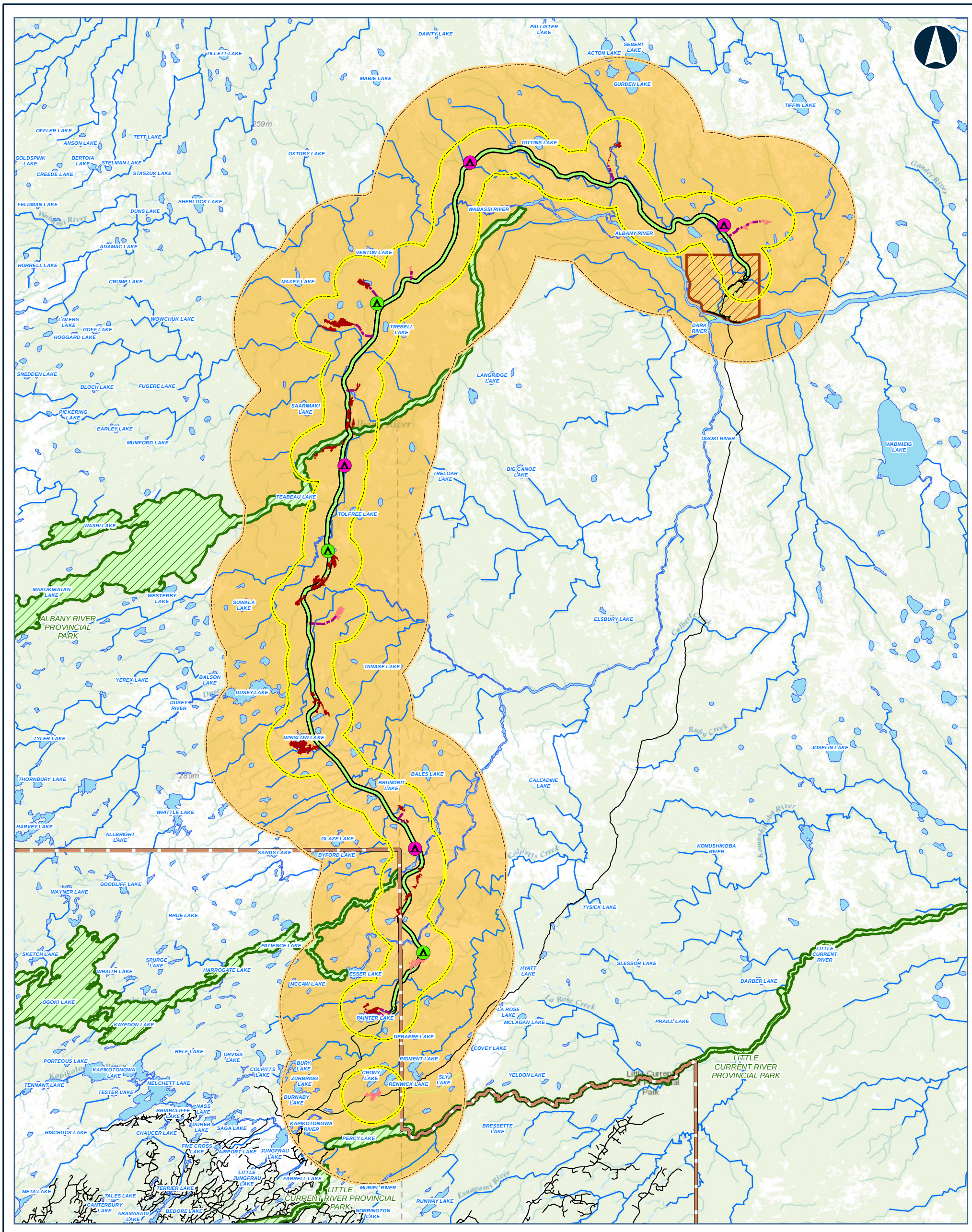
Construction

Project Construction may cause shifts in chimney swift, bank swallow, and barn swallow territory distribution and changes to chimney swift, bank swallow, and barn swallow movements. More details are presented in **Section 7.3.1.2.1.1**.

There is a similar proportion of high suitability habitat for chimney swift, bank swallow, and barn swallow in the effects assessment Construction Disturbance Area as in the effects assessment Local Study Area and effects assessment Regional Study Area (<1% of each study area). After addition of the Project, the distribution of high to moderate suitability habitat remains similar as described during existing conditions with most suitable habitat along the Dark River and its tributaries in the northeast portion of the effects assessment Regional Study Area (**Figure 7-14**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on chimney swift, bank swallow, and barn swallow distribution from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for chimney swift, bank swallow, and barn swallow within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on chimney swift, bank swallow, and barn swallow distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BANK SWALLOW HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
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Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Chimney Swift, Bank Swallow, and Barn Swallow in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-14

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0026_Bird_Section7_ResidualEffects\21455151-0026-RT-0002_7-14.mxd
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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect chimney swift, bank swallow, and barn swallow survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. However, loss of nesting habitat features is not a limiting factor for chimney swift species in Ontario (Fitzgerald et al., 2013; Steeves et al., 2020). Road cuts and sand / gravel pits created by the Project may provide suitable nesting habitat for bank swallows (Garrison and Turner, 2020). Large culverts installed for the Project may provide suitable nesting habitat for barn swallows (Brown and Brown, 2020).

Construction of the Project is predicted to remove 20.4 ha of high to moderate chimney swift, bank swallow, and barn swallow suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the barn swallow density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., <0.1 nesting territories per km^2 for both regions), this amounts to the potential loss of less than one nesting territory from the effects assessment Construction Disturbance Area, or 1.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on chimney swift, bank swallow, and barn swallow survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for chimney swift, bank swallow, and barn swallow within zero to five years after the establishment of vegetation and would likely reduce the residual effects on chimney swift, bank swallow, and barn swallow survival and reproduction caused by the Project.

7.3.1.15.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, riparian, and upland vegetation communities and result in changes to chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment*

*(*WSP, 2026a) and the *Peatlands Technical Support Document:: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.15.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential chimney swift, bank swallow, and barn swallow breeding habitat will be removed by the Project. As such, there are predicted net residual effects on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.15.2 Sensory Disturbance

7.3.1.15.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction is not expected to change chimney swift, bank swallow, and barn swallow habitat quality. These species are tolerant of sensory disturbance and can nest in urban areas, gravel pits, and other areas with high levels of sensory disturbance (Steeves et al., 2020; Garrison and Turner, 2020; Brown and

Brown, 2020). As such, a zone of influence was not considered for this species in the habitat model.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance is not expected to result in the indirect removal of suitable chimney swift, bank swallow, and barn swallow habitat in the effects assessment Local Study Area (Steeves et al., 2020; Garrison and Turner, 2020; Brown and Brown, 2020).

Distribution

Construction

Sensory disturbance during Project Construction is not anticipated to result in changes to chimney swift, bank swallow, and barn swallow distribution relative to existing conditions.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance is not anticipated to result in changes to chimney swift, bank swallow, and barn swallow distribution relative to existing conditions.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may result in changes to chimney swift, bank swallow, and barn swallow survival and reproduction, relative to existing conditions, by potentially interfering with communication (e.g., reducing ability to hear intraspecific vocalizations) and increasing the risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). As the precise threshold of effects from noise on the ability of chimney swift, bank swallow, and barn swallow to detect species communications and approaching predators is not known, individuals that nest within 300 m of human developments were assumed to be negatively affected by noise as a precautionary approach. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may result in changes to chimney swift, bank swallow, and barn swallow survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.15.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.15.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Sensory disturbance is not predicted to have residual effects on chimney swift, bank swallow, and barn swallow habitat availability and distribution. However, there is a predicted net residual effect from sensory disturbance on chimney swift, bank swallow, and barn swallow survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.16 Common Nighthawk and Eastern Whip-poor-will

7.3.1.16.1 Habitat Loss and Alteration

7.3.1.16.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to remove 1,102.6 ha of high suitability and 506.9 ha of moderate suitability common nighthawk habitat. This represents a change of 3.5% and 1.4% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions **Table 7-52**. At the scale of the effects assessment Regional Study Area, the Project will remove 0.9% and 0.4% of high and moderate suitability habitat, respectively **Table 7-52**. High and moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 115,443.9 and 125,243.3 ha of high and moderate suitability habitat remaining available for common nighthawk, respectively **Table 7-52**.

Loss of low and poor quality habitats from the Project is estimated at a total 3,090.8 ha, representing 1.2% of its availability in the effects assessment Regional Study Area **Table 7-52.** Low to poor quality habitats may support common nighthawks during the breeding season, as survey data showed use of this habitat during the breeding season **Attachment B**.

Table 7-52: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Common Nighthawk in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha) [(b, c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha) [(b, c)]	Change (%)
High	31,909.6	30,806.9	-1,102.6	-3.5	116,546.6	115,443.9	-1,102.6	-0.9
Moderate	36,540.9	36,034.1	-506.9	-1.4	125,750.1	125,243.3	-506.9	-0.4
Low	39,435.5	38,685.5	-750.0	-1.9	128,347.5	127,597.5	-750.0	-0.6
Poor	40,971.9	38,631.2	-2,340.8	-5.7	135,974.6	133,633.8	-2,340.8	-1.7

Notes: There are 137.0 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas is a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

The effects assessment Construction Disturbance Area is predicted to remove 450.7 ha of high to moderate suitability eastern whip-poor-will habitat. This represents a change of 7.4% and 2.3% at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively **Table 7-53**. High and moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 18,999.7 ha of suitable habitat remaining for eastern whip-poor-will after addition of the Project **Table 7-53**.

Loss of low to poor quality habitats is estimated at 4,249.5 ha, representing 0.8% of its availability in the Effects Study Area **Table 7-53**. Although eastern whip-poor-wills were only recorded in high and moderate suitability habitats during baseline surveys **Attachment B**, low to poor quality habitats are assumed to be capable of supporting eastern whip-poor-wills during the breeding season.

Table 7-53: Changes to Habitat Availability due to Direct Habitat loss for Eastern Whip-poor-will in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (hectare ha) [(b, c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha) [(b, c)]	Change (%)
High to Moderate	6,132.2	5,681.4	-450.7	-7.4	19,450.4	18,999.7	-450.7	-2.3
Low to Poor	142,725.8	138,476.3	-4,249.5	-3.0	487,296.6	483,047.1	-4,249.5	-0.8

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas is a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common nighthawk and eastern whip-poor-will habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common nighthawk within zero to five years and for eastern whip-poor-will within five to ten years after the establishment of vegetation and would likely reduce the residual effects on common nighthawk and eastern whip-poor-will habitat availability caused by the Project.

Distribution

Construction

Project Construction may cause shifts in common nighthawk and eastern whip-poor-will territory distribution and changes to common nighthawk and eastern whip-poor-will movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. Eastern whip-poor-wills rely heavily on forest cover and may have larger territories in areas with less forest cover (Skinner et al., 2023). However, common nighthawk density may be positively correlated with human disturbance (Haché et al., 2014).

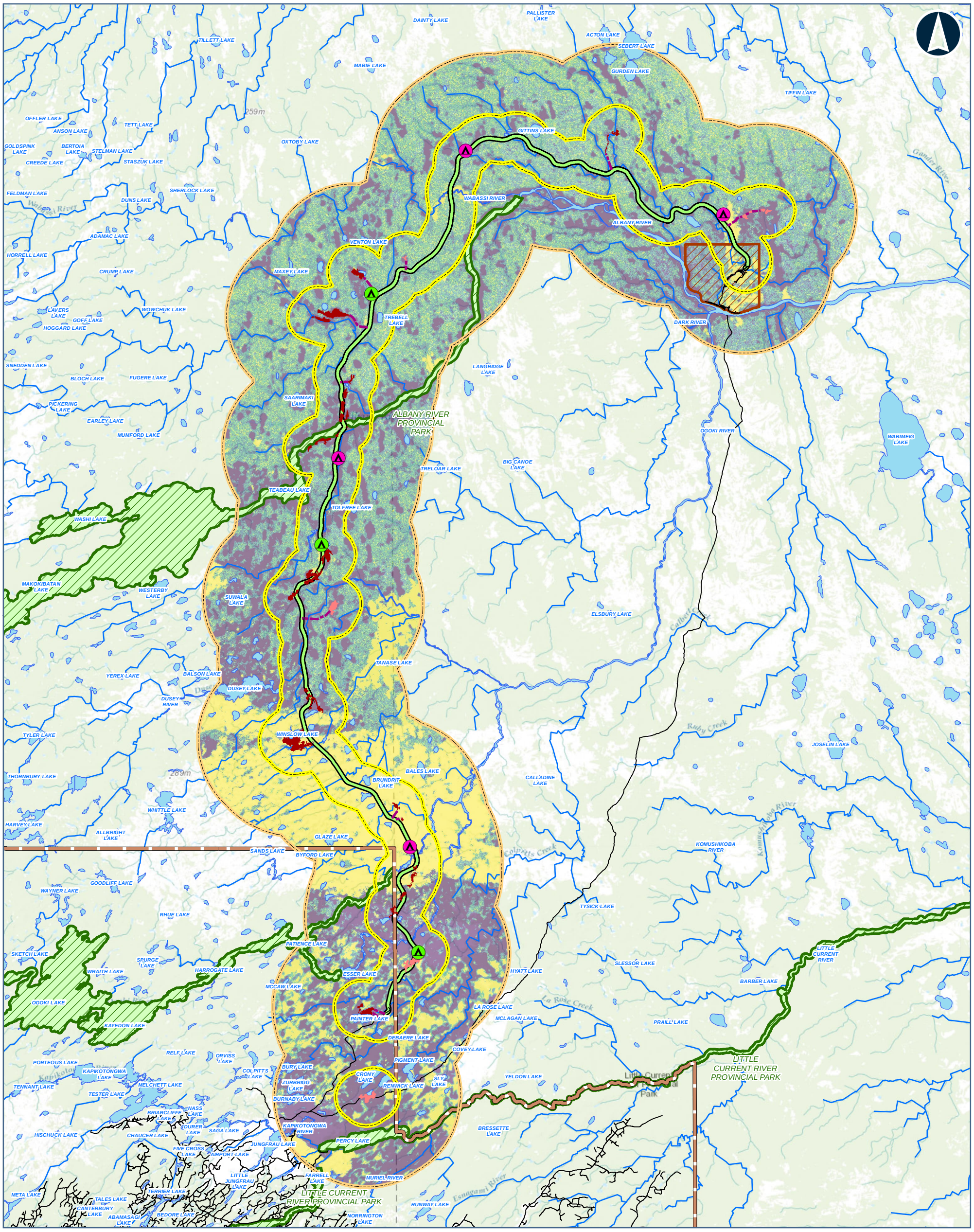
There is a lower proportion of high suitability habitat for common nighthawk in the effects assessment Construction Disturbance Area (approximately 34% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 46% of each study area). There is a slightly higher proportion of high suitability habitat for eastern whip-poor-will in the effects assessment Construction Disturbance Area (approximately 10% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 5% of each study area).

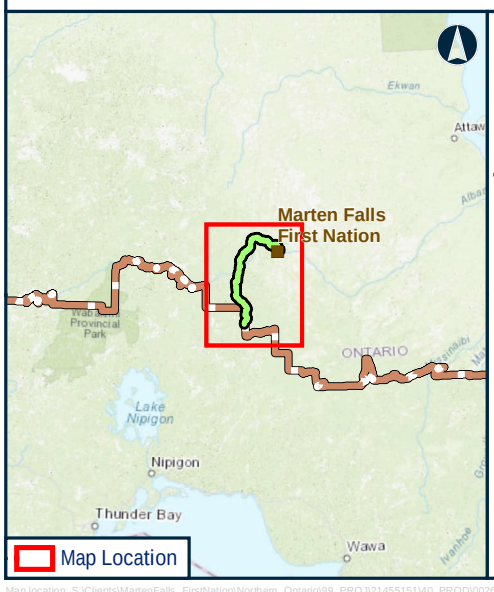
After addition of the Project, the distribution of high and moderate common nighthawk suitability habitat remains similar as described during existing conditions with most high and moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area, particularly between Dusey Lake, Tamse Lake, and the Okoki River **Figure 7-15**.

After addition of the Project, the distribution of high and moderate eastern whip-poor-will suitability habitat remains similar as described during existing conditions with most high to moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area (**Figure 7-16**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common nighthawk and eastern whip-poor-will distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common nighthawk within zero to five years and for eastern whip-poor-will within five to ten years after the establishment of vegetation and would likely reduce the residual effects on common nighthawk and eastern whip-poor-will distribution caused by the Project.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

COMMON NIGHTHAWK HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Common Nighthawk in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-15

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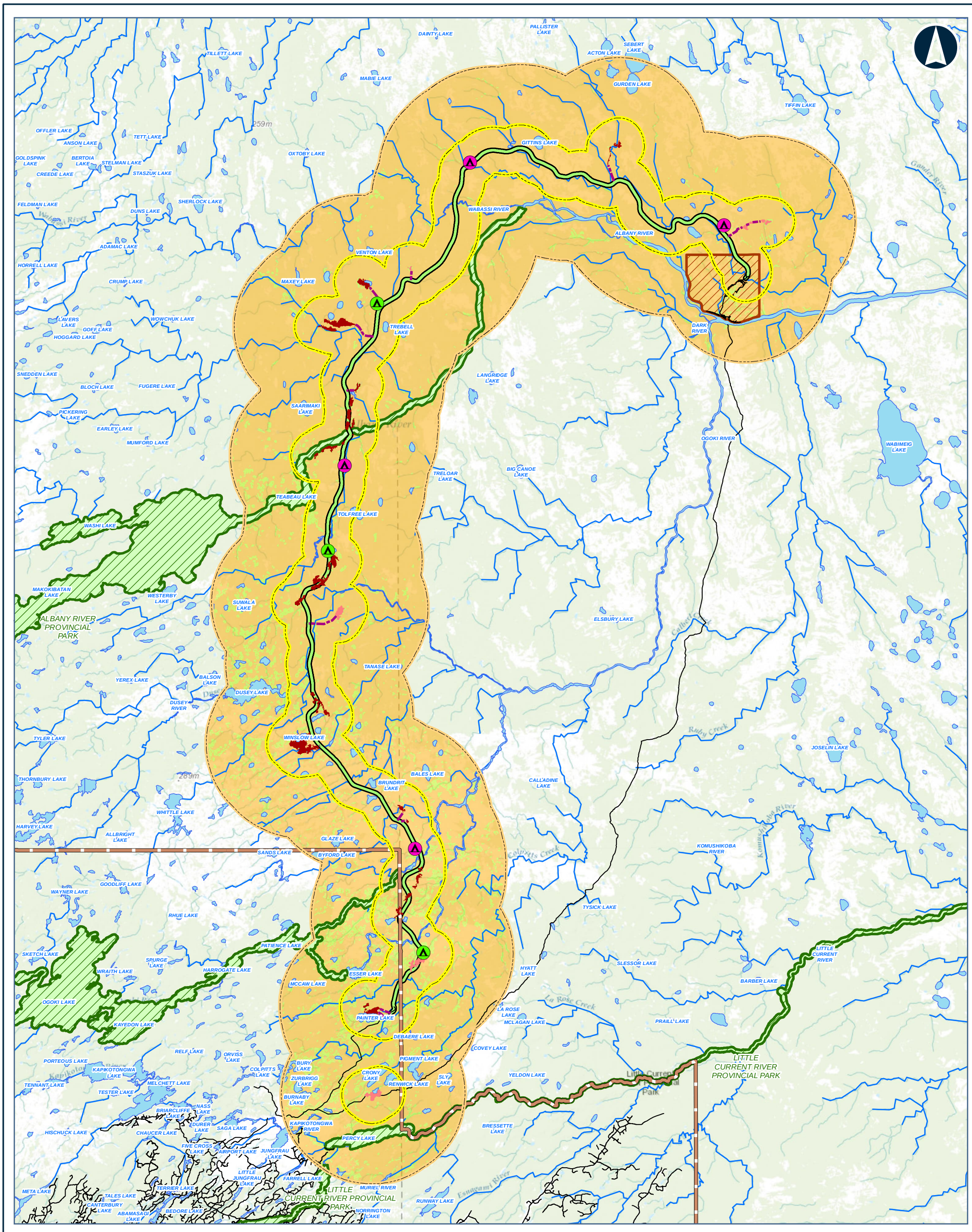

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Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0026_Bird_Section7_ResidualEffects\21455151-0026-RT-0011_7-16.mxd
Date Saved: 2/12/2026 12:39:48 PM User Name: INBA08973

Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect common nighthawk and eastern whip-poor-will habitat survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove a combined 1,609.5 ha of high and moderate suitability common nighthawk breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest common nighthawk density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.3 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to four nesting territories from the effects assessment Construction Disturbance Area, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Construction of the Project is predicted to remove 450.7 ha of high to moderate suitability eastern whip-poor-will breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the average eastern whip-poor-will territory size (5.1 ha; Cink et al., 2017), this amounts to the potential loss of up to 88 eastern whip-poor-will nesting territories from the effects assessment Construction Disturbance Area, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. This is likely an overestimation of effects as eastern whip-poor-wills were not commonly detected during baseline surveys or during *Ontario Breeding Bird Atlas* surveys in regions 44 and 37.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on common nighthawk and eastern whip-poor-will survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common nighthawk within zero to five years and for eastern whip-poor-will within five to ten years after the establishment of vegetation and would likely reduce the residual effects on common nighthawk and eastern whip-poor-will survival and reproduction caused by the Project.

7.3.1.16.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, riparian, and upland vegetation communities and result in changes to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, riparian, and upland vegetation communities are discussed in detail in the *VegetationTechnical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.16.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential common nighthawk and eastern whip-poor-will breeding habitat will be removed by the Project during Construction and effects of this habitat loss will continue through Operation and Maintenance. As such, there are predicted net residual effects on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.16.2 Sensory Disturbance

7.3.1.16.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable common nighthawk and eastern whip-poor-will habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance (Bayne et al., 2008). However, common nighthawks commonly nest in urban areas and, so, do not appear to be sensitive to sensory disturbance (Viel et al., 2020) and sensory disturbance is not a main threat to eastern whip-poor-wills in Canada (Environment and Climate Change Canada, 2018a).

As the precise threshold of avoidance by common nighthawk and eastern whip-poor-will due to sensory disturbance is not known, habitat that was within 200 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

A total of 6,105.8 ha of high and moderate suitability common nighthawk habitat will be indirectly affected within 200 m of the effects assessment Construction Disturbance Area because of sensory disturbance during Construction (**Table 7-54**). This is 9.1% and 2.5% of high and moderate suitability common nighthawk habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions.

Table 7-54: Changes to Common Nighthawk Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High	31,909.6	28,309.9	-3,599.7	-11.3	116,546.6	112,946.9	-3,599.7	-3.1
Moderate	36,540.9	34,034.8	-2,506.1	-6.9	125,750.1	123,243.9	-2,506.1	-2.0
Low	39,435.5	35,914.2	-3,521.3	-8.9	128,347.5	124,826.2	-3,521.3	-2.7
Poor	40,971.9	34,397.3	-6,574.7	-16.0	135,974.6	129,399.8	-6,574.7	-4.8

Notes: There are 137.0 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

A total 986.4 ha of high to moderate eastern whip-poor-will habitat may be indirectly affected within 200 m of the effects assessment Construction Disturbance Area because of sensory disturbance during Construction (**Table 7-55**:). This is 16.1% and 5.1% of high to moderate eastern whip-poor-will habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-55: Changes to Eastern Whip-poor-will Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	6,132.2	5,145.8	-986.4	-16.1	19,450.4	18,464.1	-986.4	-5.1
Low to Poor	142,725.8	127,510.3	-15,215.5	-10.7	487,296.6	472,081.1	-15,215.5	-3.1

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common nighthawk and eastern whip-poor-will habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on common nighthawk and eastern whip-poor-will territory placement, movements, and habitat connectivity. However, common nighthawks and eastern whip-poor-wills do not appear to be particularly sensitive to sensory disturbance (Viel et al., 2020; Environment and Climate Change Canada, 2018a). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common nighthawk and eastern whip-poor-will movements and habitat connectivity (distribution) if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on common nighthawk and eastern whip-poor-will survival and reproduction by interfering with communication (e.g., reducing ability to hear intraspecific vocalizations) and increasing risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on common nighthawk and eastern whip-poor-will survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.16.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction during Construction outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.16.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential common nighthawk and eastern whip-poor-will breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.16.3 Increase in Edge Habitat

7.3.1.16.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of habitat during construction of the Project will increase edge habitat. The creation of edge habitat in forested areas may change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). Ground-nesting birds, such as common nighthawk and eastern whip-poor-will, are particularly vulnerable to nest predation and nest predation risk may increase with habitat fragmentation (Cink, 2017).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects on common nighthawk and eastern whip-poor-will survival and reproduction will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for common nighthawk within zero to five years and for eastern whip-poor-will within five to ten years after the establishment of vegetation and would likely reduce the residual effects on common nighthawk and eastern whip-poor-will survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.16.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project construction will result in increased edge habitat and could change common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of forested vegetation communities, and therefore limit increases in edge habitat, are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net reduction in bird populations. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.16.3.3 Predicted Residual Effects

Survival and Reproduction

The Construction of the Project will result in an increase in the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there is a predicted net residual effect on common nighthawk and eastern whip-poor-will survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.17 Eastern Wood-Pewee

7.3.1.17.1 Habitat Loss and Alteration

7.3.1.17.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to remove 857.8 ha of high to moderate suitability eastern wood-pewee habitat. This represents a change of 9.5% and 2.8% high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-56**). High and moderate suitability habitat remains abundant in the effects assessment Regional Study Area, with 29,979.0 ha of suitable habitat remaining for eastern wood-pewee after addition of the Project (**Table 7-56**).

Loss of low to poor habitats is estimated at 3,842.2 ha, representing 0.8% of its availability in the effects assessment Regional Study Area (**Table 7-56**). These habitats are assumed to be capable of supporting eastern wood-pewee during the breeding season, however, no individuals were recorded in these habitats.

Table 7-56: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Eastern Wood-Pewee in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	9,002.8	8,144.9	-857.8	-9.5	30,836.9	29,979.0	-857.8	-2.8
Low to Poor	139,855.1	136,012.8	-3,842.4	-2.8	475,910.1	472,067.7	-3,842.4	-0.8

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on eastern wood-pewee habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., in perpetuity). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for eastern wood-pewee within five to ten years after the establishment of vegetation and would likely reduce the residual effects on eastern wood-pewee habitat availability caused by the Project.

Distribution

Construction

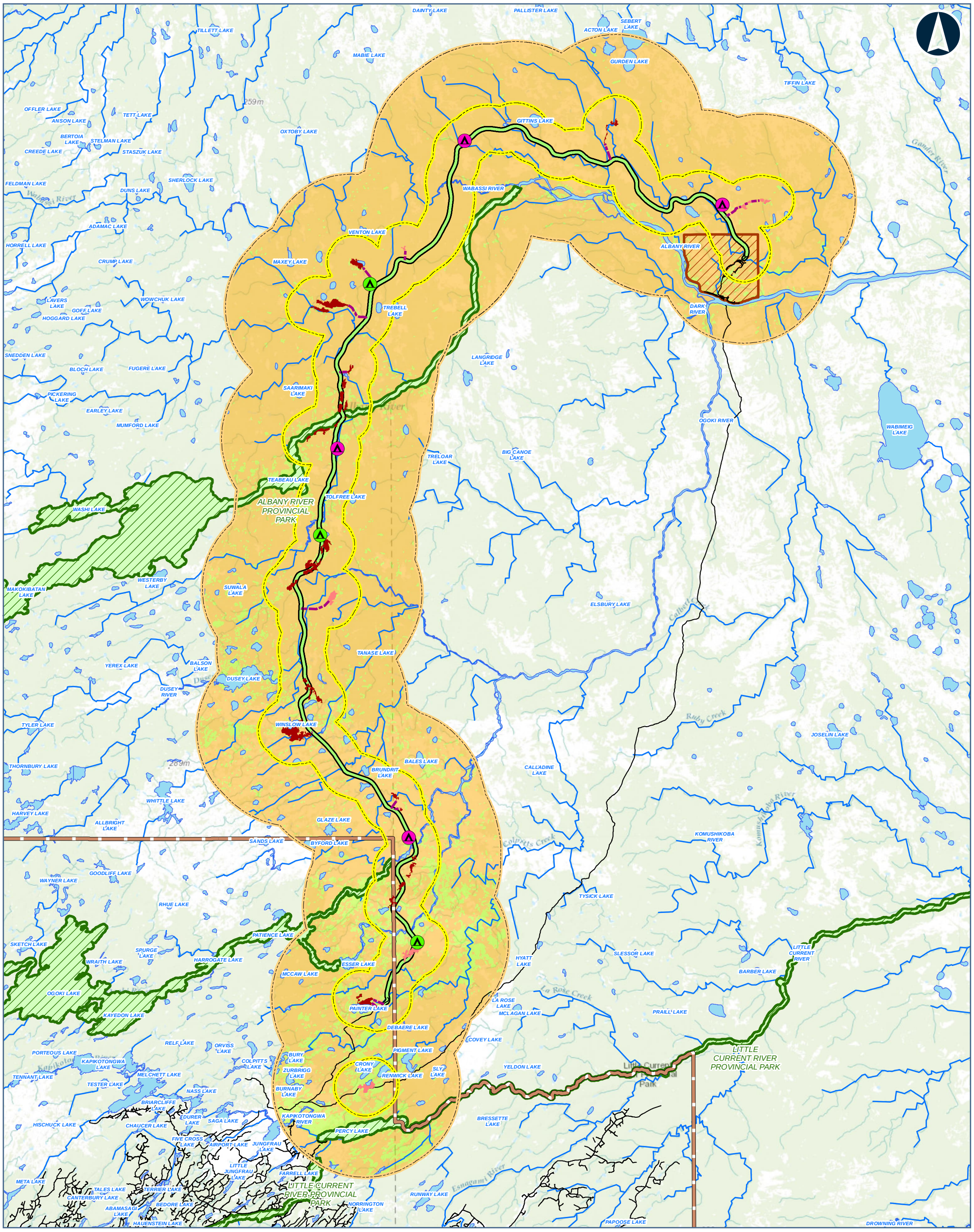
Project Construction may cause shifts in eastern wood-pewee territory distribution and changes to eastern wood-pewee movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. More details are presented in **Section 7.3.1.2.1.1**. However, habitat fragmentation of dense forested landscapes may be beneficial to this species. Eastern wood-pewee abundance was found to be positively correlated with higher land mosaic diversity and edge density (Kato, 2009).

There is a higher proportion of high suitability habitat for eastern wood-pewee in the effects assessment Construction Disturbance Area (approximately 18% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 5% of each study area). This is due to selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with most high suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area associated with upland and mixedwood forest (**Figure 7-17**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on eastern wood-pewee distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for eastern wood-pewee within five to ten years after the establishment of vegetation and would likely reduce the residual effects on eastern wood-pewee distribution caused by the Project.





Legend

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

EASTERN WOOD PEWEE HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Eastern Wood-Pewee in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 7-17

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect eastern wood-pewee habitat survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 857.8 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest eastern wood-pewee density estimate from O*ntario Breeding Bird Atlas Regions* 37 and 44 (i.e., 0.2 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to one nesting territories from the effects assessment Construction Disturbance Area, or 2.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on eastern wood-pewee survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for eastern wood-pewee within five to ten years after the establishment of vegetation and would likely reduce the residual effects on eastern wood-pewee survival and reproduction caused by the Project.

7.3.1.17.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to eastern wood-pewee habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.17.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential eastern wood-pewee breeding habitat will be removed by the Project. As such, there are predicted net residual effects on eastern wood-pewee habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.17.2 Sensory Disturbance

7.3.1.17.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable eastern wood-pewee habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance (Bayne et al., 2008).

Although eastern wood-pewees do not appear to be sensitive to noise from moderate and low use roads (Schepers and Proppe, 2017), high to moderate quality habitats that were within 300 m of human developments were assigned a suitability rank of nil as a precautionary approach (Gentry et al., 2018; Environment and Climate Change Canada, 2023f). A total of 1,952.9 ha of high to moderate quality eastern wood-pewee habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 21.7% and 6.3% of high to moderate quality habitat that is available in the effects

assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions.

Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-57: Changes to Eastern Wood-pewee Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	9,002.8	7,049.8	-1,952.9	-21.7	30,836.9	28,883.9	-1,952.9	-6.3
Low to Poor	139,855.1	120,322.9	-19,532.2	-14.0	475,910.1	456,377.9	-19,532.2	-4.1

Notes:
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on eastern wood-pewee habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on eastern wood-pewee territory placement, movements, and habitat connectivity. However, eastern wood-pewees do not appear to be sensitive to noise from roads with up to 5,000 vehicles per day (Schepers and Proppe, 2017). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on eastern wood-pewee movements and habitat connectivity. Sensory disturbance

effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on eastern wood-pewee survival and reproduction through changes to the ability to detect interspecies calls and approaching predators (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on eastern wood-pewee survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.17.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on eastern wood-pewee habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on eastern wood-pewee habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.2** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.17.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential eastern wood-pewee breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on eastern wood-pewee habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.18 Olive-sided Flycatcher

7.3.1.18.1 Habitat Loss and Alteration

7.3.1.18.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 267.8 ha of high suitability and 1,423.2 ha of moderate suitability olive-sided flycatcher habitat. This represents a change of 1.5% and 2.3% of high and moderate suitability habitat, respectively, at the scale of the effects assessment Local Study Area, relative to existing conditions **Table 7-58**. At the scale of the effects assessment Regional Study Area, the Project will remove 0.3% and 0.7% of high and moderate suitability habitat, respectively **Table 7-58**. A total of 83,684.9 ha of high and 212,911.7 ha of moderate suitability habitat remain available for olive-sided flycatcher in the effects assessment Regional Study Area **Table 7-58**.

Loss of low and poor suitability breeding habitat from the Project is estimated at a total of 3,009.2 ha, representing 1.5% of its availability in the effects assessment Regional Study Area **Table 7-58**. Low to poor quality habitats may support olive-sided flycatchers during the breeding season, as survey data showed use of this habitat during the breeding season (**Attachment B**).

Table 7-58: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Olive-sided Flycatcher in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	17,702.2	17,434.5	-267.8	-1.5	83,952.7	83,684.9	-267.8	-0.3
Moderate	60,706.5	59,283.3	-1,423.2	-2.3	214,334.9	212,911.7	-1,423.2	-0.7
Low	52,059.8	49,795.4	-2,264.4	-4.4	144,274.5	142,010.1	-2,264.4	-1.6
Poor	18,389.4	17,644.6	-744.8	-4.1	64,016.3	63,271.5	-744.8	-1.2

Notes: There are 177.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on olive-sided flycatcher habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for olive-sided flycatcher within zero to five years after the establishment of vegetation and would likely reduce the residual effects on olive-sided flycatcher habitat availability caused by the Project.

Distribution

Construction

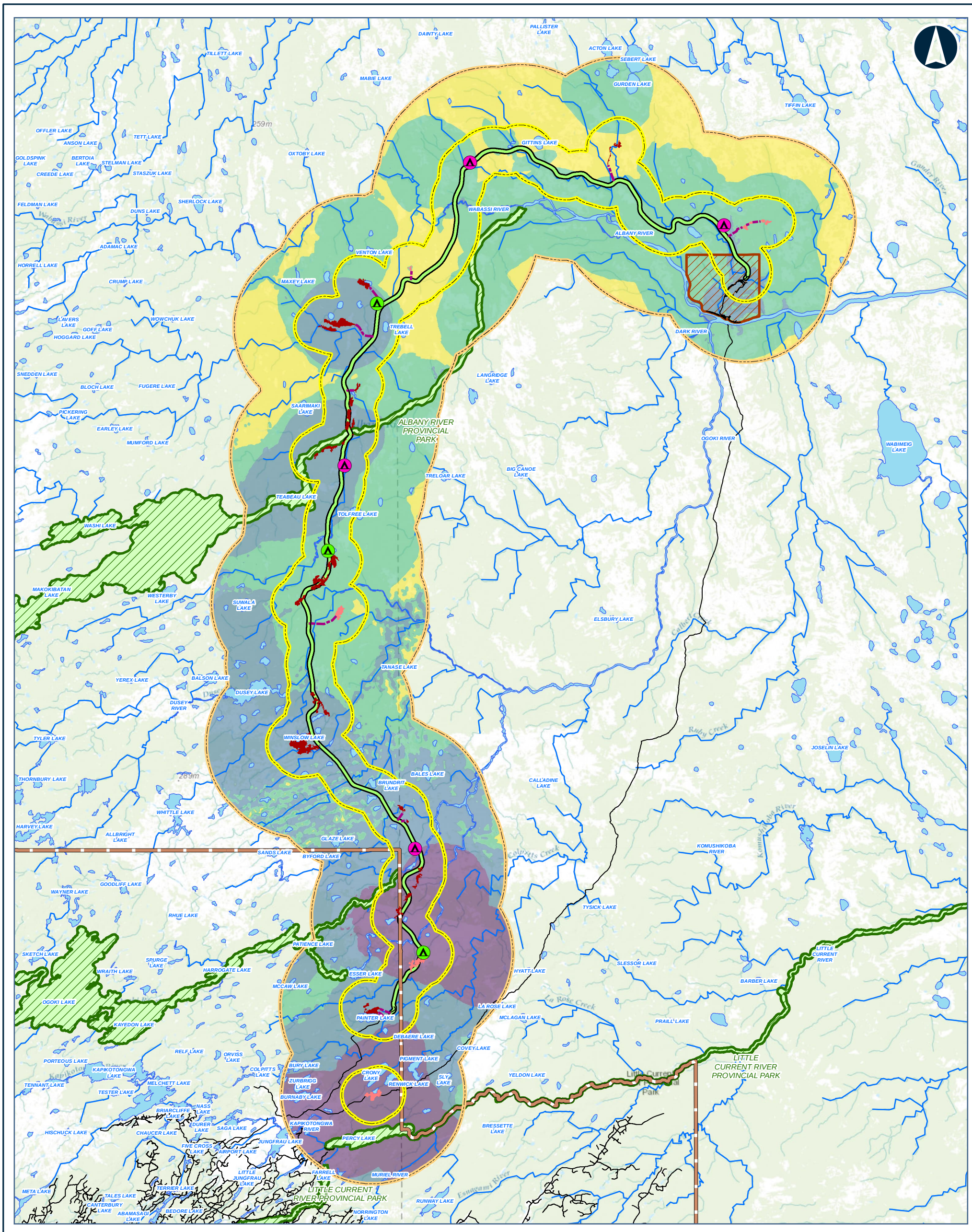
Project Construction may cause shifts in olive-sided flycatcher territory distribution and changes to olive-sided flycatcher movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. However, olive-sided flycatcher occurrence is not correlated with distance to roads (Norris et al., 2021). More details on how the Project may change olive-sided flycatcher distribution are presented in **Section 7.3.1.2.1.1**.

There is a lower proportion of high suitability habitat for olive-sided flycatcher in the effects assessment Construction Disturbance Area (approximately 35% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 52% to 58% of each study area).

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with most high suitability habitat patches concentrated in the northern portion of the effects assessment Regional Study Area associated with higher proportions of wetlands (**Figure 7-18**).

Operation and Maintenance

Even though habitat will be initially removed during Construction, the effects on olive-sided flycatcher distribution from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for olive-sided flycatcher within zero to five years after the establishment of vegetation and would likely reduce the residual effects on olive-sided flycatcher distribution caused by the Project.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OLIVE-SIDED FLYCATCHER HSI SCORE

- HIGH
- MODERATE
- LOW
- POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Olive-sided Flycatcher in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-18

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect olive-sided flycatcher habitat survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 1,690.9 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest olive-sided flycatcher density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 1.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 23 nesting territories from the effects assessment Construction Disturbance Area, or 0.% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on olive-sided flycatcher survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for olive-sided flycatcher within zero to five years after the establishment of vegetation and would likely reduce the residual effects on olive-sided flycatcher survival and reproduction caused by the Project.

7.3.1.18.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of wetland, riparian, and upland vegetation communities and result in changes to olive-sided flycatcher habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of wetland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.18.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential olive-sided flycatcher breeding habitat will be removed by the Project. As such, there are predicted net residual effects on olive-sided flycatcher habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.18.2 Sensory Disturbance

7.3.1.18.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable olive-sided flycatcher habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by olive-sided flycatcher due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 9,631.7 ha of high and moderate suitability olive-sided flycatcher habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 3.2% of high to moderate quality habitat that is available in the effects assessment Regional Study Area during existing conditions.

Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-59: Changes to Olive-sided Flycatcher Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High	17,702.2	15,718.5	-1,983.7	-11.2	83,952.7	81,968.9	-1,983.7	-2.4
Moderate	60,706.5	53,058.4	-7,648.1	-12.6	214,334.9	206,686.8	-7,648.1	-3.6
Low	52,059.8	43,008.9	-9,050.9	-17.4	144,274.5	135,223.6	-9,050.9	-6.3
Poor	18,389.4	15,586.9	-2,802.4	-15.2	64,016.3	61,213.9	-2,802.4	-4.4

Notes: There are 177.3 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on olive-sided flycatcher habitat availability. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on olive-sided flycatcher movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on olive-sided flycatcher distribution. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on olive-sided flycatcher survival and reproduction (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on olive-sided flycatcher survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.18.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on olive-sided flycatcher habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on olive-sided flycatcher habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.18.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential olive-sided flycatcher breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects from habitat loss and alteration. However, there are predicted net residual effects on olive-sided flycatcher habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.19 Bald Eagle

7.3.1.19.1 Habitat Loss and Alteration

7.3.1.19.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 811.2 ha of high to moderate suitability bald eagle habitat. This represents a change of 5.7% and 3.7% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-60**). A total of 21,145.1 ha of suitable habitat remains for bald eagle in the effects assessment Regional Study Area after addition of the Project (**Table 7-60**).

Table 7-60: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Bald Eagle Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	14,178.1	13,367.0	-811.0	-5.7	21,956.1	21,145.1	-811.0	-3.7
Low to Poor	134,679.9	130,790.7	-3,889.2	-2.9	484,790.9	480,901.712.0	-3,889.2	-0.8

Notes:
(a) There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project. Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bald eagle habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for bald eagle within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on bald eagle habitat availability caused by the Project.

Distribution

Construction

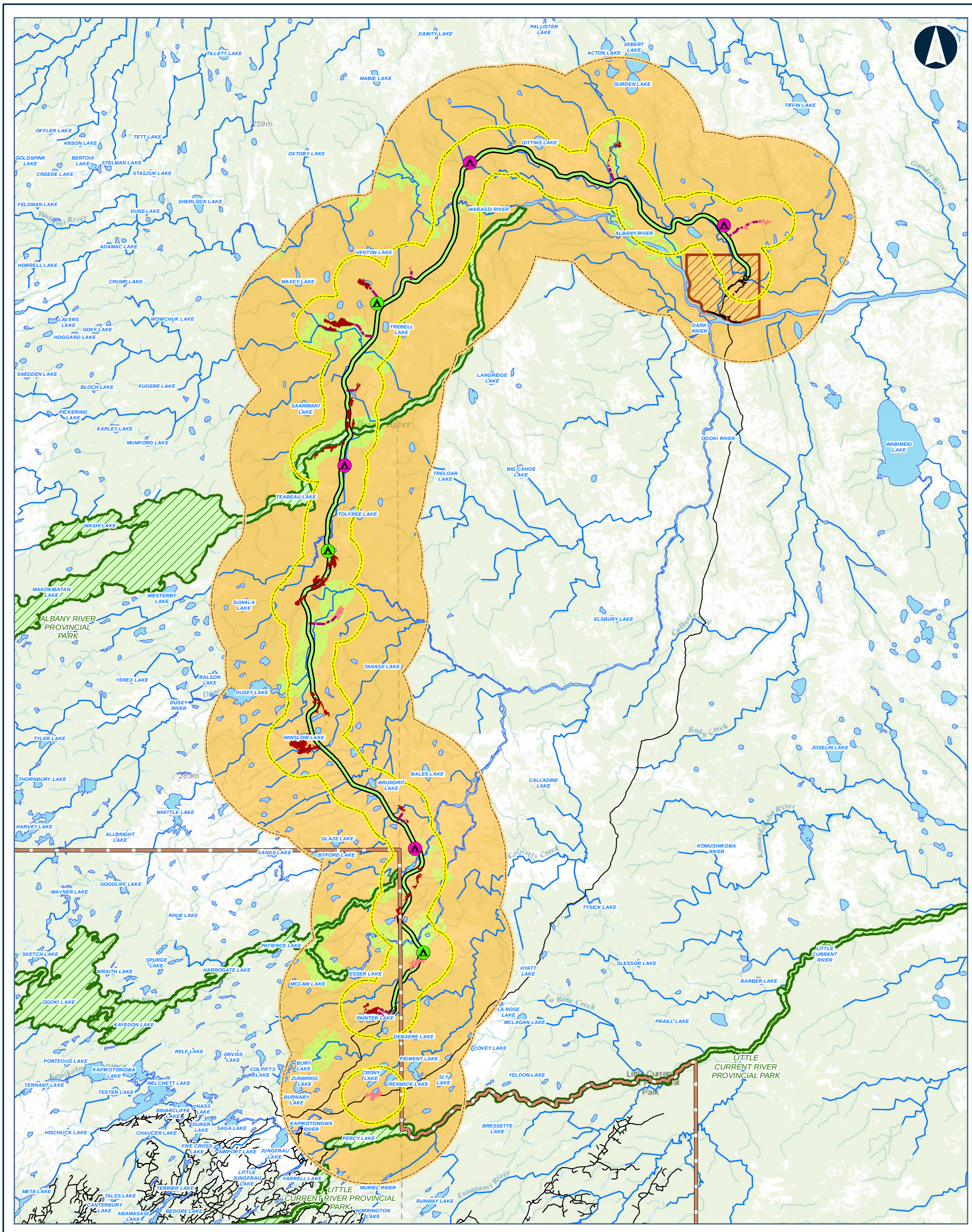
Changes to habitat distribution due to the Project may result in shifts in bald eagle territory distribution and bald eagle movements (Montana Bald Eagle Working Group, 2010). Bald eagle foraging activities can be negatively affected by high densities of linear features near forested streams (Gross and Brauning, 2011).

There is a higher proportion of high suitability habitat for bald eagle in the effects assessment Construction Disturbance Area (approximately 17% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 4% to 10% of each study area). This is due to selection of upland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with most high suitability habitat patches concentrated in areas of upland forest near large waterbodies and watercourses (**Figure 7-19**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bald eagle distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for bald eagle within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on bald eagle distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BALD EAGLE HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Bald Eagle in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-19

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Date Saved: 2/12/2026 12:08:36 PM User Name: INBA08973

Survival and Reproduction

Construction

Habitat removal from construction of the Project may result in changes to bald eagle survival and reproduction. Some studies suggest that this species is highly sensitive to the presence of human infrastructure (Saalfeld and Conway, 2010), while others conclude that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004). Road building within approximately 800 m of bald eagle nests did not result in nest abandonment or reduced productivity (Isaacs, 2005). Road density, proximity, and level of use does not appear to affect bald eagle productivity (MNR, 2010).

Using the highest bald eagle density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to three nesting territories from the effects assessment Construction Disturbance Area, or 3.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on bald eagle survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for bald eagle within 60 to 80 years after the establishment of vegetation and would likely reduce the residual effects on bald eagle survival and reproduction caused by the Project.

7.3.1.19.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of upland vegetation communities and result in changes to bald eagle habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.19.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential bald eagle breeding habitat will be removed by the Project. As such, there are predicted net residual effects on bald eagle habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.19.2 Sensory Disturbance.

7.3.1.19.2.1 Potential Effects

Habitat Availability

Construction

Some studies suggest that this species is highly sensitive to the presence of human infrastructure (Saalfeld and Conway, 2010), while others conclude that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004). Road building within approximately 800 m of bald eagle nests did not result in nest abandonment or reduced productivity (Isaacs, 2005). Road density, proximity, and level of use does not appear to affect bald eagle productivity (MNR, 2010), however, nest sites may be located further from areas with human habitation (Saalfeld and Conway, 2010). As such, habitat that was within 400 m of human developments was assumed to be negatively affected by sensory disturbance (Ministry of Natural Resources, 2010). A total of 6,867.6 ha of high to moderate quality bald eagle habitat may be indirectly affected within 400 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction (**Table 7-61**). This is 48.4% and 31.3% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-61: Changes to Bald Eagle Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	14,178.1	7,310.5	-6,867.6	-48.4	21,956.1	15,088.5	-6,867.6	-31.3
Low to Poor	134,679.9	85,367.4	-49,312.4	-36.6	484,790.9	435,478.57	-49,312.4	-10.2

Notes:
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on bald eagle habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Bald eagles may be sensitive to sensory disturbance (McGarigal et al., 1991) and sensory disturbance during Project Construction may have a negative effect on bald eagle territory placement, movements, and habitat connectivity. However, some studies suggest that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on bald eagle movements and habitat connectivity (distribution) (McGarigal et al., 1991). Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Bald eagles may be sensitive to sensory disturbance (McGarigal et al., 1991) and Project Construction may have a negative effect on bald eagle survival and reproduction. In Ontario, activities with high levels of sensory disturbance are not allowed within 400 m of bald eagle nests during the nesting period (Naylor, 2009). However, some studies suggest that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on bald eagle survival and reproduction (McGarigal et al., 1991; Naylor, 2009). Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.19.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on bald eagle habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on bald eagle habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

7.3.1.19.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential bald eagle breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on bald eagle habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.20 Peregrine Falcon

7.3.1.20.1 Habitat Loss and Alteration

7.3.1.20.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to not remove any high to moderate suitability peregrine falcon habitat. A total of 24.4 ha of suitable habitat for peregrine falcon remains in the effects assessment Regional Study Area after addition of the Project (**Table 7-62**).

Table 7-62: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Peregrine Falcon Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	0.0	0.0	0.0	0.0	24.4	24.4	0.0	0.0
Low to Poor	148,857.9	144,157.7	-4,700.2	-3.2	506,722.6	502,022.4	-4,700.2	-0.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on peregrine falcon habitat availability during Project Operation and Maintenance are not expected to occur.

Distribution

Construction

Nesting habitat for peregrine falcon is naturally patchily distributed on the landscape according to the presence of suitable natural factors (e.g., tall cliffs) for nesting (Roby et al., 2002).

After addition of the Project, the distribution of moderate and high suitability peregrine falcon habitat remains the same as described during existing conditions with habitat patches only present near Bury Lake (**Figure 7-20**).

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on peregrine falcon distribution during Project Operation and Maintenance are not expected to occur.

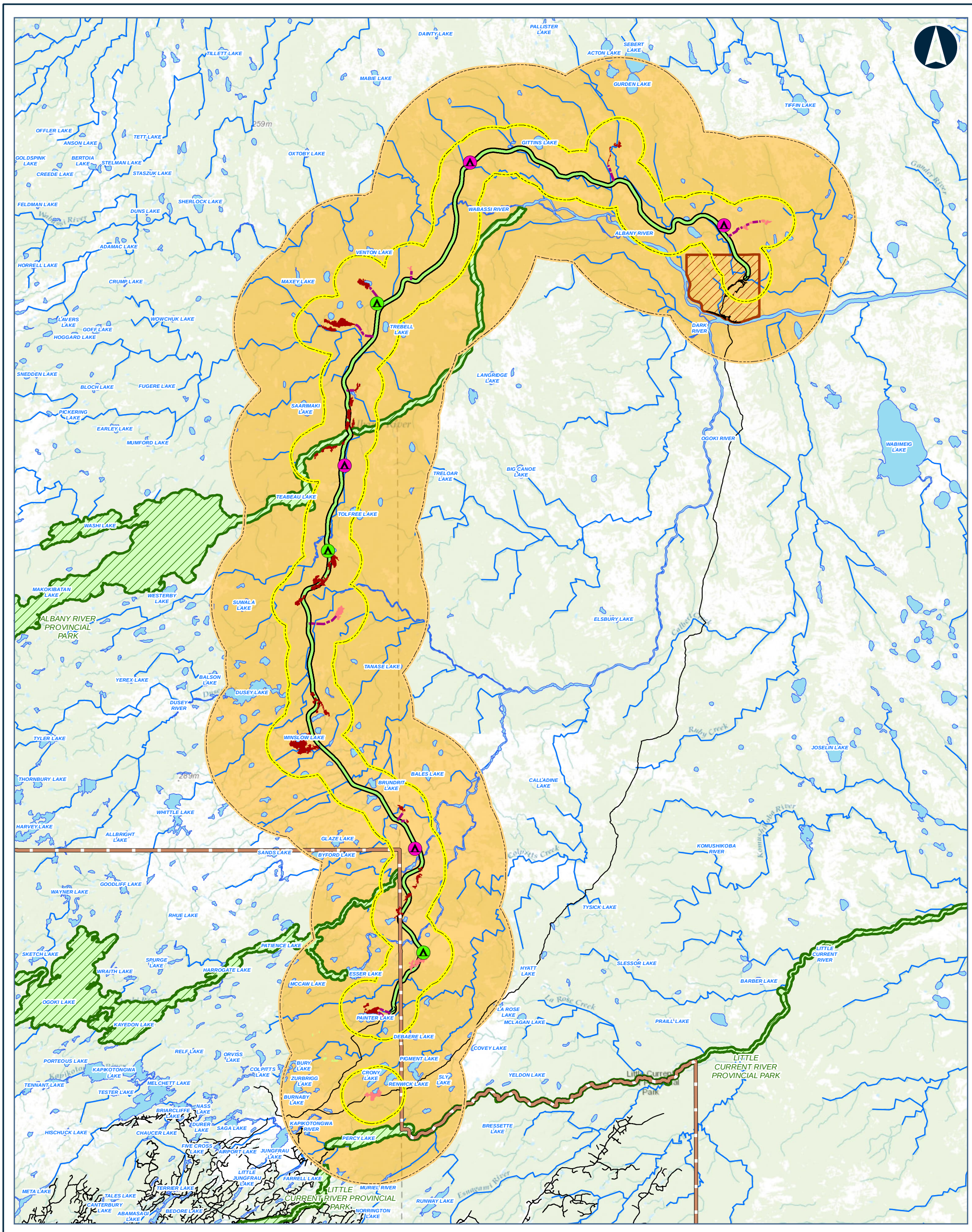
Survival and Reproduction

Construction

No changes to peregrine falcon survival and reproduction from habitat loss due to the Project Construction are anticipated as the effects assessment Construction Disturbance Area will not remove any high to moderate quality nesting habitat for this species.

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on peregrine falcon survival and reproduction during Project Operation and Maintenance are not expected to occur.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

PEREGRINE FALCON HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Peregrine Falcon in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-20

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7.3.1.20.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures to limit effects from habitat loss on peregrine falcon habitat availability, distribution, and survival and reproduction during Project Construction are not required as no nesting habitat is predicted to be removed by the Project.

Operation and Maintenance

Mitigation measures to limit effects from habitat loss on peregrine falcon habitat availability, distribution, and survival and reproduction during Project Operation and Maintenance are not required as no nesting habitat is predicted to be removed by the Project during Construction and, therefore, there are no potential effects anticipated during Operation and Maintenance.

7.3.1.20.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

No peregrine falcon nesting habitat is anticipated to be removed by the Project. As such, there are no predicted net residual effects from changes due to habitat loss from the Project on peregrine falcon habitat availability, distribution, and survival and reproduction, and this interaction was not carried forward in the assessment.

7.3.1.20.2 Sensory Disturbance.

7.3.1.20.2.1 Potential Effects

Habitat Availability

Construction

Peregrine falcon response to sensory disturbance differs among individuals; some individuals were sensitive to high noise levels, while others were not (Roby et al., 2002). As such, to be conservative, habitat that was within 1,000 m of human developments was assumed to be negatively affected by sensory disturbance. There is no high to moderate quality peregrine falcon habitat that could be indirectly affected within 1,000 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction.

Operation and Maintenance

There is no suitable peregrine falcon nesting habitat within 1,000 m of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on peregrine falcon habitat availability are not anticipated to occur.

Distribution

Construction

Sensory disturbance during Project Construction is not expected to negative effects on peregrine falcon territory placement, movements, and habitat connectivity (distribution) as there is no suitable nesting habitat within 1,000 m of the effects assessment Construction Disturbance Area.

Operation and Maintenance

There is no suitable peregrine falcon nesting habitat within 1,000 m of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on peregrine falcon distribution are not anticipated to occur.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction is not expected to have negative effects on peregrine falcon survival and reproduction as there is no suitable nesting habitat within 1,000 m of the effects assessment Construction Disturbance Area.

Operation and Maintenance

There is no suitable peregrine falcon nesting habitat within 1,000 m of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on peregrine falcon survival and reproduction are not anticipated to occur.

7.3.1.20.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Operation and Maintenance

Mitigation measures to limit effects from sensory disturbance on peregrine falcon habitat availability, distribution, and survival and reproduction are not required as no nesting habitat is predicted to be influenced by sensory disturbance during Project Construction.

Operation and Maintenance

Mitigation measures to limit effects from sensory disturbance on peregrine falcon habitat availability, distribution, and survival and reproduction are not required as no nesting habitat is predicted to be influenced by sensory disturbance during Project Operation and Maintenance.

7.3.1.20.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

No peregrine falcon nesting habitat is anticipated to be indirectly affected by sensory disturbance from the Project. As such, there are no predicted net residual effects from changes due to sensory disturbance from the Project on peregrine falcon and this interaction was not carried forward in the assessment.

7.3.1.21 Short-eared Owl

7.3.1.21.1 Habitat Loss and Alteration

7.3.1.21.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 824.3 ha of high to moderate suitability short-eared owl habitat. This represents a change of 1.5% and 0.4% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively (**Table 7-63**). A total of 190,317.4 ha of suitable habitat remains for short-eared owl in the effects assessment Regional Study Area after addition of the Project (**Table 7-63**).

Loss of low to poor suitability breeding habitat from the Project is estimated at 3,875.9 ha, representing 1.2% of its availability in the effects assessment Regional Study Area (**Table 7-63**). Low to poor quality habitats may support short-eared owls during the breeding season.

Table 7-63: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Short-eared Owl Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	55,187.9	54,363.6	-824.3	-1.5	191,141.8	190,317.4	-824.3	-0.4
Low to Poor	93,669.9	89,794.1	-3,875.9	-4.1	315,605.2	311,729.3	-3,875.9	-1.2

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on short-eared owl habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for short-eared owl within 0 to 5 years after the establishment of vegetation and would likely reduce the residual effects on short-eared owl habitat availability caused by the Project.

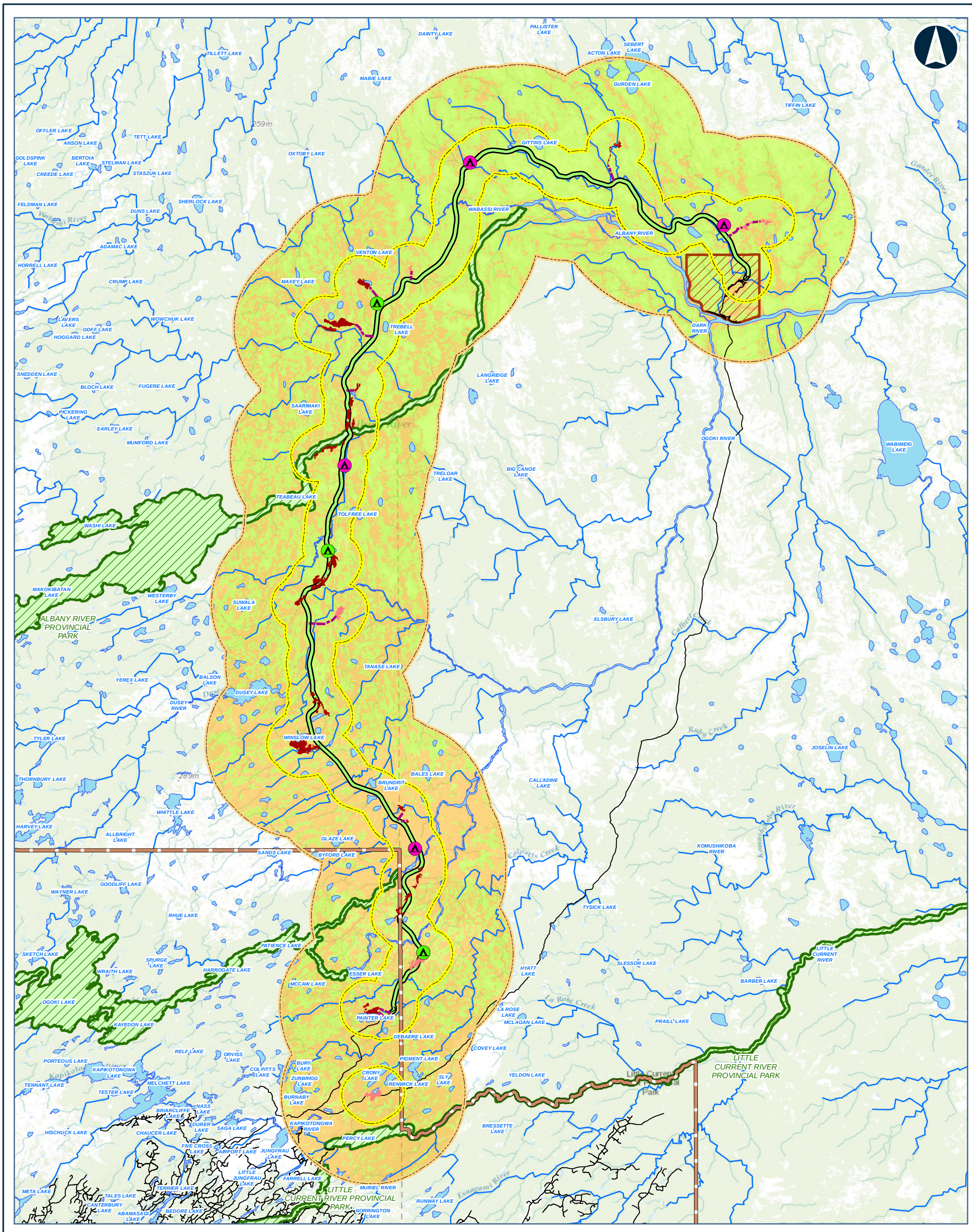
Distribution

Construction

Changes to habitat distribution due to habitat loss and alteration during construction of the Project may result in shifts in short-eared owl territory distribution and short-eared owl movements, however little information on this topic is currently available.

There is a lower proportion of high suitability habitat for short-eared owl in the effects assessment Construction Disturbance Area (approximately 17% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 35% of each study area). This is due to avoidance of wetland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability short-eared owl habitat remains similar as described during existing conditions, with most habitat concentrated in the northern portion of the effects assessment Regional Study Area and with bog, fen, and marsh habitat (**Figure 7-21**).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

SHORT-EARED OWL HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Short-eared Owl in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-21

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Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on short-eared owl distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for short-eared owl within zero to five years after the establishment of vegetation and would likely reduce the residual effects on short-eared owl distribution caused by the Project.

Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect short-eared owl habitat survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 824.3 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the average area requirements of 82 ha per nesting territory (Wiggins et al., 2020), this amounts to the potential loss of up to ten short-eared owl nesting territories from the effects assessment Construction Disturbance Area, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Given that the species is highly nomadic, the estimated number of nesting territories is anticipated to be conservative.

Habitat loss in the wintering range of this species, as well as in the breeding range of this species in the Canadian prairies and southern Ontario, appear to be the primarily causes of short-eared owl population declines in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on short-eared owl survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for short-eared owl within zero to five years after the establishment of vegetation and would likely reduce the residual effects on short-eared survival and reproduction caused by the Project.

7.3.1.21.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, riparian, and upland vegetation communities and result in changes to short-eared owl habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.21.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential short-eared owl breeding habitat will be removed by the Project. As such, there are predicted net residual effects on short-eared owl habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.21.2 Sensory Disturbance.

7.3.1.21.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable short-eared owl habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. Sensory disturbance is not considered a large threat to short-eared owls in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008). However, some regulatory bodies in Canada suggest that short-eared

owls may be sensitive to disturbance within 500 m of a nest site (Government of Saskatchewan, 2017). As such, to be conservative, short-eared owl habitat that was within 500 m of human developments was assumed to be negatively affected by sensory disturbance . A total of 9,481.5 ha of high to moderate quality short-eared owl habitat may be indirectly affected within 500 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 17.2% and 5.0% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-64: Changes to Short-eared Owl Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	55,187.9	45,706.5	-9,481.5	-17.2	191,141.8	181,66.3	-9,481.5	-5.0
Low to Poor	93,669.9	71,434.7	-22,235.3	-23.7	315,605.2	293,369.9	-22,235.3	-7.0

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on short-eared owl habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on short-eared owl territory placement, movements, and habitat connectivity if individuals avoid areas with sensory disturbance. However, sensory disturbance is not considered a large threat to short-eared owls in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008b). Additionally, sensory disturbance effects are anticipated to

occur intermittently during the Construction Phase; more details are provided in **Section 7.3.1.2.2.1**. As such, potential effects on short-eared owl distribution from sensory disturbance during Project Construction are anticipated to be small.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on short-eared owl territory placement, movements, and habitat connectivity if individuals avoid areas with sensory disturbance. However, sensory disturbance is not considered a large threat to short-eared owls in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008). As such, potential effects on short-eared owl distribution from sensory disturbance during Project Construction are anticipated to be small. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase; more details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on short-eared owl survival and reproduction. Traffic noise has been found to decrease owl foraging efficiency by reducing the ability of owls to detect prey at distances at least 120 m from a road (Senzaki et al., 2016). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on short-eared owl survival and reproduction by reducing the ability to detect prey species through auditory cues (Senzaki et al., 2016). Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2**.

7.3.1.21.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on short-eared owl habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on short-eared owl habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

7.3.1.21.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential short-eared owl breeding habitat that may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on short-eared owl habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.21.3 Increase in Edge Habitat

7.3.1.21.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of habitat during construction of the Project will increase edge habitat. The creation of edge habitat in forested areas may change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent habitats (Chalfoun et al., 2002; Söderström et al., 1998). Short-eared owls are vulnerable to nest predation, and increased nest predation from increased edge habitat due to habitat fragmentation is often cited as a primary factor in the decline of short-eared owls in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects on short-eared owl survival and reproduction will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for short-eared owl within zero to five years after the establishment of vegetation and would likely reduce the residual effects on short-eared owl survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.21.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in increased edge habitat and could change short-eared owl habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland and upland vegetation communities, and therefore limit increases in edge habitat, are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2024b). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2**. The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.21.3.3 Predicted Residual Effects

Survival and Reproduction

The construction of the Project will result in an increase in the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there is a predicted net residual effect on short-eared owl survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.22 Black Tern

7.3.1.22.1 Habitat Loss and Alteration

7.3.1.22.1.1 Potential Effects

Construction

The effects assessment Construction Disturbance Area is predicted to not remove any high to moderate suitability black tern habitat. A total of 14.5 ha of suitable habitat remains for black tern in the effects assessment Regional Study Area after addition of the Project (**Table 7-65**).

Table 7-65: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Black Tern Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Application Case (ha)	Change in Area (ha)[a,b]	Change (%)	Existing Conditions (ha)	Application Case (ha)	Change in Area (ha)[a,b]	Change (%)
High to Moderate	14.5	14.5	0.0	0.0	14.5	14.5	0.0	0.0
Low to Poor	148,843.4	144,143.2	-4,700.2	-3.2	506,732.5	502,032.3	-4,700.2	-0.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(b) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on black tern habitat availability during Project Operation and Maintenance are not expected to occur.

Distribution

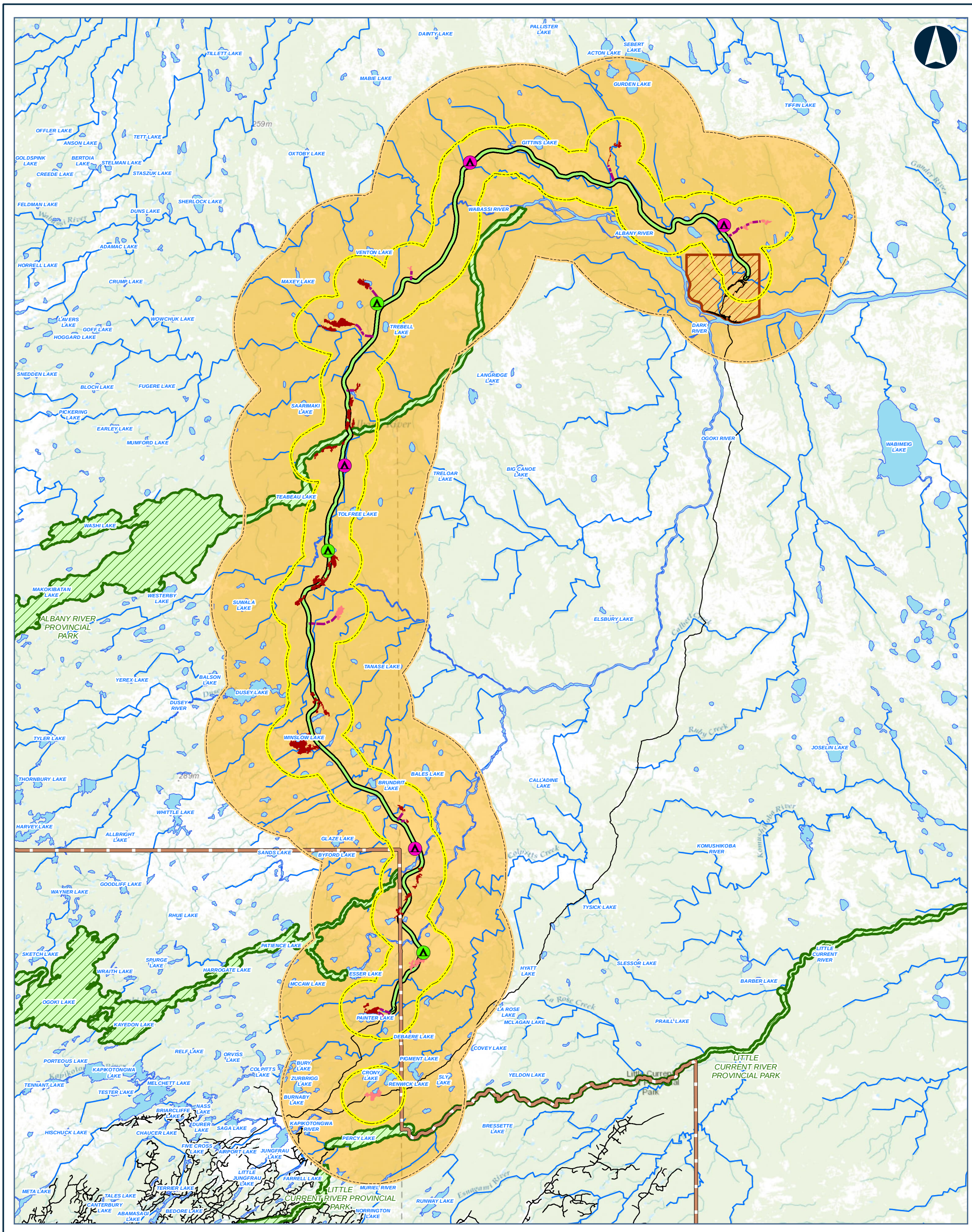
Construction

Nesting habitat for this species (i.e., wetland habitat with a matrix of emergent vegetation and open water) is naturally patchily distributed on the landscape and is relatively rare on the landscape (i.e., <20 ha). Additionally, the occurrence of this species appears to be correlated with local wetland variables and not landscape variables (Steen and Powell, 2012).

The distribution of moderate and high suitability black tern habitat remains the same as described during existing conditions (**Figure 7-22**).

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on black tern distribution during Project Operation and Maintenance are not expected to occur.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BLACK TERN HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Black Tern in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 7-22

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Survival and Reproduction

Construction

No changes to black tern survival and reproduction from habitat loss due during Project Construction are anticipated as the effects assessment Construction Disturbance Area will not remove any high to moderate quality nesting habitat for this species.

Operation and Maintenance

No suitable nesting habitat will be removed by the Project during Construction and so effects from habitat loss and alteration on black tern survival and reproduction during Project Operation and Maintenance are not expected to occur.

7.3.1.22.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures to limit effects from habitat loss on black tern habitat availability, distribution, and survival and reproduction are not required as no nesting habitat is predicted to be removed by the Project during Construction.

Operation and Maintenance

Mitigation measures to limit effects from habitat loss on black tern habitat availability, distribution, and survival and reproduction during Project Operation and Maintenance are not required as no nesting habitat is predicted to be removed by the Project during Construction and, therefore, there are no potential effects anticipated during Operation and Maintenance.

7.3.1.22.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

No black tern nesting habitat is anticipated to be removed by the Project. As such, there are no predicted net residual effects from changes due to habitat loss from the Project on black tern and this interaction was not carried forward in the assessment.

7.3.1.22.2 Sensory Disturbance.

7.3.1.22.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable black tern habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by black tern due to sensory disturbance is not known, habitat that was within 400 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. There is no high to moderate quality black tern habitat that could be indirectly affected within 400 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction.

Operation and Maintenance

There is no suitable black tern nesting habitat within 400 of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on black tern habitat availability are not anticipated to occur.

Distribution

Construction

Sensory disturbance during Project Construction is not expected to have negative effects on black tern territory placement, movements, and habitat connectivity as there is no suitable habitat within 400 m of the effects assessment Construction Disturbance Area.

Operation and Maintenance

There is no suitable black tern nesting habitat within 400 of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on black tern distribution are not anticipated to occur.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction is not expected to have negative effects on black tern territory survival and reproduction as there is no suitable habitat within 400 m of the effects assessment Construction Disturbance Area.

Operation and Maintenance

There is no suitable black tern nesting habitat within 400 of the effects assessment Construction Disturbance Area and, so, effects from sensory disturbance from Project Operation and Maintenance on black tern survival and reproduction are not anticipated to occur.

7.3.1.22.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation measures to limit effects from sensory disturbance from Construction on black tern habitat availability, distribution, and survival and reproduction are not required as no nesting habitat is predicted to be influenced by sensory disturbance from the Project.

Operation and Maintenance

Mitigation measures to limit effects from sensory disturbance on black tern habitat availability, distribution, and survival and reproduction are not required as no nesting habitat is predicted to be influenced by sensory disturbance during Project Operation and Maintenance.

7.3.1.22.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

No black tern nesting habitat is anticipated to be indirectly affected by sensory disturbance from the Project. As such, there are no predicted net residual effects from changes due to sensory disturbance from the Project on black tern and this interaction was not carried forward in the assessment.

7.3.1.23 Lesser Yellowlegs

7.3.1.23.1 Habitat Loss and Alteration

7.3.1.23.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 1,684.7 ha of high to moderate suitability lesser yellowlegs habitat. This represents a change of 3.6% and 1.1% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-66**). A total of 156,915.2 ha of suitable habitat for

lesser yellowlegs remains in the effects assessment Regional Study Area after addition of the Project (**Table 7-66**).

Loss of low to poor suitability breeding habitat from the Project is estimated at 3,015.6 ha, representing 0.9% of its availability in the effects assessment Regional Study Area (**Table 7-66**). Low to poor quality habitats may support lesser yellowlegs during the breeding season, however, no individuals were recorded in these habitats.

Table 7-66: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Lesser Yellowlegs Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	46,492.4	44,807.7	-1,684.7	-3.6	158,599.9	156,915.2	-1,684.7	-1.1
Low to Poor	102,365.6	99,349.9	-3,015.6	-2.9	348,147.1	345,131.5	-3,015.6	-0.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on lesser yellowlegs habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., in perpetuity). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for lesser yellowlegs within five to ten years after the establishment of vegetation and would likely reduce the residual effects on lesser yellowlegs habitat availability caused by the Project.

Distribution

Construction

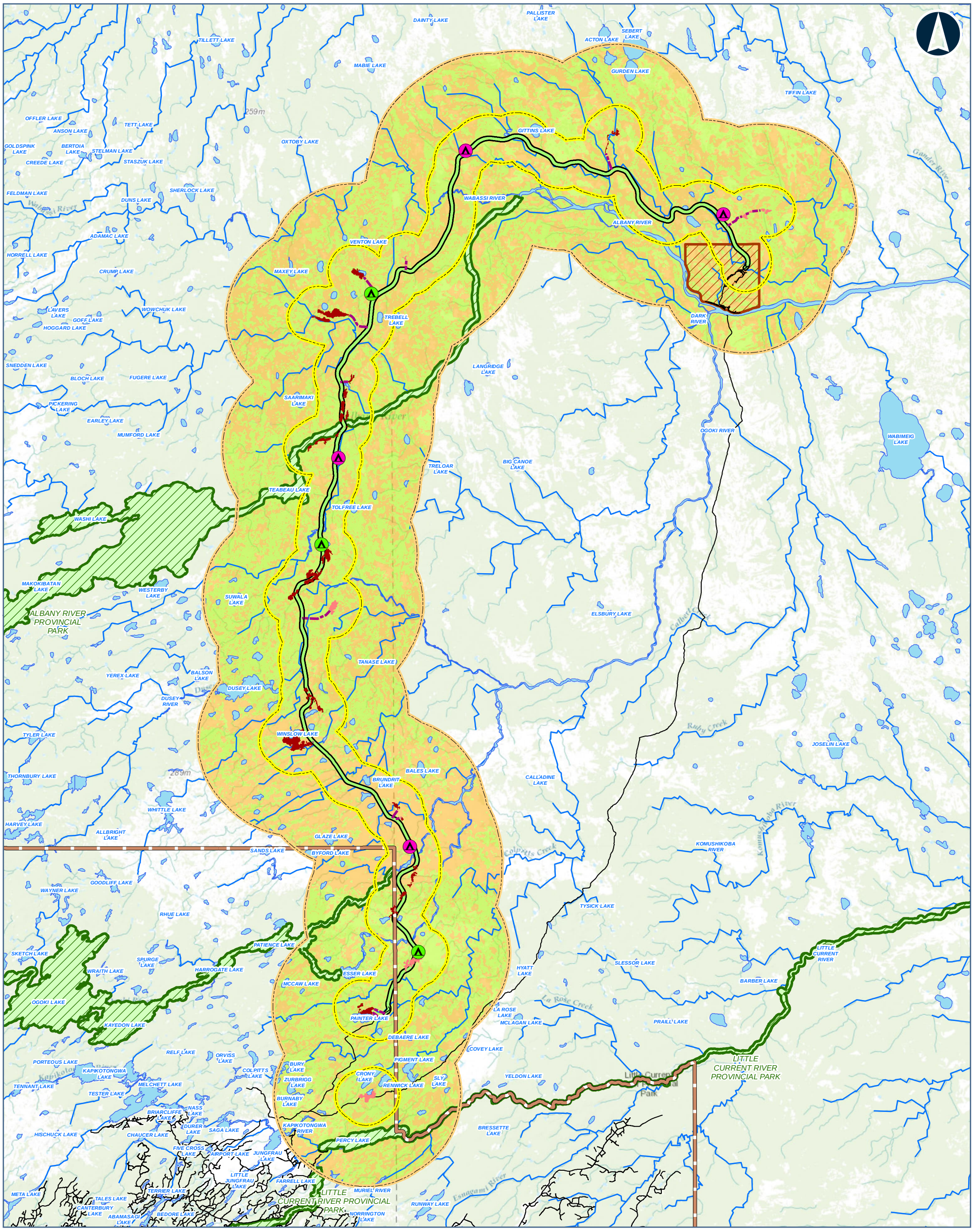
Changes to habitat distribution due to the Project may result in shifts in lesser yellowlegs territory distribution and lesser yellowlegs movements, however little information on this topic is currently available. Habitat fragmentation in this species' breeding range may be contributing to population declines (Committee on the Status of Endangered Wildlife in Canada, 2020b).

There is a slightly higher proportion of high suitability habitat for lesser yellowlegs in the effects assessment Construction Disturbance Area (approximately 35% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 30% of each study area).

After addition of the Project, the distribution of moderate and high suitability lesser yellowlegs habitat remains similar as described during existing conditions with patches distributed throughout the Project study areas (**Figure 7-23**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on lesser yellowlegs distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for lesser yellowlegs within five to ten years after the establishment of vegetation and would likely reduce the residual effects on lesser yellowlegs distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

LESSER YELLOWLEGS HSI SCORE

- LOW TO POOR
- MODERATE TO HIGH

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Lesser Yellowlegs in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 7-23

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Survival and Reproduction

Construction

Habitat loss in the wintering range of this species appears to be the primarily cause of lesser yellowlegs population declines in Canada (Committee on the Status of Endangered Wildlife in Canada, 2020b).

Habitat loss from construction of the Project could affect lesser yellowlegs habitat survival and reproduction if habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 1,684.7 ha of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest lesser yellowlegs density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.8 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 13 nesting territories from the effects assessment Construction Disturbance Area, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on lesser yellowlegs survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for lesser yellowlegs within five to ten years after the establishment of vegetation and would likely reduce the residual effects on lesser yellowlegs survival and reproduction caused by the Project.

7.3.1.23.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, riparian, and upland vegetation communities and result in changes to lesser yellowlegs habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, riparian, and upland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document:: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.23.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential lesser yellowlegs breeding habitat will be removed by the Project. As such, there are predicted net residual effects on lesser yellowlegs habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.23.2 Sensory Disturbance.

7.3.1.23.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable lesser yellowlegs habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by lesser yellowlegs due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 7,249.9 ha of high to moderate quality lesser yellowlegs habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 15.6% and 4.6% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-67: Changes to Lesser Yellowlegs Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[(a)]	Change in Area (ha)[(b,c)]	Change (%)
High to Moderate	46,492.4	39,242.5	-7,249.9	-15.6	158,599.9	151,350.0	-7,249.9	-4.6
Low to Poor	102,365.6	88,130.3	-14,235.9	-13.9	348,147.1	333,911.8	-14,235.9	-4.1

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on lesser yellowlegs habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1.**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on lesser yellowlegs territory placement, movements, and habitat connectivity if individuals avoid areas with sensory disturbance. However, sensory disturbance is not considered a large threat to lesser yellowlegs in Canada (Committee on the Status of Endangered Wildlife in Canada, 2020b). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Although sensory disturbance is not considered a major threat to lesser yellowlegs populations Canada (Committee on the Status of Endangered Wildlife in Canada, 2020b), sensory disturbance during Project Operation and Maintenance may have a negative effect on lesser yellowlegs distribution. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have negative effects on lesser yellowlegs survival and reproduction by reducing the ability of individuals to hear approaching predators and species communications. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on lesser yellowlegs survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.23.2.2 Mitigation and Enhancement Measures

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on lesser yellowlegs habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on lesser yellowlegs habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.23.2.3 Predicted Residual Effects

After mitigation, potential lesser yellowlegs breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on lesser yellowlegs habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.24 Rusty Blackbird

7.3.1.24.1 Habitat Loss and Alteration

7.3.1.24.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 1,710.9 ha of high to moderate suitability rusty blackbird habitat. This represents a change of 1.8% and 0.5% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing conditions (**Table 7-68**). A total of 322,546.2 ha of suitable habitat for rusty blackbird remains in the effects assessment Regional Study Area (**Table 7-68**).

Loss of low to poor suitability breeding habitat from the Project is estimated at 2,989.3 ha, representing 1.6% of its availability in the effects assessment Regional Study Area (**Table 7-68**). Low to poor quality habitats may support rusty blackbirds during the breeding season, however, no individuals were recorded in these habitats.

Table 7-68: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Rusty Blackbird Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	96,032.1	94,321.2	-1,710.9	-1.8	324,257.2	322,546.2	-1,710.9	-0.5
Low to Poor	52,825.9	49,836.6	-2,989.3	-5.7	182,489.8	179,500.5	-2,989.3	-1.6

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on rusty blackbird habitat availability from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for rusty blackbird within zero to five years after the establishment of vegetation and would likely reduce the residual effects on rusty blackbird habitat availability caused by the Project.

Distribution

Construction

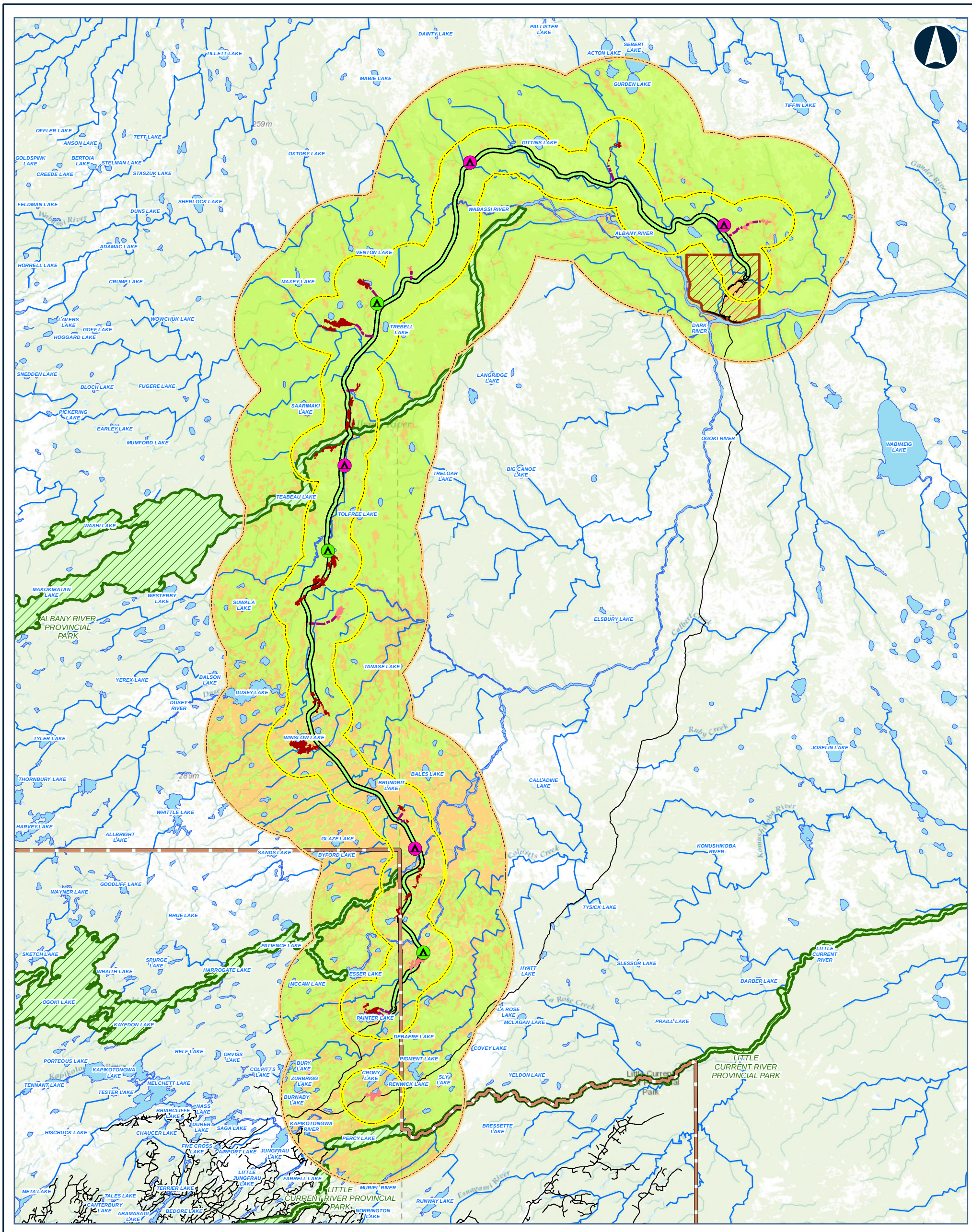
Project Construction may cause shifts in rusty blackbird territory distribution and changes to rusty blackbird movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area. However, rusty blackbird nest site selection was not correlated with landscape fragmentation from forestry activities (Buckley, 2013). More details on how the Project may change rusty blackbird distribution are presented in **Section 7.3.1.2.1.1**.

There is a lower proportion of high suitability habitat for rusty blackbird in the effects assessment Construction Disturbance Area (approximately 36% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 65% of each study area). This is due to avoidance of wetland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with a higher concentration of suitable habitat in the northern half of the Project study areas (**Figure 7-24**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on rusty blackbird distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for rusty blackbird within zero to five years after the establishment of vegetation and would likely reduce the residual effects on rusty blackbird distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

RUSTY BLACKBIRD HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Rusty Blackbird in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 7-24

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Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect rusty blackbird survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 1,710.9 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest rusty blackbird density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.9 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 16 nesting territories from the effects assessment Construction Disturbance Area, or 0.5% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on rusty blackbird survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for rusty blackbird within zero to five years after the establishment of vegetation and would likely reduce the residual effects on rusty blackbird survival and reproduction caused by the Project.

7.3.1.24.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of peatland, wetland, riparian, and upland vegetation communities and result in changes to rusty blackbird habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of peatland, wetland, and riparian vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a) and the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.24.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential rusty blackbird breeding habitat will be removed by the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual on rusty blackbird habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-24**.

7.3.1.24.2 Sensory Disturbance

7.3.1.24.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable rusty blackbird habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by rusty blackbird due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 11,703.9 ha of high to moderate quality rusty blackbird habitat may be indirectly affected within 300 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 12.2% and 3.6% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are

anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-69: Changes to Rusty Blackbird Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	96,032.1	84,328.1	-11,703.9	-12.2	324,257.1	312,553.2	-11,703.9	-3.6
Low to Poor	52,825.9	43,044.7	-9,781.2	-18.5	182,489.8	172,708.6	-9,781.2	-5.4

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on rusty blackbird habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on rusty blackbird movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on rusty blackbird distribution. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on rusty blackbird survival and reproduction (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on rusty blackbird survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.24.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on rusty blackbird habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on rusty blackbird habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.24.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential rusty blackbird breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on rusty blackbird habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.24.3 Increase in Edge Habitat

7.3.1.24.3.1 Potential Effects

Survival and Reproduction

Construction

The removal of vegetation during construction of the Project will increase edge habitat in forested areas, which could change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). Rusty blackbirds prefer to nest in isolated areas and so may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased forest edge habitat (Keyser et al., 1998).

Operation and Maintenance

Although the removal of habitat and creation of edge habitat will initially occur during Construction, effects will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for rusty blackbird within zero to five years after the establishment of vegetation and would likely reduce the residual effects on rusty blackbird survival and reproduction caused by increased edge habitat created by the Project.

7.3.1.24.3.2 Mitigation and Enhancement Measures

Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in increased edge habitat in forested areas and could have negative effects on rusty blackbird survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of

forested vegetation communities, and therefore limit increases in edge habitat, are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Construction are discussed in **Section 7.3.1.2.1.2**.

The effectiveness of mitigation measures will be evaluated during Construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat and associated creation of edge habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term (i.e., during Project Operation and Maintenance), measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat, which is anticipated to result in a net increase in migratory bird populations. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and thereby effects from increased edge habitat on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2**.

7.3.1.24.3.3 Predicted Residual Effects

Survival and Reproduction

The construction of the Project will increase the amount of edge habitat, relative to existing conditions, and effects from changes to predator communities and increased predation risk will occur throughout the Construction and Operation and Maintenance Phases. The implementation of mitigation and enhancement measures is expected to limit negative effects but there is a predicted net residual effect on rusty blackbird survival and reproduction. This residual effect is characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.25 Yellow Rail

7.3.1.25.1 Habitat Loss and Alteration

7.3.1.25.1.1 Potential Effects

Habitat Availability

Construction

The effects assessment Construction Disturbance Area is predicted to directly remove 557.5 ha of high to moderate suitability yellow rail habitat. This represents a change of 2.1% and 0.6% of high to moderate suitability habitat at the scale of the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, relative to existing (**Table 7-70**). A total of 93,435.9 ha of suitable habitat for yellow rail remains in the effects assessment Regional Study Area (**Table 7-70**).

Loss of low to poor suitability breeding habitat from the Project is estimated at 4,142.7 ha, representing 1.0% of its availability in the effects assessment Regional Study Area (**Table 7-70**). Low to poor quality habitats may support yellow rails during the breeding season, however, no individuals were recorded in these habitats.

Table 7-70: Changes to Habitat Availability due to Direct Habitat Loss and Alteration for Yellow Rail Habitat in the Residual Effects Assessment

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	27,171.3	26,613.8	-557.5	-2.1	93,993.5	93,435.9	-557.5	-0.6
Low to Poor	121,686.6	117,543.9	-4,142.7	-3.4	412,753.5	408,610.8	-4,142.7	-1.0

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains after construction of the Project.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the effects assessment Construction Disturbance Area (i.e., direct effect on habitats).
ha = hectare; % = percent; - = negative.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on yellow rail habitat availability from habitat loss will continue through Operation and Maintenance of the Project (i.e., closure and reclamation of the road is not anticipated). Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction

is complete are anticipated to provide functional habitat for yellow rail within zero to five years after the establishment of vegetation and would likely reduce the residual effects on yellow rail habitat availability caused by the Project.

Distribution

Construction

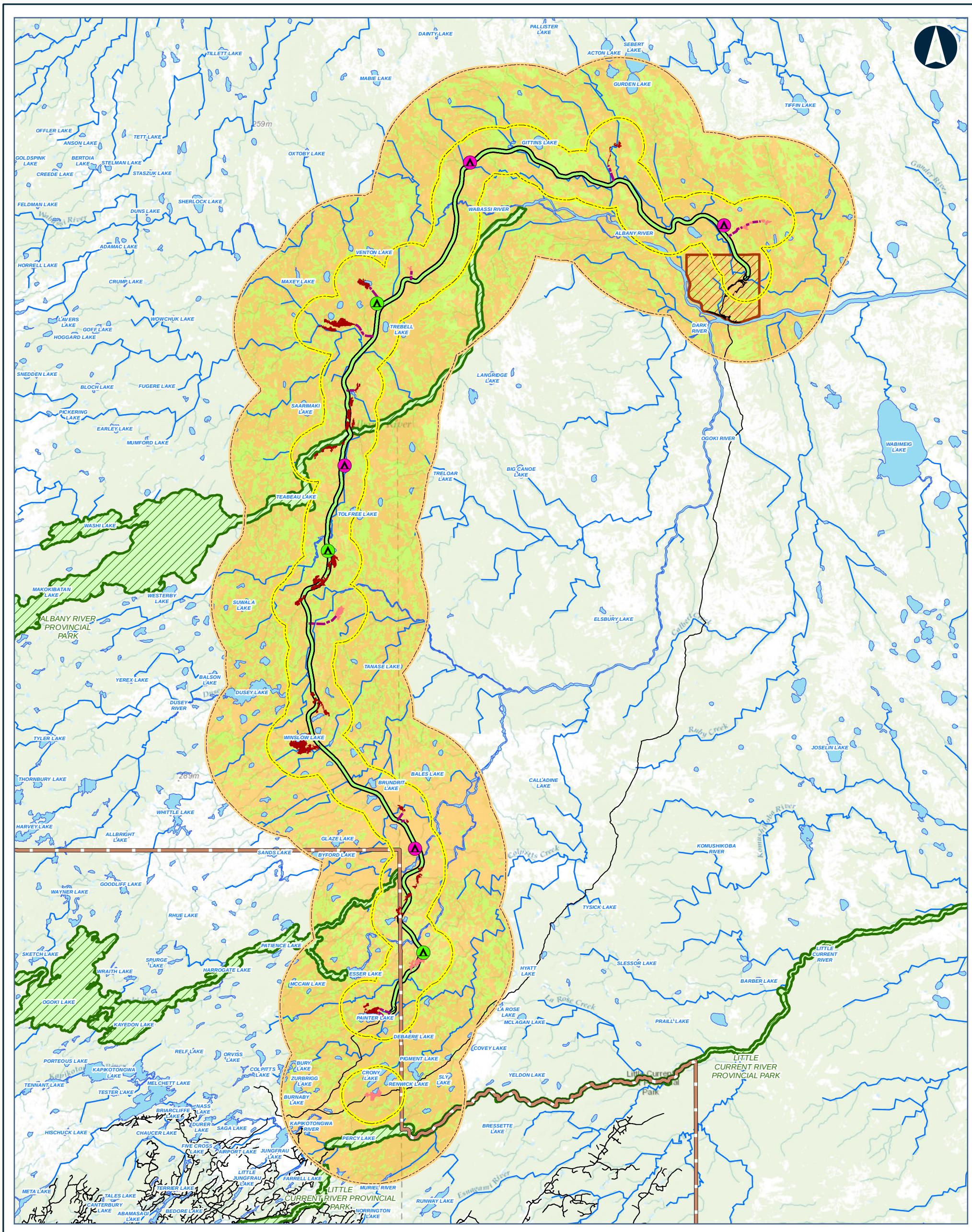
Project Construction may cause shifts in yellow rail territory distribution and yellow rail movements. Individuals that previously used habitats in the effects assessment Construction Disturbance Area may establish breeding territories in suitable habitat outside of the effects assessment Construction Disturbance Area or may shift their territories away from the effects assessment Construction Disturbance Area.

There is a slightly lower proportion of high suitability habitat for yellow rail in the effects assessment Construction Disturbance Area (approximately 12% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (approximately 20% of each study area). This is due to avoidance of wetland habitat for the Project route.

After addition of the Project, the distribution of moderate and high suitability habitat remains similar as described during existing conditions with patches of suitable habitat distributed throughout the Project study areas (**Figure 7-25**).

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on yellow rail distribution from habitat loss will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for yellow rail within zero to five years after the establishment of vegetation and would likely reduce the residual effects on yellow rail distribution caused by the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

YELLOW RAIL HSI SCORE

- MODERATE TO HIGH
- LOW TO POOR

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Habitat Suitability for Yellow Rail in the Effects Regional Study Area after implementation of the Project

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 7-25

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Date Saved: 2/12/2026 3:08:31 PM User Name: INBA08973

Survival and Reproduction

Construction

Habitat loss from construction of the Project could affect yellow rail survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Construction of the Project is predicted to remove 557.5 ha of high to moderate suitability breeding habitat that is available in the effects assessment Regional Study Area during existing conditions. Using the highest yellow rail density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., <0.1 nesting territories per km^2 for Region 37), this amounts to the potential loss of less than one nesting territory from the effects assessment Construction Disturbance Area, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions.

Operation and Maintenance

Although habitat will be initially removed during Construction, the effects on yellow rail survival and reproduction from removal of nesting territories will continue through Operation and Maintenance of the Project. Temporary features that are decommissioned and reclaimed or naturally revegetate after Construction is complete are anticipated to provide functional habitat for yellow rail within zero to five years after the establishment of vegetation and would likely reduce the residual effects on yellow rail survival and reproduction caused by the Project.

7.3.1.25.1.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Vegetation removal during Project Construction will result in the direct loss of wetland vegetation communities and result in changes to yellow rail habitat availability, distribution, and survival and reproduction. Mitigation measures that will be implemented to minimize direct loss of wetland vegetation communities are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment (*WSP, 2026a). Other mitigation measures that will be implemented to limit effects from habitat loss on birds and bird species at risk are outlined in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2.** The effectiveness of mitigations will be evaluated during Construction and mitigations will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

The effects assessment Construction Disturbance Area was designed to avoid removal of bird habitat as much as practical, but a Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

Additional mitigation measures that will be implemented to limit effects from habitat loss and alteration on birds during Project Operation and Maintenance are discussed in **Section 7.3.1.2.1.2** and **Section 7.3.1.13.1.2**.

7.3.1.25.1.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

Even after mitigation, potential yellow rail breeding habitat will be removed by the Project. As such, there are predicted net residual effects on yellow rail habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.25.2 Sensory Disturbance

7.3.1.25.2.1 Potential Effects

Habitat Availability

Construction

Sensory disturbance during Project Construction could result in the indirect removal of suitable yellow rail habitat in the effects assessment Local Study Area if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by yellow rail due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach. A total of 3,710.9 ha of high to moderate quality yellow rail habitat may be indirectly affected within 350 m of the effects assessment Construction Disturbance Area because of sensory disturbance inducing habitat avoidance during Construction. This is 13.7% and 3.9% of high and moderate suitability habitat that is available in the effects assessment Local Study Area and effects assessment Regional Study Area, respectively, at existing conditions. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Table 7-71: Changes to Yellow Rail Habitat Availability from Project-induced Sensory Disturbance

Habitat Suitability	Effects Assessment Local Study Area				Effects Assessment Regional Study Area			
	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)	Existing Conditions (ha)	Residual Effects (ha)[a]	Change in Area (ha)[b,c]	Change (%)
High to Moderate	27,171.3	23,460.4	-3,710.9	-13.7	93,993.5	90,282.5	-3,710.9	-3.9
Low to Poor	121,686.6	101,316.1	-20,370.6	-16.7	412,753.5	392,382.9	-20,370.6	-4.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent; - = negative.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on yellow rail habitat availability if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Distribution

Construction

Sensory disturbance during Project Construction may have a negative effect on yellow rail movements and habitat connectivity if individuals avoid areas with sensory disturbance. Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on yellow rail movements and habitat connectivity. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

Survival and Reproduction

Construction

Sensory disturbance during Project Construction may have a negative effect on yellow rail survival and reproduction by reducing the ability of individuals to detect approaching predators and communication calls (Ortega, 2012). Sensory disturbance effects are anticipated to occur intermittently during the Construction Phase. More details are provided in **Section 7.3.1.2.2.1**.

Operation and Maintenance

Sensory disturbance during Project Operation and Maintenance may have a negative effect on yellow rail survival and reproduction. Sensory disturbance effects are anticipated to occur continually during the Operation and Maintenance Phase. More details are provided in **Section 7.3.1.2.2.1**.

7.3.1.25.2.2 Mitigation and Enhancement Measures

Habitat Availability, Distribution, and Survival and Reproduction

Construction

Mitigation that will be implemented to limit effects from sensory disturbance on yellow rail habitat availability, distribution, and survival and reproduction during Construction are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**. The effectiveness of mitigation measures will be evaluated during Construction, and mitigation measures will be modified or enhanced as necessary through adaptive management.

Operation and Maintenance

Mitigation that will be implemented to limit effects from sensory disturbance on yellow rail habitat availability, distribution, and survival and reproduction during Operation and Maintenance are outlined in **Section 7.3.1.2.2.1** and **Section 7.3.1.13.2.2**.

A Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*) has been developed to have no net loss of bird habitat. Over the long term, measures undertaken as part of the Biodiversity Offset Plan would be implemented to achieve a net increase in functional migratory bird habitat. However, because there is uncertainty in the effectiveness and timing of offset measures in the Biodiversity Offset Plan, and as described in **Section 4.4.2.2**, offsetting has not been considered in the conclusion of predicted residual effects below.

7.3.1.25.2.3 Predicted Residual Effects

Habitat Availability, Distribution, and Survival and Reproduction

After mitigation, potential yellow rail breeding habitat may be indirectly removed or degraded due to sensory disturbance from the Project. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted net residual effects on yellow rail habitat availability, distribution, and survival and reproduction. These residual effects are characterized in **Section 7.3.2** and **Table 7-73**.

7.3.1.26 Summary of Potential Effects, Mitigation and Enhancement Measures, and Identification of Residual Effects

Table 7-72 provides a summary of the Project activities, potential effects, mitigation, and enhancement measures and predicted residual effects.

Table 7-72: Summary of Potential Effects, Mitigation and Enhancement Measures and Predicted Residual Effects on Birds

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Introduction and spread of invasive plant species**—can affect plant community composition, which can affect bird habitat availability and distribution	■ A comprehensive list of mitigation measures to control invasive plant species during construction of the Project is provided in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a) and *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.	Residual effects in bird habitat availability and distribution due to introduction and spread of invasive plant species.
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures to control invasive plant species during Operation and Maintenance of the Project is provided in the *Vegetation Technical Support Document:Existing Conditions and Effects Assessment* (WSP, 2026a) and *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants ■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration	Construction	**Emissions of criteria air contaminants**—Deposition of particulates in criteria air contaminant emissions (e.g., potential acid inputs) may change soil quality and vegetation and affect bird habitat	■ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).	No predicted residual effect

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas		availability and distribution.		
	■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants ■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Fugitive dust emissions**—Deposition of dust particulates may change soil and vegetation quality and affect bird habitat availability and distribution.	■ A comprehensive list of mitigation measures that will be implemented to limit dust deposition during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).	Residual effects to bird habitat availability and distribution from dust emissions and deposition
	■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures that will be implemented to limit dust deposition during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants	Construction	**Erosion and sedimentation—** can alter surface water, groundwater, soil, and vegetation quality and affect bird habitat availability and distribution.	■ A comprehensive list of mitigation measures to limit changes to erosion and sedimentation during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and	No predicted residual effect

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas			Ontario Ministry of Natural Resources, will be followed during Construction.	
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures to limit changes to erosion and sedimentation during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Pits and quarries ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants ■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Changes to surface water quantity**—alteration of surface water drainage patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.	■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction. ■ A comprehensive list of mitigation measures to limit changes to surface water quantity during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).	No predicted residual effect
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Follow *Ontario Provincial Standard Specification 411* and regularly inspect and maintain culverts and bridges ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
				■ A comprehensive list of mitigation measures to limit changes to surface water quantity during Construction is provided in the *Surface Water Technical Support* Document*: Existing Conditions and Effects Assessment* (WSP, 2026b).	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Surface water quality**—changes in surface water quality from Project activities could adversely affect bird habitat availability and distribution.	■ A comprehensive list of mitigation measures to limit changes to surface water quality during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.	No predicted residual effect
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures to limit changes to surface water quality during Operation and Maintenance is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Pits and quarries ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants ■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;*	Construction	**Changes to groundwater**—alteration of groundwater drainage and infiltration patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.	■ A comprehensive list of mitigation measures to limit changes to groundwater quantity during Construction is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.	Residual effects to bird habitat availability and distribution from changes to groundwater quantity.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Decommissioning of temporary camps, roads / trails and staging areas				
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ A comprehensive list of mitigation measures to limit changes to groundwater quantity during Operation and Maintenance is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e). ■ The groundwater monitoring program is described in more detail in the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment Report* (WSP & AECOM, 2026d). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Temporary concrete batch plants ■ Pits and quarries ■ Drilling / blasting / aggregate production ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Increase in public access**—could affect bird survival and reproduction through legal and illegal hunting.	■ Restrict access to the effects assessment Construction Disturbance Area to construction personnel and prohibit firearms.	Residual effects to bird survival and reproduction from increased public access
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Potential changes in hunter and angler pressure, and fish and bird harvest during Project Operation and Maintenance will continue to be managed by Environment and Climate Change Canada, Ministry of Natural Resources, and Fisheries and Oceans Canada.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
All Birds	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act;* ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Incidental take**—vegetation removal and soil alterations during site preparation for construction and maintenance activities, vegetation maintenance activities during Operation and Maintenance may result in destruction of nests, eggs, and individuals of birds.	■ Follow guidance as outlined in Environment and Climate Change Canada's *Avoidance Guidelines for Migratory Birds*. ■ Vegetation clearing activities will occur between August 15 and April 27 (outside of the migratory bird nesting season for nesting zones C5 and C6), as much as possible. ■ Non-intrusive pre-clearing nest surveys to look for migratory bird nests will be completed if any vegetation clearing is required during the migratory bird nesting season (April 28 to August 14). Pre-clearing nest surveys will follow guidance outlined in **Attachment D**. ■ Wildlife sweeps to look for pileated woodpecker nests and raptor stick nests will be completed prior to vegetation clearing at any time of the year.	Residual effects to bird survival and reproduction from incidental take
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ As per the Ministry of Transportation's *Environmental Protection for Migratory Birds (EP-4)*, bridges and culverts will be inspected for the presence of nests and / or birds prior to maintenance activities taking place.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Collisions with vehicles and equipment**—may cause injury or mortality to individual birds.	■ Restricting access to the Project to construction personnel during Construction. ■ Providing wildlife awareness training for road construction workers to reduce vehicle speeds.	Residual effects to bird survival and reproduction from collisions with vehicles and equipment
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Posting and enforcement of an 80 km/hr speed limit during Project Operation and Maintenance.	
All Birds	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Wildlife attractants**—attraction of wildlife to the Project site can affect bird survival and reproduction through increased	■ Keeping building and storage container doors closed. ■ The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting.	Residual effects to bird survival and reproduction from wildlife attractants

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Operate the Preferred route ■ Maintain the Preferred route	Operation and Maintenance	mortality risk and changes to predator-prey relationships.	■ Roadkill, debris, and waste management as per Ministry of Transportation's *Debris Control Maintenance Quality Standard (MQS-331)* and Ministry of Transportation's *Rest Area/Picnic Site Maintenance Best Practice (MBP-325).* ■ The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting.	
All Birds	■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Pits and quarries ■ Drilling / blasting / aggregate production	Construction	**Blasting and fly rock**—may result in injury or mortality to birds.	■ An Environmental Protection Plan will be implemented that includes policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife, including birds.	No predicted residual effect
	■ Pits and quarries ■ Maintain the Preferred Route	Operation and Maintenance		■ An Environmental Protection Plan will be implemented that includes policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife, including birds.	
All Birds	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Construction site restoration ■ Rehabilitation (progressive and final) and surrender of pits and quarries in accordance with the *Aggregate Resources Act*; ■ Decommissioning of temporary camps, roads / trails and staging areas	Construction	**Chemical or hazardous material spills**—(e.g., petroleum products) can affect soil quality, ecosystems, and, ultimately, the health of birds.	■ Adhere to federal and provincial regulations and guidelines regarding hazardous substance collection and storage, use and handling, and disposal and treatment, such as the federal *Transportation of Dangerous Goods Act*, Ontario *Dangerous Goods Transportation Act*, and the Ontario *Environmental Protection Act*. ■ Providing training for road construction workers to reduce vehicle speeds.	No predicted residual effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Adhere to federal and provincial regulations and guidelines regarding hazardous substance collection and storage, use and handling, and disposal and treatment, such as the federal *Transportation of Dangerous Goods Act*, Ontario *Dangerous Goods Transportation Act*, and the Ontario *Environmental Protection Act*. ■ Posting and enforcement of an 80 km/hr speed limit during Project Operation and Maintenance.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
Red-eyed Vireo	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ Mitigation measures that will be implemented to minimize direct loss of vegetation communities (i.e., bird habitat) are discussed in detail in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a). ■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources will be followed during Construction.	Residual effects to red-eyed vireo habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources will be followed during Operation and Maintenance. ■ A Preliminary Biodiversity Offset Plan has been developed to have no net loss of bird habitat and no net reduction in bird populations.	
Red-eyed Vireo	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ Restrict construction traffic to designated areas. ■ Wildlife awareness training will be provided for road construction workers to reduce vehicle speeds. ■ Implement buffer zones for nests and indicated nests. ■ During Construction, access to the Community Access Road corridor will be restricted to construction personnel. ■ Control lighting required for Construction, including direction (e.g., focused on work areas and away from undisturbed areas) and timing (e.g., avoid work at night) to avoid effects on birds, while meeting operational health and safety requirements. ■ Avoid high quality habitats and sensitive areas for migratory bird species at risk, where possible.	Residual effects to red-eyed vireo habitat availability, distribution, and survival and reproduction from sensory disturbance.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ Posting and enforcement of an 80 km/hr speed limit during Project Operation and Maintenance. ■ Maintenance activities would be undertaken in the fall and winter where feasible to avoid nesting periods. ■ Industry best practices will be used for blasting activities, including scheduling when in the vicinity of sensitive wildlife sites.	
Ovenbird	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to ovenbird habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Ovenbird	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to ovenbird habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
Ovenbird	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation of interior-nesting birds.	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	Residual effects to ovenbird survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	
Dark-eyed Junco	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to dark-eyed junco habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Dark-eyed Junco	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to dark-eyed junco habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Osprey	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to osprey habitat availability, distribution, and survival and reproduction from habitat loss and alteration.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance	survival and reproduction.	■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Osprey	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to osprey habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the referred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Boreal Owl	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Road usage ■ Maintenance	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to boreal owl habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Boreal Owl	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ No Construction mitigation for sensory disturbance required for boreal owl.	No predicted residual effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ No Operation and Maintenance mitigation for sensory disturbance required for boreal owl.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
Wilson's Snipe	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to Wilson's snipe habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Wilson's Snipe	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to Wilson's snipe habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Mallard	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to mallard habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Mallard	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to mallard habitat survival and reproduction from sensory disturbance.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Palm Warbler	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to palm warbler habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Palm Warbler	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to palm warbler habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Palm Warbler	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation of interior-nesting birds.	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	Residual effects to palm warbler survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	
Common Yellowthroat	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries	Construction	**Habitat loss**—the direct removal or alteration of soil	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to common yellowthroat habitat availability, distribution, and survival and

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.		reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Common Yellowthroat	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to common yellowthroat habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Northern Waterthrush	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to northern waterthrush habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Northern Waterthrush	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use,	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to northern waterthrush habitat availability, distribution, and survival and reproduction from sensory disturbance

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		and connectivity (movement and behaviour), and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Northern Waterthrush	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation of interior-nesting birds	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	Residual effects to northern waterthrush survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo.	
Sora	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to sora habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Sora	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to sora habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Canada Warbler	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation	■ The Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible. ■ See Construction mitigation measures for habitat loss presented for red-eyed vireo.	Residual effects to Canada warbler habitat availability, distribution, and survival and reproduction from habitat loss and alteration.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		that may have effects on habitat abundance, connectivity, and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo.	
Canada Warbler	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ The Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible. ■ See mitigation measures for sensory disturbance presented for red-eyed vireo.	Residual effects to Canada warbler habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo.	
Evening Grosbeak	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to evening grosbeak habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Evening Grosbeak	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to evening grosbeak habitat availability, distribution, and survival and reproduction from sensory disturbance.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance	survival and reproduction.	■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Chimney Swift, Barn Swallow, and Bank Swallow	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to chimney swift, barn swallow, and bank swallow habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Chimney Swift, Barn Swallow, and Bank Swallow	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to chimney swift, barn swallow, and bank swallow survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Common Nighthawk and Eastern Whip-poor-will	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Common Nighthawk and Eastern Whip-poor-will	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps	Construction	**Sensory disturbance**—(e.g., lights,	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.		and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Common Nighthawk and Eastern Whip-poor-will	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation.	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	Residual effects to common nighthawk and eastern whip-poor-will survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	
Eastern Wood-pewee	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to eastern wood-pewee habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Eastern Wood-pewee	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to eastern wood-pewee habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
Olive-sided Flycatcher	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to olive-sided flycatcher habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Olive-sided Flycatcher	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls) ■ Road usage ■ Maintenance	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to olive-sided flycatcher habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Road usage ■ Maintenance	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Bald Eagle	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to bald eagle habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Bald Eagle	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails	Construction	**Sensory disturbance**—(e.g., lights, smells, noise,	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to bald eagle habitat availability, distribution, and survival and reproduction from sensory disturbance.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Peregrine Falcon	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ No Construction mitigation for habitat loss required for peregrine falcon.	No predicted residual effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ No Operation and Maintenance mitigation for habitat loss required for peregrine falcon.	
Peregrine Falcon	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ No Construction mitigation for sensory disturbance required for peregrine falcon.	No predicted residual effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ No Operation and Maintenance mitigation for sensory disturbance required for peregrine falcon.	
Short-eared Owl	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to short-eared owl habitat availability, distribution, and survival and reproduction from habitat loss and alteration.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		abundance, connectivity, and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Short-eared Owl	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to short-eared owl habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Short-eared Owl	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation.	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	Residual effects to short-eared owl survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	
Black Tern	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ No Construction mitigation for habitat loss required for black tern.	No predicted residual effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ No Operation and Maintenance mitigation for habitat loss required for black tern.	
Black Tern	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity)	■ No Construction mitigation for sensory disturbance required for black tern.	No predicted residual effect

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)		can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.		
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ No Operation and Maintenance mitigation for sensory disturbance required for black tern.	
Lesser Yellowlegs	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to lesser yellowlegs habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Lesser Yellowlegs	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to lesser yellowlegs habitat availability, distribution, and survival and reproduction from sensory disturbance
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Rusty Blackbird	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to rusty blackbird habitat availability, distribution, and survival and reproduction from habitat loss and alteration.

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance	survival and reproduction.	■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	
Rusty Blackbird	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to rusty blackbird habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	
Rusty Blackbird	■ Mobilization of equipment and supplies ■ Temporary access roads and trails ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	Construction	**Increase in edge habitat**—can increase nest predation of interior-nesting birds.	■ See Construction mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	Residual effects to rusty blackbird survival and reproduction from increased edge habitat.
	■ Operate the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss, which will also reduce edge habitat, presented for red-eyed vireo and Canada warbler.	
Yellow Rail	■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Habitat loss**—the direct removal or alteration of soil and vegetation that may have effects on habitat abundance, connectivity, and survival and reproduction.	■ See Construction mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	Residual effects to yellow rail habitat availability, distribution, and survival and reproduction from habitat loss and alteration.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for habitat loss presented for red-eyed vireo and Canada warbler.	

Valued Component	Project Activities	Project Phase	Description of Potential Effect	Mitigation and Enhancement Measures[a]	Predicted Residual Effect
Yellow Rail	■ Mobilization of equipment and supplies ■ Temporary construction staging areas ■ Temporary construction camps ■ Temporary access roads and trails ■ Pits and quarries ■ Right-of-way clearing and grubbing ■ Road construction (stripping, subgrade excavation, embankment fill placement, grading, ditching) ■ Bridge and culvert installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	Construction	**Sensory disturbance**—(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use, and connectivity (movement and behaviour), and survival and reproduction.	■ See Construction mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	Residual effects to yellow rail habitat availability, distribution, and survival and reproduction from sensory disturbance.
	■ Pits and quarries ■ Operate the Preferred Route ■ Maintain the Preferred Route	Operation and Maintenance		■ See Operation and Maintenance mitigation measures for sensory disturbance presented for red-eyed vireo and Canada warbler.	

Notes:
(a) Mitigation measures in this table are associated with the most relevant potential effect(s) to minimize redundancy.

7.3.2 Characterization of Predicted Residual Effects

Even after assuming effective implementation of all mitigation and enhancement measures **Table 7-72**, residual effects as a result of the Project are predicted for all bird Valued Components. Predicted residual effects are characterized according to the effect characteristics of context, direction, magnitude, reversibility, geographic extent, duration, frequency, likelihood, and uncertainty (**Section 4.4.2.4** and **Section 4.4.3**). A description of the predicted residual effects of the Project on bird Valued Components is presented below and summarized in **Table 7-73**.

7.3.2.1 All Bird Valued Components

Invasive plant species—During Construction and Operation and Maintenance of the Project, invasive plant species may occasionally be introduced within the effects assessment Construction Disturbance Area. Best management practices and mitigation measures for controlling the spread of invasive plant species that will be implemented during Construction and Operation and Maintenance are well understood and the methods have been demonstrated to be effective. After implementation of mitigation, effects from the introduction of invasive plants are predicted to be **possible** to occur, **reversible** in the **short term** (Construction) to **long term** (Operation and Maintenance), **infrequent**, and confined to the **effects assessment Construction Disturbance Area**. Effects from the introduction of invasive plants on the ability of the bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Changes to groundwater— Pit dewatering and dredging and settlement of the road base structure and underlying peat material or sediment accumulation in the road base material during Construction and Operation and Maintenance are expected to change groundwater quantity. Effects from changes to groundwater quantity are predicted to be **probable, irreversible** (**long term**), **continuous**, and confined to the **effects assessment Local Study Area**. Effects from changes to groundwater quantity on the ability of the bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Dust emissions—Project Construction and Operation and Maintenance are expected to increase dust emissions. Although mitigation measures will be implemented to reduce dust emissions, dust deposition during Project Construction and Operation and Maintenance is predicted to degrade vegetation immediately adjacent to the Project. Effects from dust emissions are predicted to be **certain**, **reversible** in the **medium term** (Construction) or **irreversible** (**long term**) (Operation and Maintenance), **continuous**, and confined to the **effects assessment Local Study Area**. Effects from dust emissions on the ability of the

bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Public access—The Project may increase public access and hunting and poaching of birds and their food sources (i.e., fish). Although mitigation measures will be implemented to limit increases in public access during Construction, there is potential for the Project to increase hunting, fishing, and poaching during Operation and Maintenance, relative to existing conditions. However, due to the isolation of the Project from large urban centres, increases in hunting and poaching on birds are expected to be small. Effects from increases in public access are predicted to be **unlikely** (Construction) **to possible** (Operation and Maintenance), **irreversible** (**long term)**, **continuous**, and confined to the **effects assessment Regional Study Area**. Effects from increased hunting and poaching on the ability of the bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Incidental take—Clearing of vegetation during Project Construction and maintenance of vegetation during Project Operation and Maintenance may result in incidental take of nesting birds. The implementation of mitigation is anticipated to limit incidental take of migratory birds, particularly during Construction, but there is still potential for incidental take of migratory birds if vegetation clearing, mowing, and pruning is completed during the migratory bird nesting season. Effects from incidental take are predicted to be **possible**, **reversible** in the **medium term** (Construction) or **irreversible** in the **long term** (Operation and Maintenance), **frequent** (Construction) to **infrequent** (Operation and Maintenance), and confined to the **effects assessment Construction Disturbance Area**. Effects from incidental take on the ability of the bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Collision risk—There is a risk of increased risk of bird-vehicle collisions with implementation of the Project. The implementation of mitigation is anticipated to limit bird-vehicle collisions, particularly during Construction, but there is potential for increased bird injury and mortality from collisions with vehicles during Project Construction and Operation and Maintenance. Effects from increased bird-vehicle collisions are predicted to be **possible**, **reversible** in the **medium term** (Construction) or **irreversible** (**long term**) (Operation and Maintenance), **frequent** (Construction) to **continuous** (Operation and Maintenance),and confined to the **effects assessment Construction Disturbance Area**. Effects from increased bird-vehicle collisions during Operation and Maintenance are predicted to be **possible**, **irreversible** (**long term**), **continuous**, and confined to the **effects assessment Construction Disturbance Area**. Effects from increased bird-vehicle collisions during Construction and Operation and Maintenance on the ability of the bird

populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

Wildlife attractants—Garbage, infrastructure, and other wildlife attractants may be present during Project Construction and Operation and Maintenance. Wildlife attractants may increase bird predator abundance and predation risk near the Project. Additionally, the use of infrastructure or equipment for nesting could result in inadvertent disturbance or destruction of bird nests by Project staff. Mitigation should limit wildlife attractants and attraction of birds and their predators to the Project. However, there is potential that birds and their predators may be attracted to the Project during Construction and Operation and Maintenance, which may affect the survival and reproduction of birds. Effects are predicted to be **possible**, **irreversible** (**long term**) (e.g., permanent aggregate piles and culverts), **continuous**, and confined to the **effects assessment Construction Disturbance Area**. Effects from wildlife attractants on the ability of the bird populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible in magnitude**. The residual effects characterization is provided in **Table 7-73**.

7.3.2.1.1 Summary

Changes to air emissions, erosion and sedimentation, blasting and associated fly rock, and chemical or hazardous material spills were previously determined to have no net residual effects on bird Valued Components (**Section 7.3.1.1**).

Based on the above assessments, the residual effects on the assessment endpoints (self sustaining and ecologically effective populations) from the introduction and spread of invasive plant species, incidental take, wildlife collisions, and wildlife attractants on bird Valued Components are predicted to be **negligible** and **possible** to occur (**Section 7.3.1.1**). As such, these Project–environment interactions **are not carried forward** to the Cumulative Effects Assessment for birds (**Section 8**).

Based on the above assessments, the residual effects on the assessment endpoints from changes to groundwater quality and dust deposition are predicted to be **negligible** but **certain** to occur (**Section 7.3.1.1**). As such, potential effects from changes to groundwater quality and dust emissions and deposition are **carried forward** to the Cumulative Effects Assessment for birds (**Section 8**).

7.3.2.2 Red-eyed Vireo

Red-eyed vireo is one of the most common species detected during field surveys and is one of the most abundant breeding songbirds in the forests of eastern North America (Cimprich et al., 2020). Moderate and high suitability red-eyed vireo nesting habitat covers approximately 40% of the effects assessment Local and Regional Study Areas under

existing conditions. Existing disturbance is low and primarily includes winter roads. Available information suggests that red-eyed vireo in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—During Construction, the Project is expected to result in a loss of 2,363.2 ha of high and moderate suitability habitat (combined), representing 1.2% of these habitats in the effects assessment Regional Study Area. Slightly more high suitability (1,240.2 ha) than moderate suitability (1,096.8 ha) habitat is expected to be removed (1.3% and 1.1% of available high and moderate suitability habitat in the effects assessment Regional Study Area, respectively). Changes will be mostly permanent; some temporary work areas will be reclaimed or allowed to revegetate naturally but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction from habitat loss and alteration are likely to have small but measurable effects on the regional breeding population of red-eyed vireo given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on red-eyed vireo habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of red-eyed vireo from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on red-eyed vireo will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the red-eyed vireo population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs of red-eyed vireos occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.7% of high and moderate suitability habitat (combined) that is available in the effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the

Project will exist in perpetuity as there is no plan to reclaim the Project. However, red-eyed vireos have relatively high adult survival (53%) and reproductive rate (nest success 65%; three eggs per brood) (Cimprich et al., 2020). Additionally, this species is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area that are not affected by sensory disturbance from the Project.

Effects from sensory disturbance on red-eyed vireo habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the red-eyed vireo population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.3 Ovenbird

Ovenbird is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Ovenbird is a common breeding species south of the southern portion of the Hudson Bay Lowland ecozone (Natural Heritage Information Centre, 2023). This species was commonly detected during field surveys. Moderate and high suitability ovenbird nesting habitat covers approximately 60% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that ovenbird in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 3,207.5 ha of high and moderate suitability habitat, representing 1.1% of these habitats in the effects assessment Regional Study Area. More high suitability (2,170.4 ha) than moderate suitability (1,037.1 ha) habitat is expected to be removed (1.2% and 1.0% of available high and moderate suitability habitat in the effects assessment Regional Study Area, respectively). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction from habitat loss and alteration are likely to have limited effects on the regional breeding population of ovenbird given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on ovenbird habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of ovenbird from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on ovenbird will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the ovenbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.4% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on ovenbird, leading to small declines in survivorship and reproductive rate for local breeding populations. Adults have a moderate to high annual survival rate (42% to 58%). This species has high reproductive rate; nest success in unfragmented landscapes ranges from 60% to 70% and this species lays four eggs per brood and raises one brood per season (Porneluzi et al., 2020). Furthermore, ovenbird is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on ovenbird habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the ovenbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. The residual effects characterization is provided in **Table 7-73**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**).

Increased Edge Habitat—Anticipated increases in ovenbird predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat during Project Construction are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the effects assessment Construction Disturbance Area that continue through Operation and Maintenance of the Project. This is expected to have minor residual effects on ovenbird, leading to small declines in survivorship and reproductive rate for local breeding populations. However, ovenbird has high yearly survival and nest success rates. Changes to predation risk in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat are predicted to be **probable** to occur, irreversible (**long term**), **continuous**, and confined to the **effects assessment Local Study Area**.

Residual effects from increased edge habitat on the ability of the ovenbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.4 Dark-eyed Junco

Dark-eyed junco is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Dark-eyed junco is a common breeding species in and north of the Canadian Shield ecozone (Natural Heritage Information Centre, 2023). This species was commonly detected during field surveys. Moderate and high suitability dark-eyed junco nesting habitat covers approximately 30% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that dark-eyed junco in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 2,716.7 ha of high and moderate suitability habitat, representing 1.9% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and

survival and reproduction from habitat loss and alteration are likely to have limited effects on the regional breeding population of dark-eyed junco given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on dark-eyed junco habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of dark-eyed junco from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on dark-eyed junco will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the dark-eyed junco population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 6.1% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on dark-eyed junco, leading to small declines in survivorship and reproductive rate for local breeding populations. This species has high annual survival (49%) and reproductive rate (nest success rate of 55% to 76%, 3.5 eggs per brood, and one brood per season) (Nolan et al., 2020). Additionally, dark-eyed junco is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on dark-eyed junco habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**.

Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the dark-eyed junco population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.5 Osprey

Osprey is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. The osprey population in Ontario is increasing (Natural Heritage Information Centre, 2023). Moderate and high suitability osprey nesting habitat covers approximately 30% and 15% of the effects Local and Regional Study Areas, respectively, under existing conditions. This species was rarely detected during baseline surveys. The available information suggests that osprey in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 3,013.9 ha of high and moderate suitability habitat, representing 3.3% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of osprey given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on osprey habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability of osprey from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution and survival and reproduction are **possible**. The effects on osprey will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the osprey population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 400 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 21.9% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. However, several studies have found that that osprey nests near roads have the same or higher productivity as nests far from roads (Van Daele and Van Daele, 1982; Levenson and Koplin, 1984). Osprey is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. This species has survival rates of 43% to 49% for their first year of life and rates of 82% to 84% for each year thereafter (Bierregaard et al., 2020). This species has moderate reproductive rate (three eggs per brood and one brood per season); nest success ranges from 38% to 63% (Bierregaard et al., 2020) and is positively related to food availability and water level (Houston et al., 2010). Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on osprey habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **possible** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the osprey population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.6 Boreal Owl

Boreal owl is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007* and North America populations are considered stable in the long term (Hayward and Hayward, 2020). This species was frequently detected during baseline surveys. Moderate and high suitability habitat covers approximately 50% of the effects assessment Local and Regional Study Areas under existing conditions. The available

information suggests that boreal owl in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 2,539.4 ha of high and moderate suitability habitat, representing 1.4% of these habitats in the effects assessment Regional Study Area. Approximately the same amount of high suitability (1,228.9 ha) and moderate suitability (1,310.5 ha) habitat will be removed by the Project and account for 1.6% and 1.1% of the high and moderate suitability habitat available in the Regional Study Area, respectively. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction from habitat loss and alteration are likely to have limited effects on the regional breeding population of boreal owl given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on boreal owl habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of boreal owl from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **possible**. The effects on boreal owl will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the boreal owl population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project is not expected to lead to reduced survivorship and / or reproductive rate for boreal owl. This species does not appear to be influenced by industrial noise (Shonfield and Bayne 2017, 2023). Additionally, adults have high annual survival (range 62% to 72%) (Hayward and Hayward, 2020). This species has moderate to high reproductive rate. Boreal owls typically lay three eggs per brood and raise one brood per season; nest success is correlated with prey abundance with higher success reported in years with abundant prey (Hayward and Hayward, 2020). Boreal owl is highly mobile and capable of relocating to

portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

There are no predicted effects from sensory disturbance on boreal owls during Project Construction and Operation and Maintenance. As such, the residual effects characterization was not completed for this Project–environment interaction and the interaction **is not carried forward** to the Cumulative Effects Assessment for birds (**Section 8**).

7.3.2.7 Wilson's Snipe

Wilson's snipe is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007* and is a common breeding species throughout Ontario (Natural Heritage Information Centre, 2023). This species was frequently detected during baseline surveys. Moderate and high suitability nesting habitat for this species covers approximately 45% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that Wilson's snipe in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 2,600.5 ha of high and moderate suitability habitat, representing 1.1% of these habitats in the effects assessment Regional Study Area. More medium suitability (1,885.4 ha) than high suitability (715.2 ha) habitat is expected to be removed (1.3% and 0.7% of available moderate and high suitability habitat in the effects assessment Regional Study Area, respectively). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction from habitat loss and alteration are likely to have limited effects on the regional breeding population of Wilson's snipe given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on Wilson's snipe habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of Wilson's snipe from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on Wilson's snipe will vary from the

effects assessment Construction Disturbance Area (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the Wilson's snipe population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.1% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on birds; however, sensory disturbance is expected to have minor residual effects on Wilson's snipe, leading to small declines in survivorship and reproductive rate for local breeding populations. This species has a high adult annual survival rate (50% to 65%) and moderate reproductive rate (nest success rate of 41%, four eggs per brood, and one brood per season) (Mueller, 2020). Additionally, Wilson's snipe is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on Wilson's snipe habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the Wilson's snipe population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.8 Mallard

Mallard is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Mallard is the most abundant duck species in North America (Drilling et al., 2020) and this species was among the most common waterfowl and waterbird species detected during field surveys in 2018 to 2022. Moderate and high suitability nesting habitat for this species covers approximately 85% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that mallard in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 3,685.3 ha of high and moderate suitability habitat, representing 0.8% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of mallard given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on mallard habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of mallard from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on mallard will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss and sensory disturbance on the ability of the mallard population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding mallard pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Proposed mitigation measures are expected to minimize the effects of noise on birds; however, sensory disturbance is expected to have minor residual effects on mallard by

reducing the ability to hear communications and approach predators, leading to small declines in survivorship and reproductive rate for local breeding populations. This species has a high adult annual survival rate (50% to 70%). Mallards also have high reproductive rate; this species typically lay eight eggs per brood and, even though nest success rates can vary largely (10% to 70%) (Drilling et al., 2020), this species will renest if the initial brood fails (Messmer et al., 2021). Additionally, mallard is not considered sensitive to sensory disturbance and is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on mallard survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the mallard population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.9 Palm Warbler

Palm warbler is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. This species is a common breeder in the Hudson Bay Lowlands and boreal forest of Ontario (Natural Heritage Information Centre, 2023) and this species was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that palm warbler in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 2,101.6 ha of high and moderate suitability habitat, representing 0.6% of these habitats in the effects assessment Regional Study Area. More high suitability (1,178.1 ha) than moderate suitability (923.5 ha) habitat is expected to be removed (0.6% of both available high and moderate suitability habitat in the effects assessment Regional Study Area). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to

habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of palm warbler given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on palm warbler habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of palm warbler from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on palm warbler will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the palm warbler population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73.**

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding palm warblers occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 3.4% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on palm warbler, leading to small declines in survivorship and reproductive rate for local breeding populations. Information on adult survival and nest success is not available for this species. Females lay an average of 4.5 eggs per brood and raise one brood per season (Wilson, 2020). Palm warbler is highly mobile and is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on palm warbler habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**.

Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the palm warbler population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73.**

Increased Edge Habitat—Anticipated increases in predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the effects assessment Construction Disturbance Area that continue through Operation and Maintenance of the Project. This is expected to have minor residual effects on palm warbler, leading to small declines in survivorship and reproductive rate for local breeding populations. Changes to predation risk in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat are predicted to be **probable** to occur, irreversible (**long term**), **continuous**, and confined to the **effects assessment Local Study Area**.

Residual effects increased edge habitat on the ability of the palm warbler population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73.**

7.3.2.10 Common Yellowthroat

Common yellowthroat is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Common yellowthroat is one the most widespread warblers in North America (Guzy and Ritchison, 2020) and is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023). This species was frequently detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that common yellowthroat in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,918.9 ha of high and moderate suitability habitat, representing 0.6% of these habitats in the effects assessment Regional Study Area. More high suitability (1,152.6 ha) than moderate suitability (76.63 ha) habitat is expected to be removed (0.6% of both available high and moderate suitability habitat in the effects assessment Regional Study Area). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of common yellowthroat given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on common yellowthroat habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of common yellowthroat from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on common yellowthroat will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the common yellowthroat population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding common yellowthroats occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 3.5% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on common yellowthroat, leading to small declines in survivorship and reproductive rate for local breeding populations. This species has moderate annual survival (45%) and reproductive rate (nest success rate of 33% to 55%, four eggs per brood, and one brood per season) (Guzy and Ritchison, 2020). Common yellowthroat is highly mobile and is capable of relocating to portions of the effects

assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on common yellowthroat habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the common yellowthroat population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.11 Northern Waterthrush

Northern waterthrush is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Northern waterthrush is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023) and was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 40% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that northern waterthrush in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,454.3 ha of high and moderate suitability habitat, representing 0.7% of these habitats in the effects assessment Regional Study Area. More moderate suitability (847.9 ha) than high suitability (606.4 ha) habitat is expected to be removed (0.6% and 0.8% of available moderate and high suitability habitat in the effects assessment Regional Study Area, respectively). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of northern waterthrush given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on northern waterthrush habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of northern waterthrush from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on northern waterthrush will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the northern waterthrush population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding northern waterthrushes occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.2% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on northern waterthrush, leading to small declines in survivorship and reproductive rate for local breeding populations. This species has high annual survival (range 50% to 70%) and reproductive rate (nest success rate of 70%, four eggs per brood, and one brood per season) (Whitaker and Eaton, 2020). Northern waterthrush is highly mobile and is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on northern waterthrush habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the northern waterthrush population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Increased Edge Habitat—Anticipated increases in predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the effects assessment Construction Disturbance Area that continue through Operation and Maintenance of the Project. This is expected to have minor residual effects on northern waterthrush, leading to small declines in survivorship and reproductive rate for local breeding populations. Changes to predation risk in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat are predicted to be **probable** to occur, **i**rreversible (**long term**), **continuous**, and confined to the **effects assessment Local Study Area**.

Residual effects from increased edge habitat on the ability of the northern waterthrush population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.12 Sora

Sora is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Sora is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023) and was detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 20% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that sora in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 557.5 ha of high and moderate suitability habitat, representing 0.6% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival from habitat loss are likely to have limited effects on the regional breeding population of sora given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on sora habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of sora from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on sora will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the sora population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.4% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on soras; however, sensory disturbance is expected to have minor residual effects on sora, leading to small declines in survivorship and reproductive rate for local breeding populations. No information on adult survival rates is available (Melvin and Gibbs, 2020). This species has high reproductive rate (nest success rate of 43% to 53%, 8-11 eggs per brood, and one brood per season) (Melvin and Gibbs, 2020). Sora is highly mobile and is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on sora habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the sora population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.13 Canada Warbler

Canada warbler is listed as a species of Special Concern under Schedule 1 of *Species at Risk Act* and under the *Endangered Species Act, 2007*. Canada warblers were infrequently detected during baseline surveys. Moderate and high suitability Canada warbler nesting habitat covers approximately 50% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that the Canada warbler population in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions, albeit at low population levels.

Habitat Loss and Alteration—The Project is expected to result in a loss of 2,885.9 ha of high and moderate suitability Canada warbler habitat, representing 1.1% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of Canada warbler given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on Canada warbler habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of Canada warbler from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on Canada warbler will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the Canada warbler population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within in 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.7% of high and moderate suitability Canada warbler habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on Canada warbler, leading to small declines in survivorship and reproductive rate for local breeding populations. However, although no specifics are available, the yearly survival rate for adult Canada warbler is thought to be high (Reitsma et al., 2020). This species usually lays four to five eggs per clutch and usually only raises one clutch per year, although two clutches are possible (Reitsma et al., 2020). Nest survival rates are high (0.96 [Reitsma et al., 2020]). Additionally, Canada warblers are highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. As such, changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on Canada warbler habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the Canada warbler population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.14 Evening Grosbeak

Evening grosbeak is listed as Special Concern under Schedule 1 of the *Species at Risk Act* and the *Endangered Species Act, 2007*. Evening grosbeaks were not detected during baseline surveys; this species is highly nomadic and travels to and inhabits areas with high prey abundance. Moderate and high suitability evening grosbeak nesting habitat covers approximately 20% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that the evening grosbeak population in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions, albeit at low population levels.

Habitat Loss and Alteration—The Project is expected to result in a loss 1,857.3 ha of high and moderate suitability habitat for evening grosbeak, representing 2.1% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of evening grosbeak given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on evening grosbeak habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of evening grosbeak from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on evening grosbeak will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the evening grosbeak population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance

Area. Sensory disturbance is predicted to affect 6.3% of evening grosbeak high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on evening grosbeak, leading to small declines in survivorship and reproductive rate for local breeding populations. However, although specifics are not available, the yearly survival rate for adult evening grosbeak is thought to be high (Gillihan and Byers, 2020). Evening grosbeaks typically lay three to four eggs per brood and the nest success rate is approximately 55% (Gillihan and Byers, 2020). Additionally, evening grosbeak is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. As such, changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on evening grosbeak habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the evening grosbeak population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.15 Chimney Swift, Barn Swallow, and Bank Swallow

Chimney swift and bank swallow are listed as Threatened under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Bank swallow is a Special Concern species under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. None of these species were detected during baseline surveys.

Moderate and high suitability chimney swift, bank swallow, and barn swallow nesting habitat covers approximately 0.2% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that these species are largely absent from the effects assessment Regional Study Area at existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 20.4 ha of high and moderate suitability habitat, representing 1.8% of these habitats in the effects assessment Regional Study Area for chimney swift, barn swallow, and bank swallow.

Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of chimney swift, bank swallow, and barn swallow given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of chimney swift, bank swallow, and barn swallow from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **possible**. The effects on chimney swift, bank swallow, and barn swallow will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the chimney swift, bank swallow, and barn swallow populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area, however, both barn swallow and chimney swift are typically not sensitive to human disturbance. Nest success rates are generally quite high for chimney swift, barn swallow, and bank swallow, with studies showing success rates of 44% to 90% (Brown and Brown, 2020; Garrison and Turner, 2020; Steves et al., 2020). Additionally, chimney swift, bank swallow, and barn swallow are highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. As such, changes to survival and reproduction in the effects assessment Local Study Area are not expected to have a measurable effect on for the regional populations.

Effects from sensory disturbance on chimney swift, bank swallow, and barn swallow survival and reproduction during Construction and Operation and Maintenance are **unlikely** and are expected to be confined to the **effects assessment Local Study Area**.

Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the chimney swift, bank swallow, and barn swallow populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.16 Common Nighthawk and Eastern Whip-poor-will

Common nighthawk and eastern whip-poor-will are Special Concern species under Schedule 1 of *Species at Risk Act*. Common nighthawk is a Special Concern species under the *Endangered Species Act, 2007*, while eastern whip-poor-will is listed as Threatened under the *Endangered Species Act, 2007*. Eastern whip-poor-will was recently re-assessed and downlisted to Special Concern by the Committee on the Status of Endangered Wildlife in Canada and the Committee on the Status of Species at Risk in Ontario. Subsequent downlisting under the *Species at Risk Act* and the *Endangered Species Act* are anticipated in the future.

Common nighthawk was frequently detected during baseline surveys, while eastern whip-poor-will was infrequently detected. Moderate and high suitability common nighthawk and eastern whip-poor-will nesting habitat covers approximately 45% and 5%, respectively, of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that common nighthawk and eastern whip-poor-will in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,609.5 ha of high and moderate suitability habitat, representing 1.4% of these habitats in the effects assessment Regional Study Area for common nighthawk. The Project is expected to result in a loss 450.7 ha of high and moderate suitability habitat for eastern whip-poor-will, representing 2.3% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of common nighthawk and eastern whip-poor-will given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely; however, some effects from temporary features will be **reversible** over the **medium** (common nighthawk) to **long term** (eastern whip-poor-will). Habitat loss will have **continuous, negative** effects on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of common nighthawk and eastern whip-poor-will from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on common nighthawk and eastern whip-poor-will will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the common nighthawk and eastern whip-poor-will populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 200 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 2.5% of common nighthawk and 5.1% of eastern whip-poor-will high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on these species; however, sensory disturbance is expected to have minor residual effects on common nighthawk and eastern whip-poor-will, leading to small declines in survivorship and reproductive rate for local breeding populations.

Effects from sensory disturbance on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the common nighthawk and eastern whip-poor-will populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Increased Edge Habitat—Anticipated increases in common nighthawk and eastern whip-poor-will predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the effects assessment Construction Disturbance Area that will continue through Operation and Maintenance. This is expected to have minor residual effects on common nighthawk and eastern whip-poor-will, leading to small declines in survivorship and reproductive rate for local breeding populations.

However, females of both species typically lay two eggs per brood, and while common nighthawks typically raise one brood per season, eastern whip-poor-wills will often lay a second brood (Brigham et al., 2020; Cink et al., 2017). Additionally, common nighthawk and eastern whip-poor-will are highly mobile and capable of relocating to portions of the effects assessment Regional Study Area. As such, changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional populations.

Effects from increased edge habitat are predicted to be **probable** to occur, **irreversible (long term)**, **continuous**, and confined to the **effects assessment Local Study Area**.

Residual effects from increased edge habitat on the ability of the common nighthawk and eastern whip-poor-will populations in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.17 Eastern Wood-pewee

Eastern wood-pewee is listed as Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. This species was infrequently detected during baseline surveys. Moderate and high suitability eastern wood-pewee nesting habitat covers approximately 5% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that eastern wood-pewee in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions, albeit at a low population.

Habitat Loss and Alteration—The Project is expected to result in a loss of 857.8 ha of high and moderate suitability habitat, representing 2.8% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of eastern wood-pewee given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on eastern wood-pewee habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of eastern wood-pewee from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on eastern wood-pewee will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the eastern wood-pewee population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 6.3% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on eastern wood-pewee, leading to small declines in survivorship and reproductive rate for local breeding populations.

Eastern wood-pewee has moderate reproductive rate (nest success 32% to 56%, three eggs per brood, and one brood per season) (Watt et al., 2020). Additionally, eastern wood-pewee is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. As such,

changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on eastern wood-pewee habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the eastern wood-pewee population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.18 Olive-sided Flycatcher

Olive-sided flycatcher is listed as Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. This species was frequently detected during baseline surveys. Moderate and high suitability olive-sided flycatcher nesting habitat covers approximately 55% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that olive-sided flycatcher in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,691.0 ha of high and moderate suitability habitat, representing 0.5% of these habitats in the effects assessment Regional Study Area. A total of 267.8 ha of high suitability habitat is expected to be removed (0.3% of available high suitability habitat in the effects assessment Regional Study Area). Most of the habitat loss would occur in moderate suitability habitat (1423.2 ha; 0.7% of the habitat's availability in the effects assessment Regional Study Area). Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of olive-sided flycatcher given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on olive-sided flycatcher habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of olive-sided flycatcher from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on olive-sided flycatcher will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the olive-sided flycatcher population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 3.2% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on olive-sided flycatcher, leading to small declines in survivorship and reproductive rate for local breeding populations. Olive-sided flycatchers are vulnerable to changes in survival and reproduction as they have one of the lowest reproductive rates of all passerines in North America. However, olive-sided flycatchers are highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. As such, changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on olive-sided flycatcher habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the olive-sided flycatcher population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.19 Bald Eagle

Bald eagle is not a listed species under the *Species at Risk Act* but is a species of Special Concern under the *Endangered Species Act, 2007*. Bald eagle is a widespread and common breeding species throughout Ontario (Natural Heritage Information Centre, 2023) and the bald eagle population in North America is increasing (Oleyar et al., 2021). This species was frequently detected during baseline surveys, particularly near the Ogoki River. Moderate and high suitability eagle nesting habitat covers approximately 10% of the effects assessment Local Study Area and 5% of the effects assessment Regional Study Area under existing conditions. The available information suggests that bald eagle in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 811.2 ha of high and moderate suitability habitat, representing 3.7% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability are likely to have limited effects on the regional breeding population of bald eagle given the small anticipated loss of habitat relative to what is available to the regional population in the rest of the effects assessment Regional Study Area.

Clearing activities associated with Construction would result in a measurable change to the existing distribution of bald eagle habitat in the effects assessment Local Study Area. There is a higher proportion of high suitability habitat for bald eagle in the effects assessment Construction Disturbance Area (approximately 17% of the study area) than in the effects assessment Local Study Area and effects assessment Regional Study Area (from 4% to 10% of each study area). The Project is unlikely to have a measurable effect on bald eagle habitat connectivity and movement in the effects assessment Regional Study Area given that several studies have shown that road do not result in nest abandonment or reduced productivity (Isaacs et al., 2005; MNR, 2010).

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on bald eagle habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on

habitat availability and survival and reproduction of bald eagle from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **possible**. The effects on bald eagle will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the bald eagle population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 400 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 31.3% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Some studies suggest that bald eagles are sensitive to sensory disturbance (McGarigal et al., 1991), while other studies suggest that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004). Bald eagle is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Bald eagles have adult survival (>80%) and nest success (>50%) rates (Buehler, 2020). Females lay an average of two eggs per brood and raise one brood per year (Buehler, 2020). Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on bald eagle habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **possible** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the bald eagle population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.20 Short-eared Owl

Short-eared owl is a Threatened species under the *Endangered Species Act, 2007*; this species is currently listed as Special Concern under *Species at Risk Act* but is under consideration for a status change to Threatened. Short-eared owl is an uncommon to rare breeding species in Ontario and most individuals occur in the Hudson Bay Lowlands (Natural Heritage Information Centre, 2023). Habitat loss in the wintering range of this species, as well as in the breeding range of this species in the Canadian prairies and southern Ontario, appear to be the primarily causes of short-eared owl population declines in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008).

This species was not observed during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 35% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that short-eared owl in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 824.3 ha of high and moderate suitability habitat, representing 0.4% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of short-eared owl given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on short-eared owl habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of short-eared owl from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on short-eared owl will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the short-eared owl population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 500 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 5.0% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on birds; however, sensory disturbance is expected to have minor residual effects on short-eared owl, leading to small declines in survivorship and reproductive rate for local breeding populations. Annual adult survival rates are not available for this species but females lay an average is 5.6 eggs per brood and raise one brood per season (Wiggins et al., 2020). Nest success estimates for this species are high and range from 75% to 90% (Wiggins et al., 2020). Sensory disturbance is not considered a large threat to short-eared owls in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008) and this species is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on short-eared owl habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the short-eared owl population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Increased Edge Habitat—Anticipated increases in predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories

near the effects assessment Construction Disturbance Area that continue through Operation and Maintenance. This is expected to have minor residual effects on short-eared owl, leading to small declines in survivorship and reproductive rate for local breeding populations. However, this species has a high reproductive rate. As such, changes to predation risk in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat are predicted to be **probable** to occur, **irreversible (long term)**, **continuous**, and **confined to the effects assessment Local Study Area**.

Residual effects from increased edge habitat on the ability of the short-eared owl population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.21 Lesser Yellowlegs

Lesser yellowlegs is a Threatened species under the *Endangered Species Act, 2007*; this species not currently listed under *Species at Risk Act* but is under consideration for listing under the *Species at Risk Act*. Lesser yellowlegs is a common breeding species in the northern third of Ontario (Natural Heritage Information Centre, 2023). This species was infrequently detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 30% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that lesser yellowlegs in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,684.7 ha of high and moderate suitability habitat, representing 1.1% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of lesser yellowlegs given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on lesser yellowlegs habitat availability, distribution, and survival and reproduction that will start

during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of lesser yellowlegs from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on lesser yellowlegs will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the lesser yellowlegs population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 4.6% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on birds; however, sensory disturbance is expected to have minor residual effects on lesser yellowlegs, leading to small declines in survivorship and reproductive rate for local breeding populations. Annual adult survival rates are not available for this species but females usually lay four eggs per brood and raise one brood per season (Tibbitts and Moskoff, 2020). Fledging success estimates range from 27% to 34% (Tibbitts and Moskoff, 2020). Sensory disturbance is not considered a large threat to lesser yellowlegs in Canada (Committee on the Status of Endangered Wildlife in Canada, 2020b) and this species is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on lesser yellowlegs habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the lesser yellowlegs population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.22 Rusty Blackbird

Rusty blackbird is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Most threats to the rusty blackbird are within their stopover and wintering habitats (Committee on the Status of Endangered Wildlife in Canada, 2017). This species was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that rusty blackbird in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 1,710.9 ha of high and moderate suitability habitat, representing 0.5% of these habitats in the effects assessment Regional Study Area. Changes will be mostly irreversible (long term). Changes to habitat availability, distribution, and survival and reproduction from habitat loss are likely to have limited effects on the regional breeding population of rusty blackbird given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on rusty blackbird habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of rusty blackbird from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on rusty blackbird will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the rusty blackbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding rusty blackbird pairs occupying territories within 300 m the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 3.6% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on songbirds; however, sensory disturbance is expected to have minor residual effects on rusty blackbird, leading to small declines in survivorship and reproductive rate for local breeding populations. This species is highly mobile and is capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project.

Effects from sensory disturbance on rusty blackbird habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the rusty blackbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Increased Edge Habitat—Anticipated increases in predation risk due to changes in predator-prey dynamics and predator access with increases in edge habitat are expected to be relatively small. Increased predation risk associated with the Project could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the effects assessment Construction Disturbance Area that continue through Operation and Maintenance. This is expected to have minor residual effects on short-eared owl, leading to small declines in survivorship and reproductive rate for local breeding populations. However, this species has a high reproductive rate; females typically lay four eggs per brood and raise one brood per season (Avery, 2020). Nest success also appears to be high (77% to 98%) (Avery, 2020; Wohner et al., 2020). As such, changes to predation risk in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat are predicted to be **probable** to occur, **i**rreversible (**long term**), **continuous**, and confined to the **effects assessment Local Study Area**.

Residual effects from increased edge habitat on the ability of the rusty blackbird population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.2.23 Yellow Rail

Yellow rail is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Historically, most yellow rail breeding pairs were thought to occur in the James Bay and Hudson Bay Lowlands (Committee on the Status of Endangered Wildlife in Canada, 2009b). However, a recent study in the Northwest Territories suggests that the population and range of yellow rails in Canada may be much larger than currently reported and further study is required to determine population size and distribution in Canada (McLeod et al., 2021). This species was detected once during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 20% of the effects assessment Local and Regional Study Areas under existing conditions. Existing disturbance is low and primarily includes winter roads. The available information suggests that yellow rail in the effects assessment Regional Study Area is self-sustaining and ecologically effective but unlikely to occur in the study areas under existing conditions.

Habitat Loss and Alteration—The Project is expected to result in a loss of 557.5 ha of high and moderate suitability habitat, representing 0.6% of these habitats in the effects assessment Regional Study Area. Changes will be mostly permanent; some temporary work areas will be reclaimed but most of the effects assessment Construction Disturbance Area will remain disturbed in perpetuity. Changes to habitat availability, distribution, and survival and reproduction are likely to have limited effects on the regional breeding population of yellow rail given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the effects assessment Regional Study Area.

Mitigation measures are expected to minimize the effects of habitat loss during Construction, but habitat loss from the Project will physically occur. This loss is considered mainly **irreversible (long term)** because the Community Access Road will remain disturbed indefinitely. Habitat loss will have **continuous, negative** effects on yellow rail habitat availability, distribution, and survival and reproduction that will start during Construction and continue through Operation and Maintenance of the Project. Effects on habitat availability and survival and reproduction of yellow rail from habitat loss and alteration during Construction and Operation and Maintenance are predicted to be **certain**, while effects on distribution are **probable**. The effects on yellow rail will vary from the **effects assessment Construction Disturbance Area** (habitat availability and survival and reproduction) to the **effects assessment Local Study Area** (movement and connectivity [distribution]).

Residual effects from habitat loss on the ability of the yellow rail population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

Sensory Disturbance—Sensory disturbance associated with the Project could lead to habitat avoidance and reduced survivorship and / or reproductive rate for breeding pairs occupying territories within 300 m of the effects assessment Construction Disturbance Area. Sensory disturbance is predicted to affect 3.9% of high and moderate suitability habitat that is available in the effects assessment Regional Study Area during existing conditions. Proposed mitigation measures are expected to minimize the effects of sensory disturbance on birds; however, sensory disturbance is expected to have minor residual effects on yellow rail, leading to small declines in survivorship and reproductive rate for local breeding populations. Currently, little information is available on yellow rail breeding biology, but females usually lay eight eggs per brood and raise one brood per season (Leston and Bookhout, 2020). This species is highly mobile and capable of relocating to portions of the effects assessment Regional Study Area not affected by the sensory disturbance from the Project. Changes to habitat availability and distribution in the effects assessment Local Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from sensory disturbance on yellow rail habitat availability, distribution, and survival and reproduction during Construction and Operation and Maintenance are **probable** and are expected to be confined to the **effects assessment Local Study Area**. Effects from sensory disturbance from Construction are expected to be **frequent** and reversible in the **short term**. Effects from sensory disturbance during Operation and Maintenance are predicted to be **continuous** (during the breeding and migration seasons) and irreversible (**long term**).

Residual effects from sensory disturbance on the ability of the yellow rail population in the effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**. As such, this Project–environment interaction **is carried forward** to the Cumulative Effects Assessment for birds (**Section 8**). The residual effects characterization is provided in **Table 7-73**.

7.3.3 Determination of Significance

7.3.3.1 All Bird Valued Components

Predicted residual effects on all bird Valued Components are negative but negligible in magnitude, unlikely to possible to occur (except effects from changes to groundwater quantity and dust emissions on bird habitat availability and distribution, which are probable or certain), and ranging from confined to the effects assessment Construction Disturbance Area (e.g., incidental take) to confined to the Effects Regional Study Area (e.g., increased public access).

Bird Valued Components are predicted to remain self-sustaining and ecologically effective with the implementation of the Project. Overall, the anticipated changes to bird Valued Component habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional populations. Effects from soil contamination from introduction and spread of invasive plants, emissions of criteria air contaminants, changes to erosion and sedimentation, changes to groundwater quantity, dust deposition, increased public access, incidental take, collisions with vehicles and equipment, and wildlife attractants on bird Valued Components are therefore predicted to be **not significant**.

7.3.3.2 Red-eyed Vireo

Predicted residual effects from habitat loss and sensory disturbance on red-eyed vireo habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Red-eyed vireo is predicted to remain self-sustaining and ecologically effective with the implementation of the Project. Overall, the anticipated changes to red-eyed vireo habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.3 Ovenbird

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on ovenbird habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Ovenbird is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to ovenbird habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significan**t.

7.3.3.4 Dark-eyed Junco

Predicted residual effects from habitat loss and sensory disturbance on dark-eyed junco habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Dark-eyed junco is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to dark-eyed junco habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.5 Osprey

Predicted residual effects from habitat loss and sensory disturbance on osprey habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or possible and are mostly irreversible (long term).

Osprey is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to osprey habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.6 Boreal Owl

Predicted residual effects from habitat loss on boreal owl habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or effects assessment Local Study Area. Effects are certain and are mostly irreversible (long term).

Boreal owl is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to boreal owl habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.7 Wilson’s Snipe

Predicted residual effects from habitat loss and sensory disturbance on Wilson’s snipe habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Wilson's snipe is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to Wilson's snipe habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.8 Mallard

Predicted residual effects from habitat loss and sensory disturbance on mallard habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain, probable, or possible and are mostly irreversible (long term).

Mallard is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to mallard habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.9 Palm Warbler

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on palm warbler habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Palm warbler is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to palm warbler habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.10 Common Yellowthroat

Predicted residual effects from habitat loss and sensory disturbance on common yellowthroat habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Common yellowthroat is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to common yellowthroat habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.11 Northern Waterthrush

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on northern waterthrush habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Northern waterthrush is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to northern waterthrush habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.12 Sora

Predicted residual effects from habitat loss and sensory disturbance on sora habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Sora is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to sora habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.13 Canada Warbler

Predicted residual effects from habitat loss and sensory disturbance on Canada warbler habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Canada warbler is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to Canada warbler habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.14 Evening Grosbeak

Predicted residual effects from habitat loss and sensory disturbance on evening grosbeak habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Evening grosbeak is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to evening grosbeak habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.15 Chimney Swift, Barn Swallow, and Bank Swallow

Predicted residual effects from habitat loss and sensory disturbance on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain, possible, or unlikely and are mostly irreversible (long term).

Chimney swift, bank swallow, and barn swallow are predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.16 Common Nighthawk and Eastern Whip-poor-will

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Common nighthawk and eastern whip-poor-will are predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.17 Eastern Wood-pewee

Predicted residual effects from habitat loss and sensory disturbance on eastern wood-pewee habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Eastern wood-pewee is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to eastern wood-pewee habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.18 Olive-sided Flycatcher

Predicted residual effects from habitat loss and sensory disturbance on olive-sided flycatcher habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Olive-sided flycatcher is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to olive-sided flycatcher habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.19 Bald Eagle

Predicted residual effects from habitat loss and sensory disturbance on bald eagle habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or possible and are mostly irreversible (long term).

Bald eagle is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to bald eagle habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.20 Short-eared Owl

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on short-eared owl habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Short-eared owl is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to short-eared owl habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.21 Lesser Yellowlegs

Predicted residual effects from habitat loss and sensory disturbance on lesser yellowlegs habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Lesser yellowlegs is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to lesser yellowlegs habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.22 Rusty Blackbird

Predicted residual effects from habitat loss, sensory disturbance, and increased edge habitat on rusty blackbird habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Rusty blackbird is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to rusty blackbird habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.3.23 Yellow Rail

Predicted residual effects from habitat loss and sensory disturbance on yellow rail habitat availability, distribution, and survival and reproduction are of low magnitude and are confined to the effects assessment Construction Disturbance Area or the effects assessment Local Study Area. Effects are certain or probable and are mostly irreversible (long term).

Yellow rail is predicted to remain self-sustaining and ecologically effective after implementation of the Project (i.e., there is no predicted change in the assessment endpoints). Overall, the anticipated changes to yellow rail habitat availability, distribution, and survival and reproduction from the Project are expected to remain within the resilience and adaptability limits of the regional population. The residual effects from the Project are therefore considered **not significant**.

7.3.4 Prediction Confidence and Uncertainty

Scientific inference is associated with uncertainty, and prediction confidence (i.e., the level of confidence in assessment results) depends on the level of uncertainty and the way this uncertainty is addressed. Primary factors affecting confidence in the predictions made in the birds assessment include:

- Availability and accuracy of baseline data;
- Level of understanding of baseline bird habitat conditions, range of natural variation, and the resilience of bird Valued Components to disturbance;
- Understanding of Project-related effects on complex ecosystems that contain interactions across different scales of time and space (e.g., exactly how the Project would influence bird Valued Components); and
- Level of certainty associated with the effectiveness of proposed mitigation measures, where applicable.

Uncertainty was managed by:

- Reviewing baseline studies and other relevant information related to existing bird habitat conditions in the effects assessment Local Study Area and effects assessment Regional Study Area;
- Completing quality assurance and quality control of baseline data;
- Applying conservative assumptions regarding the footprint area that may cause direct bird habitat loss to increase confidence that the effects were not underestimated;
- Applying conservative assumptions regarding the zone of influence for sensory disturbance that may cause indirect habitat loss to increase confidence that the effects were not underestimated;
- Empirical models were validated using field data collected for the Project;
- Comparing assessment results to relevant published scientific literature;
- Assuming high to moderate quality habitat for bird Valued Components is fully occupied and at carrying capacity;
- Assuming that bird Valued Components would be present in potential habitats where they may occur but were not observed; and
- Using the best available land cover data for Ecological Land Classification mapping in the effects assessment Local Study Area and effects assessment Regional Study Area.

Overall, there is a high degree of confidence (i.e., low level of uncertainty) in the predictions related to the changes to bird Valued Components. Mitigation measures and best management practices would be implemented to reduce effects on the bird Valued Components. There is a high level of confidence (i.e., low level of uncertainty) in the mitigation measures and best management practices as these are routinely and effectively implemented across Canada. There is a good understanding of the existing bird habitat conditions in the effects assessment Local Study Area, where surveys were completed during the bird habitat environment baseline study (**Attachment B**).

7.3.5 Summary

Table 7-73 provides a summary of the characterization of predicted residual effects and determination of significance for bird Valued Components.

Table 7-73: Characterization of Predicted Residual Effects and Determination of Significance for Bird Valued Components

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
All Birds	Construction	Introduction and Spread of Invasive Plant Species	Low amount of existing human disturbance has resulted in a minimal amount of invasive plant species in the Construction Disturbance Area. Invasive plant species are not a threat to bird habitat in the existing environment.	Negative	Invasive plant species often establish in fragmented landscapes along edge habitats, such as cleared areas adjacent to roads. Most non-native invasive plant species are introduced through various forms of human transport. The introduction and spread of invasive plant species (e.g., Phragmites) can affect plant community composition and function over the long term and degrade habitat for birds. Mitigations to limit the introduction and spread of invasive plants are well understood and the methods have been demonstrated to be effective Negligible changes to bird habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Short term / Reversible	Infrequent	Possible	Not Significant	Low	Indirect
All Birds	Operation and Maintenance	Introduction and Spread of Invasive Plant Species	Low amount of existing human disturbance has resulted in a minimal amount of invasive plant species in the Construction Disturbance Area. Invasive plant species are not a threat to bird habitat in the existing environment.	Negative	Mitigation measures to limit the introduction and spread of invasive plants are well understood and the methods have been demonstrated to be effective. Negligible changes to bird habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Long term / Reversible	Infrequent	Possible	Not Significant	Low	Indirect
All Birds	Construction	Groundwater Quantity	Low amount of existing human disturbance has resulted in a minimal change to groundwater quantity in the Local Study Area. Changes to groundwater quantity are not threats to bird habitat in the existing environment.	Negative	Changes to groundwater quantity from dewatering of pits, settling of the road base and/or accumulation of sedimentation in the road base can affect bird habitat availability and distribution. Effects are anticipated to be localized. Negligible changes to habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not Significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
	Operation and Maintenance	Groundwater Quantity	Low amount of existing human disturbance has resulted in a minimal change to groundwater quantity in the Local Study Area. Changes to groundwater quantity are not threats to bird habitat in the existing environment.	Negative	Changes to groundwater quantity from settling of the road base and/or accumulation of sedimentation in the road base can affect bird habitat availability and distribution. Effects are anticipated to be localized. Negligible changes to habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not Significant	Moderate	Indirect
All Birds	Construction	Dust Deposition	Low amount of existing human disturbance has resulted in a minimal amount of dust deposition in the Birds effects assessment Local Study Area. Changes to soil and vegetation from dust emissions are not a threat to bird habitat in the existing environment	Negative	The deposition of dust can affect plant health, and alter plant species composition, structure, and biomass. Mitigation measures to limit dust deposition are well understood and the methods have been demonstrated to be effective. Negligible changes to habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Local	Medium term / Reversible	Continuous	Certain	Not Significant	Low	Indirect
All Birds	Operation and Maintenance	Dust Deposition	Low amount of existing human disturbance has resulted in a minimal amount of dust deposition in the Birds effects assessment Local Study Area. Changes to soil and vegetation from dust emissions are not a threat to bird habitat in the existing environment	Negative	The deposition of dust can affect plant health, and alter plant species composition, structure, and biomass. Mitigation measures to limit dust deposition are well understood and the methods have been demonstrated to be effective. Negligible changes to habitat availability and distribution in the effects assessment Regional Study Area, relative to existing conditions.	Local	Long term / Irreversible	Continuous	Certain	Not Significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
All Birds	Construction	Increase in Public Access	Public access is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can improve public access, including access by hunters, into areas that are largely inaccessible by vehicle or off-highway-vehicle. As such, the introduction of linear features into remote areas can lead to an increase in hunter harvest pressures on birds.	Negative	The isolation of the Project from urban centres and the general lack of trails in the effects study areas are likely to limit increases in public access, relative to existing conditions. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Regional	Long term / Irreversible	Continuous	Unlikely	Not Significant	Low	Indirect
All Birds	Operation and Maintenance	Increase in Public Access	Public access is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can improve public access, including access by hunters, into areas that are largely inaccessible by vehicle or off-highway-vehicle. As such, the introduction of linear features into remote areas can lead to an increase in hunter harvest pressures on birds.	Negative	The isolation of the Project from urban centres and the general lack of trails in the effects study areas are likely to limit increases in public access, relative to existing conditions Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Regional	Long term / Irreversible	Continuous	Possible	Not Significant	Moderate	Indirect
All Birds	Construction	Incidental Take	Low amount of existing human disturbance and activities has resulted in a minimal amount of incidental take of birds in the Birds effects assessment Local Study Area and incidental take is not a large threat to bird survival and reproduction at existing conditions.	Negative	Mitigation measures to limit incidental take are well understood. However, vegetation clearing during nesting periods can still result in incidental take, particularly in forested areas. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Medium term / Reversible	Frequent	Possible	Not Significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
All Birds	Operation and Maintenance	Incidental Take	Low amount of existing human disturbance and activities has resulted in a minimal amount of incidental take of birds at existing conditions.	Negative	Mitigation measures to limit incidental take are well understood. However, mowing and pruning of vegetation during nesting periods can still result in incidental take. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Long term / Irreversible	Infrequent	Possible	Not Significant	Moderate	Indirect
All Birds	Construction	Collision Risk	Low amount of existing human disturbance and activities has resulted in a minimal amount of bird-vehicle collision risk at existing conditions.	Negative	The creation of a linear disturbance may cause birds to shift their territories away from the effects assessment Construction Disturbance Area. However, bird-vehicle collisions may still occur. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Medium term / Reversible	Frequent	Possible	Not Significant	Moderate	Indirect
All Birds	Operation and Maintenance	Collision Risk	Low amount of existing human disturbance and activities has resulted in a minimal amount of bird-vehicle collision risk at existing conditions.	Negative	The creation of a linear disturbance may cause birds to shift their territories away from the effects assessment Construction Disturbance Area. However, bird-vehicle collisions may still occur. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Long term / Irreversible	Continuous	Possible	Not Significant	Moderate	Indirect
All Birds	Construction	Wildlife Attractants	Low amount of existing human disturbance and activities has resulted in a minimal amount of wildlife attractants at existing conditions.	Negative	Mitigation measures to limit wildlife attractants are well understood. However, there is potential for attraction of birds and their predators to Project infrastructure and equipment. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Long term / Irreversible	Continuous	Possible	Not Significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
All Birds	Operation and Maintenance	Wildlife Attractants	Low amount of existing human disturbance and activities has resulted in a minimal amount of wildlife attractants at existing conditions.	Negative	Mitigation measures to limit wildlife attractants are well understood. However, there is potential for attraction of birds and their predators to Project infrastructure and equipment. Negligible changes to survival and reproduction in the effects assessment Regional Study Area, relative to existing conditions.	Construction Disturbance Area	Long term / Irreversible	Continuous	Possible	Not Significant	Moderate	Indirect
Red-eyed Vireo	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. One of the most common species detected during field surveys. Relatively high adult survival (53%) and reproductive rate (nest success 65%; three eggs per brood)., Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,336.9 ha of high and moderate suitability habitat (change of 1.2% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 557 nesting territories, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Red-eyed Vireo	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. One of the most common species detected during field surveys. Relatively high adult survival (53%) and reproductive rate (nest success 65%; three eggs per brood) Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for red-eyed vireo for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for red-eyed vireo within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Red-eyed Vireo	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the effects study areas at existing conditions	Negative	A total of 9,479.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.7% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Red-eyed Vireo	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the effects study areas at existing conditions	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Ovenbird	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 55% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (42-58%) and reproductive rate (nest success 60-70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 3,207.5 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 458 nesting territories, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Ovenbird	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 60% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (42-58%) and reproductive rate (nest success 60-70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for ovenbird for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for ovenbird within 60 to 80 years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Ovenbird	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 12,523.4 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Ovenbird	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Ovenbird	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Ovenbird	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Dark-eyed Junco	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (49%) and reproductive rate (nest success 55-76%, 3.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,716.7 ha of high and moderate suitability habitat (change of 1.9% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 238 nesting territories, or up to 1.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Dark-eyed Junco	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (49%) and reproductive rate (nest success 55-76%, 3.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for dark-eyed junco for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for dark-eyed junco within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Dark-eyed Junco	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 8,852.7 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Dark-eyed Junco	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Osprey	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Rarely detected during baseline surveys. Relatively high adult survival (>80%) and reproductive rate (nest success 38-63%, three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 3,013.9 ha of high and moderate suitability habitat (change of 3.3% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to seven nesting territories, or 3.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Osprey	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Rarely detected during baseline surveys. Relatively high adult survival (>80%) and reproductive rate (nest success 38-63%, three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for osprey for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for osprey within 60 to 80 years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Osprey	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 20,335.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (21.9% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Negligible changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Possible	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Osprey	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Possible	Not significant	Low	Indirect
Boreal Owl	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Frequently detected during baseline surveys. Relatively high adult survival (62-72%) and reproductive rate (nest success varies with prey abundance; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,539.4 ha of high and moderate suitability habitat (change of 1.3% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 31 territories, or 1.3% of the predicted number of territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Boreal Owl	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Frequently detected during baseline surveys. Relatively high adult survival (62-72%) and reproductive rate (nest success varies with prey abundance; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for boreal owl for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for boreal owl within 60 to 80 years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Wilson's Snipe	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (50-65%) and reproductive rate (nest success 41%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,600.5 ha of high and moderate suitability habitat (change of 1.0% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 176 nesting territories, or 2.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Wilson's Snipe	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 45% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (50-65%) and reproductive rate (nest success 41%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for Wilson's snipe for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for Wilson's snipe within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Wilson's Snipe	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 10,060.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Wilson's Snipe	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Mallard	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 85% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. The most abundant duck species in North America. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 10-70%; eight eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 3,685.3 ha of high and moderate suitability habitat (change of 0.8% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 14 nesting territories, or 0.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Mallard	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 85% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. The most abundant duck species in North America. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 10-70%; eight eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for mallard for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for mallard within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Mallard	Construction	Sensory Disturbance	Species is not considered sensitive to sensory disturbance but sensory disturbance could lead to reduced survivorship and / or reproductive rate. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Mallard	Operation and Maintenance	Sensory Disturbance	Species is not considered sensitive to sensory disturbance but sensory disturbance could lead to reduced survivorship and / or reproductive rate. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Palm Warbler	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 70% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Nest and adult survival rates are unknown; relatively high reproductive rate (4.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,101.6 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 135 nesting territories, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Palm Warbler	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Nest and adult survival rates are unknown; relatively high reproductive rate (4.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for palm warbler for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for palm warbler within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Palm Warbler	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 11,554.5 ha of high and moderate suitability habitat may be indirectly affected due to of sensory disturbance inducing habitat avoidance (3.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Palm Warbler	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Palm Warbler	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Palm Warbler	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Yellowthroat	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Moderate adult survival (45%) and reproductive rate (nest success 33-55%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,918.9 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 136 nesting territories, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Common Yellowthroat	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Moderate adult survival (45%) and reproductive rate (nest success 33-55%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for common yellowthroat for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for common yellowthroat within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Yellowthroat	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 11,481.3 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.5% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Common Yellowthroat	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Northern Waterthrush	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,454.3 ha of high and moderate suitability habitat (change of 0.7% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 103 nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Northern Waterthrush	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for northern waterthrush for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for northern waterthrush within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	High	Direct
Northern Waterthrush	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 8,487.8 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.2% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Northern Waterthrush	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Northern Waterthrush	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Northern Waterthrush	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Sora	Construction	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Uncommonly detected during field surveys. Relatively high reproductive rate (nest success 43-53%; eight to 11 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 557.5 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of less than one nesting territory, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Sora	Operation and Maintenance	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Uncommonly detected during field surveys. Relatively high reproductive rate (nest success 43-53%; eight to 11 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for sora for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for sora within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Sora	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 4,159.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Sora	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Canada Warbler	Construction	Habitat Loss and Alteration	Threatened species under the *Species at Risk Act* and is a Special Concern species under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Relatively high reproductive rate (nest success 96%; four to five eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 2,885.9 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Potential loss of up to 28 nesting territories, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Canada Warbler	Operation and Maintenance	Habitat Loss and Alteration	Threatened species under the *Species at Risk Act* and is a Special Concern species under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Relatively high reproductive rate (nest success 96%; four to five eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for Canada warbler for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for Canada warbler within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Canada Warbler	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 12,033.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.7% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Canada Warbler	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Evening Grosbeak	Construction	Habitat Loss and Alteration	Special Concern species under the *Species at Risk Act* and *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Highly nomadic; presence varies with food resources. Not detected during field surveys. Relatively high reproductive rate (nest success 55%; three to four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,857.3 ha of high and moderate suitability habitat (change of 2.1% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Evening Grosbeak	Operation and Maintenance	Habitat Loss and Alteration	Special Concern species under the *Species at Risk Act* and *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Highly nomadic; presence varies with food resources. Not detected during field surveys. Relatively high reproductive rate (nest success 55%; three to four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for evening grosbeak for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for evening grosbeak within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Evening Grosbeak	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 5,630.6 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Evening Grosbeak	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Chimney Swift, Bank Swallow, and Barn Swallow	Construction	Habitat Loss and Alteration	Chimney swift and bank swallow are Threatened under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Bank swallow is Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 0.2% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and species are not sensitive to human disturbance. None of these species were detected during field surveys and suitable habitat for these species was not observed during species-specific surveys. Relatively high reproductive rate for all species (nest success 44-90%). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 20.4 ha of high and moderate suitability habitat (change of 1.8% in the effects assessment Regional Study Area, relative to existing conditions). Negligible changes to the distribution of breeding territories and movements. Potential loss of less than one barn swallow nesting territory, or 1.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Chimney Swift, Bank Swallow, and Barn Swallow	Operation and Maintenance	Habitat Loss and Alteration	Chimney swift and bank swallow are Threatened under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Bank swallow is Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 0.2% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and species are not sensitive to human disturbance. None of these species were detected during field surveys and suitable habitat for these species was not observed during species-specific surveys. Relatively high reproductive rate for all species (nest success 44-90%). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for chimney swift, bank swallow, and barn swallow for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for chimney swift, bank swallow, and barn swallow within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Chimney Swift, Bank Swallow, and Barn Swallow	Construction	Sensory Disturbance	Species are not considered sensitive to sensory disturbance, but sensory disturbance could lead to reduced survivorship and / or reproductive rate. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Unlikely	Not significant	Low	Indirect
Chimney Swift, Bank Swallow, and Barn Swallow	Operation and Maintenance	Sensory Disturbance	Species are not considered sensitive to sensory disturbance, but sensory disturbance could lead to reduced survivorship and / or reproductive rate. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Unlikely	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Nighthawk and Eastern Whip-poor-will	Construction	Habitat Loss and Alteration	Common nighthawk is Special Concern Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Eastern whip-poor-will is Special Concern under Schedule 1 of *Species at Risk Act* and is Threatened under the *Endangered Species Act, 2007*. Eastern whip-poor-will may be downlisted to Special Concern in the future. Moderate and high suitability common nighthawk habitat covers approximately 45% of the effects assessment Regional Study Area at existing conditions. Moderate and high suitability eastern whip-poor-will habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area. These species will nest in areas of human disturbance. Common nighthawk was frequently detected during field surveys. Eastern whip-poor-will was infrequently detected during field surveys. Common nighthawks typically lay one brood per year. Eastern whip-poor-wills commonly raise two broods per year. Populations appear to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,609.5 ha of high and moderate suitability common nighthawk breeding habitat (change of 0.7% in the effects assessment Regional Study Area, relative to existing conditions). Removal of a total of 450.7 high and moderate suitability eastern whip-poor-will habitat (change of 2.3% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to four common nighthawk nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Potential loss of up to 88 eastern whip-poor-will territories, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Nighthawk and Eastern Whip-poor-will	Operation and Maintenance	Habitat Loss and Alteration	Common nighthawk is Special Concern Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Eastern whip-poor-will is Special Concern under Schedule 1 of *Species at Risk Act* and is Threatened under the *Endangered Species Act, 2007*. Eastern whip-poor-will may be downlisted to Special Concern in the future. Moderate and high suitability common nighthawk habitat covers approximately 45% of the effects assessment Regional Study Area at existing conditions. Moderate and high suitability eastern whip-poor-will habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area. These species will nest in areas of human disturbance. Common nighthawk was frequently detected during field surveys. Eastern whip-poor-will was infrequently detected during field surveys. Common nighthawks typically lay one brood per year. Eastern whip-poor-wills commonly raise two broods per year. Populations appear to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for common nighthawk and eastern whip-poor-will for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for common nighthawk within zero to five years after the establishment of vegetation and for eastern whip-poor-will within five to 190 years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps]) (common nighthawk) Long term / Reversible (temporary features [i.e., access roads, construction camps]) (eastern whip-poor-will)	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Nighthawk and Eastern Whip-poor-will	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 200 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 6,105.8 ha of high and moderate suitability common nighthawk habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (2.5% of habitat available in the effects assessment Regional Study Area during existing conditions). A total of 986.4 ha of high and moderate suitability eastern whip-poor-will habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Common Nighthawk and Eastern Whip-poor-will	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 200 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Common Nighthawk and Eastern Whip-poor-will	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Common Nighthawk and Eastern Whip-poor-will	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Eastern Wood-Pewee	Construction	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Moderate reproductive rate (nest success 32-56%; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 857.8 ha of high and moderate suitability habitat (change of 2.8% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to one nesting territories, or 2.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Eastern Wood-Pewee	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Moderate reproductive rate (nest success 32-56%; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for eastern wood-pewee for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for eastern wood-pewee within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Eastern Wood-Pewee	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 1,952.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Eastern Wood-Pewee	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Olive-sided Flycatcher	Construction	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 60% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Low reproductive rate. Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,691.0 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 23 nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Olive-sided Flycatcher	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 55% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. Low reproductive rate. Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for olive-sided flycatcher for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for olive-sided flycatcher within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Olive-sided Flycatcher	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 9,631.7 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.2% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Olive-sided Flycatcher	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Bald Eagle	Construction	Habitat Loss and Alteration	Special Concern under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area. Bald eagle nest locations and suitable habitat are concentrated around fish-bearing waterbodies and watercourses. Frequently detected during field surveys. High adult survival (>80%) and reproductive rate (nest success >50%). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 811.2 ha of high and moderate suitability habitat (change of 3.7% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to three nesting territories, or 3.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Bald Eagle	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area. Bald eagle nest locations and suitable habitat are concentrated around fish-bearing waterbodies and watercourses. Frequently detected during field surveys. High adult survival (>80%) and reproductive rate (nest success >50%). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for bald eagle for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for bald eagle within 60 to 80 years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Possible for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Bald Eagle	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 6,867.6 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (31.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Possible	Not significant	Low	Indirect
Bald Eagle	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Possible	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Short-eared Owl	Construction	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 35% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Not detected during field surveys. High reproductive rate (nest success 75-90%; average 5.6 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 824.3 ha of high and moderate suitability habitat (change of 0.4% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to ten nesting territories, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Short-eared Owl	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 35% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Not detected during field surveys. High reproductive rate (nest success 75-90%; average 5.6 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for short-eared owl for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for short-eared owl within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Short-eared Owl	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 500 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 9,481.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.0% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Short-eared Owl	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 500 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Short-eared Owl	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Short-eared Owl	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Lesser Yellowlegs	Construction	Habitat Loss and Alteration	Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the Effects Assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Moderate reproductive rate (fledgling success 27-34%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,684.7 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 13 nesting territories, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Lesser Yellowlegs	Operation and Maintenance	Habitat Loss and Alteration	Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the Effects Assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Infrequently detected during field surveys. Moderate reproductive rate (fledgling success 27-34%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for lesser yellowlegs for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for lesser yellowlegs within five to ten years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Long term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Lesser Yellowlegs	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 7,249.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.6% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Lesser Yellowlegs	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Rusty Blackbird	Construction	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. High reproductive rate (nest success 77-98%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 1,710.9 ha of high and moderate suitability habitat (change of 0.5% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 16 nesting territories, or 0.5% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Rusty Blackbird	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Commonly detected during field surveys. High reproductive rate (nest success 77-98%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for rusty blackbird for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat for rusty blackbird within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Rusty Blackbird	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 11,703.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.6% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Rusty Blackbird	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect
Rusty Blackbird	Construction	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect
Rusty Blackbird	Operation and Maintenance	Increase in Edge Habitat	Edge habitat associated with human linear disturbances is limited across most of the Birds effects assessment Regional Study Area because existing roads and trails are limited in the region with most concentrated in the southern portion of the effects study areas. Introducing linear features (e.g., roads and trails) can increase edge habitat, which could lead to small changes in predator-prey dynamics and bird survival and reproduction.	Negative	The construction of linear features (e.g., roads and trails) will increase edge habitat and may lead to small changes in predator-prey dynamics. As a result, a low magnitude of change to survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Moderate	Indirect

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Yellow Rail	Construction	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Detected once during field surveys. Moderate to high reproductive rate (8 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Removal of a total 557.5 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of less than one nesting territory, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct
Yellow Rail	Operation and Maintenance	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the effects assessment Regional Study Area at existing conditions. Minimal existing disturbance in the effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions. Detected once during field surveys. Moderate to high reproductive rate (8 eggs per brood). Population appears to be self-sustaining and ecologically effective in the effects assessment Regional Study Area at existing conditions.	Negative	Habitat lost during the construction of the Project will remain unavailable for yellow rail for the duration of the Operation and Maintenance Phase and is considered irreversible (permanent). The exception to this is for temporary features (i.e., access roads, construction camps) that will be decommissioned and reclaimed or left to revegetate and are expected to provide functional habitat yellow rail within zero to five years after the establishment of vegetation. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Construction Disturbance Area for habitat availability and survival and reproduction. Local for distribution (movement and connectivity).	Long term / Irreversible (permanent features [i.e., Community Access Road]) Medium term / Reversible (temporary features [i.e., access roads, construction camps])	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution (habitat connectivity and movement)	Not significant	Low	Direct

Valued Component	Phase	Predicted Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty	Direct / Indirect
Yellow Rail	Construction	Sensory Disturbance	Species may be sensitive to sensory disturbance within 350 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	A total of 3,710.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.9% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Short term / Reversible	Frequent	Probable	Not significant	Low	Indirect
Yellow Rail	Operation and Maintenance	Sensory Disturbance	Species may be sensitive to sensory disturbance within 350 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions.	Negative	The amount of habitat that may be indirectly affected by sensory disturbance during Operation and Maintenance Phase is predicted to be the same as during Construction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds effects assessment Regional Study Area relative to existing conditions.	Local	Long term / Irreversible	Continuous	Probable	Not significant	Low	Indirect

ha = hectare; % = percent; m = metre; > = greater than.

8 Cumulative Effects Assessment

The *Canadian Environmental Assessment Act,* 2012 (Government of Canada, 2012) requires that each Environmental Assessment of a project take into account any cumulative environmental effects that are likely to result from the project in combination with the environmental effects of other physical activities that have been or will be carried out.

This section presents the assessment of potential cumulative effects completed as part of the Project. The effects of present and reasonably foreseeable activities in the effects assessment Study Areas on Valued Components identified for the Project were assessed and results are described in the following sections.

The cumulative effects assessment builds on the results of the effects assessment described in **Section 7** and will consider the incremental changes that are predicted to have a likely residual adverse effect on a Valued Component.

8.1 Cumulative Effects Scoping

8.1.1 Valued Components with Residual Effects

The results of the effects assessment completed in **Section 7** which have been carried forward for assessment of cumulative effects are described in **Table 8-1.**

Table 8-1: Valued Components and Residual Effects

Valued Component	Residual Effect
Red-eyed Vireo	Direct removal of 2,336.9 ha of high and moderate suitability habitat (change of 1.2% in the effects assessment Regional Study Area, relative to existing conditions). A total of 9,479.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.7% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential direct loss of up to 557 nesting territories, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.
Ovenbird	Direct removal of 3,207.5 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). A total of 12,523.4 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 438 nesting territories, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Dark-eyed Junco	Direct removal of 2,716.7 ha of high and moderate suitability habitat (change of 1.9% in the effects assessment Regional Study Area, relative to existing conditions). A total of 8,852.7 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 238 nesting territories, or 1.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.

Valued Component	Residual Effect
Osprey	Direct removal of 3,013.9 ha of high and moderate suitability habitat (change of 3.3% in the effects assessment Regional Study Area, relative to existing conditions). A total of 20,335.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (21.9% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to seven nesting territories, or 3.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Negligible changes to survival and reproduction from sensory disturbance.
Boreal Owl	Direct removal of 2,539.4 ha of high and moderate suitability habitat (change of 1.3% in the effects assessment Regional Study Area, relative to existing conditions). No changes to habitat availability from sensory disturbance. Small changes to the distribution of breeding territories and movements from direct habitat loss. No changes to distribution from sensory disturbance. Potential loss of up to 31 nesting territories, or 1.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Negligible changes to survival and reproduction from sensory disturbance.
Wilson's Snipe	Direct removal of 2,600.5 ha of high and moderate suitability habitat (change of 1.0% in the effects assessment Regional Study Area, relative to existing conditions). A total of 10,060.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 176 nesting territories, or 2.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Mallard	Direct removal of 3,685.3 ha of high and moderate suitability habitat (change of 0.8% in the effects assessment Regional Study Area, relative to existing conditions). No changes to habitat availability from sensory disturbance. Small changes to the distribution of breeding territories and movements from direct habitat loss. No changes to distribution from sensory disturbance. Potential loss of up to 14 nesting territories, or 0.9% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.

Valued Component	Residual Effect
Palm Warbler	Direct removal of 2,101.6 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). A total of 11,554.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 135 nesting territories, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Common Yellowthroat	Direct removal of 1,918.9 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). A total of 11,481.3 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.5% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 136 nesting territories, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Northern Waterthrush	Direct removal of 1,454.3 ha of high and moderate suitability habitat (change of 0.7% in the effects assessment Regional Study Area, relative to existing conditions). A total of 8,487.8 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.2% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 103 nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.

Valued Component	Residual Effect
Sora	Direct removal of 557.5 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). A total of 4,159.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.4% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of one nesting territory, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Canada Warbler	Direct removal of 2,885.9 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). A total of 12,033.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.7% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 28 nesting territories, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Evening Grosbeak	Direct removal of 1,857.3 ha of high and moderate suitability habitat (change of 2.1% in the effects assessment Regional Study Area, relative to existing conditions). A total of 5,630.6 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements and survival and reproduction from direct habitat loss and sensory disturbance.
Chimney Swift, Bank Swallow, and Barn Swallow	Direct removal of 20.4 ha of high and moderate suitability habitat (change of 1.8% in the effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss. No changes to distribution from sensory disturbance. Negligible changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of one barn swallow nesting territory, or 1.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.

Valued Component	Residual Effect
Common Nighthawk and Eastern Whip-poor-will	Direct removal of 1,609.5 ha of high and moderate suitability common nighthawk habitat (change of 0.7% in the effects assessment Regional Study Area, relative to existing conditions). Direct removal of 450.7 ha of high and moderate suitability eastern whip-poor-will habitat (change of 2.3% in the effects assessment Regional Study Area, relative to existing conditions). A total of 6,105.8 ha of high and moderate suitability common nighthawk habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (2.5% of habitat available in the effects assessment Regional Study Area during existing conditions). A total of 986.4 ha of high and moderate suitability eastern whip-poor-will habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.1% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to four common nighthawk nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Potential loss of up to 88 eastern whip-poor-will nesting territories, or 2.3% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Eastern Wood-pewee	Direct removal of 857.8 ha of high and moderate suitability habitat (change of 2.8% in the effects assessment Regional Study Area, relative to existing conditions). A total of 1,952.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential direct loss of up to one nesting territories, or 2.8% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.
Olive-sided Flycatcher	Direct removal of 1,691.0 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). A total of 9,631.7 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.2% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential direct loss of up to 23 nesting territories, or 0.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.

Valued Component	Residual Effect
Bald Eagle	Direct removal of 811.2 ha of high and moderate suitability habitat (change of 3.7% in the effects assessment Regional Study Area, relative to existing conditions). A total of 6,867.6 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (31.3% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to three nesting territories, or 3.7% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.
Short-eared Owl	Direct removal of 824.3 ha of high and moderate suitability habitat (change of 0.4% in the effects assessment Regional Study Area, relative to existing conditions). A total of 9,481.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.0% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to ten nesting territories, or 0.4% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Lesser Yellowlegs	Direct removal of 1,684.7 ha of high and moderate suitability habitat (change of 1.1% in the effects assessment Regional Study Area, relative to existing conditions). A total of 7,249.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.6% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of up to 13 nesting territories, or 1.1% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.
Rusty Blackbird	Direct removal of 1,710.9 ha of high and moderate suitability habitat (change of 0.5% in the effects assessment Regional Study Area, relative to existing conditions). A total of 11,703.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.6% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential direct loss of up to 16 nesting territories, or 0.5% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance.

Valued Component	Residual Effect
Yellow Rail	Direct removal of 557.5 ha of high and moderate suitability habitat (change of 0.6% in the effects assessment Regional Study Area, relative to existing conditions). A total of 3,710.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.9% of habitat available in the effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements from direct habitat loss and sensory disturbance. Potential loss of one nesting territory, or 0.6% of the predicted number of nesting territories in the effects assessment Regional Study Area during existing conditions. Small changes to survival and reproduction from sensory disturbance and increased edge habitat.

ha = hectare*; % = percent.*

8.1.2 Spatial and Temporal Boundaries

8.1.2.1 Temporal Boundary

Temporal boundaries for the cumulative effects assessment correspond to the duration that the likely residual adverse effects of the Project are predicted to occur. There are currently no plans to decommission the Community Access Road as there is no expected / known end date for its need. Therefore, future suspension, decommissioning, and eventual abandonment of the Community Access Road was not considered in this Report. As a result, this assessment is limited to identifying and assessing cumulative effects during the Project Construction and Operations and Maintenance Phases .

The Project is planned to occur in two phases:

- **Construction Phase—**The time from start of construction, including site preparation activities, to the start of operation and maintenance of the Community Access Road. Decommissioning of construction works is included in the Construction Phase. The Construction Phase is anticipated to take approximately three to ten years to complete; and
- **Operation and Maintenance Phase—**The Operation and Maintenance Phase starts once construction activities are complete and lasts for the life of the Project. The Operation and Maintenance Phase of the Project is considered to be permanent based on the expected timeline for when major refurbishment of road components (e.g., bridges), is anticipated.

In determining the temporal boundaries, in particular the long duration of the Operation and Maintenance Phase, consideration was given to the long-term effects on the well-being of present and future generations.

8.1.2.2 Spatial Boundaries

The spatial boundary for the cumulative effects assessment corresponds to the geographic extent that the likely residual adverse effects of the Project are predicted to occur. The study areas used in the cumulative effects assessment are the same as the birds effects assessment Regional Study Area used for the residual effects assessment (**Table 8-2**).

Table 8-2: Spatial and Temporal Boundaries

Valued Component	Spatial Boundary	Temporal Boundary
All Birds	11 km buffer on either side of the centreline of the preferred Project route (506,756 ha)	■ Construction ■ Operation and Maintenance

ha = hectare*; km = kilometre.*

8.1.3 Physical Activities Inclusion List

To determine the spatial boundaries of potential cumulative effects, three related projects within the Birds effects assessment Regional Study Area have been considered and are listed below in **Table 8-3**.

Table 8-3: Project and Physical Activity Inclusion List

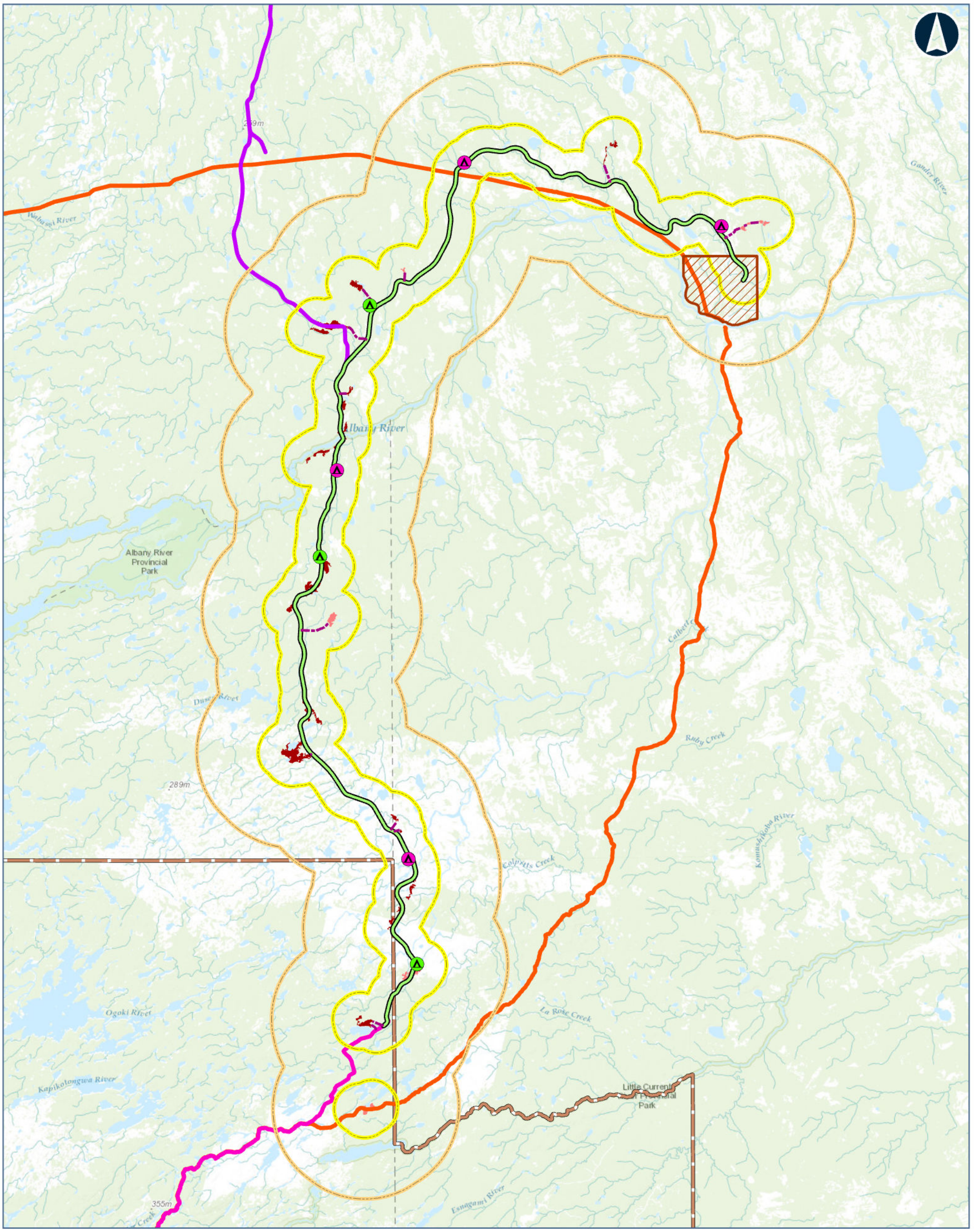
Project	Identified in *Tailored Impact Statement Guidelines* (Yes / No)	Location	Status	Distance (km) and Direction from the Project	Developer / Company	Project Start Date	Project Duration	Project Completion Date	Assumed Temporal Overlap with Community Access Road Activities (Y / N)	Project Description	Bird Valued Components Temporal Overlap with Project (Yes / No)	Bird Valued Components Spatial Overlap with Project (Y / N)	Included in Cumulative Effects Assessment (Yes / No)
Northern Road Link	Yes	Between the Community Access Road and Webequie Supply Road, northwestern Ontario	Impact Assessment ongoing	0 (adjacent or overlapping)	Webequie First Nation Marten Falls First Nation	October 28, 2020	Unknown	Unknown	Yes – construction and operation will overlap with Community Access Road Construction (expected for Northern Road Link to begin construction during construction of northern portion of Community Access Road).	▪ Marten Falls First Nation and Webequie First Nation are proposing to build, operate and maintain an multi-use road and associated infrastructure between the Community Access Road that has been proposed by Marten Falls First Nation and the supply road that has been proposed by Webequie First Nation. ▪ *Terms of Reference* for the preparation of an Environmental Assessment were approved March 3, 2023.	Yes	Local Study Area – Yes Regional Study Area – Yes	Yes
Anaconda and Painter Lake Road Upgrades	Yes	James Bay Lowlands	Unknown	0 (adjacent or overlapping)	In discussions: Ministry of Transportation, Ontario and Aroland First Nation	Not Started	2-5 years	Unknown	Yes –operation expected to overlap with Community Access Road Construction and Operation and Maintenance	▪ Upgrades to existing road will be required for heavy vehicles accessing the Community Access Road route during Construction and Operation and Maintenance. ▪ Currently discussions on proponency and scope of work are underway. ▪ Potential scope of work is expected to include roadway widening, culvert and bridge replacements / rehabilitations to accommodate higher weight vehicles, and road base improvements. ▪ This project will be completed prior to the start of the construction of the Community Access Road and therefore the upgrades to these roads is not	Yes	Local Study Area – Yes Regional Study Area – Yes	Yes

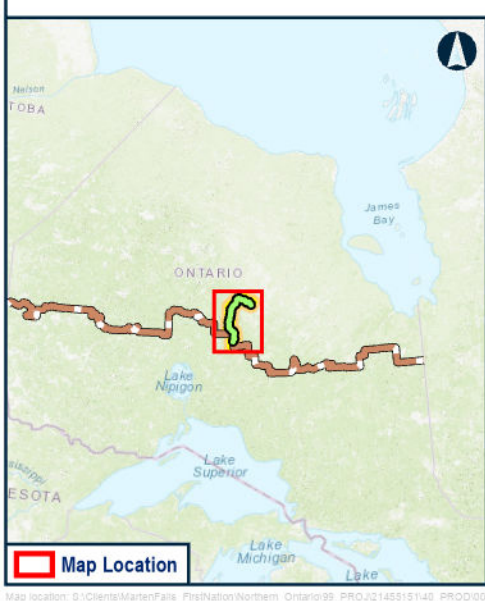
Project	Identified in *Tailored Impact Statement Guidelines* (Yes / No)	Location	Status	Distance (km) and Direction from the Project	Developer / Company	Project Start Date	Project Duration	Project Completion Date	Assumed Temporal Overlap with Community Access Road Activities (Y / N)	Project Description	Bird Valued Components Temporal Overlap with Project (Yes / No)	Bird Valued Components Spatial Overlap with Project (Y / N)	Included in Cumulative Effects Assessment (Yes / No)
										expected to overlap with the construction of the Community Access Road.			
Rapid Lynx Broadband	Yes	Matawa First Nation communities	Phase 1: Complete Phase 2: Ongoing	Phase 1 – 0 (adjacent or overlapping) Phase 2 – 57.69	Rapid Lynx	February 2020	Unknown	Unknown	Yes – operations of Phase 1 and operations and construction of Phase 2 expected to overlap with Community Access Road Construction and Operation and Maintenance Phases	▪ Approximately 810 km of fibre-optic cables, providing reliable high-speed internet service to five Matawa First Nation communities: Eabametoong, Marten Falls, Neskantage, Nibinamik and Webequie with an interconnection at Aroland.	Yes	Local Study Area – Yes Regional Study Area – Yes	Yes
Winter Road Realignment Project	No	Various	Ongoing	0	Ministry of Northern Economic Development and Growth	2025	Unknown	Unknown	Yes – construction and operations will overlap with Community Access Road Construction (expected to occur concurrently)	▪ Funding to remote northern communities for projects involving installation of water crossing infrastructure, such as pre-engineered bridges and culverts, and repairs to existing structures. ▪ Funding for approximately 3,200 kilometres of winter roads in Northern Ontario.	Yes	Yes	No, winter roads are included in the landcover for existing conditions.

km = kilometre; Y = yes; N = no; % = percent.

8.1.4 Summary of Outcome

The predicted residual effects identified in **Table 8-1** are applicable to all birds Valued Components. The three projects identified within **Table 8-3** have the potential for residual effects to overlap with the spatial and temporal boundaries of the birds Valued Components (**Table 8-2**). **Table 8-4** summarizes the outcome of the cumulative effects scoping and are shown on **Figure 8-1.**





LEGEND

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY

PHYSICAL ACTIVITIY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Physical Activities Inclusions in the Birds Regional Study Area

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-1

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2023), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 5:22 PM User Name: INBA08973

Table 8-4: Summary of Outcome

Past, Existing and Future Physical Activities / Projects	Valued Component Carried Forward	Results of Scoping
Northern Road Link	■ All bird Valued Components	Both the Community Access Road Project and Northern Road Link project have the potential for residual effects on the habitat quantity and quality of bird Valued Components through habitat loss and alteration, sensory disturbance and linear barriers, and residual effects on the survival and reproduction of all bird Valued Components from habitat loss and alteration, sensory disturbance, linear barriers, increased predator access, increased public access, collisions with vehicles, and fugitive dust emissions. The residual effects from both projects may overlap temporally during the Construction and Operation and Maintenance Phases. Spatially, residual effects from the Northern Road link project may overlap with the residual effects from the Community Access Road Project within the Local and Regional Study Areas.
Anaconda and Painter Lake Road Upgrades	■ All bird Valued Components	Both the Community Access Road Project and Anaconda and Painter Lake road upgrades project have the potential for residual effects on the habitat quantity and quality of bird Valued Components through habitat loss and alteration, sensory disturbance and linear barriers, and residual effects on the survival and reproduction of all bird Valued Components from habitat loss and alteration, sensory disturbance, linear barriers, increased predator access, increased public access, collisions with vehicles, and fugitive dust emissions. The residual effects from both projects may overlap temporally during the Construction and Operation and Maintenance Phases. Spatially, residual effects during operation from the Anaconda and Painter Lake road project may overlap with the residual effects from the Community Access Road Project within the Local and Regional Study Areas.
Rapid Lynx Broadband	■ All bird Valued Components	Both the Community Access Road Project and Rapid Lynx Broadband project have the potential for residual effects on the habitat quantity and quality of bird Valued Components through habitat loss and alteration, sensory disturbance and linear barriers, and residual effects on the survival and reproduction of all bird Valued Components from habitat loss and alteration, sensory disturbance, linear barriers, increased predator access, increased public access, collisions with vehicles, and fugitive dust emissions. The residual effects from both projects may overlap temporally during the Construction and Operation and Maintenance Phases. Spatially, residual effects from the Rapid Lynx Broadband project would overlap with the residual effects from the Community Access Road Project within the Local and Regional Study Areas.

8.2 Cumulative Effects Assessment

8.2.1 All Bird Valued Components

8.2.1.1 Changes to Groundwater

8.2.1.1.1 Potential Cumulative Effects

8.2.1.1.1.1 Habitat Availability and Distribution

The Project, the Northern Road Link project and the Anaconda and Painter Lake Road upgrades may cause alterations to drainage patterns, recharge rates and increased or decreased groundwater levels due to activities such as road construction through wetlands, changes to topography, short-term water-taking, pit / quarry dewatering and discharge of water.

It is expected that the Northern Road Link and Anaconda and Painter Lake road upgrades would also require development of aggregate pits and quarries to complete their construction. However, no additional pits or quarries are expected to be required where the projects overlap. Therefore, no additional cumulative changes to groundwater quantity due to pit or quarry dewatering in the areas of spatial or temporal overlap between the Project and the Northern Road Link and Anaconda and Painter Lake road upgrades are expected.

It is expected that the road crossings in peatlands used for the Project, the Northern Road Link, and the Anaconda and Painter Lake road upgrades would have similar potential to result in residual effects. The road projects would not be expected to cross the same peatland area in more than one location with the possible exception of the junction between the Project and the Northern Road Link. Therefore, no additional cumulative changes to groundwater quantity due to road construction in peatland areas in the areas of spatial or temporal overlap between the Project and the Northern Road Link and Anaconda and Painter Lake road upgrades are expected. A more detailed discussion of potential effects on peatlands is provided in the *Peatlands Technical Support Document: Existing Conditions and Effects Assessment Report* (WSP, 2026d).

Because the Rapid Lynx Broadband project is anticipated to be buried approximately one m underground and underneath waterbodies, only temporary and minimal changes in groundwater are expected during construction, which does not overlap temporally with the Project.

A further discussion on cumulative effects on groundwater quantity is provided in the *Groundwater & Geochemistry Technical Support Document: Existing Conditions & Effects Assessment* (WSP 2026e).

As discussed in **Section 7.3.1.4**, changes to groundwater can cause changes to bird habitat availability and distribution. If changes to groundwater regimes are sufficient to change the

composition of a vegetation community, then the availability, distribution, composition, and function of that altered vegetation community type will also eventually be affected within the effects assessment Regional Study Area. These indirect effects on retained vegetation communities are difficult to quantify as they largely depend on the effectiveness of the mitigation measures that are implemented.

8.2.1.1.2 Mitigation and Enhancement Measures

It is anticipated that mitigation measures will be implemented to limit changes to groundwater quality from dust suppression chemicals during the construction and operation and maintenance of the Northern Road Link and upgraded Anaconda and Painter Lake roads will be similar to those implemented for the Project.

As a best practice, it is suggested that the monitoring programs of the Project and any reasonably foreseeable developments share relevant monitoring data for areas where predicted effects may overlap.

8.2.1.1.3 Predicted Cumulative Effects

Due to the predicted similar aggregate requirements and residual effects of the Project and the Northern Road Link and Anaconda and Painter Lake road upgrades it is not expected that there would be any additional pit or quarry development and dewatering in the areas where the projects overlap.

Due to the limited spatial and temporal overlaps of the Project and reasonably foreseeable developments, it is not generally expected that there would be any additional cumulative effects due to road construction in peatland areas. There may be potential for additional cumulative effects beyond the predicted residual effects levels in the area where the Project and the Northern Road Link would meet if they both cross the same peatland area.

8.2.1.1.4 Characterization of Predicted Cumulative Effects

The Project and other reasonably foreseeable developments may cause alterations to drainage patterns and increase or decrease groundwater levels, thereby affecting bird habitat availability and distribution. However, with the effective implementation of the mitigation measures and the use of best management practices, it is anticipated that cumulative residual effects on bird Valued Components from changes to groundwater will be minimized and will be regulated through permitting. Effects from changes to groundwater quantity are predicted to be **probable**, **irreversible (long term)**, **continuous**, and occur within the **cumulative effects Regional Study Area**. Effects from changes to groundwater quality on the ability of the bird populations in the cumulative effects Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible** in magnitude.

8.2.1.1.5 Determination of Significance of Cumulative Effects

Overall, the anticipated changes to bird Valued Component habitat availability and distribution from changes to groundwater quantity from reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional populations. That is, bird Valued Components are predicted to remain self-sustaining and ecologically effective after cumulative effects changes to groundwater on habitat from reasonably foreseeable developments. As such, effects from changes to groundwater on bird Valued Components are predicted to be **not significant**.

8.2.1.2 Dust Deposition

8.2.1.2.1 Potential Cumulative Effects

8.2.1.2.1.1 Habitat Availability and Distribution

Construction

Construction and use of the upgraded Anaconda and Painter Lake roads and Rapid Lynx Broadband project are assumed to begin prior to construction of the Project. The construction and operation and maintenance of the upgraded Anaconda and Painter Lake road and the construction and maintenance of the Rapid Lynx Broadband project are anticipated result in increases in dust deposition that will be cumulative with dust deposition created during Project Construction.

Accumulation of airborne dust produced from the Project and other reasonably foreseeable developments may result in direct, localized changes to vegetation. For example, deposition of airborne dust onto vegetation can smother plant tissues, hinder gas exchange, and reduce photosynthesis by physically blocking sunlight (Farmer 1993). Consequently, the deposition of dust can and alter plant species composition, structure, and biomass. As a result, dust generated by Project construction activities could adversely affect birds by degrading habitat quality and forage availability and distribution. More details of the potential effects of dust deposition on bird habitat availability and distribution are provided in **Section 7.3.1.1.3.1**.

Operation and Maintenance

Construction and operation and maintenance of the Northern Road Link project is assumed to be begin during the Operation and Maintenance Phase of the Project. Operation and maintenance of the upgraded Anaconda and Painter Lake roads and Rapid Lynx Broadband project will continue through Operation and Maintenance of the Project. The operation and maintenance of the upgraded Anaconda and Painter Lake road, the construction and operation and maintenance of the Northern Road Link project, and the maintenance of the Rapid Lynx Broadband project are anticipated result in increases in dust deposition that will be cumulative with dust deposition created during Project Operation and

Maintenance. Effects of cumulative dust deposition from reasonably foreseeable developments on bird habitat availability and distribution will be the same as described in the Construction section, above, and in **Section 7.3.1.1.3.1**.

8.2.1.2.2 Mitigation and Enhancement Measures

It is anticipated mitigation measures that will be implemented to limit dust deposition during the construction and operation and maintenance of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project. Standard mitigation measures and best practices to limit dust deposition are well understood and the methods have been demonstrated to be effective.

8.2.1.2.3 Predicted Cumulative Effects

The Project, Northern Road Link, and upgraded Anaconda and Painter Lake roads will generate dust emissions starting in construction that will extend through operation and maintenance of the projects. Dust generation is expected to higher during operation than construction of the Project, Northern Road Link, and upgraded Anaconda and Painter Lake roads due to the potential use of the roads by several hundred vehicles per day during operation of the projects. There is anticipated to be comparatively little construction traffic when compared to traffic expected during operation and maintenance of the projects. Dust generation from the Rapid Lynx Broadband project is only anticipated during construction and maintenance of the project as there is no operation traffic associated with this project.

Additionally, mitigation measures to limit dust emissions are predicted to be more effective during construction and maintenance than during operation of the reasonably foreseeable road developments because construction and maintenance traffic and equipment will be managed by contractors and more easily controlled, while, during operation, the road projects will be used by public vehicles. Cumulative dust deposition due to reasonably foreseeable road developments is predicted to result in negligible but certain changes to vegetation quality and, thereby, bird habitat availability and distribution in the effects assessment Regional Study Area. As such, there are predicted be cumulative residual effects on bird habitat availability and distribution that will start prior to construction of the Project that will extend through Operation and Maintenance of the Project.

8.2.1.2.4 Characterization of Predicted Cumulative Effects

Construction and Operation and Maintenance of the Project and other reasonably foreseeable developments, particularly roads such as the Northern Road Link and upgraded Anaconda and Painter Lake roads, are expected to result in cumulative increases in dust emissions compared to existing conditions. Although mitigation measures will be implemented to reduce dust emissions, dust deposition from reasonably foreseeable developments is predicted to degrade vegetation immediately adjacent to the projects.

Effects from dust emissions are predicted to be **certain**, **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects Regional Study Area**. Effects from dust emissions on the ability of the bird populations in the cumulative effects Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **negligible** in magnitude.

8.2.1.2.5 Determination of Significance of Cumulative Effects

Overall, the anticipated changes to bird Valued Component habitat availability and distribution from dust deposition from reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional populations. That is, bird Valued Components are predicted to remain self-sustaining and ecologically effective after cumulative effects dust deposition on habitat from reasonably foreseeable developments. As such, effects from dust deposition on bird Valued Components are predicted to be **not significant**.

8.2.2 Red-eyed Vireo

8.2.2.1 Habitat Loss and Alteration

8.2.2.1.1 Potential Cumulative Effects

8.2.2.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,821.3 ha of high suitability and 1,587.7 ha of moderate suitability red-eyed vireo breeding habitat. This represents a change of 1.8% and 1.6% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-5**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 97,781.1 and 99,890.1 ha of high and moderate suitability habitat, respectively, available for red-eyed vireo after implementation of the Project and other reasonably foreseeable developments (**Table 8-5**).

Effects from habitat loss from the upgraded Anaconda and Painter Lake roads and Rapid Lynx Broadband project are assumed to begin prior to Construction of the Project and continue through Operation and Maintenance of the Project. Effects from habitat loss from the Northern Road Link are assumed to begin and continue through Operation and Maintenance of the Project.

Table 8-5: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Red-eyed Vireo

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	99,602.4	97,781.1	1,821.3	1.8
Moderate	101,477.9	99,890.1	1,587.7	1.6
Low	131,948.0	129,731.0	2,217.0	1.7
Poor	173,536.9	171,855.8	1,681.0	0.9

Note: There are 190.6 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks. Generally, in red-eyed vireo habitat that is temporarily influenced by fire; individuals may return to burned areas within one to two years (Rush et al., 2012). This effect may be similar for habitats affected by insect outbreaks.

Increased temperatures, wildfires, and insect outbreaks may affect the condition of boreal forest ecosystems in Ontario by shifting sites to deciduous forests, which may benefit red-eyed vireo. Therefore, climate change and insect outbreaks may improve habitat availability for red-eyed vireo in the cumulative effects Regional Study Area in the future, relative to existing conditions.

8.2.2.1.1.2 Distribution

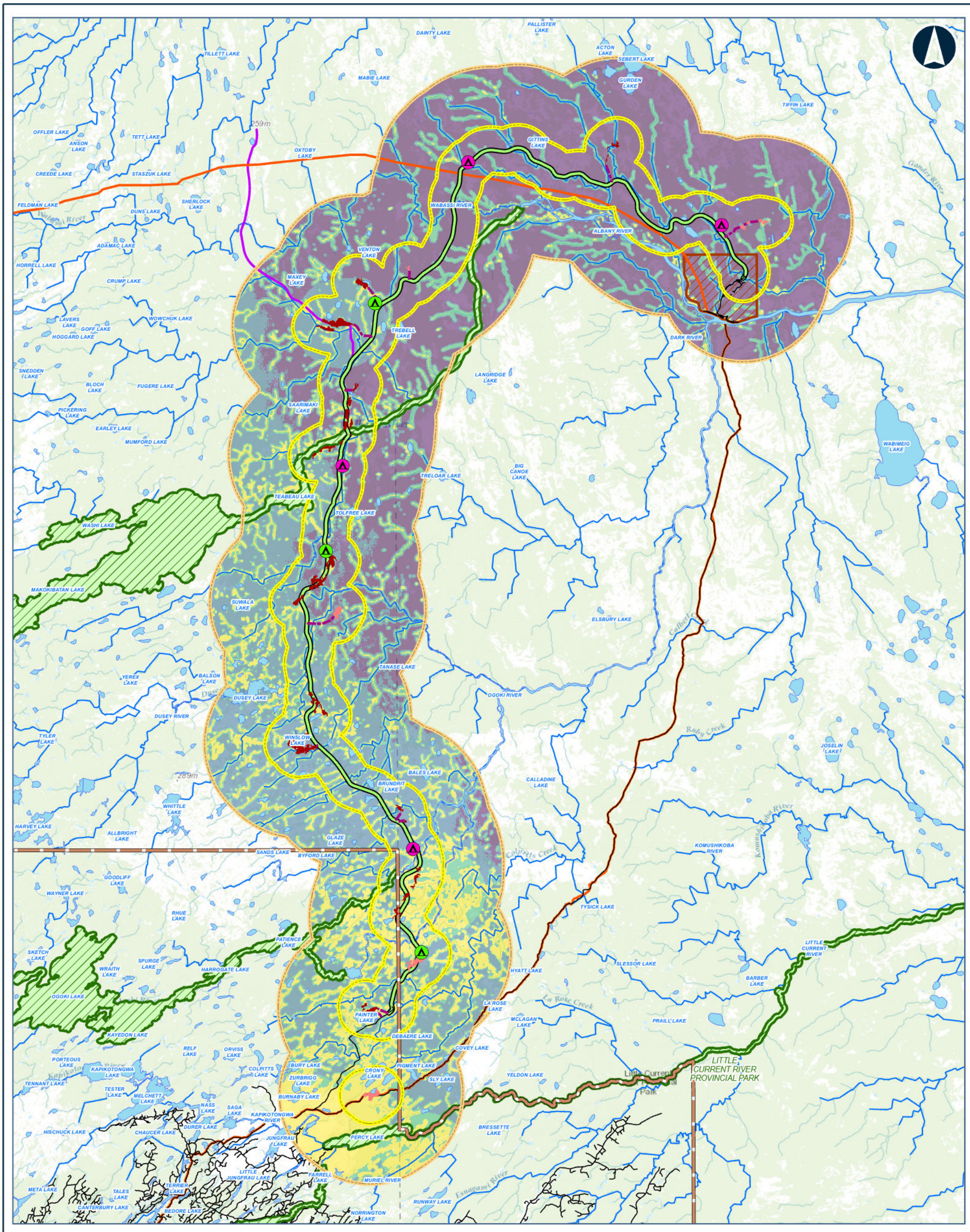
After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for red-eyed vireo remains similar as described during existing conditions with the majority of high suitability habitat patches concentrated in the southern portion of the cumulative effects assessment Regional Study Area associated with deciduous, mixedwood, and riparian areas.

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for red-eyed vireos. As such, during construction and operation and maintenance of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause red-eyed vireos to shift their territories away from the project footprints. A study in the boreal forest of the Northwest Territories found that some passerine bird species move their territories away from human linear disturbance features (Machtans, 2006). The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to red-eyed vireo distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act also as barriers to red-eyed vireo movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., cleared 60 to 100 m wide right-of-way), and the right-of-way that will be retained for access and maintenance to the Rapid Lynx Broadband project is assumed to be 100 m. A study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for red-eyed vireos after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of red-eyed vireos in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 9%, 12%, and 20% of red-eyed vireo range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society 2024). However, most of this range reduction will occur in the southern portion of this species' range and the range of this species in Ontario will be generally maintained or expanded under these temperature regimes (National Audubon Society, 2024). If temperatures warm by 1.5°C to 3.0°C, the red-eyed vireo range in North America is predicted to increase by 15% to 23%, relative to current conditions, and this includes range expansion in northern Ontario (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

RED-EYED VIREO HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Red-eyed Vireo in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-2

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8.2.2.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect red-eyed vireo survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. However, a study in the Athabasca Oil Sands region of Alberta found that red-eyed vireo abundance was positively associated with the amount of linear disturbance on the landscape (Mahon et al., 2019). As such, the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may increase red-eyed vireo abundance in the cumulative effects Regional Study Area.

To be conservative, the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,409.1 ha of high and moderate suitability red-eyed vireo habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 23.8 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 812 nesting territories from the Project and other reasonably foreseeable developments, or 16.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Red-eyed vireo has low vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes) in the future. These extreme weather events can have an effect on migratory bird populations, such as red-eyed vireo, during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting as insect life cycles are primarily related to spring temperatures, while timing of bird migration may be influenced by factors other than climate (e.g., photoperiod) (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). In eastern North America, red-eyed vireo appears vulnerable to this timing disjunct because this species is arriving on breeding grounds later than was typical 100 years ago (Butler, 2003). One factor for this may be that climate change may cause a delay of the onset of spring immediately south of the Great Lakes; this may delay caterpillar development on southern migratory staging areas and limit the amount of food available for fattening up prior to migratory flights (Strode, 2003). If spring continues to arrive later south of the Great Lakes region, this may increase pressure on caterpillar specialist populations, such as red-eyed vireo, by widening the time gap between peak insect emergence in their migratory staging areas and northern breeding grounds (Strode, 2003).

8.2.2.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.2.1.3 Predicted Cumulative Effects

After mitigation, potential red-eyed vireo breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on red-eyed vireo habitat availability, distribution, and survival and reproduction from human developments; climate change may have positive effects on red-eyed vireo.

8.2.2.1.4 Characterization of Predicted Cumulative Effects

Red-eyed vireo is one of the most common species detected during field surveys and is one of the most abundant breeding songbirds in the forests of eastern North America (Cimprich et al., 2020). Moderate and high suitability red-eyed vireo nesting habitat covers approximately 40% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. Available information suggests that red-eyed vireo in the cumulative effects assessment Regional Study Area is self--sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,409.1 ha of high and moderate suitability habitat (combined), representing 1.7% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of red-eyed vireo given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to red-eyed vireo movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of red-eyed vireo and vireo habitat in the cumulative effects assessment Regional Study Area.

All reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects from habitat loss on bird habitat availability, distribution, and survival and reproduction.

Effects from direct habitat loss and alteration from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on red-eyed vireo are predicted to be **certain or probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss and alteration from the Project and other reasonably foreseeable developments on the ability of the red-eyed vireo population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Red-eyed vireo in northern Ontario has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is maintained or increased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society 2024). As such, effects from climate change are predicted to have **possible**, **irreversible (long term)**, **continuous**, and **neutral to positive effects** on the red-eyed vireo population **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.2.1.5 Determination of Significance

Red-eyed vireo is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to red-eyed vireo habitat availability, distribution, and survival and reproduction from habitat loss and alteration due to the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**. Effects from climate change are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.2.2 Sensory Disturbance

8.2.2.2.1 Potential Cumulative Effects

8.2.2.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable red-eyed vireo

habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by red-eyed vireo due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 13,566.1 ha of high and moderate suitability red-eyed vireo habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operation and maintenance of these projects. This is 6.8% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-6**).

Table 8-6: Changes to Red-eyed Vireo Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	99,602.4	92,712.6	6,889.8	6.9
Moderate	101,477.9	94,801.6	6,676.2	6.6
Low	131,948.0	123,174.6	8,773.5	6.7
Poor	173,536.9	164,498.6	9,038.3	5.2

Note: There are 190.6 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during Construction. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day and night over the life of the Northern Road Link project and along the full length of the road. Although traffic

levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when red-eyed vireos are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.2.2.1.2 Distribution

Sensory disturbance during construction and / or operation and maintenance of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on red-eyed vireo movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to red-eyed vireo distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when red-eyed vireos are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to red-eyed vireo distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the red-eyed vireo breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.2.2.1.3 Survival and Reproduction

The effects of noise on the survival and reproduction of red-eyed vireos are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). Environment and Climate Change Canada (2023d) indicates that noise levels greater than 50 decibels or ten decibels above ambient (background) noise can negatively affect birds. While the precise threshold for effects on red-eyed vireo survival and reproduction due to sensory disturbance is not known, adverse effects on red-eyed vireo survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operation and maintenance of these projects.

To be conservative, potential sensory disturbance effects and changes to red-eyed vireo survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when red-eyed vireos are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to red-eyed vireo survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the red-eyed vireo breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.2.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.2.2.3 Predicted Cumulative Effects

After mitigation, potential red-eyed vireo breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on red-eyed vireo habitat availability, distribution, and survival and reproduction.

8.2.2.2.4 Characterization of Predicted Cumulative Effects

Available information suggests that red-eyed vireo in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of red-eyed vireos occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.8% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Red-eyed vireo is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

All reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit sensory disturbance effects on bird habitat availability, distribution, and survival and reproduction.

Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **irreversible (long term), continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments are anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the red-eyed vireo population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.2.2.5 Determination of Significance

Red-eyed vireo is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to red-eyed vireo habitat availability, distribution, and survival and reproduction **from** sensory disturbance **due to the** Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.3 Ovenbird

8.2.3.1 Habitat Loss and Alteration

8.2.3.1.1 Potential Cumulative Effects

8.2.3.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 3,879.1 ha of high suitability and 1,268.9 ha of moderate suitability ovenbird breeding habitat. This represents a change of 2.1% and 1.3% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-7**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 180,681.9 and 99,026.1 ha of high and moderate suitability habitat, respectively, available for ovenbird after implementation of the Project and other reasonably foreseeable developments (**Table 8-7**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-7: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat loss for Ovenbird

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	184,560.9	180,681.9	3,879.1	2.1
Moderate	100,294.9	99,026.1	1,268.9	1.3
Low	41,290.5	40,889.5	401.1	0.9
Poor	180,396.0	178,637.9	1,758.2	0.9

Note: There are 213.2 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks. Forest habitat structure may not be suitable for ovenbirds until 20 years after a fire (Haney et al. 2008). This may also apply to forests that have been affected by insect outbreaks.

Increased temperatures, wildfires, and insect outbreaks may affect the condition of boreal forest ecosystems in Ontario by shifting sites to deciduous forests, which may benefit ovenbirds. Therefore, climate change and insect outbreaks may improve habitat availability for ovenbird in the cumulative effects Regional Study Area in the future, relative to existing conditions.

8.2.3.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for ovenbird remains similar as described during existing conditions with large patches of mixedwood and deciduous habitat and watercourses and waterbodies in the cumulative effects assessment Regional Study Area (**Figure 8-3**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for ovenbirds. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

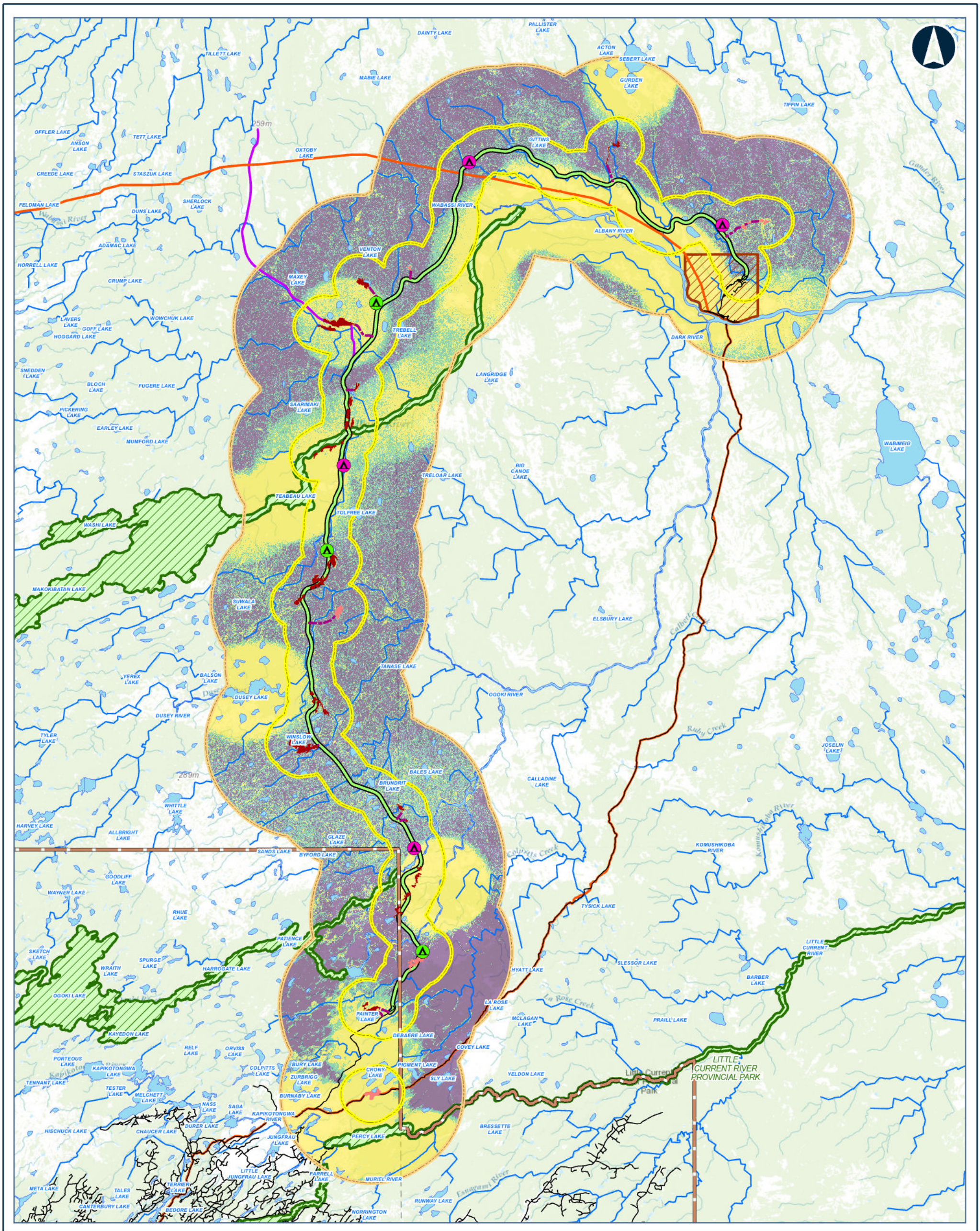
Ovenbirds generally require large tracts of undisturbed forest for breeding. As such, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause ovenbirds to shift their territories away from the project footprints. The

Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to ovenbird distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act also as barriers to ovenbird movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., 60 to 100 m wide), and the Rapid Lynx Broadband project will be 100 m wide. A study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for ovenbirds after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of ovenbirds in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

The removal of habitat due to the Northern Road Link and Rapid Lynx Broadband projects is predicted to result in a change to the distribution of ovenbird breeding territories and movements in the cumulative effects assessment Regional Study Area.

Overall, increases in temperatures are predicted to remove 35%, 46%, and 71% of ovenbird range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in northern Ontario is maintained, relative to current conditions, under temperature increases of 1.5°C and 2.0°C but temperature increases of 3.0°C may result in the loss of ovenbird distribution from much of northeastern Ontario (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OVENBIRD HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Ovenbird in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-3

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8.2.3.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect ovenbird survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 5,147.9 ha of high and moderate suitability ovenbird habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 14.3 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 735 nesting territories from the Project and other reasonably foreseeable developments, or 1.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Ovenbird has moderate vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on ovenbird populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, ovenbirds appear to be arriving on their breeding grounds earlier, possibly responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow ovenbirds to adapt to future climate change.

8.2.3.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.3.1.3 Predicted Cumulative Effects

After mitigation, potential ovenbird breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on ovenbird habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.3.1.4 Characterization of Predicted Cumulative Effects

Ovenbird is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Ovenbird is a common breeding species south of the southern portion of the Hudson Bay Lowland ecozone (Natural Heritage Information Centre, 2023). This species was commonly detected during field surveys. Moderate and high suitability ovenbird nesting habitat covers approximately 60% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. Available information suggests that ovenbird in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 5,147.9 ha of high and moderate suitability habitat (combined), representing 1.8% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of ovenbird given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to ovenbird movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of ovenbirds and ovenbird habitat in the cumulative effects assessment Regional Study Area.

All reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects from habitat loss and alteration on bird habitat availability, distribution, and survival and reproduction.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on ovenbird are predicted to be **certain or probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the ovenbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Ovenbird has moderate vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is maintained, relative to current conditions, under temperature increases of 1.5°C and 2.0°C but temperature increases of 3.0°C may result in the loss of ovenbird distribution from much of northeastern Ontario (National Audubon Society 2024). As such, effects from climate change are predicted to have **negative, possible**, **permanent**, **continuous**, and **low to moderate magnitude** effects on the ovenbird population; effects are **irreversible (long term)** and will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.3.1.5 Determination of Significance

Ovenbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to ovenbird habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the ovenbird population beyond the cumulative effects assessment Regional Study Area, especially if temperatures increase by 3.0°C relative to current conditions.

8.2.3.2 Sensory Disturbance

8.2.3.2.1 Potential Cumulative Effects

8.2.3.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable ovenbird habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by ovenbird due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and

Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 18,983.4 ha of high and moderate suitability ovenbird habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operation and maintenance of these projects. This is 6.7% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-8**).

Table 8-8: Changes to Ovenbird Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	184,560.9	170,891.5	13,669.5	7.4
Moderate	100,294.9	94,981.1	5,313.9	5.3
Low	41,290.5	39,596.4	1,694.1	4.1
Poor	180,396.0	173,477.6	6,918.4	3.8

Note: There are 213.2 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when ovenbirds are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.3.2.1.2 Distribution

Sensory disturbance during construction and / or operation and maintenance of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on ovenbird movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to ovenbird distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when ovenbirds are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to ovenbird distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the ovenbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.3.2.1.3 Survival and Reproduction

The effects of noise on the survival and reproduction of ovenbirds are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching

predators) (Ortega, 2012). While the precise threshold for effects on ovenbird survival and reproduction due to sensory disturbance is not known, adverse effects on ovenbird survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to ovenbird survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when ovenbirds are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to ovenbird survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the ovenbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.3.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.3.2.3 Predicted Cumulative Effects

After mitigation, potential ovenbird breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on ovenbird habitat availability, distribution, and survival and reproduction.

8.2.3.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of ovenbirds occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.7% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects.

Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Ovenbird is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the ovenbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.3.2.5 Determination of Significance

Ovenbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to ovenbird habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.3.3 Increase in Edge Habitat

8.2.3.3.1 Potential Cumulative Effects

8.2.3.3.1.1 Survival and Reproduction

The creation of forest edge due to the construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects may facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002). Interior-forest nesting birds, such as ovenbird, may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased forest edge habitat (Keyser et al., 1998).

8.2.3.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.3.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on ovenbird survival and reproduction.

8.2.3.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. However, ovenbirds have a moderate to high annual adult survival rate (42% to 58%). This species has high reproductive rate; nest success in unfragmented landscapes ranges from 60% to 70% and this species lays four eggs per brood and raises one brood per season (Porneluzi et al., 2020). As such, this is expected to have minor residual effects on ovenbird, leading to small declines in survivorship and reproductive rate for the breeding population. However, ovenbird has high yearly survival and nest success rates. Changes to predation risk due to increased edge habitat from construction of reasonably foreseeable developments are not expected to have a measurable effect on survival and reproduction for the population in the in the cumulative effects assessment Regional Study Area.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on ovenbird are predicted to be **probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the ovenbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.3.3.5 Determination of Significance

Ovenbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to ovenbird survival and reproduction due to increased edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.4 Dark-eyed Junco

8.2.4.1 Habitat Loss and Alteration

8.2.4.1.1 Potential Cumulative Effects

8.2.4.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 3,318.7 ha of high to moderate suitability dark-eyed junco breeding habitat. This represents a change of 2.3% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-9**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 142,564.6 ha of high and moderate suitability habitat available for dark-eyed junco after implementation of the Project and other reasonably foreseeable developments (**Table 8-9**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-9: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Dark-eyed Junco

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	145,883.3	142,564.6	3,318.7	2.3
Low to Poor	360,863.7	356,874.2	3,989.6	1.1

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).

ha = hectare; % = percent.

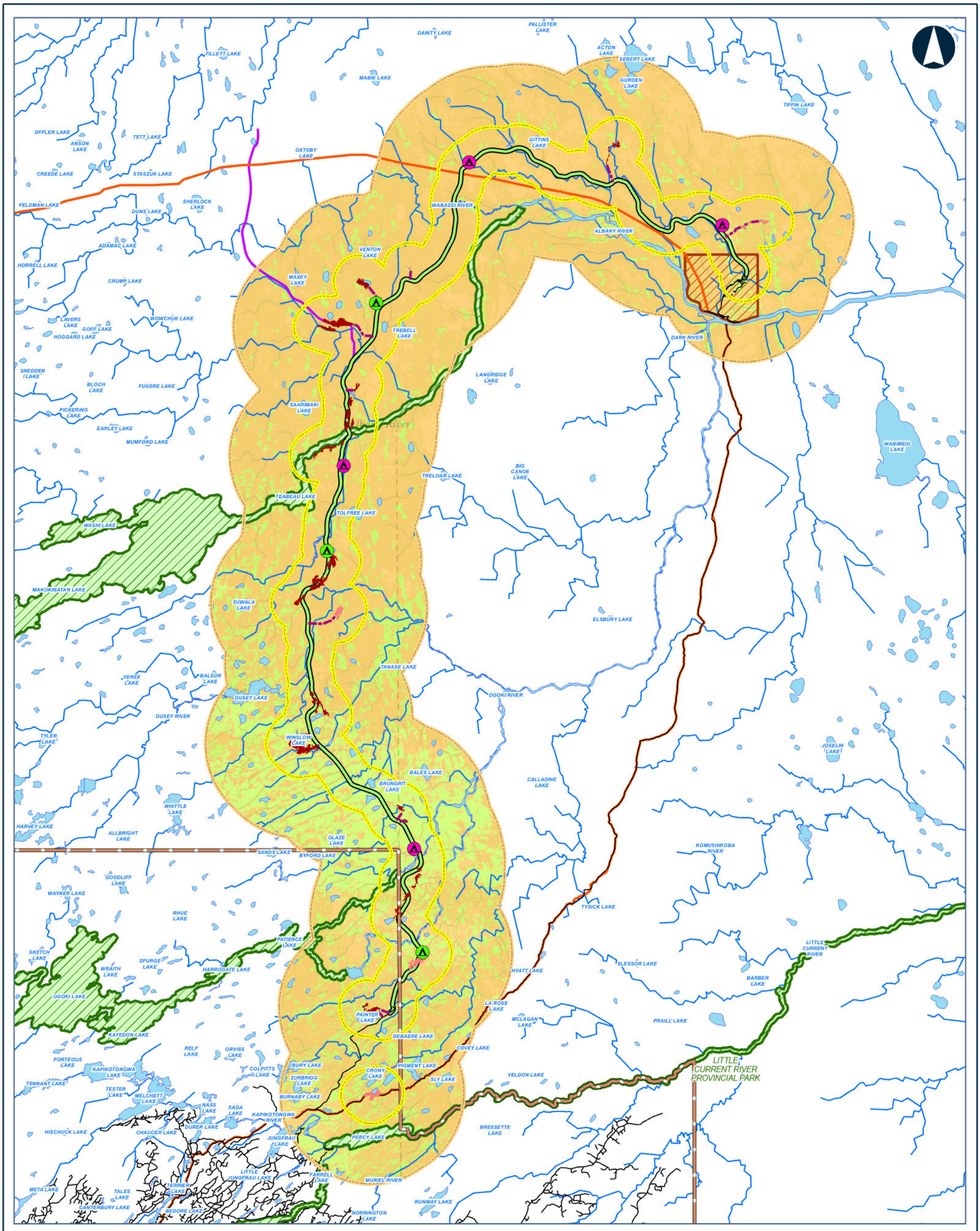
Insect outbreaks and wildfire may have a positive effect on dark-eyed junco habitat availability (Smucker et al., 2005). Some studies report higher junco abundance in recently burned forests than in mature forests (Nolan et al., 2020). This may be similar for insect outbreak-affected habitats.

Increased temperatures, wildfires, and insect outbreaks may affect the condition of boreal forest ecosystems in Ontario by shifting sites to deciduous forests, which may have negative effects on dark-eyed junco.

8.2.4.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for dark-eyed junco remains similar as described during existing conditions with most high to moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area associated with upland coniferous, mixedwood, and early successional / sparse treed habitats **(Figure 8-4**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for dark-eyed juncos. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

DARK-EYED JUNCO HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:

Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Dark-eyed Junco in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026 | 1:480,000 * when printed 11"x17"

Rev:0

Figure 8-4

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

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In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause dark-eyed juncos to shift their territories away from the project footprints. A study in the boreal forest of the Northwest Territories found that some passerine bird species move their territories away from human linear disturbance features (Machtans, 2006). The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to dark-eyed junco distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act also as barriers to dark-eyed movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., 60 m wide), and the Rapid Lynx Broadband project will be 100 m wide. A study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for dark-eyed juncos after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of dark-eyed juncos in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

The removal of habitat due to the Northern Road Link and Rapid Lynx Broadband projects is predicted to result in a change to the distribution of dark-eyed junco breeding territories and movements in the cumulative effects assessment Regional Study Area.

Overall, increases in temperatures are predicted to remove 26%, 31%, and 52% of dark-eyed junco range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). Much of the dark-eyed junco range in northeastern Ontario is predicted to be removed under the increase by 1.5°C and 2.0°C scenarios and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society, 2024).

8.2.4.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect dark-eyed junco survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,318.7 ha of high and moderate suitability dark-eyed junco habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 8.8

nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 291 nesting territories from the Project and other reasonably foreseeable developments, or 2.3% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Dark-eyed junco has moderate to high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on dark-eyed junco populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, dark-eyed juncos appear to be nesting earlier than in the past (Friedline et al., 2012). This plasticity in timing of migration and breeding may allow dark-eyed juncos to adapt to climate change.

8.2.4.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.4.1.3 Predicted Cumulative Effects

After mitigation, potential dark-eyed junco breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on dark-eyed junco habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.4.1.4 Characterization of Predicted Cumulative Effects

Dark-eyed junco is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Dark-eyed junco is a common breeding species in and north of the Canadian Shield ecozone (Natural Heritage Information Centre, 2023). This species was commonly detected during field surveys. Moderate and high suitability dark-eyed junco nesting habitat covers approximately 30% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. Available information suggests that dark-eyed junco in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,318.7 ha of high and moderate suitability habitat (combined), representing 2.3% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of dark-eyed junco given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to dark-eyed junco movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of dark-eyed junco and junco habitat in the cumulative effects assessment Regional Study Area.

This species has high annual survival (49%) and reproductive rate (nest success rate of 55% to 76%, 3.5 eggs per brood, and one brood per season) (Nolan et al., 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on dark-eyed junco are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the dark-eyed junco population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Dark-eyed junco has moderate to high vulnerability to climate change (National Audubon Society, 2024). Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative, probable**,

permanent, **continuous**, and **high magnitude** effects on the dark-eyed junco population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.4.1.5 Determination of Significance

Dark-eyed junco is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to dark-eyed junco habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the dark-eyed junco population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.4.2 Sensory Disturbance

8.2.4.2.1 Potential Cumulative Effects

8.2.4.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable dark-eyed junco habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by dark-eyed junco due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 11,293.8 ha of high and moderate suitability dark-eyed junco habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 7.7% of high and moderate

suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-10**).

Table 8-10: Changes to Dark-eyed Junco Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	145,883.3	134,589.5	11,293.8	7.8
Low to Poor	360,863.7	340,775.3	20,088.4	5.6

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when dark-eyed juncos are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.4.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on dark-eyed junco movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to dark-eyed junco distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when dark-eyed juncos are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to dark-eyed junco distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the dark-eyed junco breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.4.2.1.3 Survival and Reproduction

Noise from the construction and / or operation and maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on dark-eyed junco survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on dark-eyed junco survival and reproduction due to sensory disturbance is not known, adverse effects on dark-eyed junco survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to dark-eyed junco survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to dark-eyed junco survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons.

Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.4.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.4.2.3 Predicted Cumulative Effects

After mitigation, potential dark-eyed junco breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on dark-eyed junco habitat availability, distribution, and survival and reproduction.

8.2.4.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of dark-eyed juncos occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 7.8% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Dark-eyed junco is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and

continuous during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the dark-eyed junco population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.4.2.5 Determination of Significance

Dark-eyed junco is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to dark-eyed junco habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.5 Osprey

8.2.5.1 Habitat Loss and Alteration

8.2.5.1.1 Potential Cumulative Effects

8.2.5.1.1.1 Habitat Availability

The Project and the Northern Road Link upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 3,542.5 ha of high to moderate suitability osprey breeding habitat. This represents a change of 3.8% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-11**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 89,154.3 ha of high and moderate suitability habitat available for osprey after implementation of the Project and other reasonably foreseeable developments (**Table 8-11**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

If climate change causes increased periods of drought in the cumulative effects Regional Study Area, this may result in a reduction in osprey foraging habitat because lower water levels may decrease fish abundance (Houston et al., 2010).

Table 8-11: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Osprey

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	92,696.8	89,154.3	3,542.5	3.8
Low to Poor	414,050.8	410,284.4	3,765.7	0.9

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

8.2.5.1.1.2 Distribution

Changes to habitat distribution due to the Project and other reasonably foreseeable developments may result in shifts in osprey territory distribution. However, habitat fragmentation is not a large threat to osprey populations (Ewins, 1997).

After the addition of the Project, and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects the distribution of moderate and high suitability habitat remains similar as described during existing conditions with most high suitability habitat patches concentrated in the southern portion of the cumulative effects assessment Regional Study Area associated with upland forest habitats near large waterbodies and watercourses (**Figure 8-5**).

Overall, increases in temperatures are predicted to result in an osprey range expansion in North America by 35%, 45%, and 73%, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). Osprey range in northern Ontario is maintained or expanded under increased temperature regimes of 1.5°C to 3.0°C (National Audubon Society, 2024).

8.2.5.1.1.3 Survival and Reproduction

Habitat loss from the Project, and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects could affect osprey survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Reasonably foreseeable developments are predicted to remove 3,542.5 ha of high to moderate suitability breeding habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.2 nesting

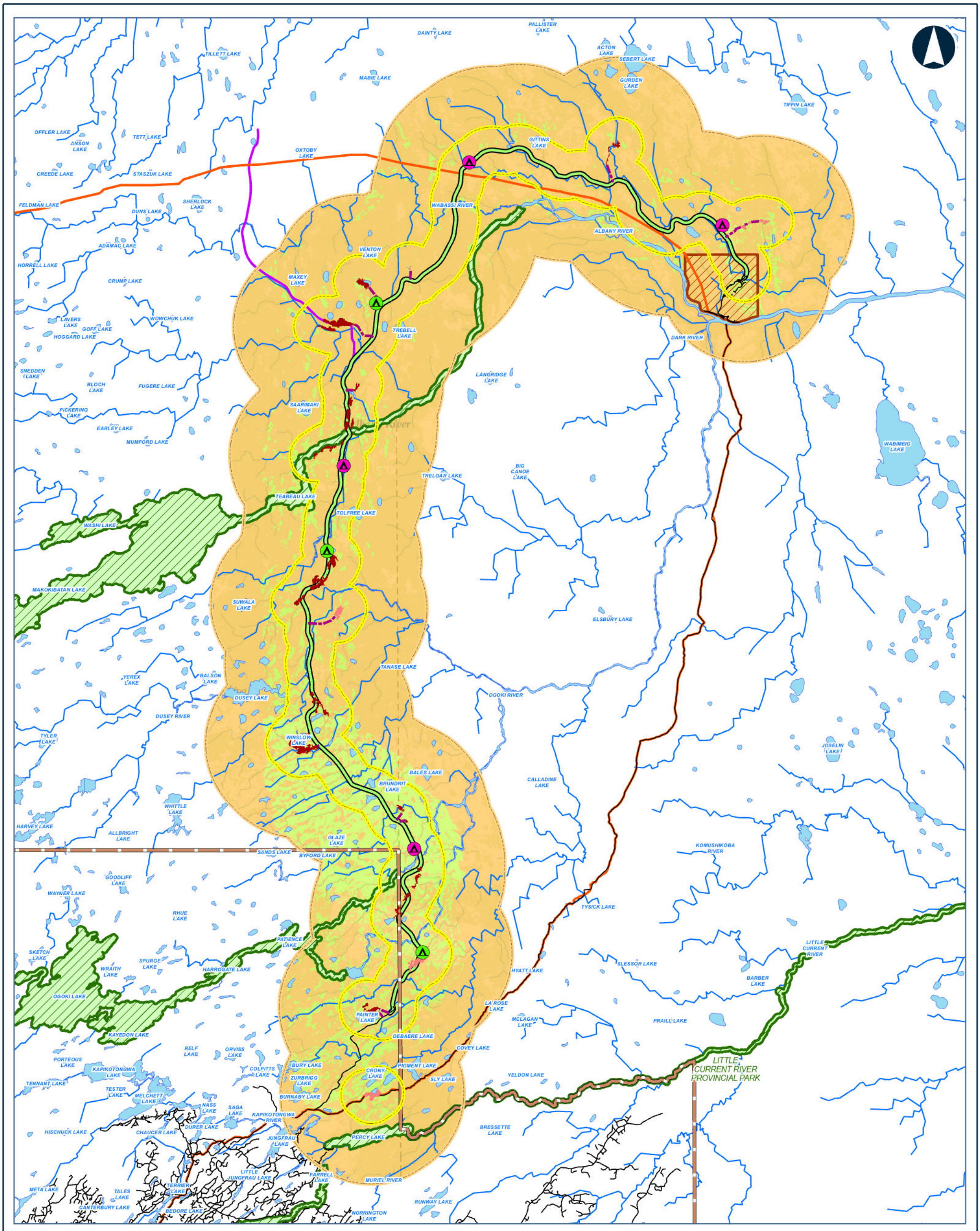
territories per km^2 for Region 44), this amounts to the potential loss of up to nine nesting territories from the cumulative effects assessment Construction Disturbance Area, or 3.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Osprey is not vulnerable to climate change (National Audubon Society 2024). Osprey time of breeding in Finland was positively correlated with warmer January temperatures, which may reflect changes in ice melt (Solonen, 2008). This suggests that ospreys have behavioural plasticity that is allowing them to adapt to climate change. Increased periods of drought may negatively effect ospreys by reducing prey availability (Houston et al. 2010).

Climate change may be increasing the intensity of extreme weather events (e.g., hurricanes). These extreme weather events can negatively osprey population during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al. 2008).

8.2.5.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OSPREY HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Osprey in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-5

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0037_Blnd_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 4:51 PM User Name: INBA08973

8.2.5.1.3 Predicted Cumulative Effects

After mitigation, potential osprey breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on osprey habitat availability, distribution, and survival and reproduction from human developments; climate change may have positive effects on osprey.

8.2.5.1.4 Characterization of Predicted Cumulative Effects

Osprey is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. The osprey population in Ontario is increasing (Natural Heritage Information Centre 2023). Moderate and high suitability osprey nesting habitat covers approximately 15% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that osprey in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,542.5 ha of high and moderate suitability habitat, representing 3.8% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of osprey given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to osprey movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects may result in a small but measurable change to the existing distribution of ospreys and osprey habitat in the cumulative effects assessment Regional Study Area.

This species has survival rates of 43% to 49% for their first year of life and rates of 82% to 84% for each year thereafter (Bierregaard et al., 2020). This species has moderate reproductive rate (three eggs per brood and one brood per season); nest success ranges from 38% to 63% (Bierregaard et al., 2020) and is positively related to food availability and water level (Houston et al. 2010). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional osprey population.

All reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on osprey are predicted to be **certain to probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the osprey population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Osprey has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is maintained or increased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **possible**, **permanent**, **continuous**, and **neutral to positive effects** on the osprey population **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.5.1.5 Determination of Significance

Osprey is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to osprey habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**. Effects from climate change are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.5.2 Sensory Disturbance

8.2.5.2.1 Potential Cumulative Effects

8.2.5.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable osprey habitat if individuals avoid areas with sensory disturbance. Although ospreys often nest in areas with human presence, including near roads (Bierregaard et al., 2014), habitat that was within

400 m of human developments was assumed to be negatively affected by sensory disturbance based on the Stand and Site Guide (Ministry of Natural Resources, 2010).

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 400 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 24,504.5 ha of high and moderate suitability osprey habitat may be indirectly affected within 400 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 26.4% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-12**).

Table 8-12: Changes to Osprey Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	92,696.8	68,192.4	24,504.5	26.4
Low to Poor	414,050.8	358,132.8	55,917.4	13.5

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when ospreys are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.5.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects is unlikely to have a negative effect on osprey territory placement, movements, and habitat connectivity. In fact, permanent roads may have a positive effect on the likelihood of osprey nest occupancy (Naylor, 2009). However, the recommended setback from osprey nests in the Stand and Site Guide is 400 m (Ministry of Natural Resources, 2010).

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to osprey distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when ospreys are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to osprey distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the osprey breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.5.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx

Broadband projects may have negative effects on osprey survival and reproduction. In Ontario, activities with high levels of sensory disturbance are not allowed within 400 m of osprey nests during the nesting period (Ministry of Natural Resources, 2010). However, Van Daele and Van Daele (1982) found that osprey nests within 1.5 km of well-travelled roads had higher productivity than nests greater than 1.5 km from roads. Likewise, productivity at osprey nests that were disturbed by highway traffic was similar to nests located away from highways (Levenson and Koplin, 1984).

To be conservative, potential sensory disturbance effects and changes to osprey survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to osprey survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.5.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.5.2.3 Predicted Cumulative Effects

After mitigation, potential osprey breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on osprey habitat availability, distribution, and survival and reproduction.

8.2.5.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of ospreys occupying territories near the Project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 26.4% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to

habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Osprey is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **possible** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **possible**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the osprey population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.5.2.5 Determination of Significance

Osprey is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to osprey habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) and climate change are therefore considered **not significant**.

8.2.6 Boreal Owl

8.2.6.1 Habitat Loss and Alteration

8.2.6.1.1 Potential Cumulative Effects

8.2.6.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,661.2 and 1,809.8 ha of high to moderate suitability boreal owl breeding habitat, respectively. This represents a change of 2.2% and 1.5% for high and moderate suitability habitats, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-13**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 192,406.7 ha of high and moderate suitability habitat available for boreal owl after implementation of the Project and other reasonably foreseeable developments (**Table 8-13**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-13: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Boreal Owl

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	77,065.0	75,403.9	1,661.2	2.2
Moderate	118,812.6	117,002.8	1,809.8	1.5
Low	146,413.0	144,711.8	1,701.2	1.2
Poor	164,288.7	162,153.7	2,135.0	1.3

Note: There are 176.3 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

The level of effect that insect outbreaks have on boreal owls depends on habitat type and habitat availability. Spruce-fir and aspen forests provide primary breeding habitat for this species; pine forests provide secondary breeding habitat. As such, in landscapes greater than 4,050 ha that are dominated by spruce-fir and aspen forests, effects from wildfire and

insect outbreaks will be minimal because forest patches left after a disturbance event will still provide suitable breeding habitat for this species (Wiggins et al., 2020). However, if landscapes are dominated by pine forests, habitat patches remaining may not provide enough suitable breeding habitat for this species to be able to maintain a breeding population (Wiggins et al., 2020). Upland forested communities in the existing conditions Local Study Area are dominated by jack pine (Oji-Cree translation, *okikatik*) ecosites (*Vegetation Technical Support Document*, Section 1.15.3.1, WSP, 2026a) and, so, boreal owls in the Project study areas may be susceptible to changes in habitat availability caused by increased frequency and severity of fire and insect outbreaks due to climate change.

8.2.6.1.1.2 Distribution

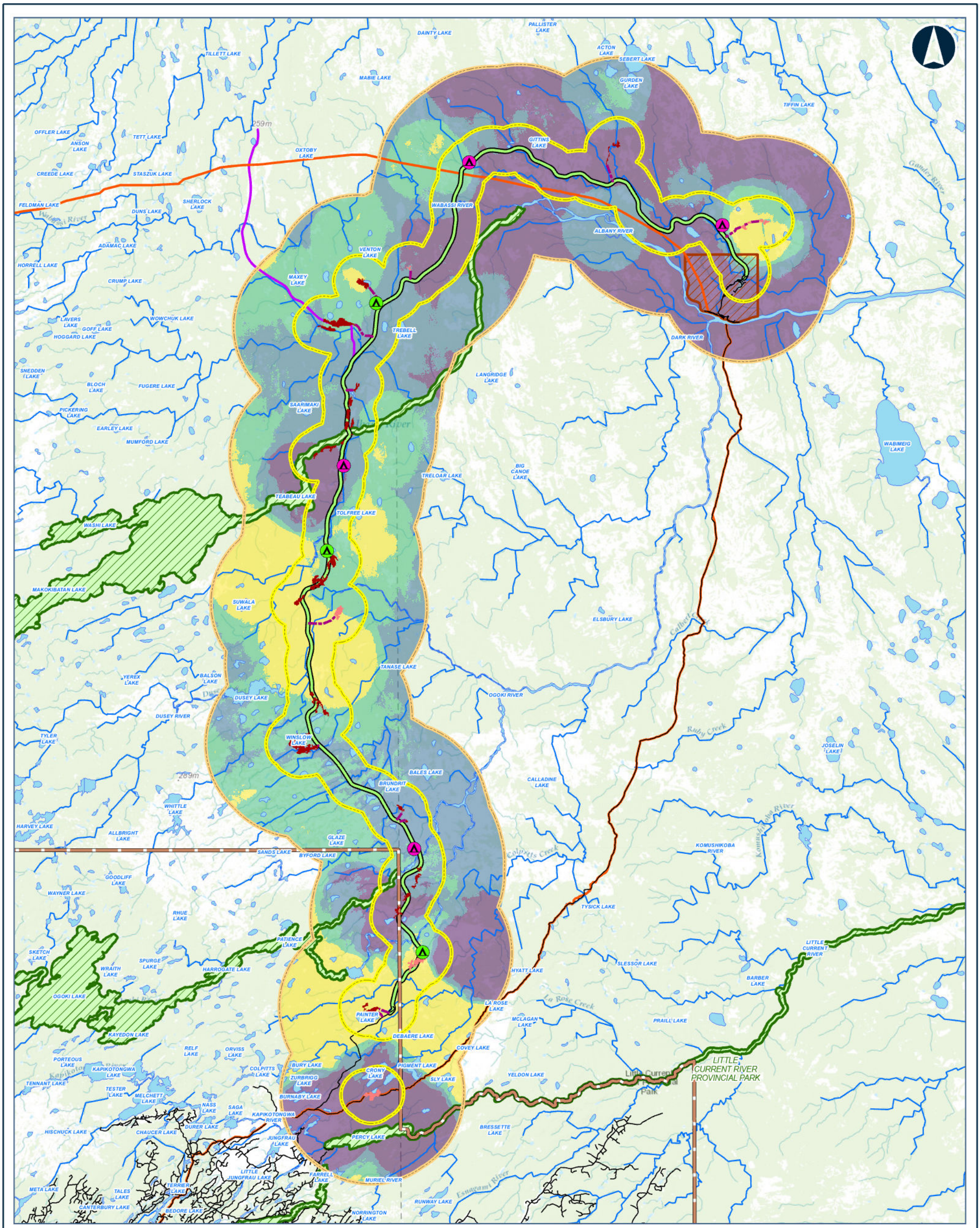
After the addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat remains similar as described during existing conditions; large patches of habitat remain in the southern, central, and northeastern portions of the cumulative effects assessment Regional Study Area (**Figure 8-6**).

Habitat fragmentation may have negative effects on boreal owl distribution. Some studies suggest that the density of linear features at the landscape scale may have negative effects on boreal owl distribution (Domahidi et al., 2019). While other studies suggest that the presence of boreal owls is not influenced by habitat fragmentation from human developments (Shonfield and Bayne, 2017, 2023).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for boreal owls. As such, during construction and operations of reasonably foreseeable developments, individuals that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for boreal owls after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of boreal owls in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 41%, 57%, and 84% of boreal owl range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society 2024). Much of the boreal owl range in northeastern Ontario is predicted to be removed under the increase by 1.5°C and 2.0°C scenarios and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BOREAL OWL HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Boreal Owl in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-6

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8.2.6.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect boreal owl survival and reproduction if breeding habitat is removed and individuals are subsequently unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,471.0 ha of high and moderate suitability boreal owl habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the average home range size, 82 ha (Hayward and Hayward et al., 2020), this amounts to the potential loss of up to 42 nesting territories from the Project and other reasonably foreseeable developments, or 1.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Boreal owl has moderate to high vulnerability to climate change (National Audubon Society, 2024).

8.2.6.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.6.1.3 Predicted Cumulative Effects

After mitigation, potential boreal owl breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on boreal owl habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.6.1.4 Characterization of Predicted Cumulative Effects

Boreal owl is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007* and North America populations are considered stable in the long term (Hayward and Hayward, 2020). This species was frequently detected during baseline surveys. Moderate and high suitability habitat covers approximately 50% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that boreal owl in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,471.0 ha of high and moderate suitability habitat (combined), representing 1.8% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of boreal owl given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

This species has moderate to high reproductive rate. Boreal owls typically lay 3 eggs per brood and raise one brood per season; nest success is correlated with prey abundance with higher success reported in years with abundant prey (Hayward and Hayward 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on boreal owl are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the boreal owl population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Boreal owl has moderate to high vulnerability to climate change (National Audubon Society, 2024). Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the boreal owl population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The summary of the cumulative residual effects characterization is provided in **Table 8-48**.

8.2.6.1.5 Determination of Significance

Boreal owl is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to boreal owl habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably

foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the boreal owl population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.7 Wilson's Snipe

8.2.7.1 Habitat Loss and Alteration

8.2.7.1.1 Potential Cumulative Effects

8.2.7.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 990.3 and 2,597.7 ha of high and moderate suitability Wilson's snipe breeding habitat, respectively. This represents a change of 1.0% and 1.7% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions, for high and moderate suitability habitats, respectively (**Table 8-14**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 244,717.8 ha of high and moderate suitability habitat (combined) available for Wilson's snipe after implementation of the Project and other reasonably foreseeable developments (**Table 8-14**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-14: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Wilson's Snipe

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	98,068.2	97,077.9	990.3	1.0
Moderate	150,237.5	147,639.8	2,597.7	1.7
Low	45,115.1	44,145.8	969.3	2.2
Poor	213,151.2	210,401.2	2,749.9	1.3

Note: There are 183.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Increased severity and frequency of insect outbreaks and wildfire may increase habitat availability for Wilson's snipe (Gyug, 2012). Wilson's snipe breeding habitat may be negatively affected if climate change is increasing wetland drying in the Project study areas (Steen et al., 2014).

8.2.7.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for Wilson's snipe remains similar as described during existing conditions with high to moderate suitability habitats widely distributed throughout the southwest two thirds of the cumulative effects assessment Regional Study Area (**Figure 8-7**).

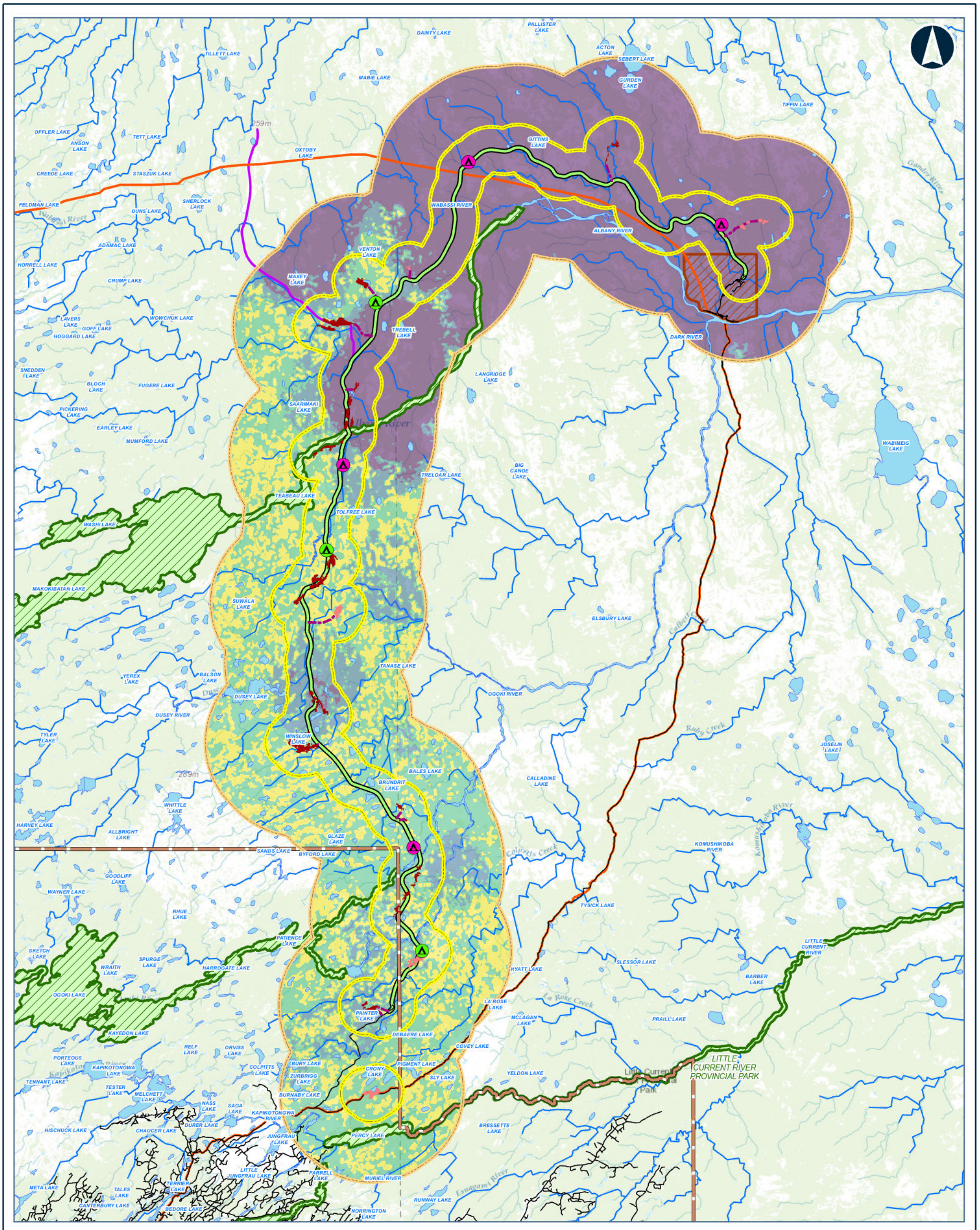
It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for Wilson's snipe. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause Wilson's snipes to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to Wilson's snipe distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act also as barriers to Wilson's snipe during foraging and dispersal. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for Wilson's snipe after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of Wilson's snipe in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

The removal of habitat due to the Northern Road Link and Rapid Lynx Broadband projects is predicted to result in a change to Wilson's snipe breeding territories and movements in the cumulative effects assessment Regional Study Area.

Overall, increases in temperatures are predicted to remove 22%, 28%, and 53% of Wilson's snipe range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society 2024). There is some removal of this species' range in northern Ontario under the increase by 1.5°C and 2.0°C scenarios and this species' range is expected to shift north of Akimiski Island in Ontario under the increase by 3.0°C (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

WILSON'S SNIPE HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Wilson's Snipe in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-7

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8.2.7.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect Wilson's snipe survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,587.9 ha of high and moderate suitability Wilson's snipe habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the average area requirements of 14.8 ha (Mueller et al., 2020), this amounts to the potential loss of up to 242 nesting territories from the Project and other reasonably foreseeable developments, or 1.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Wilson's snipe has moderate vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on Wilson's snipe populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting Wilson's snipes by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019).

8.2.7.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.7.1.3 Predicted Cumulative Effects

After mitigation, potential Wilson's snipe breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on Wilson's snipe habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.7.1.4 Characterization of Predicted Cumulative Effects

Wilson's snipe is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007* and is a common breeding species throughout Ontario (Natural Heritage

Information Centre, 2023). This species was frequently detected during baseline surveys. Moderate and high suitability nesting habitat for this species covers approximately 45% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that Wilson's snipe in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,587.9 ha of high and moderate suitability habitat (combined), representing 1.5% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of Wilson's snipe given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to Wilson's snipe movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of Wilson's snipe and snipe habitat in the cumulative effects assessment Regional Study Area.

This species has a high adult annual survival rate (50% to 65%) and moderate reproductive rate (nest success rate of 41%, four eggs per brood, and one brood per season) (Mueller, 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on Wilson's snipe are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the Wilson's snipe population in the cumulative

effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Wilson's snipe has moderate vulnerability to climate change (National Audubon Society, 2024). Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the Wilson's snipe population in the cumulative effects assessment Regional Study Area.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.7.1.5 Determination of Significance

Wilson's snipe is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to Wilson's snipe habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the Wilson's snipe population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.7.2 Sensory Disturbance

8.2.7.2.1 Potential Cumulative Effects

8.2.7.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable Wilson's snipe habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by Wilson's snipe due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project.

However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 13,771.0 ha of high and moderate suitability Wilson's snipe habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.6% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-15**).

Table 8-15: Changes to Wilson's Snipe Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	98,068.2	93,365.4	4,702.9	4.8
Moderate	150,237.5	141,169.4	9,068.2	6.0
Low	45,115.1	41,347.7	3,767.4	8.4
Poor	213,151.2	199,311.7	13,839.5	6.5

Note: There are 183.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when Wilson's snipes are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.7.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on Wilson's snipe movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to Wilson's snipe distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when Wilson's snipes are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to Wilson's snipe distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the Wilson's snipe breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.7.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on Wilson's snipe survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega,

2012). While the precise threshold for effects on Wilson's snipe survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to Wilson's snipe survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to Wilson's snipe survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.7.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.7.2.3 Predicted Cumulative Effects

After mitigation, potential Wilson's snipe breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on Wilson's snipe habitat availability, distribution, and survival and reproduction.

8.2.7.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of Wilson's snipes occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 5.6% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the + of the Rapid Lynx Broadband project are anticipated to be of short duration. Additionally, Wilson's snipe is

highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the Wilson's snipe population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in** magnitude.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.7.2.5 Determination of Significance

Wilson's snipe is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to Wilson's snipe habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.8 Mallard

8.2.8.1 Habitat Loss and Alteration

8.2.8.1.1 Potential Cumulative Effects

8.2.8.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 5,743.8 ha of high and moderate suitability mallard breeding habitat. This represents a change of 1.8% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-14**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 434,493.2 ha of high and moderate suitability habitat

available for mallard after implementation of the Project and other reasonably foreseeable developments (**Table 8-14**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Mallard breeding habitat may be negatively affected if climate change increases wetland drying in the cumulative effects Regional Study Area (Steen et al., 2014).

Table 8-16: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat loss for Mallard

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	440,237.0	434,493.2	5,743.8	1.3
Low to Poor	66,509.9	64,945.5	1,564.5	2.4

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

8.2.8.1.1.2 Distribution

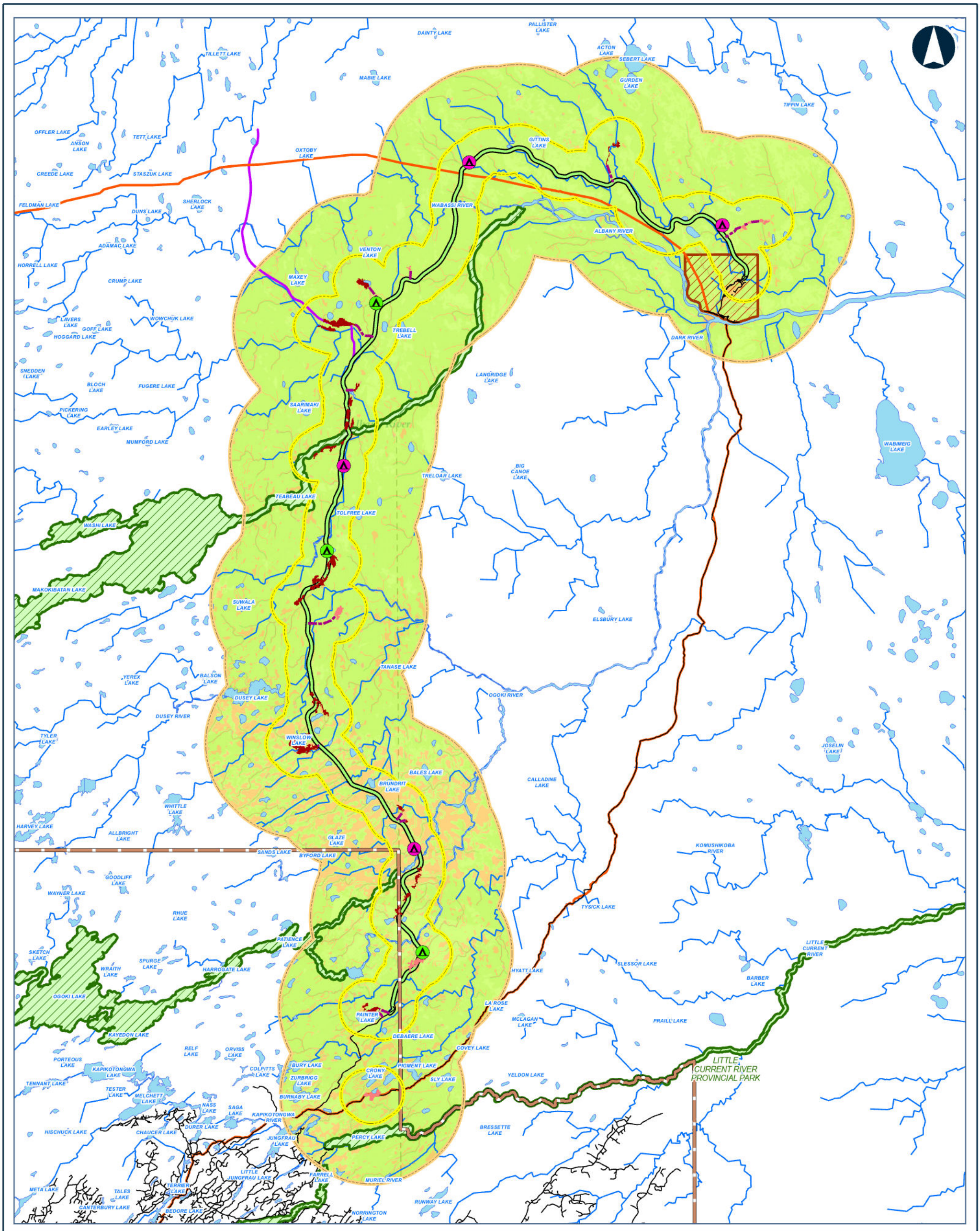
After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for mallard remains similar as described during existing conditions with high to moderate suitability habitats widely distributed throughout the cumulative effects Regional Study Area (**Figure 8-8**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for mallard. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for mallard after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause

mallards to shift their territories away from the project footprints. However, mallards do not appear to be sensitive to habitat fragmentation from human activities (Drilling et al., 2020). This species nests closer to roads and pipelines (Pasitschniak-Arts et al., 1998; Johnstone et al., 2023) and there may be more mallard pairs in areas with a higher disturbance index (Loesch et al., 2021). Therefore, the Northern Road Link and Rapid Lynx Broadband projects are not expected to act as barriers to mallard during foraging and dispersal.

Overall, increases in temperatures are predicted to maintain 86%, 87%, and 89% of mallard range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). There are small patches of range lost in northern Ontario under all three increased temperature regimes.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

MALLARD HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Mallard in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-8

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8.2.8.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect mallard survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 5,743.8 ha of high and moderate suitability mallard habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 22 nesting territories from the Project and other reasonably foreseeable developments, or 1.3% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Mallard has low vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on mallard populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting mallard by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019).

8.2.8.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.8.1.3 Predicted Cumulative Effects

After mitigation, potential mallard breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on mallard habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.8.1.4 Characterization of Predicted Cumulative Effects

Mallard is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Mallard is the most abundant duck species in North America (Drilling et al., 2020) and this species was among the most common waterfowl and waterbird species detected during field surveys in 2018 to 2022. Moderate and high suitability nesting habitat for this species covers approximately 85% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that mallard in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 5,743.8 ha of high and moderate suitability habitat, representing 1.3% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of mallard given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to mallard movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of mallard and mallard habitat in the cumulative effects assessment Regional Study Area.

This species has a high adult annual survival rate (54% to 68%) and high reproductive rate (nest success rate of 10% to 71%, eight eggs per brood, and re-nesting is common) (Drilling et al. 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on mallard are predicted to be **certain to probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the mallard population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Mallard has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is generally maintained, relative to current conditions, under temperature increases of 1.5°C to 3.0°C, but there are predicted to be some areas in northern Ontario that will be removed from the mallard range (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **possible**, **permanent**, **continuous**, and **low magnitude** effects on the mallard population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.8.1.5 Determination of Significance

Mallard is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to mallard habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) and climate change are therefore considered **not significant**.

8.2.8.2 Sensory Disturbance

8.2.8.2.1 Potential Cumulative Effects

8.2.8.2.1.1 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on mallard survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012).

To be conservative, potential sensory disturbance effects and changes to mallard survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to mallard survival and reproduction during construction of the Rapid Lynx Broadband project

are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.8.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.8.2.3 Predicted Cumulative Effects

The implementation of mitigation and enhancement measures is expected to limit negative effects from sensory disturbance. However, there are predicted cumulative residual effects on mallard survival and reproduction.

8.2.8.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of mallards occupying territories near the project footprints. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the mallard population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.8.2.5 Determination of Significance

Mallard is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to mallard survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.9 Palm Warbler

8.2.9.1 Habitat Loss and Alteration

8.2.9.1.1 Potential Cumulative Effects

8.2.9.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,478.8 ha of high suitability and 1,878.2 ha of moderate suitability palm warbler breeding habitat. This represents a change of 0.8% and 1.2% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-17**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 183,159.7 and 155,110.9 ha of high and moderate suitability habitat, respectively, available for palm warbler after implementation of the Project and other reasonably foreseeable developments (**Table 8-17**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-17: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Palm Warbler

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	184,638.5	183,159.7	1,478.8	0.8
Moderate	156,989.2	155,110.9	1,878.2	1.2
Low	109,234.8	106,440.4	2,794.4	2.6
Poor	55,703.3	54,547.7	1,155.6	2.1

Note: There are 238.6 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Climate change increase wildfire and insect outbreak frequency and severity. Habitat is suitable for palm warblers for up to 30 years post fire (Kirk and Hobson, 2000). This may also apply to forests that have been affected by insect outbreaks. However, palm warblers were detected at lower abundance in moderate and high intensity burned areas, compared to low burned areas and control areas (Knaggs et al., 2020). As such, depending on how climate change affects the frequency and intensity of fires and insect outbreaks, palm warbler habitat availability in the cumulative effects Regional Study Area may increase or decreased in the future, relative to existing conditions.

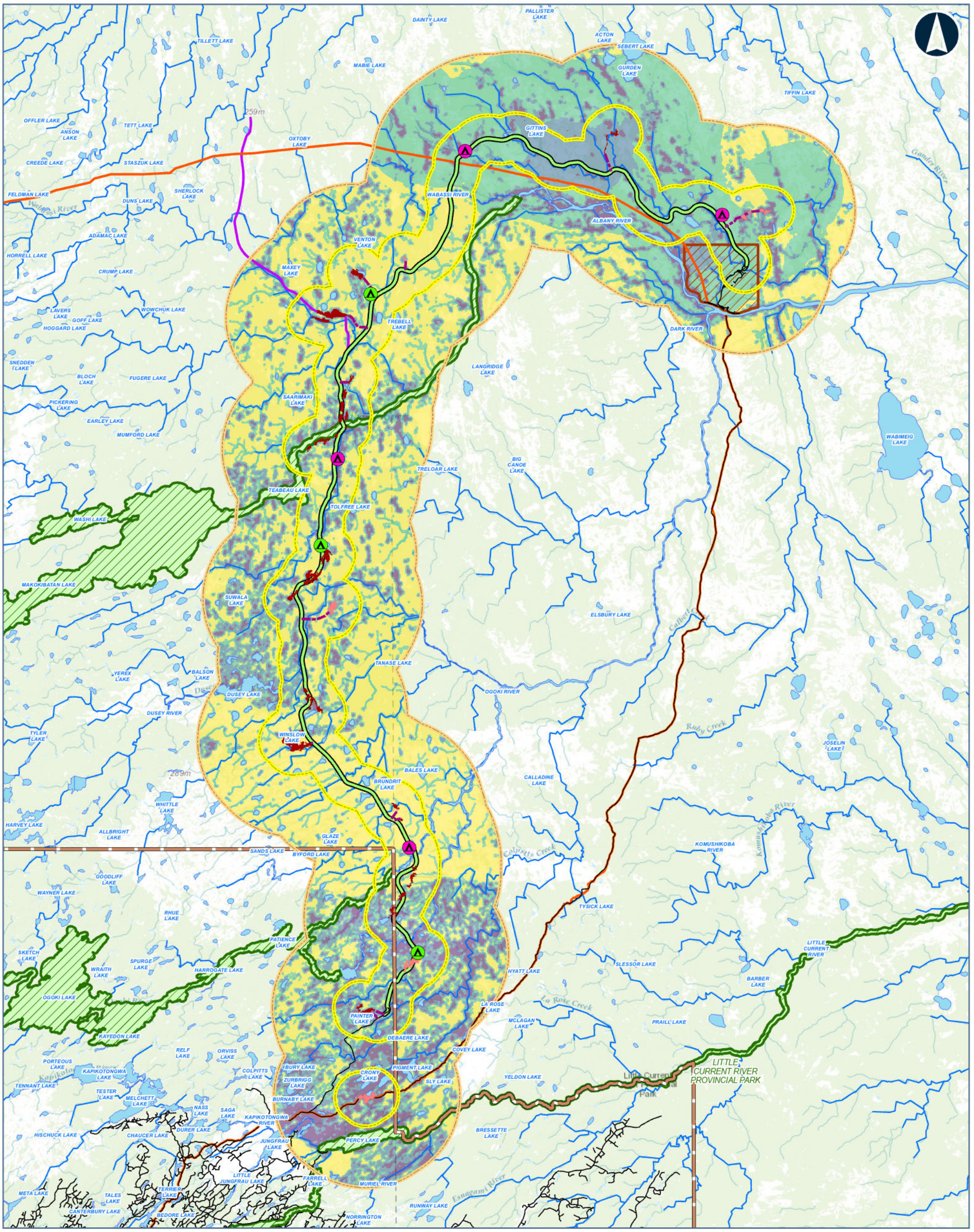
8.2.9.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for palm warbler remains similar as described during existing conditions with high and moderate suitability habitat patches generally extending throughout the cumulative effects assessment Regional Study Area (**Figure 8-9**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for palm warbler. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for palm warbler after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause palm warblers to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to palm warbler distribution relative to existing conditions.

Overall, increases in temperatures are predicted to remove 43%, 58%, and 83% of palm warbler range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society 2024). Much of the palm warbler range in northeastern Ontario is predicted to be removed under the increase by 1.5°C and 2.0°C scenarios and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE
APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
BEDROCK
SAND AND GRAVEL

PALM WARBLER HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Palm Warbler in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-9

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8.2.9.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect palm warbler survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,357.0 ha of high and moderate suitability palm warbler habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 6.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 216 nesting territories from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Palm warbler has moderate to high vulnerability to climate change (National Audubon Society 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on palm warbler populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al. 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode 2003; Radchuk et al. 2019; Shipley et al. 2022). Palm warbler appears vulnerable to this timing disjunct because this species is arriving on breeding grounds later than 100 years ago (Butler 2003). One factor for this may be that, recently, climate change has been causing a delay of the onset of spring immediately south of the Great Lakes; this may be delaying caterpillar development on southern migratory staging areas and limiting the amount of food available for fattening up prior to migratory flights (Strode 2003). If spring continues to arrive later south of the Great Lakes region, this may increase pressure on palm warbler by widening the time gap between peak insect emergence in their migratory staging areas and northern breeding grounds (Strode 2003).

8.2.9.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.9.1.3 Predicted Cumulative Effects

After mitigation, potential palm warbler breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on palm warbler habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.9.1.4 Characterization of Predicted Cumulative Effects

Palm warbler is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. This species is a common breeder in the Hudson Bay Lowlands and boreal forest of Ontario (Natural Heritage Information Centre 2023) and this species was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the cumulative effects Regional Study Area under existing conditions after implementation of the Project. The available information suggests that palm warbler in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,357.0 ha of high and moderate suitability habitat (combined), representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of palm warbler given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to palm warbler movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of palm warbler and palm warbler habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on red-eyed vireo are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the palm warbler population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Palm warbler has moderate to high vulnerability to climate change (National Audubon Society 2024). Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C (National Audubon Society 2024). As such, effects from climate change **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the palm warbler population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The summary of cumulative residual effects characterization is provided in **Table 8-48.**

8.2.9.1.5 Determination of Significance

Palm warbler is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to palm warbler habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the palm warbler population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.9.2 Sensory Disturbance

8.2.9.2.1 Potential Cumulative Effects

8.2.9.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable palm warbler habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by palm warbler due to sensory disturbance is not known, habitat that was within

300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 16,362.5 ha of high and moderate suitability palm warbler habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 4.8% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-18**).

Table 8-18: Changes to Palm Warbler Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	184,638.5	177,161.2	7,477.3	4.1
Moderate	156,989.2	148,103.9	8,885.2	5.7
Low	109,234.8	98,284.9	10,949.9	10.0
Poor	55,703.3	51,638.1	4,065.2	7.3

Note: There are 238.6 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the

life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when palm warblers are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.9.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on palm warbler movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to palm warbler distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when palm warblers are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to palm warbler distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the palm warbler breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.9.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on palm warbler survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al. 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega 2012). While the precise threshold for effects on palm warbler survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to palm warbler survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to palm warbler survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.9.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.9.2.3 Predicted Cumulative Effects

After mitigation, potential palm warbler breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on palm warbler habitat availability, distribution, and survival and reproduction.

8.2.9.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of palm warblers occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the

Rapid Lynx Broadband project is predicted to affect 5.0% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Palm warbler is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the palm warbler population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.9.2.5 Determination of Significance

Palm warbler is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to palm warbler habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.9.3 Increase in Edge Habitat

8.2.9.3.1 Potential Cumulative Effects

8.2.9.3.1.1 Survival and Reproduction

Interior-nesting birds, such as palm warbler, are particularly vulnerable to nest predation (Cink, 2017) and increased edge habitat can change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). The creation of forest edge due to the construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects may facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002).

8.2.9.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.9.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on palm warbler survival and reproduction.

8.2.9.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. This is expected to have minor residual effects on palm warbler, leading to small declines in survivorship and reproductive rate for the breeding population. However, changes to predation risk due to increased edge habitat from construction of reasonably foreseeable developments are not expected to have a measurable effect on survival and reproduction for the population in the in the cumulative effects assessment Regional Study Area.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on palm warbler are predicted to be **probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the palm warbler population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.9.3.5 Determination of Significance

Palm warbler is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to palm warbler survival and reproduction due to increased edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.10 Common Yellowthroat

8.2.10.1 Habitat Loss and Alteration

8.2.10.1.1 Potential Cumulative Effects

8.2.10.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,781.6 ha of high suitability and 1,376.9 ha of moderate suitability common yellowthroat breeding habitat. This represents a change of 0.9% and 1.1% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-19**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 199,388.2 ha and 130,376.6 ha of high and moderate suitability habitat, respectively, available for common yellowthroat after implementation of the Project and other reasonably foreseeable developments (**Table 8-19**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Climate change may increase wildfire and insect outbreak frequency and severity, which may increase habitat suitability for common yellowthroats (Lachance et al., 2005).

Table 8-19: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Common Yellowthroat

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	201,169.7	199,388.2	1,781.6	0.9
Moderate	131,753.5	130,376.6	1,376.9	1.1
Low	119,368.0	117,279.6	2,088.5	1.8
Poor	54,356.2	52,295.5	2,060.6	3.8

Note: There are 108.3 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

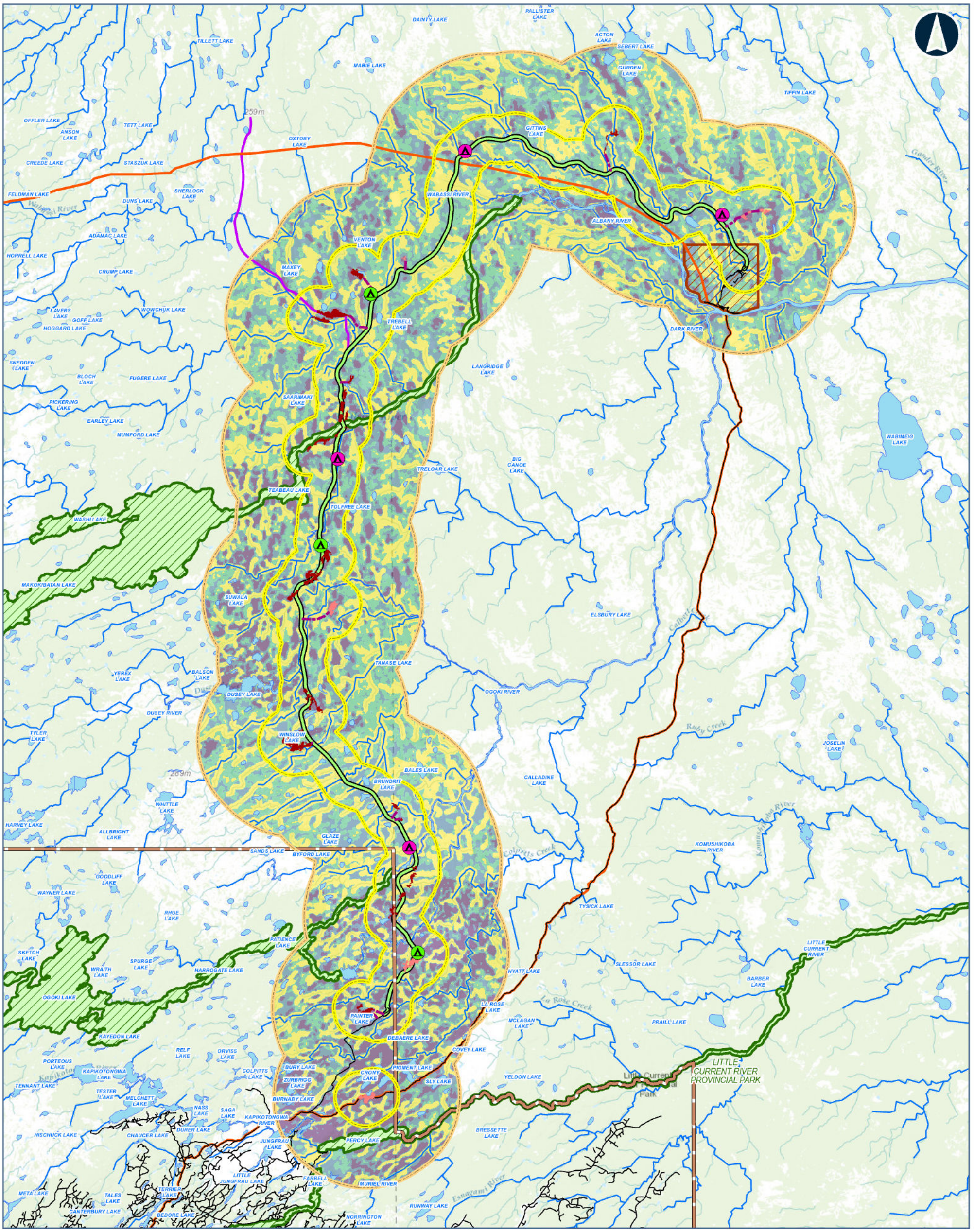
8.2.10.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for common yellowthroat remains similar as described during existing conditions with interspersed patches of riparian habitat along watercourses and waterbodies throughout the cumulative effects assessment Regional Study Area (**Figure 8-10**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for common yellowthroat. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for common yellowthroat after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause common yellowthroats to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to common yellowthroat distribution relative to existing conditions.

Overall, increases in temperatures are predicted to increase common yellowthroat range in North America by 17%, 19%, and 26%, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species range is expected to expand throughout northern Ontario under all three temperature increase regimes (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

COMMON YELLOWTHROAT HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Common Yellowthroat in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026 | 1:480,000 * when printed 11"x17"

Rev:0

Figure 8-10

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Date Saved: 2/11/2026 4:51 PM User Name: INBA08973

8.2.10.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect common yellowthroat survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,158.5 ha of high and moderate suitability common yellowthroat habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 7.1 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 225 nesting territories from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Common yellowthroat has low vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on common yellowthroat populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates, such as common yellowthroat, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow common yellowthroats to adapt to climate change.

8.2.10.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.10.1.3 Predicted Cumulative Effects

After mitigation, potential common yellowthroat breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on common yellowthroat habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.10.1.4 Characterization of Predicted Cumulative Effects

Common yellowthroat is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Common yellowthroat is one the most widespread warblers in North America (Guzy and Ritchison, 2020) and is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023). This species was frequently detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that common yellowthroat in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,158.5 ha of high and moderate suitability habitat (combined), representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of common yellowthroat given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to common yellowthroat movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of common yellowthroat and yellowthroat habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on common yellowthroat are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the common yellowthroat population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Common yellowthroat has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is increased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **possible**, **permanent**, **continuous, positive** effects on the common yellowthroat population that will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.10.1.5 Determination of Significance

Common yellowthroat is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to common yellowthroat habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**. Effects from climate change are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.10.2 Sensory Disturbance

8.2.10.2.1 Potential Cumulative Effects

8.2.10.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable common yellowthroat habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by common yellowthroat due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband

project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 16,714.9 ha of high and moderate suitability common yellowthroat habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.0% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-20**).

Table 8-20: Changes to Common Yellowthroat Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	201,169.7	191,327.9	9,841.9	4.9
Moderate	131,753.5	124,880.6	6,872.9	5.2
Low	119,368.0	110,622.6	8,745.4	7.3
Poor	54,356.2	48,436.1	5,920.1	10.9

Note: There are 108.3 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when common yellowthroats are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.10.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on common yellowthroat movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to common yellowthroat distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when common yellowthroats are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to common yellowthroat distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the common yellowthroat breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.10.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on common yellowthroat survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching

predators) (Ortega, 2012). While the precise threshold for effects on common yellowthroat survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to common yellowthroat survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to common yellowthroat survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.10.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.10.2.3 Predicted Cumulative Effects

After mitigation, potential common yellowthroat breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on common yellowthroat habitat availability, distribution, and survival and reproduction.

8.2.10.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of common yellowthroats occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 5.3% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from

the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Common yellowthroat is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the common yellowthroat population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.10.2.5 Determination of Significance

Common yellowthroat is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to common yellowthroat habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.11 Northern Waterthrush

8.2.11.1 Habitat Loss and Alteration

8.2.11.1.1 Potential Cumulative Effects

8.2.11.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 877.2 ha of high suitability and 1,418.9 ha of moderate suitability northern waterthrush breeding habitat. This represents a change of 0.8% and 1.4% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-21**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 100,404.7 and 101,419.0 ha of high and moderate suitability habitat, respectively, available for northern waterthrushes after implementation of the Project and other reasonably foreseeable developments (**Table 8-21**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Increased fire and insect outbreak severity and frequency due to climate change may increase habitat suitability for northern waterthrushes (Saab and Powell, 2005).

Table 8-21: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Northern Waterthrush

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	101,281.9	100,404.7	877.2	0.8
Moderate	102,837.9	101,419.0	1,418.9	1.4
Low	153,675.4	151,644.2	2,031.2	1.3
Poor	148,764.2	145,784.7	2,979.5	2.0

Note: There are 196.2 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

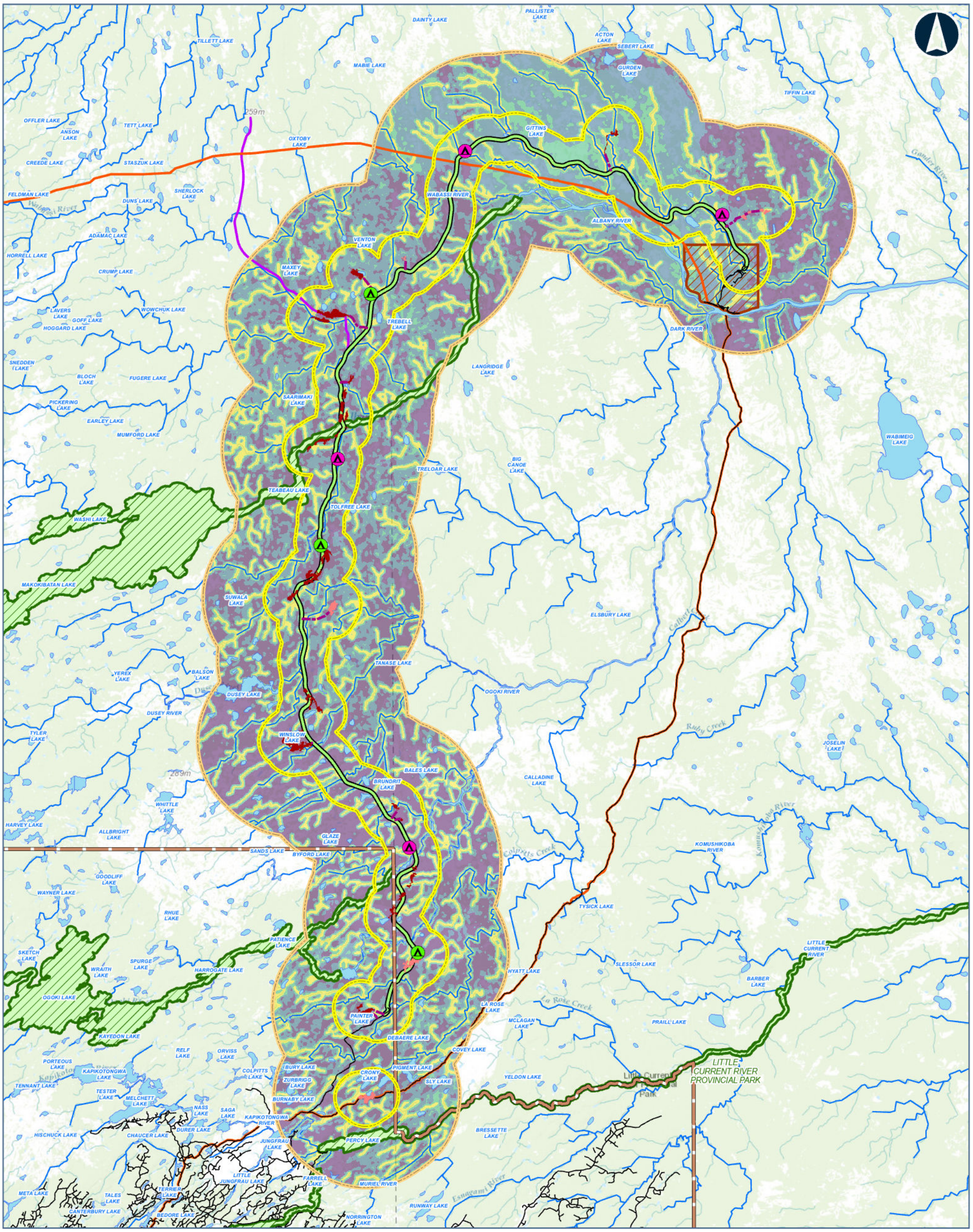
8.2.11.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for northern waterthrush remains similar as described during existing conditions with interspersed patches of riparian habitat along watercourses and waterbodies throughout the cumulative effects assessment Regional Study Area (**Figure 8-11**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for northern waterthrush. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for northern waterthrush after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause northern waterthrushes to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to northern waterthrush distribution relative to existing conditions.

Overall, increases in temperatures are predicted to remove 12%, 18%, and 26% of northern waterthrush range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in northern Ontario is maintained, relative to current conditions, under temperature increases of 1.5°C and 2.0°C but temperature increases of 3.0°C may result in the loss of northern waterthrush distribution from much of northeastern Ontario (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

NORTHERN WATERTHRUSH HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Northern Waterthrush in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-11

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 4:51 PM User Name: INBA08973

8.2.11.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect northern waterthrush survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 2,296.0 ha of high and moderate suitability northern waterthrush habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 7.1 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 163 nesting territories from the Project and other reasonably foreseeable developments, or 1.1% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Northern waterthrush has low to moderate vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on northern waterthrush populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates, such northern waterthrush, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Butler, 2003; Strode, 2003). This plasticity in timing of migration and breeding may allow northern waterthrushes to adapt to climate change.

8.2.11.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.11.1.3 Predicted Cumulative Effects

After mitigation, potential northern waterthrush breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on northern waterthrush habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.11.1.4 Characterization of Predicted Cumulative Effects

Northern waterthrush is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Northern waterthrush is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023) and was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 40% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that northern waterthrush in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 2,296.2 ha of high and moderate suitability habitat (combined), representing 1.1% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of northern waterthrush given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to northern waterthrush movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of northern waterthrush and waterthrush warbler habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on northern waterthrush are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the northern waterthrush population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Northern waterthrush has low to moderate vulnerability to climate change (National Audubon Society 2024). This species' range in northern Ontario is maintained, relative to current conditions, under temperature increases of 1.5°C to 2.0°C, but range in northeastern Ontario could be lost under increases of 3.0°C (National Audubon Society 2024). As such, to be conservative, **effects from climate change** are predicted to be **negative**, **possible**, **permanent**, **continuous**, and of **low to high magnitude**; effect will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.11.1.5 Determination of Significance

Northern waterthrush is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to northern waterthrush habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the northern waterthrush population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 3.0°C relative to current conditions.

8.2.11.2 Sensory Disturbance

8.2.11.2.1 Potential Cumulative Effects

8.2.11.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable northern waterthrush habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by northern waterthrush due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not

continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 12,000.4 ha of high and moderate suitability northern waterthrush habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.9% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-22**).

Table 8-22: Changes to Northern Waterthrush Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	101,281.9	95,734.2	5,547.7	5.5
Moderate	102,837.9	96,385.4	6,452.6	6.3
Low	153,675.4	143,606.3	10,069.1	6.6
Poor	148,764.2	139,456.5	9,307.7	6.3

Note: There are 196.2 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when northern waterthrushes are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.11.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on northern waterthrush movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to northern waterthrush distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when northern waterthrushes are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to northern waterthrush distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the northern waterthrush breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.11.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on northern waterthrush survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega 2012). While the precise threshold for effects on northern waterthrush survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to northern waterthrush survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to northern waterthrush survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.11.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.11.2.3 Predicted Cumulative Effects

After mitigation, potential northern waterthrush breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on northern waterthrush habitat availability, distribution, and survival and reproduction.

8.2.11.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of northern waterthrushes occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.3% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Northern waterthrush is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the northern waterthrush population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.11.2.5 Determination of Significance

Northern waterthrush is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to northern waterthrush habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.11.3 Increase in Edge Habitat

8.2.11.3.1 Potential Cumulative Effects

8.2.11.3.1.1 Survival and Reproduction

Interior-nesting birds, such as northern waterthrush, are particularly vulnerable to nest predation (Cink, 2017) and increased edge habitat can change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002; Söderström et al., 1998). The creation of forest edge due to the construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects may facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002).

8.2.11.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.11.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on northern waterthrush survival and reproduction.

8.2.11.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. This is expected to have minor residual effects on northern waterthrush, leading to small declines in survivorship and reproductive rate for the breeding population. However, changes to predation risk due to increased edge habitat from construction of reasonably foreseeable developments are not expected to have a measurable effect on survival and reproduction for the population in the in the cumulative effects assessment Regional Study Area.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on northern waterthrush are predicted to be **probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the palm warbler population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.11.3.5 Determination of Significance

Northern waterthrush is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to northern waterthrush survival and reproduction due to increased edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.12 Sora

8.2.12.1 Habitat Loss and Alteration

8.2.12.1.1 Potential Cumulative Effects

8.2.12.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 928.6 ha of high to moderate suitability sora breeding habitat. This represents a change of 0.9% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-23**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 93,064.9 ha of high and moderate suitability habitat available for soras after implementation of the Project and other reasonably foreseeable developments (**Table 8-23**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-23: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Sora

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	93,993.5	93,064.9	928.6	0.9
Low to Poor	412,753.5	406,373.8	6,379.7	1.6

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Increased fire frequency and intensity due to climate change may increase sora habitat availability, relative to existing conditions (Hill, 2017). Sora breeding habitat may be negatively affected if climate change is increasing wetland drying in the cumulative effects Regional Study Area (Steen et al., 2014).

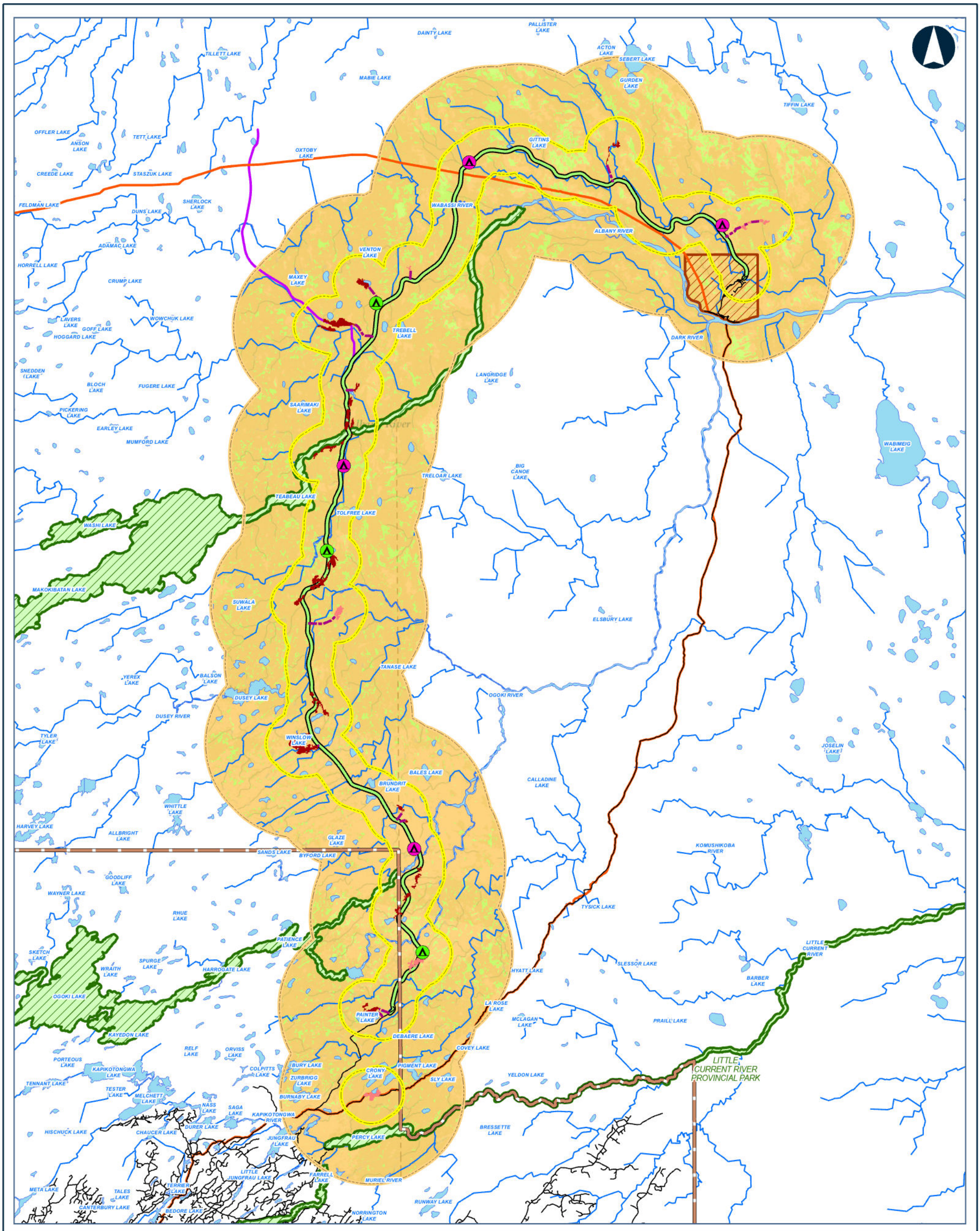
8.2.12.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for sora remains similar as described during existing conditions with patches widely interspersed throughout the cumulative effects assessment Regional Study Area (**Figure 8-12**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for sora. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for sora after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause soras to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to sora distribution relative to existing conditions.

Overall, increases in temperatures are predicted to remove 28%, 34%, and 52% of sora range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). Much of this species' range in northern Ontario is removed, relative to current conditions, under all three increased temperature regimes (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

SORA HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Sora in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 8-12

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8.2.12.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect sora survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 928.6 ha of high and moderate suitability sora habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the density estimate from *Ontario Breeding Bird Atlas* Region 44 (i.e., 0.1 nesting territories per km^2), this amounts to the potential loss of up to one nesting territory from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Sora has moderate vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on sora populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects and forest floor invertebrates and plant material, such soras, appear to be arriving on their breeding grounds earlier than historically, and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow sora to adapt to climate change.

8.2.12.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.12.1.3 Predicted Cumulative Effects

After mitigation, potential sora breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on sora habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.12.1.4 Characterization of Predicted Cumulative Effects

Sora is not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Sora is a common breeder throughout Ontario (Natural Heritage Information Centre, 2023) and was detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 20% of the cumulative effects Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that sora in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 928.6 ha of high and moderate suitability habitat, representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of sora given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to sora movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of sora and sora habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on sora are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the sora population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Sora has moderate vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is decreased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the sora population; effects will extend **beyond the cumulative effects assessment Regional Study Area**

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.12.1.5 Determination of Significance

Sora is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to sora habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the sora population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 3.0°C relative to current conditions.

8.2.12.2 Sensory Disturbance

8.2.12.2.1 Potential Cumulative Effects

8.2.12.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable sora habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by sora due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 5,958.7 ha of high and moderate suitability sora habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 6.3% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-24**).

Table 8-24: Changes to Sora Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	93,993.5	88,034.7	5,958.7	6.3
Low to Poor	412,753.5	379,904.6	32,848.9	7.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when soras are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.12.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on sora movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to sora distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when soras are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to sora distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the sora breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.12.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on sora survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on sora survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to sora survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to sora survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to

occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.12.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.12.2.3 Predicted Cumulative Effects

After mitigation, potential common sora habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on sora habitat availability, distribution, and survival and reproduction.

8.2.12.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of soras occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.3% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Sora is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the sora population in the cumulative effects

assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.12.2.5 Determination of Significance

Sora is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to sora habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.13 Canada Warbler

8.2.13.1 Habitat Loss and Alteration

8.2.13.1.1 Potential Cumulative Effects

8.2.13.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 3,828.3 ha of high moderate suitability Canada warbler breeding habitat. This represents a change of 1.5% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-25**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 253,575.0 ha of high and moderate suitability habitat, respectively, available for Canada warbler after implementation of the Project and other reasonably foreseeable developments (**Table 8-25**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Climate change may be increasing the frequency and intensity of fires and insect outbreaks, which may have negative effects on Canada warbler habitat availability in the cumulative effects Regional Study Area, relative to existing conditions (Committee on the Status of Endangered Wildlife in Canada 2016; Environment Canada 2016a).

Table 8-25: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Canada Warbler

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	257,403.3	253,575.0	3,828.3	1.5
Low to Poor	249,343.7	245,863.7	3,479.9	1.4

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

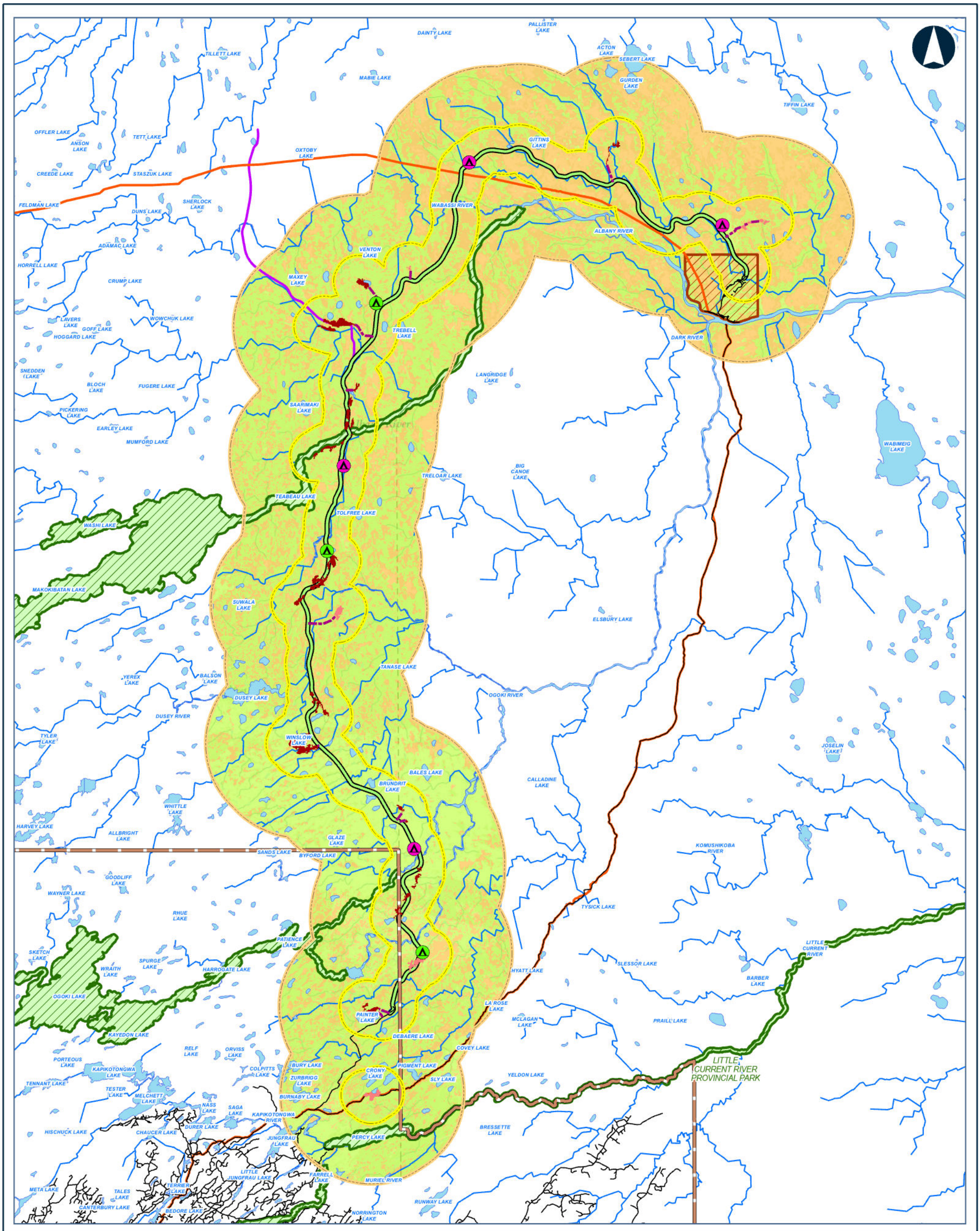
8.2.13.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for Canada warbler remains similar as described during existing conditions with high suitability habitat patches present throughout most of the cumulative effects assessment Regional Study Area except in the northeastern portion where there is more low to poor suitability habitat (**Figure 8-13**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for Canada warbler. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for Canada warbler after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause Canada warblers to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to Canada warbler distribution relative to existing conditions.

Overall, increases in temperatures are predicted to remove 47%, 64%, and 95% of Canada warbler range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). The Canada warbler range in northeastern Ontario is predicted to be maintained under a temperature increase of 1.5°C (National Audubon Society, 2024). However, much of the Canada warbler range in northeastern Ontario is predicted to be removed under the increase by 2.0°C scenario and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

CANADA WARBLER HSI SCORE
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Canada Warbler in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-13

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Date Saved: 2/11/2026 4:51 PM User Name: INBA08973

8.2.13.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect Canada warbler survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,479.9 ha of high and moderate suitability Canada warbler habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest Canada warbler density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 1.0 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to 33 nesting territories from the Project and other reasonably foreseeable developments, or 1.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Canada warbler has low to high vulnerability to climate change, depending on how much temperatures increase in the future (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on Canada warbler populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects, such as Canada warbler, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow Canada warblers to adapt to climate change.

8.2.13.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.13.1.3 Predicted Cumulative Effects

After mitigation, potential Canada warbler breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on Canada warbler habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.13.1.4 Characterization of Predicted Cumulative Effects

Canada warbler is listed as a species of Special Concern under Schedule 1 of *Species at Risk Act* and under the *Endangered Species Act, 2007*. Canada warblers were infrequently detected during baseline surveys. Moderate and high suitability Canada warbler nesting habitat covers approximately 50% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that the Canada warbler population in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions, albeit at low population levels.

Reasonably foreseeable developments are expected to result in a loss of 3,828.3 ha of high and moderate suitability habitat, representing 1.5% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of Canada warbler given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to Canada warbler movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of Canada warbler and Canada warbler habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on Canada warbler are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the Canada warbler population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Canada warbler has low to high vulnerability to climate change, depending on how much temperatures increase in the future (National Audubon Society, 2024). This species' range may be removed from much of northern Ontario if temperatures increase by 2.0°C to 3.0°C (National Audubon Society, 2024). As such, to be conservative, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the Canada warbler population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

8.2.13.1.5 Determination of Significance

Canada warbler is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to Canada warbler habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the Canada warbler population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 2.0°C to 3.0°C relative to current conditions.

8.2.13.2 Sensory Disturbance

8.2.13.2.1 Potential Cumulative Effects

8.2.13.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable Canada warbler habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by Canada warbler due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 16,078.9 ha of high and moderate suitability Canada warbler habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 6.3% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-26**).

Table 8-26: Changes to Canada Warbler Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	257,403.3	234,040.4	16,078.9	6.3
Low to Poor	249,343.7	241,324.4	15,303.3	6.1

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when Canada warblers are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.13.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on Canada warbler movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to Canada warbler distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when Canada warblers are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to Canada warbler distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the Canada warbler breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.13.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on Canada warbler survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on Canada warbler survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to Canada warbler survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to Canada warbler survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons.

Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.13.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.13.2.3 Predicted Cumulative Effects

After mitigation, potential Canada warbler breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on Canada warbler habitat availability, distribution, and survival and reproduction.

8.2.13.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of Canada warblers occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.3% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Canada warbler is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and

continuous during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.13.2.5 Determination of Significance

Canada warbler is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to Canada warbler habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.14 Evening Grosbeak

8.2.14.1 Habitat Loss and Alteration

8.2.14.1.1 Potential Cumulative Effects

8.2.14.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 2,388.2 ha of high to moderate suitability evening grosbeak breeding habitat. This represents a change of 2.7% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-27**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 87,370.9 ha of high and moderate suitability habitat, respectively, available for evening grosbeak after implementation of the Project and other reasonably foreseeable developments (**Table 8-27**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Increased fires and insect outbreaks due to climate change are expected to decrease habitat suitability for evening grosbeaks but these effects are expected to be negligible (Committee on the Status of Endangered Wildlife in Canada 2016).

Table 8-27: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Evening Grosbeak

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	89,759.2	87,370.9	2,388.2	2.7
Low to Poor	416,987.8	412,067.8	4,920.2	1.2

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

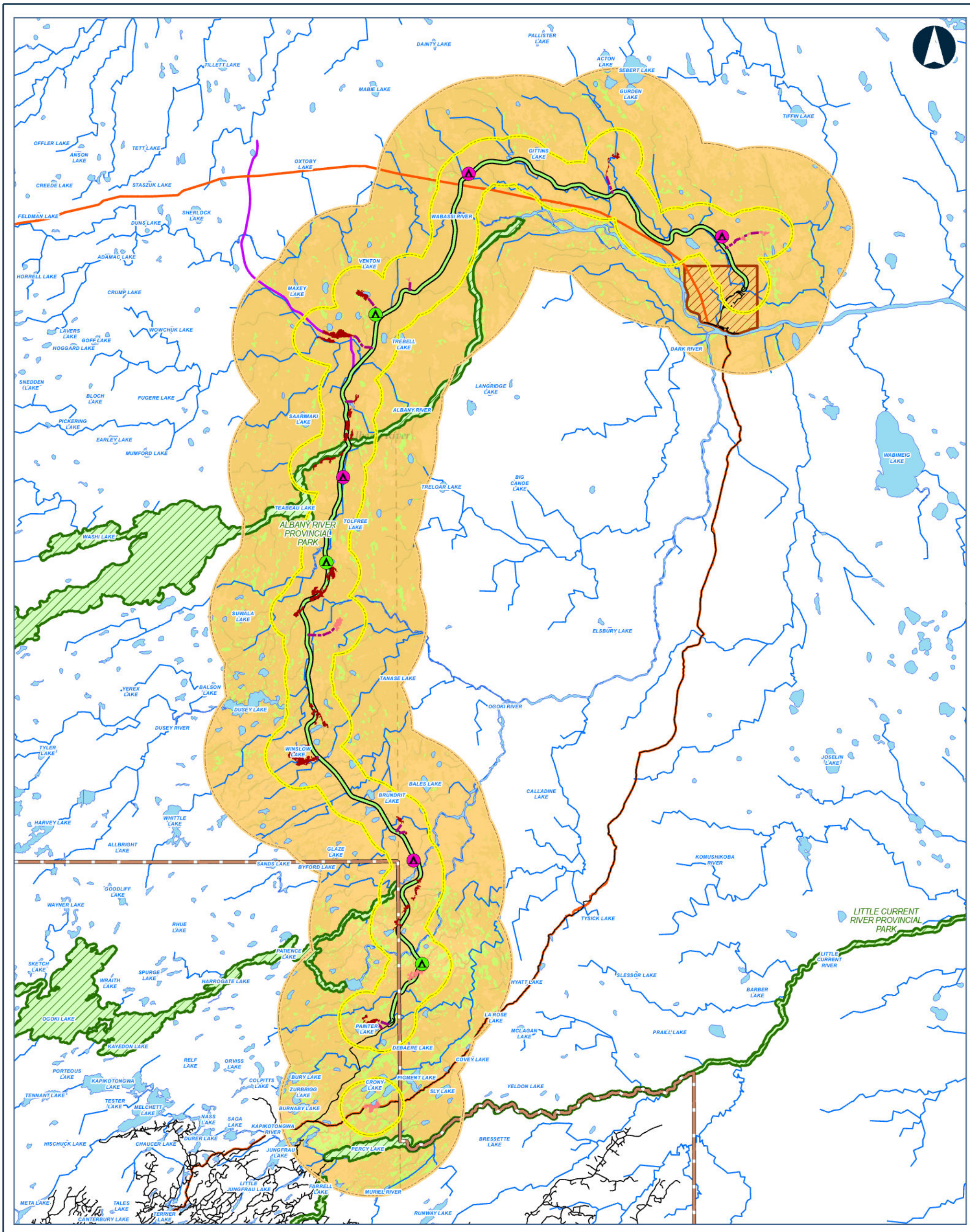
8.2.14.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for evening grosbeak remains similar as described during existing conditions with most high to moderate suitability habitat patches concentrated in the southern portion of the effects assessment Regional Study Area (**Figure 8-14**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for evening grosbeak. As such, during construction and operations of reasonably foreseeable developments, individuals that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for evening grosbeak after implementation of the Project and other reasonably foreseeable developments.

In addition to the change in location of some breeding territories, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause evening grosbeaks to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to evening grosbeak distribution relative to existing conditions.

Overall, increases in temperatures are predicted to remove 39%, 55%, and 78% of evening grosbeak range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). Much of the evening grosbeak range in northeastern Ontario is predicted to be removed under the increase by 1.5°C and 2.0°C scenario and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

EVENING GROSBEAK HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Evening Grosbeak in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-14

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 4:51 PM User Name: INBA08973

8.2.14.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect evening grosbeak survival and reproduction if individuals that previously used areas in the project footprints are unable to establish a new territory or are forced to establish a territory in lower quality habitat. Evening grosbeak is not territorial during the breeding season, is highly nomadic, and can nest in small groups and loose colonies (Gillihan and Byers, 2020; COSEWIC, 2016). As such, the number of potential nesting territories removed by the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects could not be accurately determined.

Evening grosbeak has moderate to high vulnerability to climate change (National Audubon Society, 2024). Climate change may create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, evening grosbeaks do not migrate to neotropical locations and, so, this species is expected to be less affected by these changes.

8.2.14.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.14.1.3 Predicted Cumulative Effects

After mitigation, potential evening grosbeak breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on evening grosbeak habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.14.1.4 Characterization of Predicted Cumulative Effects

Evening grosbeak is listed as Special Concern under Schedule 1 of the *Species at Risk Act* and the *Endangered Species Act, 2007*. Evening grosbeaks were not detected during baseline surveys; this species is highly nomadic and travels to and inhabits areas with high prey abundance. Moderate and high suitability evening grosbeak nesting habitat covers approximately 20% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that the evening grosbeak population in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and after implementation of the Project, albeit at low population levels.

Reasonably foreseeable developments are expected to result in a loss of 2,388.8 ha of high and moderate suitability habitat, representing 2.7% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional population of evening grosbeak given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to evening grosbeak movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of evening grosbeak and grosbeak habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on evening grosbeak are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the evening grosbeak population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Evening grosbeak has moderate to high vulnerability to climate change (National Audubon Society, 2024). Much of the evening grosbeak range in northeastern Ontario is predicted to be removed under the increase by 1.5°C and 2.0°C scenario and this species is not expected to occur in Ontario under the increase by 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the evening grosbeak population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.14.1.5 Determination of Significance

Evening grosbeak is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to evening grosbeak habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the evening grosbeak population beyond the cumulative effects assessment Regional Study Area, particularly if temperatures increase by 3.0°C relative to current conditions.

8.2.14.2 Sensory Disturbance

8.2.14.2.1 Potential Cumulative Effects

8.2.14.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of evening grosbeak habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by evening grosbeak due to sensory disturbance is not known, habitat that was within 300 m of human developments was assumed to be negatively affected by sensory disturbance as a precautionary approach.

Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects are anticipated to occur periodically (not continuously) during construction and there will be minimal sensory disturbance during operations of the broadband project. As such, effects are anticipated to smaller than predicted.

A total of 7,964.9 ha of high and moderate suitability evening grosbeak habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 8.9% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-28**).

Table 8-28: Changes to Evening Grosbeak Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	89,759.2	81,794.3	7,964.9	8.9
Low to Poor	416,987.8	393,570.5	23,417.3	5.6

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously as evening grosbeaks may be present in the cumulative effects assessment Regional Study Area year-round.

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.14.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on evening grosbeak movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory

disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to evening grosbeak distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously. Potential sensory disturbance effects and changes to evening grosbeak distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.14.2.1.3 Survival and Reproduction

Sensory disturbance during Construction and / or Operation and Maintenance of the Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects may have negative effects on evening grosbeak survival and reproduction. Noise may reduce abundance and pairing success (Habib et al., 2007; Bayne et al., 2008), interfere with communication (e.g., reducing ability to hear intraspecific vocalizations), and increase risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on evening grosbeak survival and reproduction due to sensory disturbance is not known, adverse effects on survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to evening grosbeak survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons. Potential sensory disturbance effects and changes to evening grosbeak survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.14.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from sensory disturbance during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.14.2.3 Predicted Cumulative Effects

After mitigation, potential evening grosbeak habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on evening grosbeak habitat availability, distribution, and survival and reproduction.

8.2.14.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for evening grosbeaks occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 8.9% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Evening grosbeak is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area not affected by the sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the evening grosbeak population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of cumulative residual effects characterization is provided in **Table 8-48**.

8.2.14.2.5 Determination of Significance

Evening grosbeak is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to evening grosbeak habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.15 Chimney Swift, Bank Swallow, and Barn Swallow

8.2.15.1 Habitat Loss and Alteration

8.2.15.1.1 Potential Cumulative Effects

8.2.15.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 368.0 ha of high and moderate suitability chimney swift, bank swallow, and barn swallow breeding habitat. This represents a change of 33.1% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-29**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 744.1 ha of high and moderate suitability habitat available for chimney swift, bank swallow, and barn swallow after implementation of the Project and other reasonably foreseeable developments (**Table 8-29**).

The Northern Road Link Road and Anaconda and Painter Lake Forestry Roads upgrades projects may increase habitat availability for bank swallows as roadcuts may provide suitable nesting habitat for this species (Garrison and Turner, 2020). Similarly, barn swallows may use large culverts and bridges along roads for nesting (Committee on the Status of Endangered Wildlife in Canada, 2021; Brown and Brown, 2020).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

An increase in fire and insect outbreak frequency and intensity due to climate change may increase chimney swift, bank swallow, and barn swallow foraging habitat availability relative to historical conditions. However, the effects from the anticipated drying and shrinkage of wetlands are not likely to be positive for these species (Garrison and Turner, 2020; Brown and Brown, 2020). More frequent and intense flooding events and increased ice scouring associated with climate change may have negative effects on bank swallow breeding habitat availability (Environment and Climate Change Canada, 2022).

Table 8-29: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat loss for Chimney Swift, Barn Swallow, and Bank Swallow

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	1,112.1	744.1	368.0	33.1
Low to Poor	505,634.9	498,694.6	6,940.2	1.4

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).

ha = hectare; % = percent.

8.2.15.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for chimney swift, bank swallow, and barn swallow remains similar as described during existing conditions along the Dark River and its tributaries in the northeast portion of the effects assessment Regional Study Area (**Figure 8-15**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for chimney swift, bank swallow, and barn swallow. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause chimney swift, bank swallow, and barn swallow to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to chimney swift, bank swallow, and barn swallow distribution relative to existing conditions.

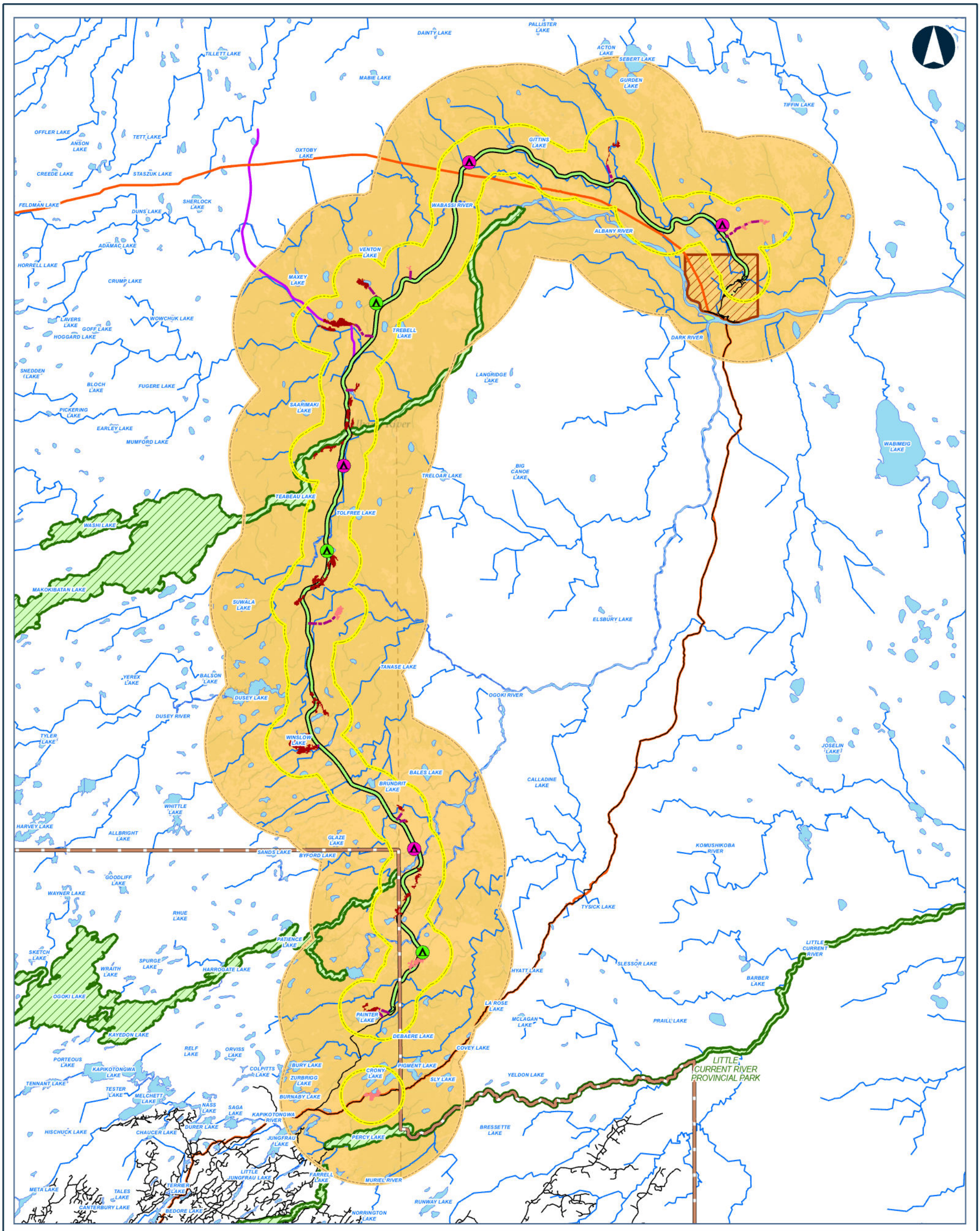
The Northern Road Link and Rapid Lynx Broadband projects may alter chimney swift, bank swallow, and barn swallow movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011; Wheeler, 2013) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., 60 m wide), and the Rapid Lynx Broadband project will be 100 m wide. There is a similar amount of undisturbed habitat in the cumulative effects assessment Regional Study Area for chimney swift, bank swallow, and barn swallow after implementation of the Project and other reasonably foreseeable developments when compared to existing conditions. As such, overall movement patterns of chimney swift, bank swallow, and barn swallow in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

The removal of habitat due to the Northern Road Link and Rapid Lynx Broadband projects is predicted to result in a change to the distribution of chimney swift, bank swallow, and barn swallow breeding territories and movements in the cumulative effects assessment Regional Study Area.

Overall, increases in temperatures are predicted to increase chimney swift range in North America by 13%, 13%, and 18%, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This includes a range expansion in northern Ontario (National Audubon Society, 2024).

The bank swallow range in North America is predicted to increase dramatically under temperature regimes increases, including throughout much of northern Ontario (National Audubon Society, 2024). This species range is predicted to increase by 37%, 44%, and 57%, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024).

The barn swallow range in North America is predicted to increase by 17%, 19%, and 28%, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species range will expand in northern Ontario (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

BANK SWALLOW HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Chimney Swift, Bank Swallow, and Barn Swallow in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-15

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8.2.15.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect chimney swift, bank swallow, and barn swallow survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 368.0 ha of high and moderate suitability chimney swift, bank swallow, and barn swallow habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the barn swallow density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., <0.1 nesting territories per km^2 for both regions), this amounts to the potential loss of less than 1 nesting territory from the Project and other reasonably foreseeable developments, or 32.6% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Chimney swift, bank swallow, and barn swallow have low vulnerability to climate change (National Audubon Society, 2024). However, climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have effects on chimney swift, bank swallow, and barn swallow populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and chimney swift, bank swallow, and barn swallow nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, chimney swifts, bank swallows, and barn swallows appear to be arriving on their breeding grounds earlier than 100 years ago and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow these species to adapt to climate change.

Cold weather can cause chimney swift mortality during the breeding season by reducing insect availability, which may result in chick and adult starvation (Steeves et al., 2020). Exposure of nests to heavy rain can also cause mass chick mortality (Steeves et al., 2020). More frequent and intense flooding events associated with climate change may have negative effects on bank swallow survival and reproduction if these events destroy nesting colonies during the breeding season (Environment and Climate Change Canada, 2022).

8.2.15.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.15.1.3 Predicted Cumulative Effects

After mitigation, potential chimney swift, bank swallow, and barn swallow breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.15.1.4 Characterization of Predicted Cumulative Effects

Chimney swift and bank swallow are listed as Threatened under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Bank swallow is a Special Concern species under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. None of these species were detected during baseline surveys. Moderate and high suitability chimney swift, bank swallow, and barn swallow nesting habitat covers approximately 0.2% of the cumulative effects Regional Study Area under existing conditions. The available information suggests that these species are largely absent from the effects assessment Regional Study Area at existing conditions.

Reasonably foreseeable developments are expected to result in a loss of 368.0 ha of high and moderate suitability habitat, representing 33.1% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of chimney swift, bank swallow, and barn swallow given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to chimney swift, bank swallow, and barn swallow movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of chimney swift, bank swallow, and barn swallow and suitable habitat for these species in the cumulative effects assessment Regional Study Area.

Nest success rates are generally quite high for chimney swift, barn swallow, and bank swallow, with studies showing success rates of 44% to 90% (Brown and Brown 2020; Garrison and Turner 2020; Steves et al. 2020). As such, changes to habitat availability and

distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional populations.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on chimney swift, bank swallow, and barn swallow are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the chimney swift, bank swallow, and barn swallow populations in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Chimney swift, bank swallow, and barn swallow have low vulnerability to climate change (National Audubon Society, 2024). These species' ranges in northern Ontario are predicted increase, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). **effects from climate change** are predicted to have **neutral to positive**, **probable**, **permanent**, and **continuous** effects on the chimney swift, bank swallow, and barn swallow populations; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.15.1.5 Determination of Significance

Chimney swift, bank swallow, and barn swallow are predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to chimney swift, bank swallow, and barn swallow habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional populations. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) and climate change are therefore considered **not significant**.

8.2.15.2 Sensory Disturbance

8.2.15.2.1 Potential Cumulative Effects

8.2.15.2.1.1 Survival and Reproduction

Potential effects from noise on chimney swift, bank swallow, and barn swallow include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). To be conservative, potential sensory disturbance effects and changes to chimney swift, bank swallow, and barn swallow survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when chimney swift, bank swallow, and barn swallow are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to chimney swift, bank swallow, and barn swallow survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the chimney swift, bank swallow, and barn swallow breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.15.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.15.2.3 Predicted Cumulative Effects

After mitigation, chimney swift, bank swallow, and barn swallow survival and reproduction may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects.

8.2.15.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of chimney swift, bank swallow, and barn swallow occupying territories near the project footprints. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road

Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Chimney swift, bank swallow, and barn swallow are highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the chimney swift, bank swallow, and barn swallow populations in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.15.2.5 Determination of Significance

Chimney swift, bank swallow, and barn swallow are predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to chimney swift, bank swallow, and barn swallow survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional populations. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.16 Common Nighthawk and Eastern Whip-poor-will

8.2.16.1 Habitat Loss and Alteration

8.2.16.1.1 Potential Cumulative Effects

8.2.16.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,377.5 ha of high suitability and 1,092.7 ha of moderate suitability common nighthawk breeding habitat. This represents a change of 1.2% and 0.9% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-30**). High and moderate suitability habitat remains abundant for common nighthawk in the cumulative effects assessment Regional Study Area, with 239,826.5 ha of high and moderate suitability habitat available after implementation of the Project and other reasonably foreseeable developments (**Table 8-31**).

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 635.9 ha of high and moderate suitability eastern whip-poor-will breeding habitat. This represents a change of 3.3% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-30**). High and moderate suitability habitat remains abundant for eastern whip-poor-will in the cumulative effects assessment Regional Study Area, with 18,815.1 ha available after implementation of the Project and other reasonably foreseeable developments (**Table 8-31**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

An increase in the intensity and frequency of fires and insect outbreaks due to climate change may increase common nighthawk and eastern whip-poor-will habitat availability (Committee on the Status of Endangered Wildlife in Canada 2009a, 2018).

Table 8-30: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat loss for Common Nighthawk

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	116,546.6	115,169.1	1,377.5	1.2
Moderate	125,750.1	124,657.4	1,092.7	0.9
Low	128,347.5	126,847.0	1,500.5	1.2
Poor	135,974.6	132,637.7	3,336.9	2.5

Note: There are 137.0 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Table 8-31: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat loss for Eastern Whip-poor-will

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	19,450.4	18,815.1	635.9	3.3
Low to Poor	487,296.6	480,623.7	6,672.9	1.4

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

8.2.16.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for common nighthawk and eastern whip-poor-will remains similar as described during existing conditions with the majority of high and moderate suitability habitat patches concentrated in the southern portion of the cumulative effects assessment Regional Study Area (**Figure 8-16**; **Figure 8-17**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for common nighthawk and eastern whip-poor-will. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously

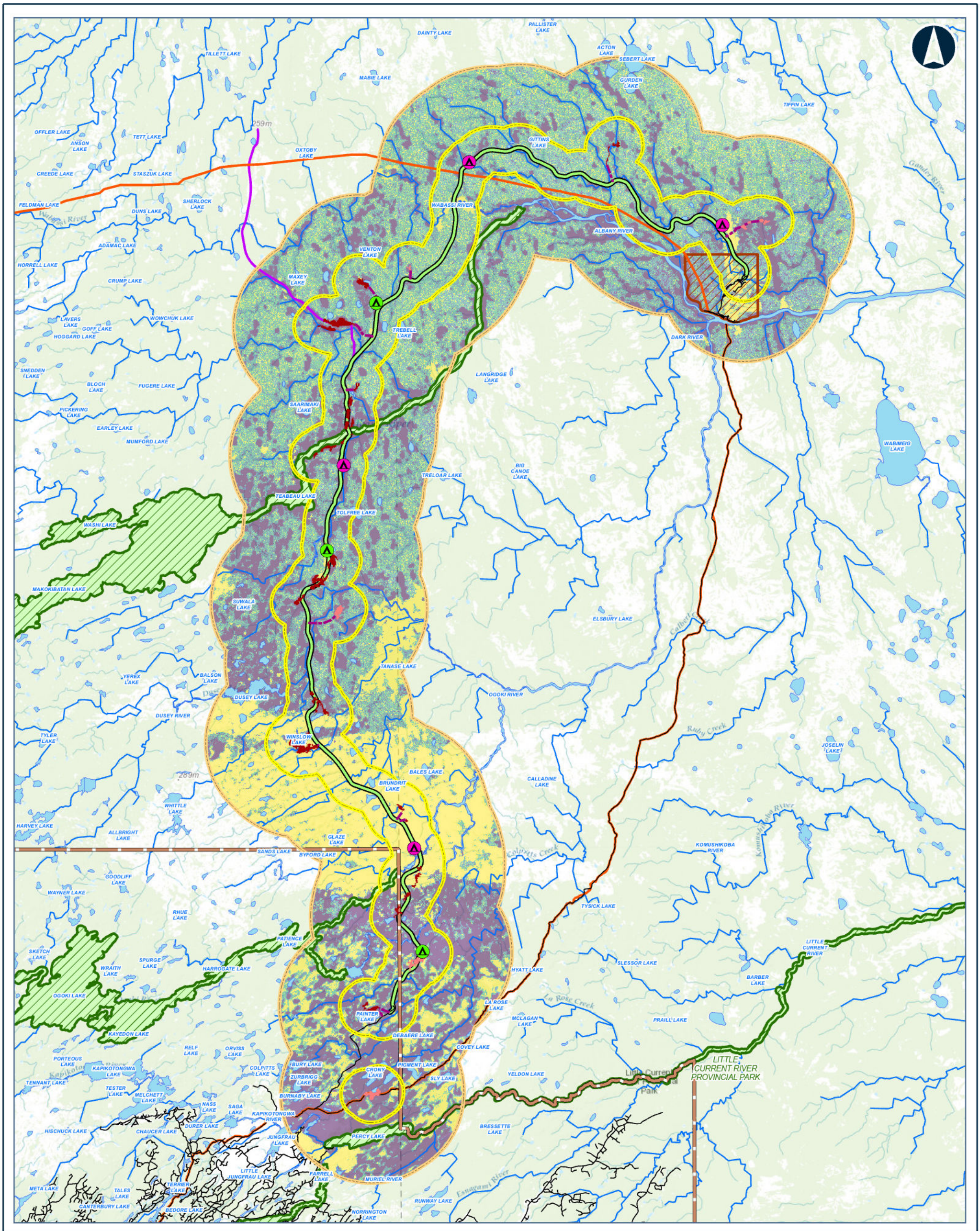
used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause common nighthawks and eastern whip-poor-wills to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to common nighthawk and eastern whip-poor-will distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects are not expected to act as barriers to common nighthawk and eastern whip-poor-will movements during foraging or dispersal. Road corridors may provide suitable foraging habitat for these species (Committee on the Status of Endangered Wildlife in Canada, 2009a). As such, overall distribution and movement patterns of common nighthawk and eastern whip-poor-will in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to maintain or increase common nighthawk range in North America, relative to existing conditions. It is predicted that 99% of the common nighthawk range in North America will be maintained under temperature increases of 1.5°C, 2.0°C, and 3.0°C, while range increases of 13%, 15%, and 20% are predicted for each temperature regime, respectively (National Audubon Society, 2024).

Although there is expected to be an overall decline in eastern whip-poor-will range in North America there are anticipated to be range increases throughout northern Ontario, Quebec, and the Maritime Provinces (National Audubon Society, 2024). Overall, there are anticipated to be range decreases of 43%, 58%, and 81% in North America under temperature increases of 1.5°C, 2.0°C, and 3.0°C, respectively. However, range expansions of 36%, 39%, and 44%, are anticipated under temperature increases of 1.5°C, 2.0°C, and 3.0°C, respectively; this range expansion includes areas in northern Ontario.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

COMMON NIGHTHAWK HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Common Nighthawk in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-16

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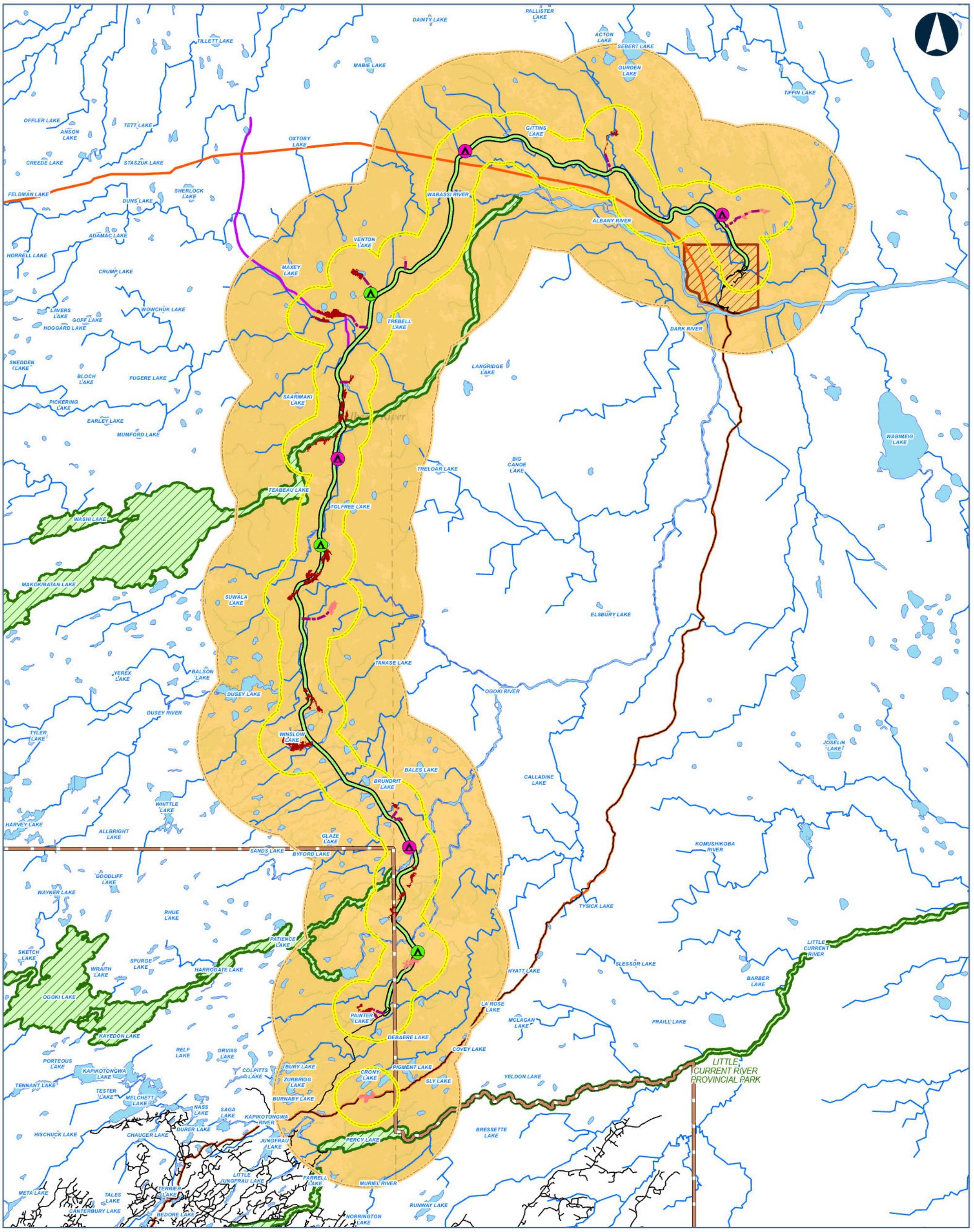



Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

EASTERN WHIP-POOR-WILL HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Eastern Whip-poor-will in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 8-17

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8.2.16.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect common nighthawk and eastern whip-poor-will survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 2,470.2 ha of high and moderate suitability common nighthawk that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest common nighthawk density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.3 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to six nesting territories from the Project and other reasonably foreseeable developments, or 1.0% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 635.9 ha of high and moderate suitability eastern whip-poor-will habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the average home range for eastern whip-poor-will of 5.1 ha, this amounts to the potential loss of up to 125 nesting territories, or 3.3% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Common nighthawk is not highly vulnerable to climate change (National Audubon Society, 2024). Eastern whip-poor-will has moderate to high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on common nighthawk and eastern whip-poor-will populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and common nighthawk and eastern whip-poor-will nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). In eastern North America, common nighthawk and eastern whip-poor-will seem to be particularly vulnerable to this change as both species appear to be arriving on breeding grounds at the same time as 100 years ago (Butler, 2003).

8.2.16.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.16.1.3 Predicted Cumulative Effects

After mitigation, potential common nighthawk and eastern whip-poor-will breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.16.1.4 Characterization of Predicted Cumulative Effects

Common nighthawk and eastern whip-poor-will are Special Concern species under Schedule 1 of *Species at Risk Act*. Common nighthawk is a Special Concern species under the *Endangered Species Act, 2007*, while eastern whip-poor-will is listed as Threatened under the *Endangered Species Act, 2007*. Eastern whip-poor-will was recently re-assessed and downlisted to Special Concern by the Committee on the Status of Endangered Wildlife in Canada and the Committee on the Status of Species at Risk in Ontario. Subsequent downlisting under the *Species at Risk Act* and the *Endangered Species Act, 2007* are anticipated in the future.

Common nighthawk was frequently detected during baseline surveys, while eastern whip-poor-will was infrequently detected. Moderate and high suitability common nighthawk and eastern whip-poor-will nesting habitat covers approximately 45% and 5%, respectively, of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that common nighthawk and eastern whip-poor-will in the effects assessment Regional Study Area are self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments (including the Project) are predicted to result in a loss of 2,470.2 ha of high and moderate suitability habitat for common nighthawk, representing 1.0% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. The Project and other reasonably foreseeable developments are predicted to result in a loss of 635.9 ha of high and moderate suitability habitat for eastern whip-poor-will, representing 3.3% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of common nighthawk and eastern whip-poor-will given the small anticipated loss of habitat relative to what is available to the

regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to common nighthawk and eastern whip-poor-will movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of common nighthawks and eastern whip-poor-wills and their habitats in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on ovenbird are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the common nighthawk and eastern whip-poor-will populations in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Common nighthawk is not highly vulnerable to climate change (National Audubon Society, 2024). Common nighthawk range in North America is predicted to be maintained or increase with increasing temperatures (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **neutral to positive**, **probable**, **permanent**, and **continuous** effects on the common nighthawk population; effects will extend **beyond the cumulative effects assessment Regional Study Area**

Eastern whip-poor-will has moderate to high vulnerability to climate change (National Audubon Society, 2024). Although the overall eastern whip-poor-will range in North America is predicted to decline, this species' range is expected to expand in northern Ontario (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **neutral to positive**, **probable**, **permanent**, and **continuous** effects on the eastern whip-poor-will population; effects will extend **beyond the cumulative effects assessment Regional Study Area**

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.16.1.5 Determination of Significance

Common nighthawk and eastern whip-poor-will are predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Effects from climate change on common nighthawk and eastern whip-poor-will in northern Ontario are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.16.2 Sensory Disturbance

8.2.16.2.1 Potential Cumulative Effects

8.2.16.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable common nighthawk and eastern whip-poor-will habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by common nighthawk and eastern whip-poor-will due to sensory disturbance is not known, habitat that was within 200 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 200 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 8,829.8 ha of high and moderate suitability common nighthawk habitat and 1,433.8 ha of high and moderate suitability eastern whip-poor-will habitat may be indirectly affected within 200 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects (**Table 8-32**; **Table 8-33**). This is 3.6% and 7.4% of high and moderate suitability habitat that is available for common nighthawk and eastern whip-poor-will, respectively, in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-32**; **Table 8-33**).

Table 8-32: Changes to Common Nighthawk Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	116,546.6	111,992.8	4,553.7	3.9
Moderate	125,750.1	121,473.9	4,276.1	3.4
Low	128,347.5	122,762.7	5,584.9	4.4
Poor	135,974.6	126,634.4	9,340.2	6.9

Note: There are 137.0 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Table 8-33: Changes to Eastern Whip-poor-will Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	19,450.4	18,016.6	1,433.8	7.4
Low to Poor	487,296.6	464,973.9	22,322.7	4.6

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains unaffected by sensory disturbance from the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when common nighthawks and eastern whip-poor-wills are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.16.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on common nighthawk and eastern whip-poor-will movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to common nighthawk and eastern whip-poor-will distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when common nighthawks and eastern whip-poor-wills are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to common nighthawk and eastern whip-poor-will distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the common nighthawk and eastern whip-poor-will breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.16.2.1.3 Survival and Reproduction

Potential effects from noise on common nighthawk and eastern whip-poor-will include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on common nighthawk and eastern

whip-poor-will survival and reproduction due to sensory disturbance is not known, adverse effects on common nighthawk and eastern whip-poor-will survival and reproduction within 200 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to common nighthawk and eastern whip-poor-will survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when common nighthawks and eastern whip-poor-wills are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to common nighthawk and eastern whip-poor-will survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the common nighthawk and eastern whip-poor-will breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.16.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.16.2.3 Predicted Cumulative Effects

After mitigation, potential common nighthawk and eastern whip-poor-will breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction.

8.2.16.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of common nighthawks and eastern whip-poor-wills occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 3.6% and 7.4% of high and moderate suitability habitat (combined) that is available for common nighthawk and eastern whip-poor-will, respectively, in the

cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Common nighthawk and eastern whip-poor-will are highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the common nighthawk and eastern whip-poor-will populations in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.16.2.5 Determination of Significance

Common nighthawk and eastern whip-poor-will are predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to common nighthawk and eastern whip-poor-will habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.16.3 Increase in Edge Habitat

8.2.16.3.1 Potential Cumulative Effects

8.2.16.3.1.1 Survival and Reproduction

Ground-nesting birds, such as common nighthawk and eastern whip-poor-will, are particularly vulnerable to nest predation (Cink, 2017) and increased edge habitat can change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent habitats (Chalfoun et al., 2002; Söderström et al., 1998). The creation of forest edge due to the Construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects may facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002).

8.2.16.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.16.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on ovenbird survival and reproduction.

8.2.16.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. This is expected to have minor residual effects on common nighthawk and eastern whip-poor-will, leading to small declines in survivorship and reproductive rate for the breeding populations. However, both species have relatively reproductive potential (Brigham et al., 2020; Cink et al., 2017). Changes to predation risk due to increased edge habitat from construction of reasonably foreseeable developments are not expected to have a measurable effect on survival and reproduction for the populations in the in the cumulative effects assessment Regional Study Area.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on common nighthawk and eastern whip-poor-will are predicted to be **probable** to occur,

largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the common nighthawk and eastern whip-poor-will populations in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.16.3.5 Determination of Significance

Common nighthawk and eastern whip-poor-will are predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to common nighthawk and eastern whip-poor-will survival and reproduction due to increased edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.17 Eastern Wood-pewee

8.2.17.1 Habitat Loss and Alteration

8.2.17.1.1 Potential Cumulative Effects

8.2.17.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,038.8 ha of high and moderate suitability eastern wood-pewee breeding habitat. This represents a change of 3.4% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-34**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 29,798.0 ha of high and moderate suitability habitat available for eastern wood-pewee after implementation of the Project and other reasonably foreseeable developments (**Table 8-34**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-34: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Eastern Wood-pewee

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	30,836.9	29,798.0	1,038.8	3.4
Low to Poor	475,910.1	469,640.7	6,269.4	1.3

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Eastern wood-pewee is more abundant in landscapes with more tree cover (Kendrick et al., 2013). As such, an increase in the intensity and frequency of fires and insect outbreaks due to climate change may decrease eastern wood-pewee habitat availability in the cumulative effects Regional Study Area, relative to existing conditions.

8.2.17.1.1.2 Distribution

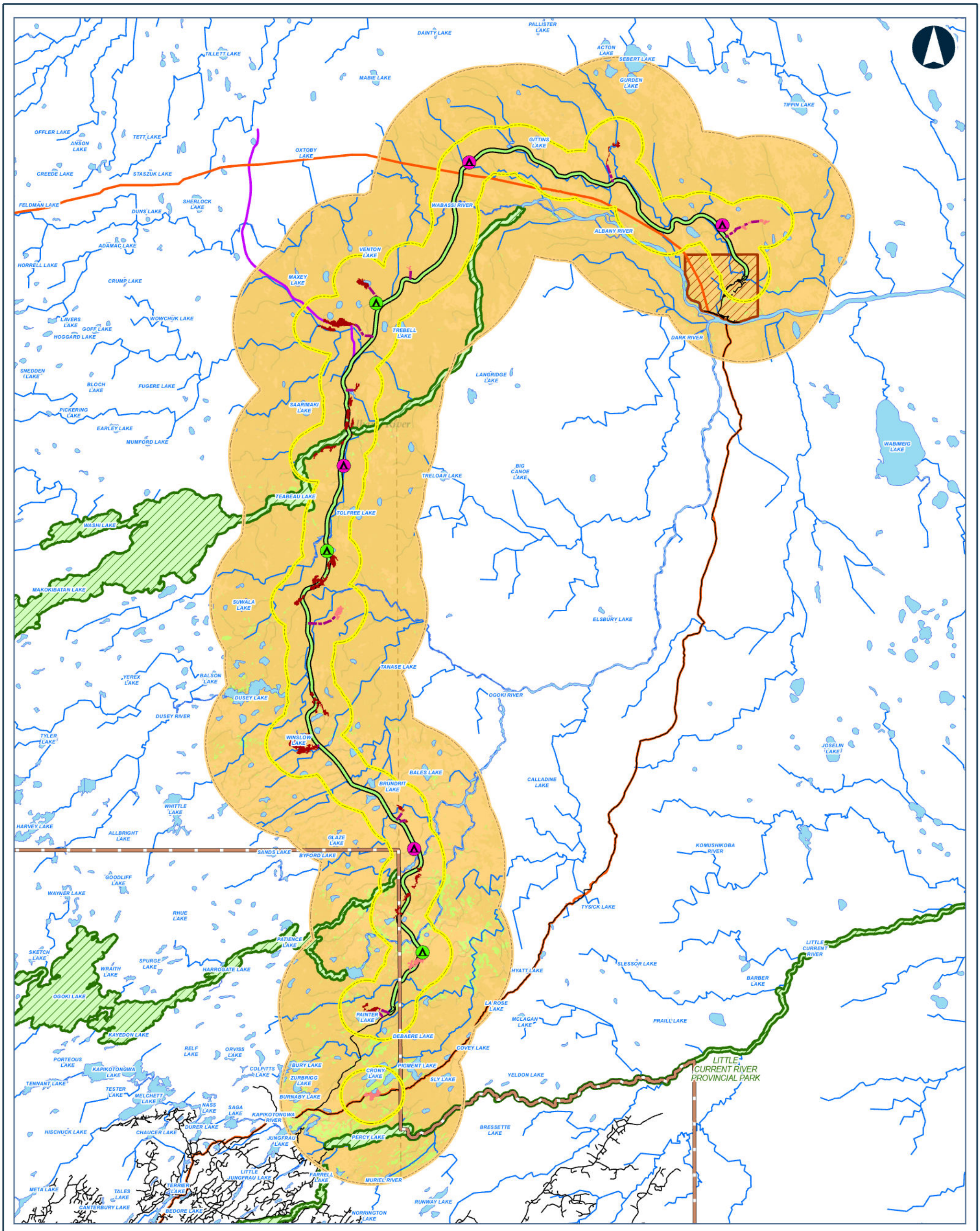
After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for eastern wood-pewee remains similar as described during existing conditions with a high concentration in the southern half of the cumulative effects assessment Regional Study Area (**Figure 8-18**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for eastern wood-pewee. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause eastern wood-pewees to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to eastern wood-pewee distribution relative to existing conditions.

The removal of habitat due to the Northern Road Link and Rapid Lynx Broadband projects is predicted to result in a change to the distribution of eastern wood-pewee breeding territories and movements in the cumulative effects assessment Regional Study Area.

Overall, increases in temperatures are predicted to increase eastern wood-pewee range in North America by 14%, 15%, and 23% if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively, relative to existing conditions (National Audubon Society, 2024). This species' range in northern Ontario is increased, relative to current conditions, under all three temperature increases (National Audubon Society, 2024).





Legend

- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

EASTERN WOOD PEWEE HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
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World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Eastern Wood-Peewee in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026 | 1:480,000 * when printed 11"x17"

Rev:0

Figure 8-18

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Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\95_PROJ\21455151\40_PROD\0037_Blnd_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 5:22 PM User Name: INBA08973

8.2.17.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect eastern wood-pewee survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 1,038.8 ha of high and moderate suitability eastern wood-pewee habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest eastern wood-pewee density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.2 nesting territories per km^2 for Region 37), this amounts to the potential loss of up to two nesting territories from the Project and other reasonably foreseeable developments, or 3.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Eastern wood-pewee has low vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on eastern wood-pewee populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, eastern wood-pewees appear to be arriving on their breeding grounds earlier than 100 years ago and may be responding to the advancement of spring conditions (Butler, 2003). This plasticity in timing of migration and breeding may allow eastern wood-pewees to adapt to climate change.

8.2.17.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.17.1.3 Predicted Cumulative Effects

After mitigation, potential eastern wood-pewee breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on eastern wood-pewee habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.17.1.4 Characterization of Predicted Cumulative Effects

Eastern wood-pewee is listed as Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. This species was infrequently detected during baseline surveys. Moderate and high suitability eastern wood-pewee nesting habitat covers approximately 5% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that eastern wood-pewee in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project, albeit at a low population.

Reasonably foreseeable developments are expected to result in a loss of 1,038.8 ha of high and moderate suitability habitat, representing 3.4% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of eastern wood-pewee given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to eastern wood-pewee movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of eastern wood-pewee and wood-pewee habitat in the cumulative effects assessment Regional Study Area.

Eastern wood-pewee has moderate reproductive rate (nest success 32% to 56%, three eggs per brood, and one brood per season) (Watt et al., 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

After implementation of mitigation measures, effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on eastern wood-pewee are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the eastern wood-pewee population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Eastern wood-pewee has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is increased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **neutral to positive**, **probable**, **permanent**, and **continuous** effects on the eastern wood-pewee population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.17.1.5 Determination of Significance

Eastern wood-pewee is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to eastern wood-pewee habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**. Effects from climate change are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.17.2 Sensory Disturbance

8.2.17.2.1 Potential Cumulative Effects

8.2.17.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable eastern wood-pewee habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by eastern wood-pewee due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However,

sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 2,760.9 ha of high and moderate suitability eastern wood-pewee habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 6.0% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-35**).

Table 8-35: Changes to Eastern Wood-pewee Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	30,836.9	28,075.9	2,760.9	6.0
Low to Poor	475,910.1	447,288.9	28,621.2	8.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when eastern wood-pewees are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.17.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on eastern wood-pewee movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to eastern wood-pewee distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when eastern wood-pewees are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to eastern wood-pewee distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the eastern wood-pewee breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.17.2.1.3 Survival and Reproduction

The effects of noise on the survival and reproduction of ovenbirds are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on eastern wood-pewee survival and reproduction due to sensory disturbance is not known, adverse effects on eastern wood-pewee survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to eastern wood-pewee survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when eastern wood-pewees are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to eastern wood-pewee survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the ovenbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.17.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.17.2.3 Predicted Cumulative Effects

After mitigation, potential eastern wood-pewee breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on eastern wood-pewee habitat availability, distribution, and survival and reproduction.

8.2.17.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of eastern wood-pewees occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.0% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Eastern wood-pewee is highly mobile and capable of relocating to portions of the cumulative effects

assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the eastern wood-pewee population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.17.2.5 Determination of Significance

Eastern wood-pewee is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to eastern wood-pewee habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.18 Olive-sided Flycatcher

8.2.18.1 Habitat Loss and Alteration

8.2.18.1.1 Potential Cumulative Effects

8.2.18.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 306.8 ha of high suitability and 2,671.6 ha of moderate suitability olive-sided flycatcher breeding habitat. This represents a change of 0.4% and 1.3% of high and moderate suitability habitat, respectively, at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-36**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 83,645.9 and 211,663.2 ha of high and moderate suitability habitat, respectively, available for olive-sided flycatcher after implementation of the Project and other reasonably foreseeable developments (**Table 8-5**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-36: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Olive-sided Flycatcher

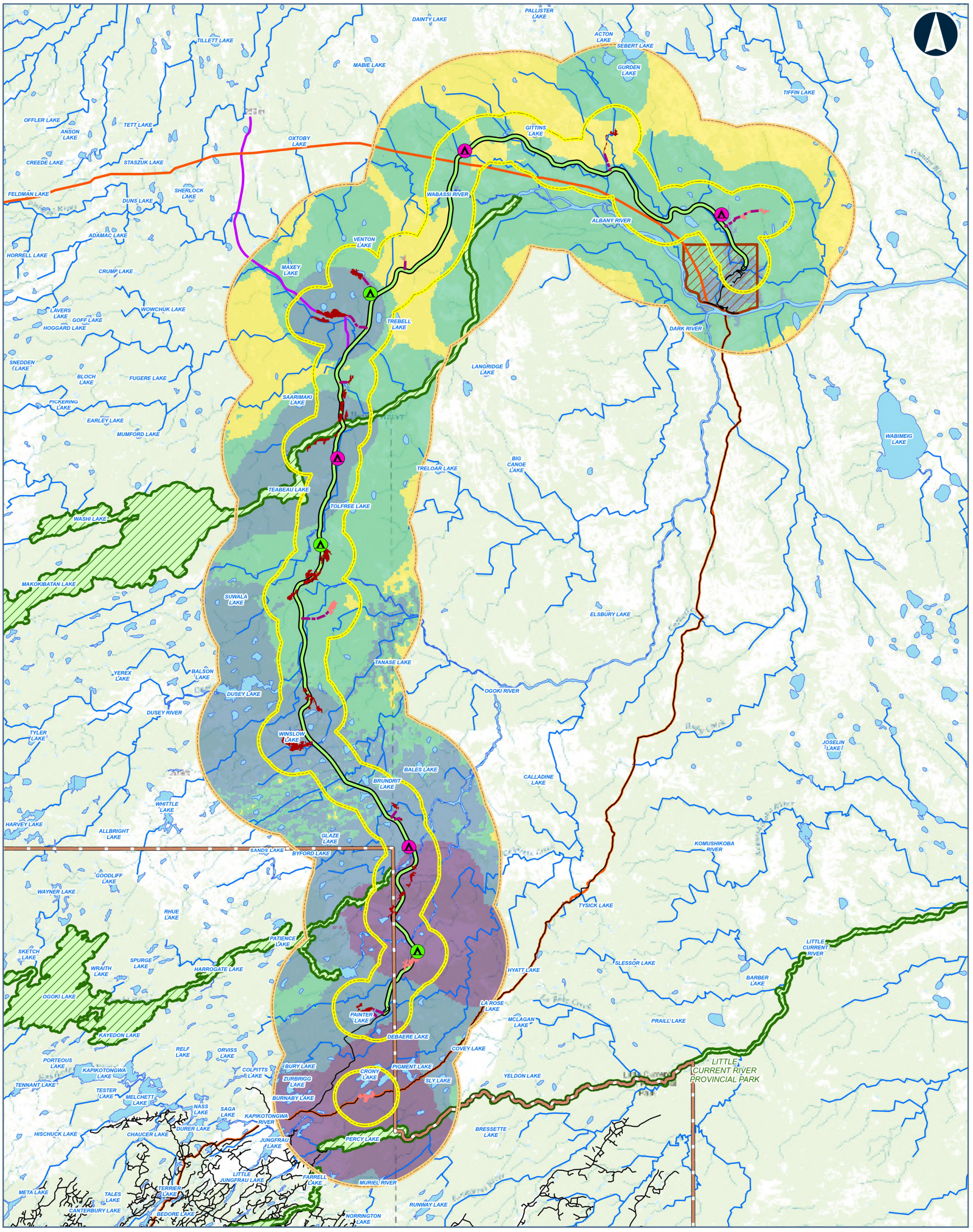
Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High	83,952.7	83,645.9	306.8	0.4
Moderate	214,334.9	211,663.2	2,671.6	1.3
Low	144,274.5	141,373.5	2,901.1	2.0
Poor	64,016.3	62,588.7	1,427.7	2.2

Note: There are 177.3 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks. These natural disturbances are expected to increase habitat suitability for olive-sided flycatcher (Committee on the Status of Endangered Wildlife in Canada, 2018b; Environment Canada, 2016c). Olive-sided flycatcher abundance is positively associated with tree mortality from mountain pine beetle outbreaks (Norris et al., 2021).

8.2.18.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for olive-sided flycatcher remains similar as described during existing conditions with most high suitability habitat patches concentrated in the southern portion of the cumulative effects assessment Regional Study Area associated with higher proportions of wetlands (**Figure 8-19)**.





Legend

CONSTRUCTION DISTRUBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

OLIVE-SIDED FLYCATCHER HSI SCORE
- HIGH
- MODERATE
- LOW
- POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Olive-sided Flycatcher in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-19

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: S:\Clients\MartenFalls_FirstNation\Northern_Ontario\99_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 9:02 AM User Name: gld_rduval

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for olive-sided flycatcher. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

Olive-sided flycatchers are generally associated with edge habitats for breeding. As such, the creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause olive-sided flycatchers to shift their territories to be nearer to the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to olive-sided flycatcher distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act as barrier to olive-sided flycatcher movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., 60 m wide), and the Rapid Lynx Broadband project will be 200 m wide. A study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for olive-sided flycatcher after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of olive-sided flycatcher in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 26%, 34%, and 56% of olive-sided flycatcher range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in northern Ontario is decreased, relative to current conditions, under all three temperature increases and this species may be lost from most of Ontario under a temperature regime increase of 3.0°C (National Audubon Society, 2024).

8.2.18.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect olive-sided flycatcher survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to

remove a total of 2,978.4 ha of high and moderate suitability olive-sided flycatcher habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest olive-sided flycatcher density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 1.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 41 nesting territories from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Olive-sided flycatcher has moderate to high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on olive-sided flycatcher populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). Olive-sided flycatcher appears vulnerable to this timing disjunct because this species is arriving on breeding grounds at the same time as 100 years ago (Butler, 2003).

8.2.18.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.18.1.3 Predicted Cumulative Effects

After mitigation, potential olive-sided flycatcher breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on olive-sided flycatcher habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.18.1.4 Characterization of Predicted Cumulative Effects

Olive-sided flycatcher is listed as Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. This species was frequently detected during baseline surveys. Moderate and high suitability olive-sided flycatcher nesting habitat covers approximately 55% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. Olive-sided flycatcher has life history traits that may this species vulnerable to changes in survival and reproduction. Overall, the available information suggests that olive-sided flycatcher in the

effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 2,978.4 ha of high and moderate suitability habitat (combined), representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of olive-sided flycatcher given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to olive-sided flycatcher movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of olive-sided flycatchers and flycatcher habitat in the cumulative effects assessment Regional Study Area.

Olive-sided flycatcher has life history traits that may this species vulnerable to changes in survival and reproduction. This species has a lengthy nesting period, which increases risk of nest predation and reproductive capacity of this species (Robertson and Hutto, 2007; Altman and Sallabanks, 2020; Environment Canada, 2016). As a result of the previous limitations, olive-sided flycatchers have one of the lowest reproductive rates of passerines in North America (Altman and Sallabanks, 2020). However, changes to habitat availability and distribution due to human developments in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

It is expected that an offset plan for migratory birds will be developed for the Northern Road Link project so that this project will have no net loss of bird habitat and no net reduction in bird populations. Similarly, all reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

After implementation of mitigation measures, effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on olive-sided flycatcher are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the olive-sided flycatcher population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Olive-sided flycatcher has moderate to high vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is predicted to decline, relative to current conditions, under temperature increases of 1.5°C to 2.0°C and most of the range in Ontario will be lost under a temperature increase of 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **moderate to high magnitude** effects on the olive-sided flycatcher population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48.**

8.2.18.1.5 Determination of Significance

Olive-sided flycatcher is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to olive-sided flycatcher habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the olive-sided flycatcher population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.18.2 Sensory Disturbance

8.2.18.2.1 Potential Cumulative Effects

8.2.18.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable olive-sided flycatcher habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by olive-sided flycatcher due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance

during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300-m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 14,664.5 ha of high and moderate suitability olive-sided flycatcher habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.2% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-37**).

Table 8-37: Changes to Olive-sided Flycatcher Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High	83,952.7	81,799.4	2,153.3	2.6
Moderate	214,334.9	201,823.6	12,511.2	5.8
Low	144,274.5	132,929.1	11,345.5	7.9
Poor	64,016.3	58,648.4	5,367.9	8.4

Note: There are 177.3 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when olive-sided flycatchers are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.18.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on olive-sided flycatcher movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to olive-sided flycatcher distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when olive-sided flycatchers are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to olive-sided flycatcher distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the ovenbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.18.2.1.3 Survival and Reproduction

The effects of noise on the survival and reproduction of olive-sided flycatcher are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear

approaching predators) (Ortega 2012). While the precise threshold for effects on olive-sided flycatcher survival and reproduction due to sensory disturbance is not known, adverse effects on olive-sided flycatcher survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to olive-sided flycatcher survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when olive-sided flycatchers are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to olive-sided flycatcher survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the olive-sided flycatcher breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.18.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.18.2.3 Predicted Cumulative Effects

After mitigation, potential olive-sided flycatcher breeding habitat will be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on olive-sided flycatcher habitat availability, distribution, and survival and reproduction.

8.2.18.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of olive-sided flycatchers occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 5.2% of high and moderate suitability habitat (combined) that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to

sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Olive-sided flycatcher is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the olive-sided flycatcher population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.18.2.5 Determination of Significance

Olive-sided flycatcher is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to olive-sided flycatcher habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.19 Bald Eagle

8.2.19.1 Habitat Loss and Alteration

8.2.19.1.1 Potential Cumulative Effects

8.2.19.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 967.1 ha of high and moderate suitability bald eagle breeding habitat. This represents a change of 4.4% at the scale of the

cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-38**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 20,988.9 ha of high and moderate suitability habitat available for bald eagle after implementation of the Project and other reasonably foreseeable developments (**Table 8-38**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-38: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Bald Eagle

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	21,956.1	20,988.9	967.1	4.4
Low to Poor	484,790.9	478,449.8	6,341.1	1.3

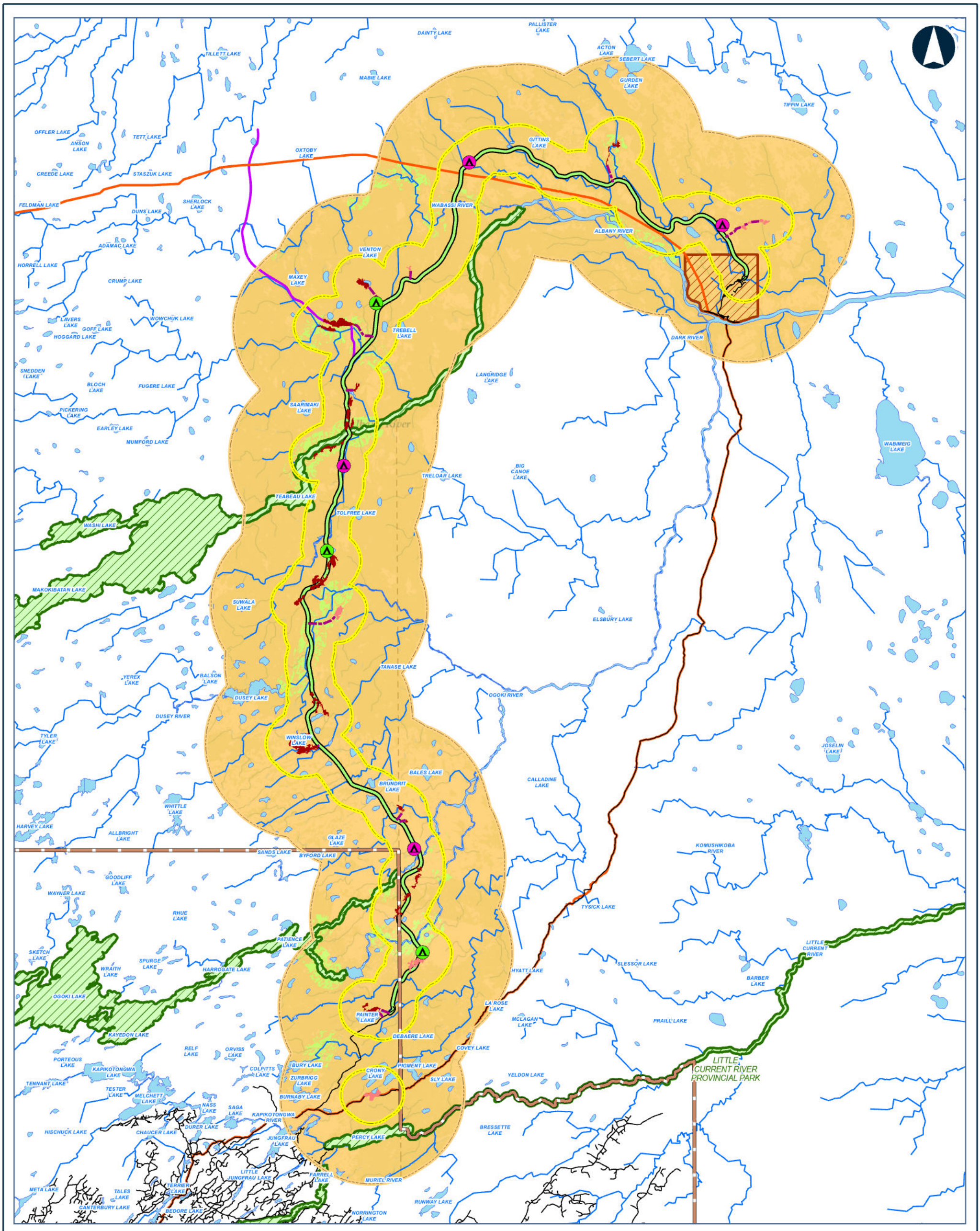
Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

An increase in fire frequency and intensity, and insect outbreak frequency due to climate change may reduce bald eagle habitat availability relative to existing conditions. Additionally, the effects from the anticipated drying and shrinkage of wetlands are not likely to be positive (Chu and Fischer, 2012).

8.2.19.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for bald eagle remains similar as described during existing conditions with most high suitability habitat patches concentrated in areas of upland forest near large waterbodies and watercourses (**Figure 8-20**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for bald eagle. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS
- PREFERRED ROUTE
- APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE
- APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP
- BEDROCK
- SAND AND GRAVEL

BALD EAGLE HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Bald Eagle in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026 | 1:480,000 * when printed 11"x17"

Rev:0

Figure 8-20

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Date Saved: 2/11/2026 5:22 PM User Name: INBA08973

The Northern Road Link and Rapid Lynx Broadband projects are not expected to act as barriers to bald eagle movements.

Overall, increases in temperatures are predicted to maintain or increase bald eagle range in Ontario, relative to existing conditions (National Audubon Society, 2024). In North America, it is predicted that 92%, 90%, 85% of the bald eagle range in North America will be maintained under temperature increases of 1.5°C, 2.0°C, and 3.0°C, respectively, while range increases of 10%, 14%, and 21% are predicted for each temperature regime, respectively (National Audubon Society, 2024).

8.2.19.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect bald eagle survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 967.1 ha of high and moderate suitability bald eagle habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest bald eagle density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.4 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to four nesting territories from the Project and other reasonably foreseeable developments, or 4.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Bald eagle low vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on bald eagle populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may cause a change in available food resources for bald eagle in the cumulative effects assessment Regional Study Area. Changes in water temperatures could affect fish communities, including their distribution, growth, survival, and reproduction (Dove-Thompson et al., 2018).

8.2.19.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.19.1.3 Predicted Cumulative Effects

After mitigation, potential bald eagle breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on bald eagle habitat availability, distribution, and survival and reproduction from human developments; climate change may have neutral to positive effects on bald eagle.

8.2.19.1.4 Characterization of Predicted Cumulative Effects

Bald eagle is not a listed species under the *Species at Risk Act* but is a species of Special Concern under the *Endangered Species Act, 2007*. Bald eagle is a widespread and common breeding species throughout Ontario (Natural Heritage Information Centre, 2023) and the bald eagle population in North America is increasing (Oleyar et al., 2021). This species was frequently detected during baseline surveys, particularly near the Ogoki River. Moderate and high suitability eagle nesting habitat covers approximately 5% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that bald eagle in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 967.1 ha of high and moderate suitability habitat, representing 4.4% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of bald eagle given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances are not anticipated to represent barriers to bald eagle movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects may result in a small but measurable change to the existing distribution of bald eagles and eagle habitat in the cumulative effects assessment Regional Study Area.

Bald eagles have a high annual adult survival rate (>80%) and high nest success rate (>50%) (Buehler, 2020). Changes to habitat availability and distribution in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on bald eagle are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the bald eagle population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Bald eagle has low vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is maintained or increased, relative to current conditions, under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **neutral to positive**, **probable**, **permanent**, and **continuous** effects on the bald eagle population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The summary of the cumulative residual effects characterization is provided in **Table 8-48**.

8.2.19.1.5 Determination of Significance

Bald eagle is predicted to remain self-sustaining and ecologically effective with the implementation of the Project, other reasonably foreseeable developments, and climate change. Overall, the anticipated changes to bald eagle habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project, other reasonably foreseeable developments, and climate change are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**. Effects from climate change are considered neutral to positive and so a determination of significance for climate change is not provided (see **Section 4.4.2.5** for more details).

8.2.19.2 Sensory Disturbance

8.2.19.2.1 Potential Cumulative Effects

8.2.19.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable bald eagle habitat if individuals avoid areas with sensory disturbance. Habitat that was within 400 m of human developments was assumed to be negatively affected by sensory disturbance (Ministry and Natural Resources, 2010) (**Attachment C**). Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 400-m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 7,817.9 ha of high and moderate suitability bald eagle habitat may be indirectly affected within 400 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 35.6% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-39**).

Table 8-39: Changes to Bald Eagle Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	21,956.1	14,138.2	7,817.9	35.6
Low to Poor	484,790.9	412,186.9	72,603.9	14.9

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when bald eagles are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.19.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on bald eagle movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to bald eagle distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when bald eagles are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to bald eagle distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the bald eagle breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.19.2.1.3 Survival and Reproduction

Bald eagles may be sensitive to sensory disturbance (McGarigal et al., 1991) and construction of the Project and other reasonably foreseeable developments may have a negative effect on bald eagle survival and reproduction. In Ontario, activities with high levels of sensory disturbance are not allowed within 400 m of bald eagle nests during the nesting period (Naylor, 2009). However, some studies suggest that bald eagles can tolerate the presence of humans, as long as direct harassment of eagles does not occur (Guinn, 2004).

To be conservative, potential sensory disturbance effects and changes to bald eagle survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when bald eagles are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to bald eagle survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the bald eagle breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.19.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.19.2.3 Predicted Cumulative Effects

After mitigation, potential bald eagle breeding habitat will be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on bald eagle habitat availability, distribution, and survival and reproduction.

8.2.19.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of bald eagles occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and

construction of the Rapid Lynx Broadband project is predicted to affect 35.6% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Bald eagle is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the bald eagle population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of the cumulative residual effects characterization is provided in **Table 8-48.**

8.2.19.2.5 Determination of Significance

Bald eagle is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to bald eagle habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.20 Short-eared Owl

8.2.20.1 Habitat Loss and Alteration

8.2.20.1.1 Potential Cumulative Effects

8.2.20.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 1,798.0 ha of high and moderate suitability short-eared owl breeding habitat. This represents a change of 0.9% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-40**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 189,342.8 ha of high and moderate suitability habitat available for short-eared owl after implementation of the Project and other reasonably foreseeable developments (**Table 8-5**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-40: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Short-eared Owl

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	191,141.8	189,342.8	1,798.0	0.9
Low to Poor	315,605.2	310,095.9	5,509.2	1.7

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct effect on habitats).
ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks, which may increase habitat availability for short-eared owl relative to existing conditions. Habitats appear to be most suitable for short-eared owls within two to eight years following a fire (Swengel and Swengel, 2014). This may be similar for habitats affected by insect outbreaks.

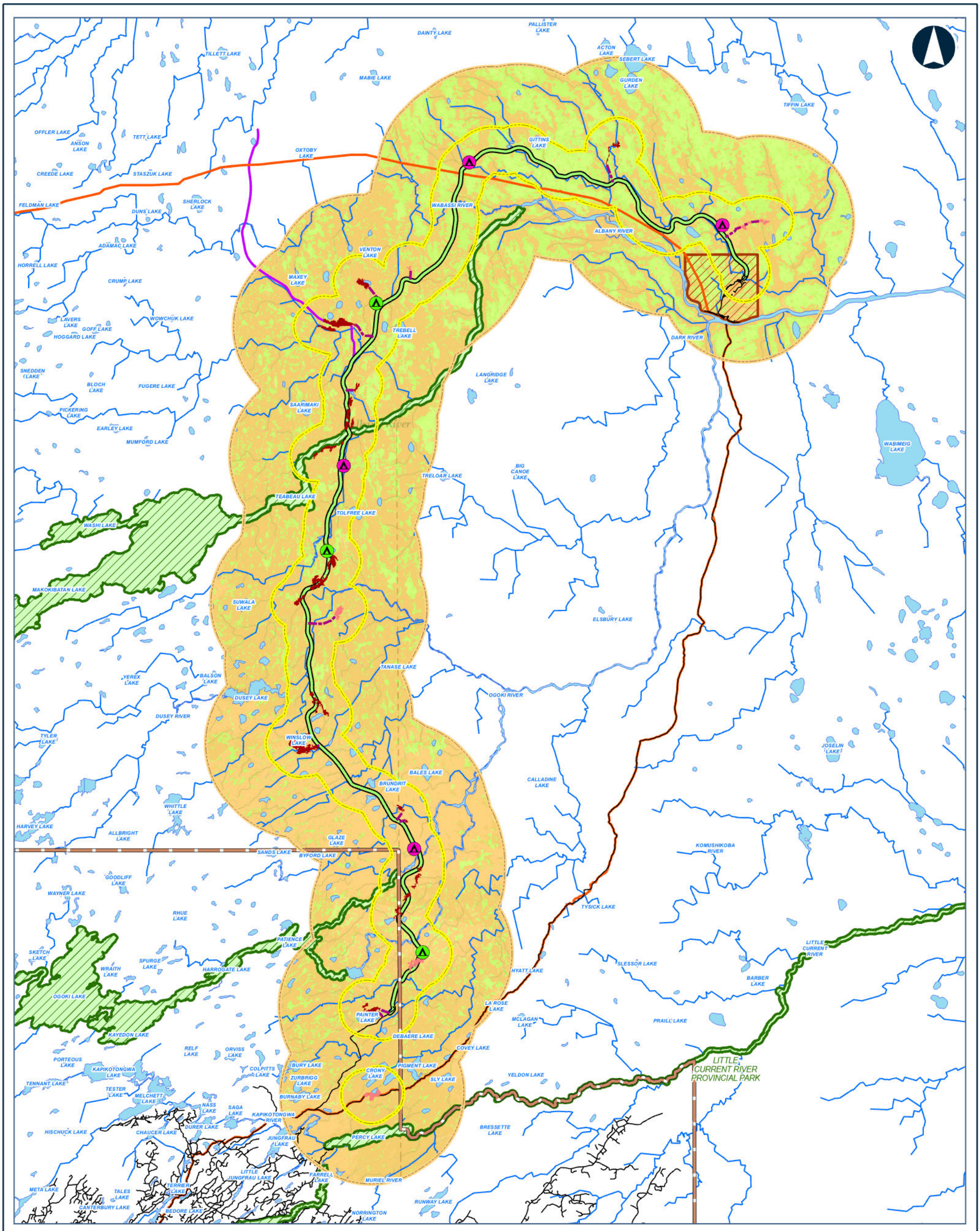
8.2.20.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for short-eared owl remains similar as described during existing conditions with most habitat concentrated in the northern portion of the cumulative effects assessment Regional Study Area and with bog, fen, and marsh habitat (**Figure 8-21).**

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for short-eared owl. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The Northern Road Link and Rapid Lynx Broadband projects are not expected to act as barriers to short-eared owl movements. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for short-eared owl after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of short-eared owl in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 18%, 22%, and 30% of short-eared owl range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range is entirely removed from Ontario under temperature increases of 1.5°C and 2.0°C but temperature increases of 3.0°C may maintain short-eared owl distribution near Fort Severn and slightly increase this species' range east along the Hudson Bay coast (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

SHORT-EARED OWL HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Short-Eared Owl in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 8-21

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8.2.20.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect short-eared owl survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 1,798.0 ha of high and moderate suitability short-eared owl habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the average area requirements of 82 ha (Wiggins et al., 2020), this amounts to the potential loss of up to 22 nesting territories from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Short-eared owl has moderate vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on short-eared owl populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Increases in extreme weather fluctuations due to climate change, especially during the early nesting season, could increase short-eared owl egg and hatchling mortality (Wiggins et al., 2020).

8.2.20.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.20.1.3 Predicted Cumulative Effects

After mitigation, potential short-eared owl breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on short-eared owl habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.20.1.1 Characterization of Predicted Cumulative Effects

Short-eared owl is a Threatened species under the *Endangered Species Act, 2007*; this species is currently listed as Special Concern under *Species at Risk Act* but is under consideration for a status change to Threatened. Short-eared owl is an uncommon to rare breeding species in Ontario and most individuals occur in the Hudson Bay Lowlands (Natural Heritage Information Centre, 2023). Habitat loss in the wintering range of this species, as well as in the breeding range of this species in the Canadian prairies and southern Ontario, appear to be the primarily causes of short-eared owl population declines in Canada (Committee on the Status of Endangered Wildlife in Canada, 2008).

This species was not observed during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 35% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that short-eared owl in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 1,798.0 ha of high and moderate suitability habitat, representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of short-eared owl given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to short-eared owl movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of short-eared owl and owl habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on ovenbird are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the short-eared owl population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Short-eared owl has moderate vulnerability to climate change (National Audubon Society, 2024). This species' range in Ontario is decreased or removed completely, relative to current conditions, under temperature increases of 1.5°C to 3.0° (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **moderate to high magnitude** effects on the short-eared owl population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.20.1.2 Determination of Significance

Short-eared owl is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to short-eared owl habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the short-eared owl population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.20.2 Sensory Disturbance

8.2.20.2.1 Potential Cumulative Effects

8.2.20.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable short-eared owl habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by short-eared owl due to sensory disturbance is not known, habitat that was within 500 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are

expected to be small relative to existing conditions. To be conservative, a 500-metre sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 15,380.9 ha of high and moderate suitability short-eared owl habitat may be indirectly affected within 500 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 8.1% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-41**).

Table 8-41: Changes to Short-eared Owl Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	191,141.8	175,760.9	15,380.9	8.1
Low to Poor	315,605.2	284,932.2	30,672.9	9.7

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unaffected by sensory disturbance after construction of the Project and other reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect effect on habitats).

ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when short-eared owls are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake

roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.20.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on short-eared owl movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to short-eared owl distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when short-eared owls are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to short-eared owl distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the short-eared owl breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.20.2.1.3 Survival and Reproduction

Sensory disturbance during Project Construction may have a negative effect on short-eared owl survival and reproduction. Traffic noise has been found to decrease owl foraging efficiency by reducing the ability of owls to detect prey at distances at least 120 m from a road (Senzaki et al., 2016). While the precise threshold for effects on short-eared owl survival and reproduction due to sensory disturbance is not known, adverse effects on ovenbird survival and reproduction within 500 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to short-eared owl survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when short-eared owls are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to short-eared owl survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the short-eared owl breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.20.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.20.2.3 Predicted Cumulative Effects

After mitigation, potential short-eared owl breeding habitat will be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on short-eared owl habitat availability, distribution, and survival and reproduction.

8.2.20.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of short-eared owls occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 8.1% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Short-eared owl is highly mobile and capable of relocating to portions of the cumulative effects assessment

Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the short-eared owl population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

8.2.20.2.5 Determination of Significance

Short-eared owl is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to short-eared owl habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.20.3 Increase in Edge Habitat

8.2.20.3.1 Potential Cumulative Effects

8.2.20.3.1.1 Survival and Reproduction

Short-eared owls are vulnerable to nest predation (Committee on the Status of Endangered Wildlife in Canada, 2008) and increased edge habitat can change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent habitats (Chalfoun et al., 2002; Söderström et al., 1998). The creation of edge habitats due to the construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects may facilitate predator movement and access to nests in adjacent forest habitats (Chalfoun et al., 2002).

8.2.20.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.20.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on short-eared owl survival and reproduction.

8.2.20.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. This is expected to have minor residual effects on short-eared owl, leading to small declines in survivorship and reproductive rate for the breeding population. However, short-eared owl has high nest success rates and lays an average of 5.6 eggs per clutch (Wiggins et al., 2020). Changes to predation risk due to increased edge habitat from construction of reasonably foreseeable developments are not expected to have a measurable effect on survival and reproduction for the population in the in the cumulative effects assessment Regional Study Area.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on short-eared owl are predicted to be **probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the short-eared owl population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.20.3.5 Determination of Significance

Short-eared owl is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to short-eared owl survival and reproduction due to increased

edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.21 Lesser Yellowlegs

8.2.21.1 Habitat Loss and Alteration

8.2.21.1.1 Potential Cumulative Effects

8.2.21.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 2,443.8 ha of high and moderate suitability lesser yellowlegs breeding habitat. This represents a change of 1.5% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-42**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 156,156.1 ha of high and moderate suitability habitat available for lesser yellowlegs after implementation of the Project and other reasonably foreseeable developments (**Table 8-42**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Lesser yellowlegs breeding habitat may be negatively affected if climate change increases wetland drying in the cumulative effects assessment Regional Study Area (Steen et al., 2014).

Table 8-42: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Lesser Yellowlegs

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	158,599.9	156,156.1	2,443.8	1.5
Low to Poor	348,147.1	343,282.7	4,864.4	1.4

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct impact on habitats).
ha = hectare; % = percent.

8.2.21.1.1.2 Distribution

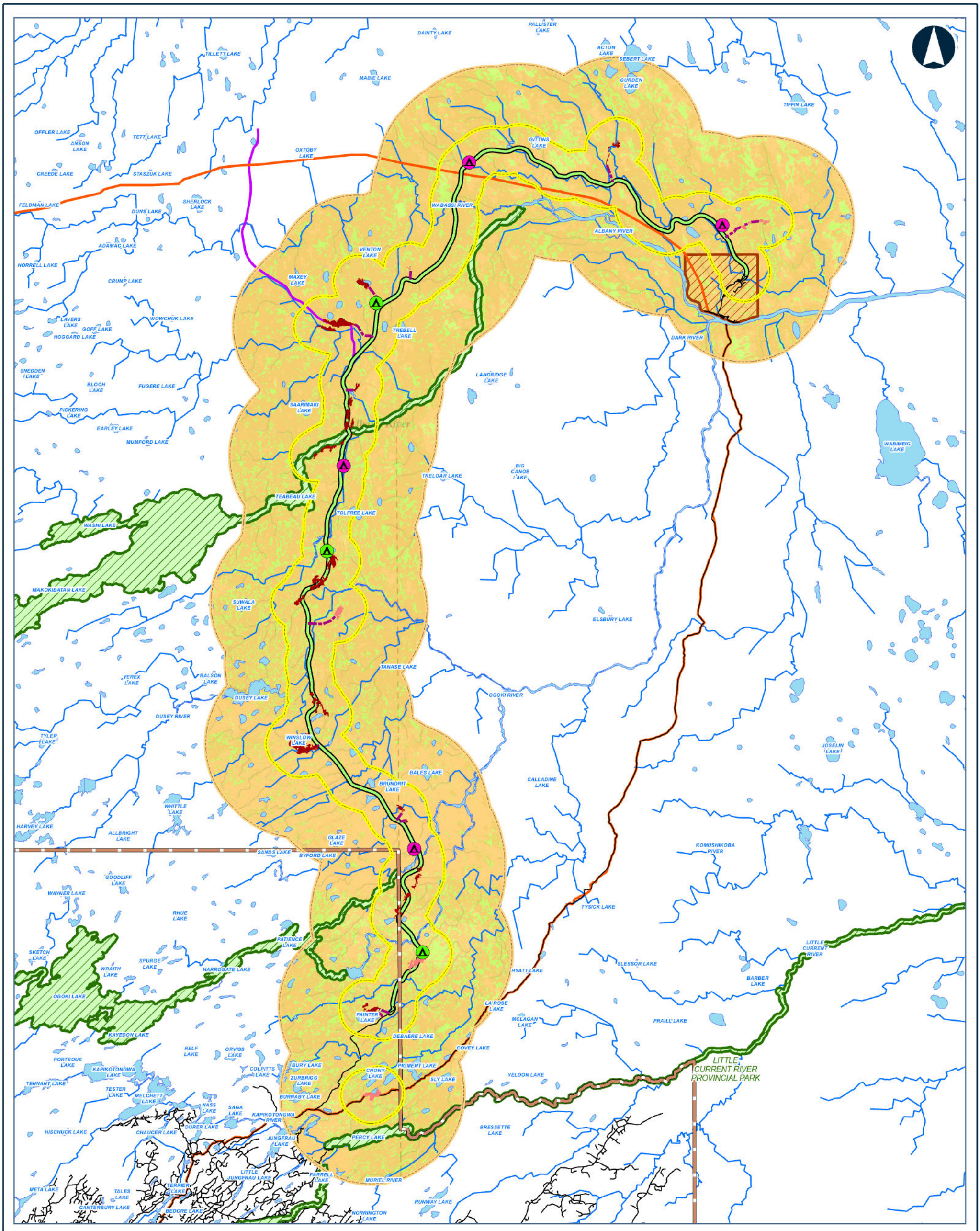
After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for lesser yellowlegs remains similar as described during existing conditions with patches distributed throughout the Project study areas (**Figure 8-22**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for lesser yellowlegs. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause lesser yellowlegs to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to lesser yellowlegs distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects are not anticipated to act as barriers to lesser yellowlegs movements. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for lesser yellowlegs after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of lesser yellowlegs in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 68%, 83%, and 96% of lesser yellowlegs range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in Ontario is anticipated to be lost under all three temperature increase regimes (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

LESSER YELLOWLEGS HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Lesser Yellowlegs in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
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Figure 8-22

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8.2.21.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect lesser yellowlegs survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 2,443.8 ha of high and moderate suitability lesser yellowlegs habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest lesser yellowlegs density estimate from *Ontario Breeding Bird* Atlas Regions 37 and 44 (i.e., 0.8 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 19 nesting territories from the Project and other reasonably foreseeable developments, or 1.5% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Lesser yellowlegs has high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on lesser yellowlegs populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting lesser yellowlegs by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019).

8.2.21.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.21.1.3 Predicted Cumulative Effects

After mitigation, potential lesser yellowlegs breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on lesser yellowlegs habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.21.1.4 Characterization of Predicted Cumulative Effects

Lesser yellowlegs is a Threatened species under the *Endangered Species Act, 2007*; this species not currently listed under *Species at Risk Act* but is under consideration for listing under the *Species at Risk Act*. Lesser yellowlegs is a common breeding species in the northern third of Ontario (Natural Heritage Information Centre, 2023). This species was infrequently detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 30% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that lesser yellowlegs in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 2,443.8 ha of high and moderate suitability habitat, representing 1.5% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of lesser yellowlegs given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to lesser yellowlegs movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of lesser yellowlegs and yellowlegs habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on lesser yellowlegs are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from habitat loss from the Project and other reasonably foreseeable developments on the ability of the lesser yellowlegs population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Lesser yellowlegs has high vulnerability to climate change (National Audubon Society, 2024). This species' range is predicted to be removed from Ontario under temperature increases of 1.5°C to 3.0°C (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **moderate to high magnitude** effects on the less yellowlegs population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The summary of the cumulative residual effects characterization is provided in **Table 8-48**.

8.2.21.1.5 Determination of Significance

Lesser yellowlegs is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to lesser yellowlegs habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the lesser yellowlegs population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.21.2 Sensory Disturbance

8.2.21.2.1 Potential Cumulative Effects

8.2.21.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable lesser yellowlegs habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by lesser yellowlegs due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300 m sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 10,375.6 ha of high and moderate suitability lesser yellowlegs habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 6.5% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-8**).

Table 8-43: Changes to Lesser Yellowlegs Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	158,599.9	148,224.3	10,375.6	6.5
Low to Poor	348,147.1	327,140.5	21,006.6	6.0

Note: There are 8.7 ha of unclassified (pixel error) habitat in the cumulative effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unimpacted by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect impact on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when lesser yellowlegs are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.21.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on lesser yellowlegs movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to lesser yellowlegs distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when lesser yellowlegs are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to lesser yellowlegs distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the lesser yellowlegs breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.21.2.1.3 Survival and Reproduction

Potential effects from noise on lesser yellowlegs include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on lesser yellowlegs survival and reproduction due to sensory disturbance is not known, adverse effects on lesser yellowlegs survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to lesser yellowlegs survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when lesser yellowlegs are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to lesser yellowlegs survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the lesser yellowlegs breeding and migration seasons. Sensory disturbance effects from

construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.21.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.21.2.3 Predicted Cumulative Effects

After mitigation, potential lesser yellowlegs breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on lesser yellowlegs habitat availability, distribution, and survival and reproduction.

8.2.21.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of lesser yellowlegs occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 6.5% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Lesser yellowlegs is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the lesser yellowlegs population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The summary of the cumulative residual effects characterization is provided in **Table 8-48**.

8.2.21.2.5 Determination of Significance

Lesser yellowlegs is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to lesser yellowlegs habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.22 Rusty Blackbird

8.2.22.1 Habitat Loss and Alteration

8.2.22.1.1 Potential Cumulative Effects

8.2.22.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 3,254.0 ha of high and moderate suitability rusty blackbird breeding habitat. This represents a change of 1.0% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-44**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 321,002.8 ha of high and moderate suitability habitat available for rusty blackbird after implementation of the Project and other reasonably foreseeable developments (**Table 8-44**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-44: Changes to Habitat Availability in the Cumulative Effects Regional Study Area due to Direct Habitat Loss for Rusty Blackbird

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	324,257.2	321,002.8	3,254.4	1.0
Low to Poor	182,489.8	178,435.9	4,053.9	2.2

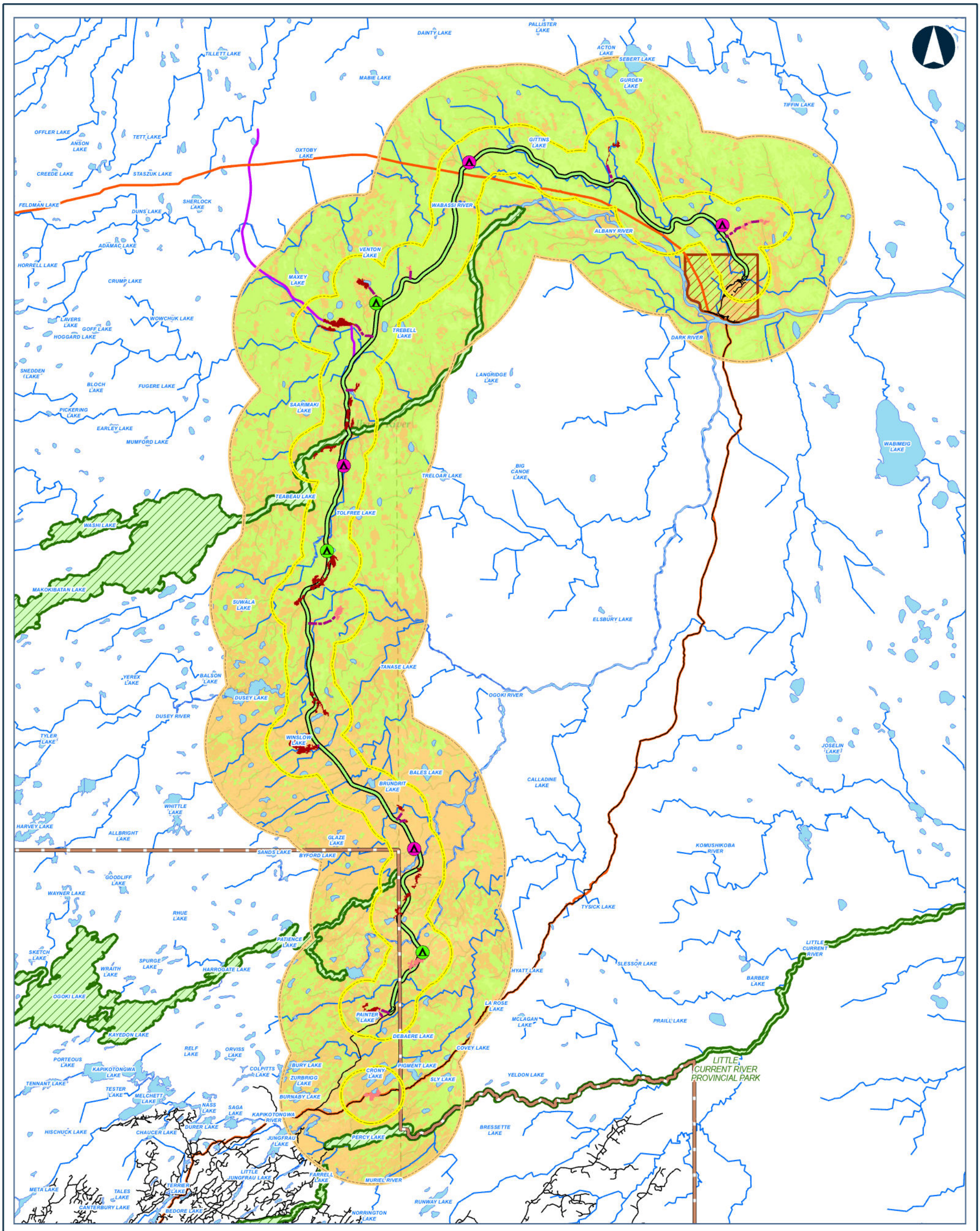
Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.
(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct impact on habitats).
ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks and this is likely to have a negative effect on rusty blackbird habitat availability. Recently burned habitats do not appear to provide suitable habitat for rusty blackbirds (Hobson and Schieck, 1999). Similarly, forested areas affected by insect outbreaks do not appear to provide suitable habitat for this species and large defoliation events may be contributing to this species' population declines (Greenberg et al., 2011).

8.2.22.1.1.2 Distribution

After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for rusty blackbird remains similar as described during existing conditions with a higher concentration of suitable habitat in the northern half of the cumulative effects assessment (**Figure 8-23**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for rusty blackbirds. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

RUSTY BLACKBIRD HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Rusty Black Bird in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-23

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\95_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 5:22 PM User Name: INBA08973

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause rusty blackbirds to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to rusty blackbird distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects may act as barriers to rusty blackbird movements during foraging (Norris and Stutchbury, 2001; Fraser and Stutchbury, 2004; MacIntosh et al., 2011) and dispersal (Tittler et al., 2009). The Northern Road Link project is likely to be the same width as the Project (i.e., 60 m wide), and the Rapid Lynx Broadband project will be 200 m wide. A study in the boreal forest of Alberta and Quebec found that some forest birds were reluctant to cross gaps greater than 50 m but would cross gaps of 200 m when no other choice existed (St. Clair et al., 1998). There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for rusty blackbird after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of rusty blackbird in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 53%, 42%, and 67% of rusty blackbird range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in northern Ontario is decreased relative to current conditions under temperature increases of 1.5°C and 2.0°C and temperature increases of 3.0°C may result in the loss of rusty blackbird distribution from Ontario (National Audubon Society, 2024).

8.2.22.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect rusty blackbird survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 3,254.4 ha of high and moderate suitability rusty blackbird habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest rusty blackbird density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., 0.9 nesting territories per km^2 for Region 44), this amounts to the potential loss of up to 30 nesting territories from the Project and other reasonably foreseeable developments, or 1.0% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Rusty blackbird has moderate to high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on rusty blackbird populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change may also create asynchrony between peak insect emergence and songbird nesting (Strode, 2003; Radchuk et al., 2019; Shipley et al., 2022). However, in eastern North America, birds that feed on early emerging aerial insects, such as rusty blackbird, appear to be arriving on their breeding grounds earlier than 100 years ago, and may be responding to the advancement of spring conditions (Strode, 2003). This plasticity in timing of migration and breeding may allow rusty blackbirds to adapt to climate change.

8.2.22.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.22.1.3 Predicted Cumulative Effects

After mitigation, potential rusty blackbird breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on rusty blackbird habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.22.1.4 Characterization of Predicted Cumulative Effects

Rusty blackbird is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Most threats to the rusty blackbird are within their stopover and wintering habitats (Committee on the Status of Endangered Wildlife in Canada, 2017). This species was commonly detected during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 65% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that rusty blackbird in the effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 3,254.4 ha of high and moderate suitability habitat, representing 1.0% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of rusty blackbird given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to rusty blackbird movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of rusty blackbirds and blackbird habitat in the cumulative effects assessment Regional Study Area.

Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on rusty blackbird are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the rusty blackbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Rusty blackbird has moderate to high vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is decreased relative to current conditions under temperature increases of 1.5°C and 2.0°C and temperature increases of 3.0°C may result in the loss of rusty blackbird distribution from Ontario (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **moderate to high magnitude** effects on the rusty blackbird population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.22.1.5 Determination of Significance

Rusty blackbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to rusty blackbird habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the rusty blackbird population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.22.2 Sensory Disturbance

8.2.22.2.1 Potential Cumulative Effects

8.2.22.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable rusty blackbird habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by rusty blackbird due to sensory disturbance is not known, habitat that was within 300 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be small relative to existing conditions. To be conservative, a 300-metre sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 18,164.4 ha of high and moderate suitability rusty blackbird habitat may be indirectly affected within 300 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.6% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-45**).

Table 8-45: Changes to Rusty Blackbird Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[a]	Change in Area from Existing Conditions (ha)[b,c]	Change (%)
High to Moderate	324,257.2	306,092.8	18,164.4	5.6
Low to Poor	182,489.8	169,271.9	13,217.9	7.2

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.
(a) Residual effects represent the amount of habitat that remains unimpacted by sensory disturbance after construction of the Project and other reasonably foreseeable developments.
(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.
(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect impact on habitats).
ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when rusty blackbirds are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.22.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on rusty blackbird movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations

than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to rusty blackbird distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when rusty blackbirds are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to rusty blackbird distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the rusty blackbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.22.2.1.3 Survival and Reproduction

The effects of noise on the survival and reproduction of rusty blackbird are unknown but noise levels above 48 decibels have been shown to reduce abundance and pairing success of some songbird species (Habib et al., 2007; Bayne et al., 2008). Other potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on rusty blackbird survival and reproduction due to sensory disturbance is not known, adverse effects on rusty blackbird survival and reproduction within 300 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to rusty blackbird survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when rusty blackbirds are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to rusty blackbird survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the rusty blackbird breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.22.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.22.2.3 Predicted Cumulative Effects

After mitigation, potential rusty blackbird breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on rusty blackbird habitat availability, distribution, and survival and reproduction.

8.2.22.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of rusty blackbirds occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 5.6% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Rusty blackbird is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the rusty blackbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.22.2.5 Determination of Significance

Rusty blackbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to rusty blackbird habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.22.3 Increase in Edge Habitat

8.2.22.3.1 Potential Cumulative Effects

8.2.22.3.1.1 Survival and Reproduction

The removal of habitat during construction of the Project will increase edge habitat. The creation of edge habitat may change predator-prey dynamics (Keyser et al., 1998) and facilitate predator movement and access to nests in adjacent habitats (Chalfoun et al., 2002; Söderström et al., 1998). Species, such as rusty blackbird, may be particularly vulnerable to changes in predator species and increases nest predation that occur with increased edge habitat (Keyser et al., 1998).

8.2.22.3.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit effects from increased edge habitat during the construction of the Northern Road Link and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.22.3.3 Predicted Cumulative Effects

The construction of the Project and the Northern Road Link and Rapid Lynx Broadband projects will increase the amount of edge habitat, relative to existing conditions. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on rusty blackbird survival and reproduction.

8.2.22.3.4 Characterization of Predicted Cumulative Effects

Anticipated increases in predation risk due to increased edge habitat are expected to be relatively small. Increased predation risk associated with the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads projects could lead to reduced survivorship and / or reproductive rate for breeding pairs occupying territories near the project footprints. This is expected to have minor residual effects on rusty blackbird, leading to small declines in survivorship and reproductive rate for the breeding population. However, rusty blackbird has a high reproductive rate this species lays four eggs per brood and nest success ranges from (77% to 98%). Changes to predation risk from increased edge habitat in the cumulative effects assessment Regional Study Area are not expected to have a measurable effect on survival and reproduction for the regional population.

Effects from increased edge habitat from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on rusty blackbird are predicted to be **probable** to occur, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from increased edge habitat from the Project and other reasonably foreseeable developments on the ability of the rusty blackbird population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.22.3.5 Determination of Significance

Rusty blackbird is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to rusty blackbird survival and reproduction due to increased edge habitat from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.23 Yellow Rail

8.2.23.1 Habitat Loss and Alteration

8.2.23.1.1 Potential Cumulative Effects

8.2.23.1.1.1 Habitat Availability

The Project and the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove 928.6 ha of high and moderate suitability yellow rail breeding habitat. This represents a change of 0.9% at the scale of the cumulative effects assessment Regional Study Area, relative to existing conditions (**Table 8-46**).

High and moderate suitability habitat remains abundant in the cumulative effects assessment Regional Study Area, with 93,064.9 ha of high and moderate suitability habitat available for yellow rail after implementation of the Project and other reasonably foreseeable developments (**Table 8-46**).

Effects from habitat loss from the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will begin and continue through Operation and Maintenance of the Project.

Table 8-46: Changes to Habitat Availability in the Cumulative Effects Regional Study Area Due to Direct Habitat Loss for Yellow Rail

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	93,993.5	93,064.9	928.6	0.9
Low to Poor	412,753.5	406,373.8	6,379.7	1.6

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Cumulative residual effects represent the amount of habitat that remains after construction of the Project and reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all habitat suitability groups to nil habitat suitability.

(c) The change in area in the study areas are a result of the assumed project footprints (i.e., direct impact on habitats).

ha = hectare; % = percent.

Climate change may increase the frequency and severity of wildfires and insect outbreaks. Habitats may be most suitable for yellow rails at two to five years following a fire as this species requires a dense grass mat for nest concealment but avoids shrubby habitats (Austin and Buhl, 2013).

Yellow rails may be particularly vulnerable to changes to water levels from increasing drought or precipitation due to climate change as this species' breeding habitat is constrained by water levels and availability of overlying dry, dead mats of grassy vegetation, which is only found in wetlands with shallow water (Nelson et al., 2014).

8.2.23.1.1.2 Distribution

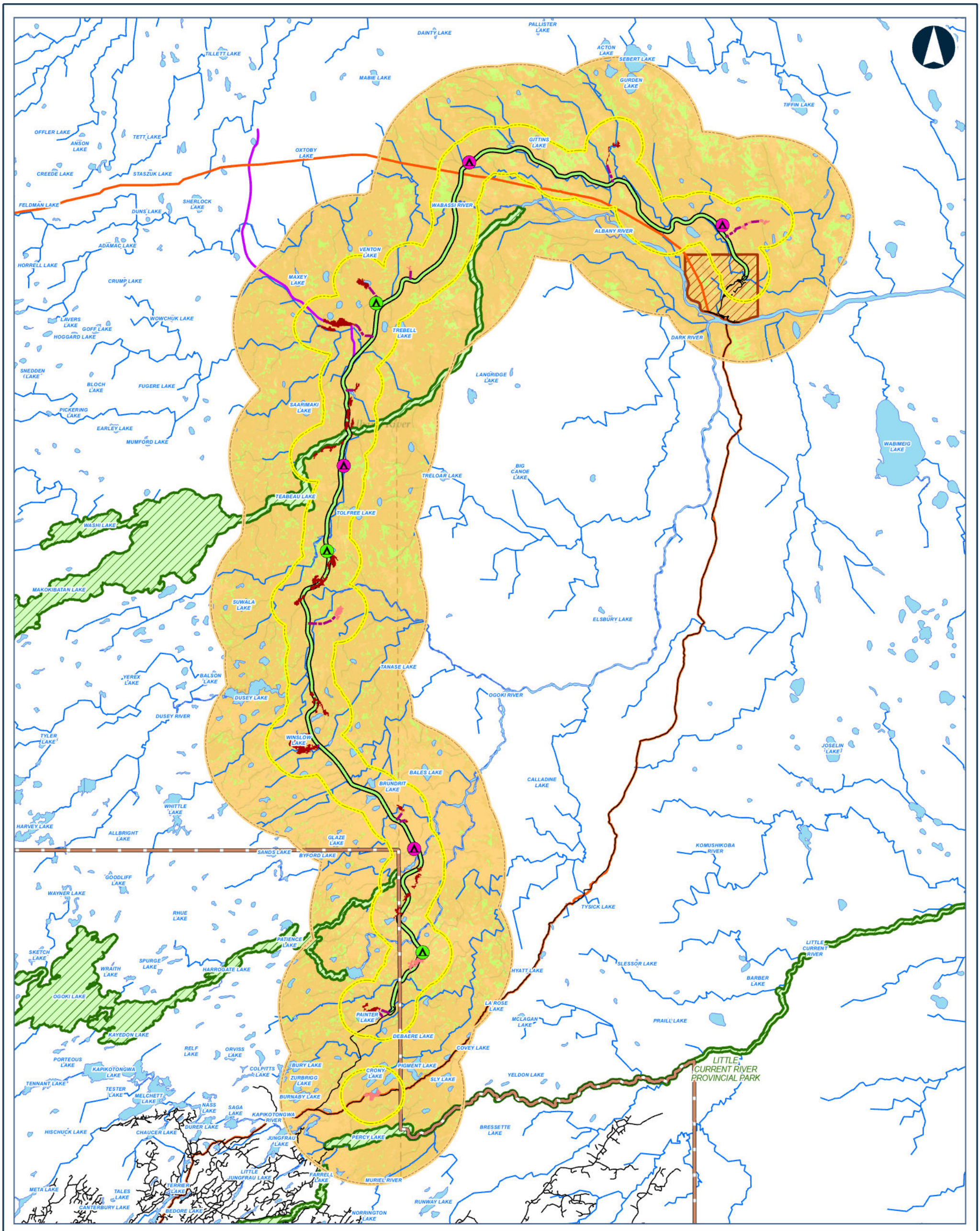
After addition of the Project and other reasonably foreseeable developments, the distribution of moderate and high suitability habitat for yellow rail remains similar as described during existing conditions with patches of suitable habitat distributed throughout the cumulative effects assessment Regional Study Area (**Figure 8-24**).

It is anticipated that moderate and high suitability habitat in the cumulative effects assessment Regional Study Area is below carrying capacity for yellow rail. As such, during construction and operations of reasonably foreseeable developments, individuals returning during spring migration that previously used habitats in the project footprints are expected to establish breeding territories in suitable habitat outside of the project footprints but within the cumulative effects assessment Regional Study Area.

The creation of a linear disturbance from the Northern Road Link and Rapid Lynx Broadband projects may cause yellow rails to shift their territories away from the project footprints. The Anaconda and Painter Lake Forestry Roads exist at existing conditions and the removal of habitat due to the widening of these roads is anticipated to result in negligible changes to yellow rail distribution relative to existing conditions.

The Northern Road Link and Rapid Lynx Broadband projects are not expected to act as barriers to yellow rail movements. There is a large amount of undisturbed habitat in the cumulative effects assessment Regional Study Area that remains available for yellow rail after implementation of the Project and other reasonably foreseeable developments. As such, overall movement patterns of yellow rail in the cumulative effects assessment Regional Study Area are expected to remain unchanged with the addition of the Project and other reasonably foreseeable developments.

Overall, increases in temperatures are predicted to remove 56%, 72%, and 96% of yellow rail range in North America, relative to existing conditions, if temperatures warm by 1.5°C, 2.0°C, and 3.0°C respectively (National Audubon Society, 2024). This species' range in northern Ontario is decreased relative to current conditions under temperature increases of 1.5°C and 2.0°C. Temperature increases of 3.0°C may result in the loss of most of the yellow rail distribution from much of northeastern Ontario; yellow rails may remain along the Hudson Bay coast (National Audubon Society, 2024).





Legend

CONSTRUCTION DISTURBANCE AREA

POTENTIAL CAMP SITE (SIZE)
- 50 PERSONS
- 200 PERSONS

PREFERRED ROUTE

APPROXIMATE ACCESS ROAD TO POTENTIAL AGGREGATE SITE

APPROXIMATE ACCESS ROAD TO POTENTIAL CONSTRUCTION CAMP

BEDROCK

SAND AND GRAVEL

YELLOW RAIL HSI SCORE
- MODERATE TO HIGH
- LOW TO POOR

PHYSICAL ACTIVITY PROJECT INCLUSION
- ANACONDA AND PAINTER LAKE FORESTRY ACCESS ROAD UPGRADES
- NORTHERN ROAD LINK
- RAPID LYNX BROADBAND PROJECT

- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- LOCAL STUDY AREA
- REGIONAL STUDY AREA
- ROAD
- WATERCOURSE
- WATERBODY

Data Source:
Base Data: Provided by MNRF 2019; Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: World Topographic Map: Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS, AAFC, NRCan
World Topographic Map: Esri Canada, Esri, © OpenStreetMap contributors, HERE, Garmin, USGS, NGA, EPA, USDA, NPS, AAFC, NRCan

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Habitat Suitability for Yellow Rail in the Cumulative Effects Assessment Regional Study Area after Implementation of the Project and other Reasonably Foreseeable Developments

0 2.75 5.5 11 16.5 22
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Feb, 2026	1:480,000 * when printed 11"x17"
Rev:0	

Figure 8-24

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2024), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: G:\Clients\MartenFalls_FirstNation\Northern_Ontario\95_PROJ\21455151\40_PROD\0037_Bird_Section8_CumulativeEffects\21455151-0037-RT-0000.aprx
Date Saved: 2/11/2026 5:22 PM User Name: INBA08973

8.2.23.1.1.3 Survival and Reproduction

Habitat loss from the Project and other reasonably foreseeable developments could affect yellow rail survival and reproduction if individuals return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or are forced to establish a territory in lower quality habitat. The Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects are predicted to remove a total of 928.6 ha of high and moderate suitability yellow rail habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions. Using the highest yellow rail density estimate from *Ontario Breeding Bird Atlas* Regions 37 and 44 (i.e., <0.1 nesting territories per km^2 for Region 37), this amounts to the potential loss of less than one nesting territory from the Project and other reasonably foreseeable developments, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.

Yellow rail has high vulnerability to climate change (National Audubon Society, 2024). Climate change may increase the intensity of extreme weather events (e.g., hurricanes), which could have an effect on yellow rail populations during migration as birds can be killed directly by these extreme weather events, or carried to locations far from their traditional wintering and/or breeding grounds, which may have negative carry-over effects related to survival and fecundity (Dionne et al., 2008).

Climate change is advancing the timing of spring insect emergence in many parts of the northern hemisphere and could be affecting yellow rail by causing a divergence between peak energy and nutrient requirements and peak supply of insect resources (Radchuk et al., 2019).

8.2.23.1.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit habitat loss during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.23.1.3 Predicted Cumulative Effects

After mitigation, potential yellow rail breeding habitat will be removed by the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects from reasonably foreseeable developments. However, there are predicted cumulative residual effects on yellow rail habitat availability, distribution, and survival and reproduction from human developments and climate change.

8.2.23.1.1 Characterization of Predicted Cumulative Effects

Yellow rail is a Special Concern species under the *Species at Risk Act* and the *Endangered Species Act, 2007*. Historically, most yellow rail breeding pairs were thought to occur in the James Bay and Hudson Bay Lowlands (Committee on the Status of Endangered Wildlife in Canada, 2009b). However, a recent study in the Northwest Territories suggests that the population and range of yellow rails in Canada may be much larger than currently reported and further study is required to determine population size and distribution in Canada (McLeod et al., 2021). This species was detected once during field surveys. Moderate and high suitability nesting habitat for this species covers approximately 20% of the cumulative effects assessment Regional Study Area under existing conditions and after implementation of the Project. The available information suggests that yellow rail in the cumulative effects assessment Regional Study Area is self-sustaining and ecologically effective under existing conditions and will continue to be self-sustaining and ecologically effective after implementation of the Project.

Reasonably foreseeable developments are expected to result in a loss of 928.6 ha of high and moderate suitability habitat, representing 0.9% of these habitats in the cumulative effects assessment Regional Study Area that are available at existing conditions. Changes from the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will be mostly permanent; some temporary work areas may be reclaimed but most of the project footprints will remain disturbed in perpetuity. Changes to habitat availability are likely to have small but measurable effects on the regional breeding population of yellow rail given the small anticipated loss of habitat relative to what is available to the regional population in the remainder of the cumulative effects assessment Regional Study Area.

Linear disturbances, such as the Northern Road Link and Rapid Lynx Broadband projects, may affect territory establishment and delineation, although linear disturbances generally do not represent barriers to yellow rail movements. Clearing activities associated with construction of the Project and the Northern Road Link, Anaconda and Painter Lake forestry road upgrades, and Rapid Lynx Broadband projects will result in a small but measurable change to the existing distribution of yellow rails and rail habitat in the cumulative effects assessment Regional Study Area.

It is Reasonably foreseeable developments are expected to implement mitigation and enhancement measures that will limit effects on birds.

Effects from direct habitat loss from the Project and the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects on yellow rail are predicted to be **certain or probable to occur**, largely **irreversible (long term)**, **continuous**, and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual **effects from habitat loss** from the Project and other reasonably foreseeable developments on the ability of the yellow rail population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

Yellow rail has high vulnerability to climate change (National Audubon Society, 2024). This species' range in northern Ontario is decreased relative to current conditions under temperature increases of 1.5°C and 2.0°C and temperature increases of 3.0°C may result in the loss of yellow rail distribution from most of Ontario (National Audubon Society, 2024). As such, **effects from climate change** are predicted to have **negative**, **probable**, **permanent**, **continuous**, and **high magnitude** effects on the yellow rail population; effects will extend **beyond the cumulative effects assessment Regional Study Area**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.23.1.2 Determination of Significance

Yellow rail is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to yellow rail habitat availability, distribution, and survival and reproduction due to habitat loss and alteration from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

Climate change may have **significant** effects on the yellow rail population beyond the cumulative effects assessment Regional Study Area if temperatures increase by 1.5°C to 3.0°C relative to current conditions.

8.2.23.2 Sensory Disturbance

8.2.23.2.1 Potential Cumulative Effects

8.2.23.2.1.1 Habitat Availability

Sensory disturbance during construction and operations of the reasonably foreseeable developments could result in the indirect loss or degradation of suitable yellow rail habitat if individuals avoid areas with sensory disturbance. As the precise threshold of avoidance by yellow rail due to sensory disturbance is not known, habitat that was within 350 m of the Project and the Northern Road Link project was assumed to be negatively affected by sensory disturbance as a precautionary approach. Sensory disturbance effects from the Anaconda and Painter Lake roads are included in the existing conditions scenario; although there may be an increase in sensory disturbance during construction of the Anaconda and Painter Lake roads upgrade project, these increases are expected to be

small relative to existing conditions. To be conservative, a 350-metre sensory disturbance zone of influence was also applied to the Rapid Lynx Broadband project to account for sensory disturbance effects during construction of this project. However, sensory disturbance effects will be lower (i.e., infrequent) during operations of the broadband project.

A total of 5,341.2 ha of high and moderate suitability yellow rail habitat may be indirectly affected within 350 m of the Project and other reasonably foreseeable development footprints because of sensory disturbance inducing habitat avoidance during construction and / or operations of these projects. This is 5.7% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area during existing conditions (**Table 8-47**).

Table 8-47: Changes to Yellow Rail Habitat Availability in the Cumulative Effects Regional Study Area from Cumulative Sensory Disturbance

Habitat Suitability	Existing Conditions (ha)	Cumulative Effects (ha)[(a)]	Change in Area from Existing Conditions (ha)[(b,c)]	Change (%)
High to Moderate	93,993.5	88,652.2	5,341.2	5.7
Low to Poor	412,753.5	382,976.9	29,776.5	7.2

Notes: There are 8.7 ha of unclassified (pixel error) habitat in the effects assessment Regional Study Area; none of the unclassified habitat is removed by the Project.

(a) Residual effects represent the amount of habitat that remains unimpacted by sensory disturbance after construction of the Project and other reasonably foreseeable developments.

(b) Changes in habitat area result from a conversion of all suitability groups to nil habitat suitability.

(c) The change in area in the study area is a result of the sensory disturbance (i.e., indirect impact on habitats).

ha = hectare; % = percent.

Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. During construction of the Northern Road Link project, activities will be primarily confined to daylight hours and will be of relatively short duration (i.e., confined to the start and end of construction of each road segment). Conversely, during operations, sensory disturbance will occur throughout the day over the life of the project and along the full length of the road. Although traffic levels will vary through the day, effects from sensory disturbance due to the Northern Road Link project are assumed to occur continuously when yellow rails are present in the cumulative effects assessment Regional Study Area (i.e., during the migration and breeding seasons).

There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed as road widening may accommodate higher traffic volumes as well as larger vehicles.

Sensory disturbance will only occur during construction of the Rapid Lynx Broadband project, unless maintenance of the broadband cable is required during operations.

Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.23.2.1.2 Distribution

Sensory disturbance during construction and / or operation of the Northern Road Link, Anaconda and Painter Lake roads upgrades, and Rapid Lynx Broadband projects may have a negative effect on yellow rail movements and habitat connectivity. Effects from sensory disturbance from the Northern Road Link project will be greater during operations than during construction of the road. There will be short-term increases in sensory disturbance along the portions of the Anaconda and Painter Lake roads as sections undergo upgrades. There is potential for permanent increased sensory disturbance effects on the Anaconda and Painter Lake roads after upgrades are completed. Sensory disturbance will primarily occur during construction of the Rapid Lynx Broadband project.

To be conservative, potential sensory disturbance effects and changes to yellow rail distribution and movement during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when yellow rails are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance effects and changes to yellow rail distribution and movement during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the yellow rail breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.23.2.1.3 Survival and Reproduction

Potential effects from noise include interference with communication (e.g., reducing ability to hear intraspecific vocalizations) and increased risk of predation (e.g., reducing ability to hear approaching predators) (Ortega, 2012). While the precise threshold for effects on yellow rail survival and reproduction due to sensory disturbance is not known, adverse effects on yellow rail survival and reproduction within 350 m of reasonably foreseeable developments may occur during construction and / or operations of these projects.

To be conservative, potential sensory disturbance effects and changes to yellow rail survival and reproduction during construction and operations of the Northern Road Link and upgraded Anaconda and Painter Lake roads are assumed to occur continuously throughout the breeding and migration seasons (i.e., when yellow rails are present in the cumulative effects assessment Regional Study Area). Potential sensory disturbance

effects and changes to yellow rail survival and reproduction during construction of the Rapid Lynx Broadband project are assumed to occur periodically during the yellow rail breeding and migration seasons. Sensory disturbance effects from construction of the Rapid Lynx Broadband project are assumed to occur over a short period of time. Sensory disturbance effects from all reasonably foreseeable developments may overlap construction of the Project.

8.2.23.2.2 Mitigation and Enhancement Measures

It is anticipated, mitigation measures that will be implemented to limit sensory disturbance during the construction of the Northern Road Link, upgraded Anaconda and Painter Lake roads, and Rapid Lynx Broadband projects will be similar to those implemented for the Project.

8.2.23.2.3 Predicted Cumulative Effects

After mitigation, potential yellow rail breeding habitat may be affected by sensory disturbance created during Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments. The implementation of mitigation and enhancement measures is expected to limit negative effects. However, there are predicted cumulative residual effects on yellow rail habitat availability, distribution, and survival and reproduction.

8.2.23.2.4 Characterization of Predicted Cumulative Effects

Sensory disturbance associated with the Construction and / or Operation and Maintenance of the Project and other reasonably foreseeable developments could lead to reduced survivorship and / or reproductive rate for breeding pairs of yellow rails occupying territories near the project footprints. Sensory disturbance from construction of the Northern Road Link and upgraded Anaconda and Painter Lake forestry roads and construction of the Rapid Lynx Broadband project is predicted to affect 5.7% of high and moderate suitability habitat that is available in the cumulative effects assessment Regional Study Area at existing conditions. Changes to habitat quality due to sensory disturbance from the construction of the Project and Northern Road Link and upgraded Anaconda and Painter Lake forestry roads will exist in perpetuity as there is no plan to reclaim these projects. Changes to habitat quality due to sensory disturbance from the construction of the Rapid Lynx Broadband project are anticipated to be of short duration. Yellow rail is highly mobile and capable of relocating to portions of the cumulative effects assessment Regional Study Area that are not affected by sensory disturbance from the Project and other reasonably foreseeable developments.

Effects from sensory disturbance due to the construction and maintenance of reasonably foreseeable developments is anticipated to be **probable** to occur, **reversible** in the **medium term**, **frequent** (construction) **to infrequent** (maintenance), and primarily confined to the **cumulative effects assessment Regional Study Area**. Effects from sensory disturbance due to the operation and maintenance of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads are predicted to be **probable**, **permanent** and **continuous** during the bird migration and breeding periods and extend **beyond the cumulative effects assessment Regional Study Area**.

Cumulative residual effects from sensory disturbance from the Project and other reasonably foreseeable developments on the ability of the yellow rail population in the cumulative effects assessment Regional Study Area to remain self-sustaining and ecologically effective are anticipated to be **negative** but **low in magnitude**.

The cumulative residual effects characterization is provided in **Table 8-48**.

8.2.23.2.5 Determination of Significance

Yellow rail is predicted to remain self-sustaining and ecologically effective with the implementation of the Project and other reasonably foreseeable developments. Overall, the anticipated changes to yellow rail habitat availability, distribution, and survival and reproduction due to sensory disturbance from the Project and other reasonably foreseeable developments are expected to remain within the resilience and adaptability limits of the regional population. The cumulative residual effects from previous, existing, and reasonably foreseeable developments (including the Project) are therefore considered **not significant**.

8.2.24 Prediction Confidence and Uncertainty

Scientific inference is associated with uncertainty and prediction confidence (i.e., level of confidence in assessment results) depends on the level of uncertainty and the way it is addressed. Primary factors affecting confidence in the effects predictions in the bird assessment include:

- Availability and accuracy of baseline data;
- Accuracy of ecosystem maps and bird habitat models;
- Level of understanding of the strength of Project–environment interactions and associated effects on each Valued Component;
- Level of certainty associated with the effectiveness of proposed mitigations; and
- Level of understanding of existing conditions, range of natural variation, and resilience and adaptive capacity of Valued Component populations.

- Uncertainty was managed by:
    - Reviewing previous and existing data and relevant studies completed in the Birds effects assessment Local and Regional Study Areas;
    - Completing quality assurance and quality control of baseline data;
    - Assuming that bird Valued Components would be present in potential habitats where they may occur but were not observed;
    - Using the best available land cover data for ecological land classification mapping in the birds effects assessment Local Study Area and Regional Study Area; and
    - Supporting and comparing assessment results with relevant published scientific literature.

Overall, there is **low to moderate uncertainty** in residual effects predictions related to the changes to bird Valued Components and best management practices during the Project lifespan that will be implemented to mitigate effects on birds. For example, residual effects from the introduction and spread of invasive plants, erosion and sedimentation, and dust and air emissions have low uncertainty because Project-related effects are well understood and the level of certainty associated with the effectiveness of proposed mitigations is high. Residual effects on bird habitat availability have low uncertainty as the habitat associations for these Valued Components are well understood, which provided robust habitat models and effects predictions. Moderate prediction confidence is anticipated for effects related to sensory disturbance given that a conservative assumption on buffers was applied for each bird Valued Component, while the scientific literature demonstrates that birds exhibit variation in behavioural responses to roads and other linear features, and effects may change through the lifespan of the Project.

Remaining uncertainty was primarily and appropriately addressed by making assumptions that conservatively overestimated rather than underestimated potential effects (i.e., a precautionary assessment). For example, it was assumed that the effects assessment Construction Disturbance Area will be permanently cleared of vegetation. However, it is anticipated some access roads and laydown areas will be decommissioned and reclaimed or left to revegetate naturally, which should decrease effects on habitat availability and distribution.

8.2.25 Summary

Table 8-48: Characterization of Predicted Cumulative Residual Effects and Determination of Significance for Bird Valued Components

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
All Birds	Changes to Groundwater	Low amount of existing human disturbance has resulted in a minimal change to groundwater quantity in the Local Study Area. Changes to groundwater quantity are not threats to bird habitat in the existing environment.	Negative	Negligible	Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
All Birds	Dust Deposition	Low amount of existing human disturbance has resulted in a minimal amount of dust deposition in the Birds effects assessment Local Study Area. Changes to soil and vegetation from dust emissions are not a threat to bird habitat in the existing environment Mitigation measures to limit dust deposition are well understood and the methods have been demonstrated to be effective.	Negative	Negligible	Beyond Regional	Long term / Irreversible	Continuous	Certain	Not significant	Low
Red-eyed Vireo	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions or after implementation of the Project. One of the most common species detected during field surveys. Relatively high adult survival (53%) and reproductive rate (nest success 65%; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative (reasonably foreseeable developments) Neutral to Positive (climate change)	Removal of a total 3,409.1 ha of high and moderate suitability habitat (change of 1.7% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 812 nesting territories, or 1.7% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. This species' range in northern Ontario is maintained or increased relative to current conditions under temperature increases of 1.5°C to 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution Possible for climate change	Not significant	Low
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the cumulative effects study areas at existing	Negative	A total of 13,566.1 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.8% of habitat available in the cumulative effects	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably	Probable	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		conditions and after implementation of the Project.		assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions.	operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
Ovenbird	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high-quality habitat covers approximately 55% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Relatively high adult survival (42-58%) and reproductive rate (nest success 60-70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 5,147.9 ha of high and moderate suitability habitat (change of 1.8% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 735 nesting territories, or 1.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions. This species' range in northern Ontario is maintained relative to current conditions under temperature increases of 1.5°C and 2.0°C but temperature increases of 3.0°C may result in the loss of ovenbird distribution from much of northeastern Ontario. As a result, a low to moderate magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution Possible for climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source.	Negative	A total of 18,983.4 ha of high and moderate suitability habitat may be indirectly affected due to sensory	Regional (construction and maintenance of the	Medium term / Reversible (construction and maintenance of	Infrequent (maintenance of the	Probable	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.		disturbance inducing habitat avoidance (6.7% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
	Increase in Edge Habitat	Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Dark-eyed Junco	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Relatively high adult survival (49%) and reproductive rate (nest success 55-76%, 3.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 3,318.7 ha of high and moderate suitability habitat (change of 2.3% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 291 nesting territories, or 2.3% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 11,293.8 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (7.7% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Osprey	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Rarely detected during baseline surveys. Relatively high adult survival (>80%) and reproductive rate (nest success 38-63%, three eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative (reasonably foreseeable developments) Neutral to Positive (climate change)	Removal of a total 3,542.5 ha of high and moderate suitability habitat (change of 3.8% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to nine nesting territories, or 3.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. This species' range in northern Ontario is maintained or increased relative to current conditions under temperature increases of 1.5°C to 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution Possible for climate change	Not significant	Low (reasonably foreseeable developments) Moderate (climate change)
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source.	Negative	A total of 24,504.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (26.4% of habitat available in the cumulative effects	Regional (construction and maintenance of the Rapid Lynx Broadband Project)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments)	Infrequent (maintenance of the Rapid Lynx Broadband Project)	Possible	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.		assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
Boreal Owl	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Frequently detected during baseline surveys. Relatively high adult survival (62-72%) and reproductive rate (nest success varies with prey abundance; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 3,471.0 ha of high and moderate suitability habitat (change of 1.8% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 42 nesting territories, or 1.8% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)
Wilson's Snipe	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the cumulative effects assessment Regional Study Area	Negative	Removal of a total 3,587.9 ha of high and moderate suitability habitat (change of 1.5% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Relatively high adult survival (50-65%) and reproductive rate (nest success 41%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		Potential loss of up to 242 nesting territories, or 1.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.				distribution and climate change	relative to current conditions).	
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 13,771.0 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.5% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Mallard	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 85% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. and after implementation of the Project.	Negative	Removal of a total 5,743.8 ha of high and moderate suitability habitat (change of 1.3% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 22 nesting territories, or 1.3% of the predicted	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. The most abundant duck species in North America. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 10-70%; eight eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Most of the current range for this species in northeastern Ontario will be maintained under increased temperature regimes of 1.5°C to 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions.				Possible for climate change		
	Sensory Disturbance	Sensory disturbance could lead to reduced survivorship and / or reproductive rate.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Palm Warbler	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 70% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Nest and adult survival rates are unknown; relatively high reproductive rate (4.5 eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area	Negative	Removal of a total 3,357.0 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 216 nesting territories, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		at existing conditions and after implementation of the Project.		Much to all the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 16,362.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (4.8% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
	Increase in Edge Habitat	Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Common Yellowthroat	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys.	Negative (reasonably foreseeable developments) Positive (climate change)	Removal of a total 3,158.5 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 225 nesting territories, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Species range is predicted to expand throughout northern Ontario	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution Possible for climate change	Not significant	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Moderate adult survival (45%) and reproductive rate (nest success 33-55%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 16,714.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.0% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Northern Waterthrush	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 40% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Relatively high adult survival (50-70%) and reproductive rate (nest success 70%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 2,296.0 ha of high and moderate suitability habitat (change of 1.1% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 163 nesting territories, or 1.1% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. This species' range in northern Ontario is maintained under temperature increases of 1.5°C to 2.0°C but most of the current range	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution Possible for climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				for this species in northeastern Ontario may be lost under increased temperature regimes of 3.0°C. As a result, a low to high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 12,000.4 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.9% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
	Increase in Edge Habitat	Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Sora	Habitat Loss and Alteration	Not a listed species under the *Species at Risk Act* or the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Uncommonly detected during field surveys.	Negative	Removal of a total 928.6 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to one nesting territory, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Relatively high reproductive rate (nest success 43-53%; 8-11 eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 5,958.7 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Canada Warbler	Habitat Loss and Alteration	Threatened species under the *Species at Risk Act* and is a Special Concern species under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 50% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Infrequently detected during field surveys. Relatively high reproductive rate (nest success 96%; 4-5 eggs per brood).	Negative	Removal of a total 3,828.3 ha of high and moderate suitability habitat (change of 1.5% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 33 nesting territories, or 1.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 2.0°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 2.0°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 16,078.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.3% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Evening Grosbeak	Habitat Loss and Alteration	Special Concern species under the *Species at Risk Act* and *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Highly nomadic; presence varies with food resources. Not detected during field surveys. Relatively high reproductive rate (nest success 55%; 3-4 eggs per brood).	Negative	Removal of a total 2,388.2 ha of high and moderate suitability habitat (change of 2.7% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 2.0°C to 3.0°C.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 7,964.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (8.9% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Chimney Swift, Bank Swallow, and Barn Swallow	Habitat Loss and Alteration	Chimney swift and bank swallow are Threatened under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Bank swallow is Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 0.2% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and species are not sensitive to human disturbance. None of these species were detected during field surveys and suitable habitat for these species was not observed during species-specific surveys. Relatively high reproductive rate for all species (nest success 44-90%). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative (reasonably foreseeable developments) Neutral to Positive (climate change)	Removal of a total 368.0 ha of high and moderate suitability habitat (change of 33.1% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of less than one barn swallow nesting territories, or 32.6% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Species ranges are expected to expand throughout northern Ontario under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
	Sensory Disturbance	Species are not considered sensitive to sensory disturbance, but sensory disturbance could lead to reduced survivorship and / or reproductive rate. Few sources of sensory disturbance in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Common Nighthawk and Eastern Whip-poor-will	Habitat Loss and Alteration	Common nighthawk is Special Concern Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Eastern whip-poor-will is Special Concern under Schedule 1 of *Species at Risk Act* and is Threatened under the *Endangered Species Act, 2007*. Eastern whip-poor-will may be downlisted to Special Concern in the future. Moderate and high suitability common nighthawk habitat covers approximately 45% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Moderate and high suitability eastern whip-poor-will habitat covers approximately 5% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area. These species will nest in areas of human disturbance. Common nighthawk was frequently detected during field surveys. Eastern whip-poor-will was infrequently detected during field surveys. Common nighthawks typically lay one brood per year. Eastern whip-poor-wills commonly raise two broods per year. Populations appear to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative Neutral to Positive (climate change effects on common nighthawk)	Removal of a total 2,470.2 ha of high and moderate suitability habitat for common nighthawk (change of 1.0% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Removal of a total 635.9 ha of high and moderate suitability habitat for eastern whip-poor-will (change of 3.3% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to six common nighthawk nesting territories, or 1.0% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Potential loss of up to 125 eastern whip-poor-will nesting territories, or 3.3% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Common nighthawk range is predicted to be maintained or expand throughout northern Ontario under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. Eastern whip-poor-will range is predicted to increase throughout northern Ontario under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant Significant (climate change for eastern whip-poor-will)	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 200 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 8,829.8 ha of high and moderate suitability common nighthawk habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (3.6% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). A total of 1,433.8 ha of high and moderate suitability eastern whip-poor-will habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (7.4% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
	Increase in Edge Habitat	Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Eastern Wood-Pewee	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project.	Negative (reasonably foreseeable developments) Neutral to Positive (climate change)	Removal of a total 1,038.8 ha of high and moderate suitability habitat (change of 3.4% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to two nesting territories, or 3.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Infrequently detected during field surveys. Moderate reproductive rate (nest success 32-56%; three eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.		Species range is expected to expand throughout northern Ontario under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 2,760.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.0% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Olive-sided Flycatcher	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 55% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. Low reproductive rate. Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 2,978.4 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 41 nesting territories, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a moderate to high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 14,664.5 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.2% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Bald Eagle	Habitat Loss and Alteration	Special Concern under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 5% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area. Bald eagle nest locations and suitable habitat are concentrated around fish-bearing waterbodies and watercourses. Frequently detected during field surveys. High adult survival (>80%) and reproductive rate (nest success >50%). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative (reasonably foreseeable developments) Neutral to Positive (climate change)	Removal of a total 967.1 ha of high and moderate suitability habitat (change of 4.4% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to four nesting territories, or 4.4% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. Species range is expected to be maintained or expand throughout northern Ontario under temperature increase regimes 1.5°C, 2.0°C, and 3.0°C. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant	Low (reasonably foreseeable developments) Moderate (climate change)
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 400 m of the disturbance source.	Negative	A total of 7,817.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat	Regional (construction and maintenance of the	Medium term / Reversible (construction and maintenance of	Infrequent (maintenance of the	Probable	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.		avoidance (35.6% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
Short-eared Owl	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 35% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Not detected during field surveys. High reproductive rate (nest success 75-90%; average 5.6 eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 1,798.0 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 22 nesting territories, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a moderate to high magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 500 m of the disturbance source.	Negative	A total of 15,380.9 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (8.1% of habitat available in the cumulative effects	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably	Probable	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.		assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
	Increase in Edge Habitat	Vulnerable to increased predation due to increased habitat fragmentation Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Lesser Yellowlegs	Habitat Loss and Alteration	Threatened under the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 30% of the Effects Assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Infrequently detected during field surveys. Moderate reproductive rate (fledgling success 27-34%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 2,443.8 ha of high and moderate suitability habitat (change of 1.5% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 19 nesting territories, or 1.5% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. The current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a moderate to high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 10,375.6 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (6.5% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low
Rusty Blackbird	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 65% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Commonly detected during field surveys. High reproductive rate (nest success 77-98%; four eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 3,254.4 ha of high and moderate suitability habitat (change of 1.0% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of up to 30 nesting territories, or 1.0% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the Birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a moderate to high magnitude of change to habitat availability, distribution, and survival and reproduction from climate change is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 300 m of the disturbance source.	Negative	A total of 18,164.4 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat	Regional (construction and maintenance of the	Medium term / Reversible (construction and maintenance of	Infrequent (maintenance of the	Probable	Not significant	Low

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
		Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.		avoidance (5.6% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)			
	Increase in Edge Habitat	Vulnerable to increased predation due to increased habitat fragmentation Limited habitat fragmentation in the study areas at existing conditions and after implementation of the Project.	Negative	Small changes to survival and reproduction. As a result, a low magnitude of change to survival and reproduction is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions.	Beyond Regional	Long term / Irreversible	Continuous	Probable	Not significant	Moderate
Yellow Rail	Habitat Loss and Alteration	Special Concern under Schedule 1 of *Species at Risk Act* and the *Endangered Species Act, 2007*. Moderate and high quality habitat covers approximately 20% of the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project. Minimal existing disturbance in the cumulative effects assessment Regional Study Area and the regional population is not limited by breeding habitat at existing conditions and after implementation of the Project. Detected once during field surveys. Moderate to high reproductive rate (8 eggs per brood). Population appears to be self-sustaining and ecologically effective in the cumulative effects assessment Regional Study Area at existing conditions and after implementation of the Project.	Negative	Removal of a total 928.6 ha of high and moderate suitability habitat (change of 0.9% in the cumulative effects assessment Regional Study Area, relative to existing conditions). Small changes to the distribution of breeding territories and movements. Potential loss of less than one nesting territory, or 0.9% of the predicted number of nesting territories in the cumulative effects assessment Regional Study Area during existing conditions. As a result, a low magnitude of change to habitat availability, distribution, and survival and reproduction from reasonably foreseeable developments is predicted at the birds cumulative effects assessment Regional Study Area relative to existing conditions. Much of the current range for this species in northeastern Ontario may be lost under increased temperature regimes of 1.5°C to 3.0°C. As a result, a high magnitude of change to habitat availability, distribution, and survival and reproduction is predicted at the birds cumulative effects assessment	Beyond Regional	Long term / Irreversible	Continuous	Certain for habitat availability and survival and reproduction Probable for habitat distribution and climate change	Not significant (reasonably foreseeable developments) Significant (climate change; if temperatures increase by 1.5°C to 3.0°C relative to current conditions).	Low (reasonably foreseeable developments) Moderate (climate change)

Valued Component	Predicted Cumulative Residual Effect	Context	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance	Uncertainty
				Regional Study Area relative to existing conditions.						
	Sensory Disturbance	Species may be sensitive to sensory disturbance within 350 m of the disturbance source. Few sources of sensory disturbance in the study areas at existing conditions and after implementation of the Project.	Negative	A total of 5,341.2 ha of high and moderate suitability habitat may be indirectly affected due to sensory disturbance inducing habitat avoidance (5.7% of habitat available in the cumulative effects assessment Regional Study Area during existing conditions). Small changes to the distribution of breeding territories and movements. Small changes to survival and reproduction.	Regional (construction and maintenance of the Rapid Lynx Broadband Project) Beyond Regional (construction and operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Medium term / Reversible (construction and maintenance of reasonably foreseeable developments) Long term / Irreversible (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Infrequent (maintenance of the Rapid Lynx Broadband Project) Frequent (construction of reasonably foreseeable developments) Continuous (operation of the Project, the Northern Road Link, and upgraded Anaconda and Painter Lake forestry roads)	Probable	Not significant	Low

% = percent; ha = hectare; °C = degree Celsius; m = metre; > = greater than.

9 Monitoring Programs and Future Commitments

A monitoring program verifies the accuracy of the residual effects assessment and evaluates the effectiveness of mitigation and enhancement measures. Monitoring programs also include future commitments related to mitigating residual effects and addressing uncertainty. A Project-specific Environmental Monitoring Program will be developed and implemented that includes the monitoring commitments related to bird Valued Components presented in this section.

9.1 Pre-Construction Monitoring Program

- Baseline data collected for breeding birds and marshbirds during point count and autonomous recording unit surveys from 2018 to 2022 are assumed to be adequate for pre-construction monitoring.
- Additional pre-construction monitoring has been proposed, including the following program:
    - Pileated Woodpecker habitat assessments, including an evaluation based on aerial interpretation and ground-truthed ahead of pre-clearing activities. These assessments are meant to keep project activities in compliance with the *Migratory Birds Convention Act* (Government of Canada, 1994), specifically identified under the *Migratory Birds Regulations* (Government of Canada, 2022) in reference to Pileated Woodpecker. Pileated Woodpecker assessments will be completed in advance of the Project commencing construction, factoring in requirements for nest monitoring per ECCC guidance (e.g., monitoring potential Pileated Woodpecker nest cavity trees for a period of 3 years).

9.2 Construction Monitoring Program

During construction, the following monitoring programs will be required:

- Clearing activities will occur outside the breeding season for most bird species, from August 15 to April 27, where possible (90% of species in nesting zones C5 and C6 are expected to be actively nesting between April 28 and August 14; Environment and Climate Change Canada, 2023c);
- If any clearing is required during the migratory bird nesting season (i.e., April 28 through August 14), non-intrusive pre-clearing nest surveys will occur within 3 to 7 days prior to clearing; the maximum number of days prior to clearing will depend on the time during the nesting season;

  - During the peak migratory bird nesting season (i.e., when >40% of birds are predicted to be nesting; May 19 through July 30) non-intrusive pre-clearing nest surveys will be completed a maximum of three days prior to clearing.
  - During non-peak nesting periods (i.e., April 28 through May 18 and July 31 through August 14), non-intrusive pre-clearing nest surveys will be completed a maximum of seven days prior to clearing.
  - Pre-clearing nest surveys will be completed by avian biologists with support from Indigenous Environmental Monitors, where possible.

- If any areas are found to have birds exhibiting breeding behaviour during non-intrusive pre-clearing nest surveys, these areas, including an activity disturbance buffer, will be flagged, and protected from disturbance until the fledglings have left the nest or the nest is otherwise deemed unoccupied (i.e., the nest is depredated);
- In addition to nest surveys during the migratory bird nesting season, wildlife sweeps will be completed outside of the nesting season to look for and document pileated woodpecker nesting cavities and raptor stick nests. Wildlife sweeps will focus on mature and old growth forest dominated by deciduous trees as these habitats are most likely to have large trees that can support raptor stick nests and pileated woodpecker nests. Wildlife sweeps will be led by avian biologists with support from Indigenous Environmental Monitors, where possible; and
- The effectiveness of mitigation measures will be evaluated during construction and operations, and mitigation measures will be modified or enhanced as necessary through adaptive management.

9.3 Operations Monitoring Program

A Before-After Control-Impact study is proposed for operations monitoring. Data from operations monitoring will be compared to data from reference sites (i.e., sites not affected by disturbance) and data collected prior to construction (i.e., baseline survey [2018-2022] point count and autonomous recording unit data) to determine population trends and determine if predictions made in the Environmental Assessment are valid. Fieldwork will be completed and led by avian biologists, with support from Indigenous Environmental Monitors, where possible.

During operations, the following monitoring programs will be required:

- Autonomous recording unit and point count surveys at selected reference sites (i.e., locations surveyed in the alternative Project route Local Study Area during breeding bird, nightjar, and marshbird baseline surveys from 2018 to 2022). Autonomous recording unit and point count surveys will be completed every two years for a period of six years; the need for surveys beyond six years will be determined in consultation with Environment and Climate Change Canada;

- Two roadside North American Breeding Bird Survey routes (each 40 km long and containing 50 survey locations) will be initiated along the Project (i.e., one transect along the southern portion of the Project and one transect along the northern portion of the Project). The placement of each route will be negotiated with Environment and Climate Change Canada. Each route will be surveyed annually with the goal for the routes to be completed by the same observer for a period of five years; the need for surveys beyond five years will be determined in consultation with Environment and Climate Change Canada. Surveys will be completed in accordance with Environment and Climate Change Canada and United States Geological Survey standards. See **Appendix AB (Preliminary Biodiversity Offset Plan)** for more information;
- Three roadside Canadian Nightjar Survey routes (each 20 km long and containing 12 survey locations) will be initiated along the Project (i.e., one transect along the southern portion of the Project, one transect along the middle portion of the Project, and one transect along the northern portion of the Project). Nightjar surveys will be focussed on the detection of Common Nighthawk and Eastern Whip-poor-will. The placement of each route will be negotiated with Birds Canada and / or Environment and Climate Change Canada. Each route will be surveyed annually with the goal for the routes to be completed by the same observer for a period of five years; the need for surveys beyond five years will be determined in consultation with Environment and Climate Change Canada. Surveys will be completed in accordance with Birds Canada survey standards. See the Preliminary Biodiversity Offset Plan (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report)* for more information; and
- A minimum of ten Marsh Monitoring Program survey stations will be initiated along the Project (i.e., spaced evenly along the Project, where suitable habitat is present). The placement of each station will be negotiated with Birds Canada and / or Environment and Climate Change Canada. Each survey station will be surveyed annually with the goal for the routes to be completed by the same observer for a period of five years; the need for surveys beyond five years will be determined in consultation with Environment and Climate Change Canada. Surveys will be completed in accordance with Birds Canada survey standards. See *Appendix AB - Preliminary Biodiversity Offset Plan* for more information.
- A minimum of 20 targeted survey stations for Short-eared Owl will be surveyed each year, over a period of three years along the Project (i.e., spaced evenly along the Project, where suitable habitat is present; total of 60 surveys). Each survey station will be surveyed a minimum of once over the 3-year period of monitoring and the total monitoring effort will equal or be greater than 60 survey stations completed. Survey stations are not anticipated to be repeated to align with greater spatial coverage throughout the Project. The placement of each station will be chosen to align with the species breeding habitat requirements.

9.4 Future Commitments

All mitigation and enhancement measures outlined in **Section 7** will be adhered to. Mitigation and enhancement measures are summarized in **Table 7-72**. The effectiveness of mitigation and enhancement measures will be evaluated during construction and operations and will be modified or enhanced as necessary through adaptive management.

A Preliminary Biodiversity Offset Plan has been developed and will be implemented for the Project to provide a net positive increase in migratory bird habitat (*Appendix AB* under the *Final Environmental Assessment / Impact Statement Report*). As part of the Biodiversity Offset Plan, primary themes to provide a net positive for migratory birds include designing surveys as part of the operation monitoring program to be in-line with existing citizen science programs and undertaking land acquisition, including outside of the primary study area that benefits over-wintering migratory birds found in the project. Additional survey requirements for bird species at risk will be determined through correspondence and potential permitting with Environment and Climate Change Canada and Ontario Ministry of the Environment, Conservation, and Parks.

9.5 Future Permits and Approvals

To facilitate the construction of the Community Access Road, including construction activities and temporary infrastructure, permits and approvals from federal, provincial government and other jurisdictional agencies will need to be acquired. A preliminary list of permits and approvals anticipated to be applicable or potentially applicable to the Project for Birds are detailed in **Table 9-2**. This list is based on a conceptual level of design, and the final determination of permits and approvals that will be required will occur as the design is further.

Table 9-2: Summary of Potential Permits and Approvals List

Permit / Approval	Issuing Authority	Purpose / Scope	Considerations / Next Steps
Wildlife Scientific Collectors Permit under the *Fish and Wildlife Conservation Act, 1997*	Ministry of Natural Resources	To facilitate capture and transfer of wildlife from one site to another	Applicable if wildlife will be handled associated with the project construction
Letter of Advice or Permit under the *Endangered Species Act, 2007*	Ministry of the Environment, Conservation, and Parks	If the Project affects a species that is listed on the Species at Risk in Ontario List as an extirpated, endangered, or threatened species	To be confirmed at detailed design
Permit Under the *Species at Risk Act, 2002*	Environment and Climate Change Canada	If the Project activities will destroy or remove a SAR listed under the *Species at Risk Act 2002* or its habitat	To be confirmed at detailed design

Permit / Approval	Issuing Authority	Purpose / Scope	Considerations / Next Steps
Permit under the *Migratory Birds Convention Act, 1994*	Environment and Climate Change Canada	If the Project activities will destroy, harm or harass any migratory birds or their nests.	To be confirmed at detailed design

The pits and quarries that are proposed through the Community Access Road Project will be subject to permitting requirements outlined within the *Aggregate Resources Act* and its regulations. For a permit to be issued, additional studies, mitigation plans, consultation and monitoring commitments may be required. In addition to permitting requirements under *the Aggregate Resources Act*, permitting and approvals under other pieces of legislation may also be required for pit and quarry development, including:

- Federal Species at Risk Act, and
- Ontario *Planning Act;*
- Ontario *Water Resources Act;*
- Ontario *Environmental Protection Act;* and
- Ontario *Endangered Species Act*;

10 Summary and Recommendations

The potential effects summary and recommendations for bird Valued Components is provided in **Table 10-1**. Through the permitting stage of the Project, a Project-specific Environmental Protection Plan and Environmental Monitoring Plan will be developed and implemented that includes an implementation plan for the mitigation and monitoring commitments related to bird Valued Components that are presented in **Table 10-1**. Any standard mitigation identified to limit residual effects from the Project on birds are assumed to be implemented at other reasonably foreseeable developments.

Table 10-1: Project Effects Summary and Recommendations

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
BIRD-01	All bird Valued Components	**Introduction and spread of invasive plant species**—can affect plant community composition, which can affect bird habitat availability and distribution	Construction	▪ Ministry of Natural Resources	▪ Prepare the environmental monitoring program that will contain mitigation measures to control invasive plant species	▪ Implement the environmental monitoring program, including mitigation for invasive plant species. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures to control invasive plant species during construction of the Project is provided in the *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a) and *Peatlands Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026d).
			Operation and Maintenance		▪ N/A	▪ As per the Ministry of Transportation's *Weed Control Maintenance Best Practice (MBP-320)*, invasive plant species will be controlled using a combination of biological, chemical, cultural, manual, and mechanical control methods during Operation and Maintenance (Ministry of Transportation, 2003).
BIRD-02	All bird Valued Components	**Emissions of criteria air contaminants—**Deposition of particulates in criteria air contaminant emissions (e.g., potential acid inputs) may change soil and vegetation quality and affect bird habitat availability and distribution.	Construction	▪ Ministry of Transportation	▪ Potential mitigation measures outlined in the Ontario Ministry of Transportation's *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions for Provincial Transportation Projects* (Ontario Ministry of Transportation, 2020) may be implemented during Detailed Design, if feasible. ▪ Prepare the environmental monitoring program that will contain mitigation measures to control dust and air emissions.	▪ Implement the environmental monitoring program, including mitigation measures to control dust and air emissions. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).
			Operation and Maintenance		▪ N/A	▪ Implement the environmental monitoring program, including mitigation measures to control dust and air emissions. ▪ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).
BIRD-03	All bird Valued Components	**Fugitive dust emissions—** deposition of dust particulates may change soil and vegetation quality and affect bird habitat availability and distribution.	Construction	▪ Ministry of Transportation	▪ Potential mitigation measures outlined in the Ontario Ministry of Transportation's *Environmental Guide for Assessing and Mitigating the Air Quality Impacts and Greenhouse Gas Emissions for Provincial Transportation Projects* (Ontario Ministry of Transportation, 2020) may be implemented during Detailed Design, if feasible. ▪ Prepare the environmental monitoring program that will contain mitigation measures to control dust and air emissions.	▪ Implement the environmental monitoring program, including mitigation measures to control dust and air emissions. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Construction is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).
			Operation and Maintenance		▪ N/A	▪ Implement the environmental monitoring program, including mitigation measures to control dust and air emissions. ▪ A comprehensive list of mitigation measures that will be implemented to limit air particulate emissions during Operation and Maintenance is provided in the *Air Quality and Greenhouse Gas Technical Support Document: Existing Conditions & Effects Assessment* (Dillon, 2026).

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
BIRD-04	All bird Valued Components	**Erosion and sedimentation**—can alter surface water, groundwater, soil, and vegetation quality and affect bird habitat availability and distribution.	Construction	▪ Ministry of Transportation ▪ Fisheries and Oceans Canada	▪ Prepare the environmental monitoring program that will contain mitigation measures to control erosion and sedimentation. ▪ Erosion and sediment control measures will be developed in accordance with *Ontario Provincial Standard Specifications for erosion and sediment control measures* (OPSS.PROV.804 and OPSS.MUNI.805). ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Detailed Design.	▪ Implement the environmental monitoring program, including mitigation measures to control erosion and sedimentation during Construction. ▪ Erosion and sediment control measures will be implemented in accordance with *Ontario Provincial Standard Specifications for erosion and sediment control measures* (OPSS.PROV.804 and OPSS.MUNI.805). ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures that will be implemented during Construction is provided in *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a) and *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).
			Operation and Maintenance		▪ N/A	▪ Implement the environmental monitoring program, including mitigation measures to control erosion and sedimentation during Maintenance. ▪ Erosion and sediment control measures will be implemented in accordance with *Ontario Provincial Standard Specifications for erosion and sediment control measures* (OPSS.PROV.804 and OPSS.MUNI.805). ▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. ▪ Mitigation identified in the Ministry of Transportation's *Maintenance Quality Standards* and *Maintenance Best Practices* for highway maintenance (Ministry of Transportation, 2003) will be implemented to minimize erosion and sedimentation during Operation and Maintenance. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Maintenance. ▪ A comprehensive list of mitigation measures that will be implemented during Operation and Maintenance is provided in *Vegetation Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026a) and *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).
BIRD-05	All bird Valued Components	**Surface water quantity—**alteration of surface water drainage patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.	Construction	▪ Ministry of the Environment, Conservation, and Parks ▪ Fisheries and Oceans Canada	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Detailed Design. ▪ A comprehensive list of mitigation measures to limit changes to surface water quantity during Detailed Design is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures to limit changes to surface water quantity during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. ▪ Follow *Ontario Provincial Standard Specification 411* and regularly inspect and maintain culverts and bridges. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. ▪ A comprehensive list of mitigation measures to limit changes to surface water quantity during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).
BIRD-06	All bird Valued Components	**Surface water quality—**changes in surface water quality from Project activities could adversely affect bird habitat availability and distribution	Construction	▪ Ministry of the Environment, Conservation, and Parks ▪ Fisheries and Oceans Canada	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Detailed Design. ▪ A comprehensive list of mitigation measures to limit changes to surface water quality during Detailed Design is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).	▪ Adhere to federal and provincial regulations and guidelines regarding collection and storage of explosives and solid waste, such as the federal *Explosives Act*. ▪ During the winter periods, sand will be used on the Community Access Road for de-icing instead of road salt. ▪ Herbicides will not be used during Construction. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures to limit changes to surface water quality during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).
			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. ▪ During the winter periods, sand will be used on the Community Access Road for de-icing instead of road salt. ▪ Herbicides will not be used during Operation and Maintenance. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. ▪ A comprehensive list of mitigation measures to limit changes to surface water quality during Operation and Maintenance is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b).
BIRD-07	All bird Valued Components	**Changes to Groundwater—** alteration of groundwater drainage and infiltration patterns, flows, and levels that can cause changes to soils and vegetation, which can affect bird habitat availability and distribution.	Construction	▪ Ministry of the Environment, Conservation and Parks	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Detailed Design. ▪ A comprehensive list of mitigation measures to limit changes to groundwater quantity during Detailed Design is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e).	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Construction. ▪ A comprehensive list of mitigation measures to limit changes to groundwater quantity during Construction is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e).

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations	
			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of Environment, Conservation and Parks, Fisheries and Oceans Canada, and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. ▪ A comprehensive list of mitigation measures to limit changes to groundwater quantity during Construction is provided in the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e).	
BIRD-09	All bird Valued Components	**Increase in public access—**could affect bird survival and reproduction through legal and illegal hunting.	Construction	▪ Ministry of Natural Resources ▪ Fisheries and Oceans Canada	▪ Use existing roads and other linear disturbances where possible.	▪ Restrict access to the effects assessment Construction Disturbance Area to construction personnel and prohibit firearms. ▪ Monitor central access corridors or have manned gate / security in place, during periods of high activity. ▪ Block winter roads and temporary access routes and trails that are no longer required. ▪ Install access controls (e.g., gates and boulders) to control public vehicle travel on some temporary access routes and trails.	
			Operation and Maintenance		▪ N/A	▪ Potential changes in hunter and angler pressure, and fish and bird harvest will continue to be managed by Environment and Climate Change Canada, Ministry of Natural Resources, and Fisheries and Oceans Canada through licensing requirements and by establishing rules in terms of season length, bag / catch limits, and catch-and-release rules for waterbodies near the Project. ▪ Local communities will be responsible for managing their resources by limiting fish catch to a sustainable level for each species.		
BIRD-010	All bird Valued Components	**Incidental take—**vegetation removal and soil alterations during site preparation for Construction and Maintenance activities, and infrastructure (e.g., camp buildings) decommissioning may result in destruction of nests, eggs, and individuals of birds.	Construction	▪ Environment and Climate Change Canada	▪ The migratory bird nesting season and timing of construction activities should be considered during Detailed Design. ▪ Micrositing the Project to avoid high quality habitats and sensitive areas, to the extent feasible. ▪ Avoiding high quality habitats and sensitive areas for migratory bird species at risk, to the extent feasible.	▪ Vegetation clearing activities will occur from August 15 to April 27, outside the breeding season for most bird species, where possible. ▪ If any vegetation clearing is required during the migratory bird nesting season (April 28 to August 14; Environment and Climate Change Canada, 2023c), non-intrusive pre-clearing nest surveys will occur within seven days prior to clearing. ▪ If any areas are found to have birds exhibiting breeding behaviour, these areas, including an activity disturbance buffer, will be flagged and protected from disturbance until the fledglings have left the nest. ▪ Prior to site clearing, wildlife sweeps will also be completed outside of the nesting season to look for and document pileated woodpecker nesting cavities and raptor stick nests. Wildlife sweeps will be focused on mature and old growth forest dominated by deciduous trees as these habitats are most likely to have large trees that can support raptor stick nests and pileated woodpecker nests. Wildlife sweeps will be completed within ten days prior to vegetation clearing. ▪ Raptor stick nests found during Construction will be marked and isolated as Environmentally Sensitive Sites and setbacks from construction activities and / or staged construction activities will be implemented. ▪ If pileated woodpecker nest cavities are found during wildlife sweeps, the nests will be	▪ Vegetation clearing activities will occur from August 15 to April 27, outside the breeding season for most bird species, where possible. ▪ If any vegetation clearing is required during the migratory bird nesting season (April 28 to August 14; Environment and Climate Change Canada, 2023c), non-intrusive pre-clearing nest surveys will occur within seven days prior to clearing. ▪ If any areas are found to have birds exhibiting breeding behaviour, these areas, including an activity disturbance buffer, will be flagged and protected from disturbance until the fledglings have left the nest. ▪ Prior to site clearing, wildlife sweeps will also be completed outside of the nesting season to look for and document pileated woodpecker nesting cavities and raptor stick nests. Wildlife sweeps will be focused on mature and old growth forest dominated by deciduous trees as these habitats are most likely to have large trees that can support raptor stick nests and pileated woodpecker nests. Wildlife sweeps will be completed within ten days prior to vegetation clearing. Raptor stick nests found during Construction will be marked and isolated as Environmentally Sensitive Sites and setbacks from construction activities and / or staged construction activities will be implemented. ▪ If pileated woodpecker nest cavities are found during wildlife sweeps, the nests will be registered in the Abandoned Nest Registry and

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
						registered in the Abandoned Nest Registry and monitored for a minimum of 36 months to determine if the nests are actively being used by migratory birds. Any trees with pileated woodpecker nests will not be removed until they are determined to be inactive for at least 36 months after discovery. monitored for a minimum of 36 months to determine if the nests are actively being used by migratory birds. Any trees with pileated woodpecker nests will not be removed until they are determined to be inactive for at least 36 months after discovery.
			Operation and Maintenance		▪ N/A	▪ The migratory bird nesting season and timing of activities should be considered during Maintenance. ▪ As per the Ministry of Transportation's *Environmental Protection for Migratory Birds (EP-4)* (Ministry of Transportation, 2003), bridges and culverts will be inspected for the presence of birds and / or nests prior to maintenance activities commencing. ▪ If an active nest is found on a culvert or bridge, a Migratory Bird (Damage) Permit must be obtained for the nest. Depending on the species and if there are no young birds in the nest, the nest may be removed under the Permit after it is obtained.
BIRD-11	All bird Valued Components	**Collision with vehicles and equipment—**collisions of birds with vehicles or heavy equipment may cause injury or mortality to individual birds.	Construction	▪ Royal Canadian Mounted Police ▪ Ministry of Transportation	▪ Incorporating standard safe road design configurations in the detailed Project design. ▪ Micrositing the Project to avoid high quality habitats and sensitive areas, to the extent feasible. ▪ Avoiding high quality habitats and sensitive areas for migratory bird species at risk, to the extent feasible.	▪ Providing wildlife awareness training for road construction workers to reduce vehicle speeds. ▪ Restricting access to the Project to construction personnel during Construction. ▪ Restricting construction traffic to designated areas. ▪ Blocking winter roads and temporary access routes and trails no longer required as construction proceeds.
			Operation and Maintenance		▪ N/A	▪ Posting and enforcement of an 80 km/hr speed limit during Project Operation and Maintenance. ▪ As per the Ministry of Transportation's *Brush Control Maintenance Quality Standard (MQS-324)* and *Grass Control Maintenance Quality Standard (MQS-326)*, mowing will be completed regularly to maintain vegetation at rest areas and within 185 m of road signs and other objects that need to be seen (e.g., guide rails) below two metres in height (Ministry of Transportation, 2003).
BIRD-12	All bird Valued Components	**Wildlife attractants—**attraction of wildlife to the Project can affect bird survival and reproduction through increased mortality risk and changes to predator-prey relationships.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ Prepare an environmental monitoring program that will include policies and actions for handling and storage of waste as well as management of materials and stockpiles.	▪ Implement the environmental monitoring program, including policies and actions for handling and storage of waste as well as management of materials and stockpiles. ▪ Keeping building and storage container doors closed. ▪ Tarping or fully wrapping structures that have nesting potential (e.g., camp buildings and shipping containers). It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality. ▪ Sealing cracks and holes where birds can enter structures. ▪ Place pallets and other small pieces of equipment low to the ground. ▪ Keeping heavy equipment free of mud, as mud can attract birds, particularly swallows, which use mud to build nests. ▪ Conducting frequent inspections of structures and equipment for evidence of birds, ideally every day during the nesting season, at dawn and dusk when birds are most active. ▪ The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting. ▪ Hanging brightly coloured strips of fabric over slope faces to deter birds. These must be well secured and weighted at the bottom. ▪ Placing geotextile, plastic covers, or tarping over slope faces or stockpiles to prevent access by birds. It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality. ▪ All work areas will be clear of any attractants such as food scraps and food containers. ▪ Food waste will be collected and temporarily stored in wildlife-proof containers. The containers will be transported off site for recycling or disposed at a licensed disposal facility.

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			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Operation and Maintenance. ▪ The slopes of material stockpiles will be maintained at 70 degrees or less to deter bank swallow nesting. ▪ Hanging brightly coloured strips of fabric over slope faces to deter birds. These must be well secured and weighted at the bottom. ▪ Placing geotextile, plastic covers, or tarping over slope faces or stockpiles to prevent access by birds. It is important to avoid using nets or other cover types that could entangle birds and cause potential injury or mortality. ▪ If material stockpiles or Project infrastructure that may support nesting migratory birds need to be disturbed during the nesting season (April 28 to August 14; Environment and Climate Change Canada, 2023c), non-intrusive pre-clearing nest surveys will occur within seven days prior to maintenance activities beginning. If any areas are found to have birds exhibiting breeding behaviour, these areas, including an activity disturbance buffer, will be flagged and protected from disturbance until the fledglings have left the nest. ▪ As per the Ministry of Transportation's *Debris Control Maintenance Quality Standard (MQS-331)*, debris less than one m in diameter, including roadkill, will be removed within 48 hours; debris greater than one m in diameter will be removed as detected (Ministry of Transportation, 2003). ▪ Generally, roadkill will be removed from the effects assessment Community Access Road and relocated to adjacent brush areas, as per the *Waste and Excess Materials Management Environmental Protection (EP-9)* requirements in the Ministry of Transportation's *Maintenance Manual* (Ministry of Transportation, 2003). As per the Waste and Excess Materials Management Environmental Protection requirements in the *Maintenance Manual*, depending on the location and weather at the time of roadkill removal, burial of small mammals occur in the roadside ditches, if this activity is permitted under a Certificate of Approval for Waste Management System (Ministry of Transportation, 2003). ▪ Rest areas will be available every 50 km along the road during Operation and Maintenance. The rest areas will be staggered every 25 km, alternating on each side of the highway. These rest areas will contain waste receptacles. As per the Ministry of Transportation's *Rest Area/Picnic Site Maintenance Best Practice (MBP-325)*, during the rest areas operating season (i.e., months during the year when temperatures remain above 0°C and closing no sooner than October 15), litter in waste receptacles will be removed from rest areas when waste receptacles are 75% full (Ministry of Transportation, 2003).
BIRD-13	All bird Valued Components	**Blasting and fly rock—**may result in injury or mortality to birds.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ Prepare an environmental monitoring program that will include policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife.	▪ Implement the environmental monitoring program during Construction, including policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife.
			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Maintenance. ▪ Implement the environmental monitoring plan during Maintenance, including policies and actions for avoiding and minimizing the risks of blasting and blasting materials to wildlife.
BIRD-14	All bird Valued Components	**Chemical or hazardous material stored on the Project site, or spills—**(e.g., petroleum products, ammonium nitrate) can affect bird survival and reproduction.	Construction	▪ Ontario Ministry of the Environment, Conservation, and Parks ▪ Ontario Ministry of Environment and Climate Change	▪ Prepare an environmental monitoring program that will include policies and actions for managing spills.	▪ Implement the environmental monitoring program, including include policies and actions for managing spills. ▪ Meet the Transportation of *Dangerous Goods Act*, Ontario *Dangerous Goods Transportation Act* and the Ontario *Environmental Protection Act* for the transport, storage, and handling of fuels required for Construction. ▪ A comprehensive list of mitigation measures to limit changes to surface water and groundwater quality from spills during Construction is provided in the *Surface Water Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026b) and the *Groundwater Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026e).

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			Operation and Maintenance		▪ N/A	▪ The mitigation measures established and refined using adaptive management during Project Construction should be maintained during Maintenance. ▪ Meet the *Transportation of Dangerous Goods Act*, Ontario *Dangerous Goods Transportation Act* and the Ontario *Environmental Protection Act* for the transport, storage, and handling of fuels required for Maintenance. ▪ Commercial vehicles who are transporting dangerous goods on the Community Access Road should be adhering to the federal *Transportation of Dangerous Goods Act* and Ontario's *Dangerous Goods Transportation Act*.
BIRD-15	Red-eyed vireo	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Detailed Design. ▪ Limit the Project footprint to the extent feasible. ▪ Use existing access roads where possible. ▪ A Preliminary Biodiversity Offset Plan has been developed to have no net loss of bird habitat.	▪ Where possible, decommission and rehabilitate temporary access roads, staging areas, camps, and debris and / or timber stockpiles following Construction. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.
			Operation and Maintenance		▪ N/A	▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. ▪ A Before-After Control-Impact study is proposed for operations monitoring. Data from operations monitoring will be compared to data from reference sites (i.e., sites not affected by disturbance) and data collected prior to construction (i.e., baseline survey [2018-2022] point count and autonomous recording unit data) to determine population trends and determine if predictions made in the Environmental Assessment are valid.
BIRD-16	Red-eyed vireo	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ The migratory bird nesting season and timing of construction activities should be considered during Detailed Design. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Detailed Design. ▪ Micrositing the Project to avoid high quality habitats and sensitive areas, to the extent feasible ▪ A Preliminary Biodiversity Offset Plan has been developed to have no net loss of bird habitat.	▪ Complete work as quickly as possible to shorten the duration of disturbance. ▪ The migratory bird nesting season and timing of activities should be considered during Construction. Clearing activities should occur from August 15 to April 27 (outside the migratory bird nesting season); if any clearing is required during the breeding bird season, non-intrusive pre-clearing nest surveys will occur within seven days of the clearing; buffers will be established around each nest, and clearing activities will be restricted near active bird nests or pileated woodpecker nest cavities. ▪ Follow guidance as outlined in Environment and Climate Change Canada's *Avoidance Guidelines for Migratory Birds*. ▪ Surveys will be conducted for ecologically sensitive sites prior to construction; marking, isolation and setbacks implemented if these sites are found. ▪ Control lighting required for construction of the Project, including direction (e.g., focused on work areas and away from undisturbed areas) and timing (e.g., minimize work at night) to minimize effects on birds, while meeting health and safety requirements. ▪ Wildlife awareness training will be provided for road construction workers to reduce vehicle speeds and associated noise and dust emission levels. ▪ Restricting construction traffic to designated areas; ▪ Industry best practices will be used for blasting activities, including scheduling outside of sensitive periods when in the vicinity of sensitive wildlife sites. ▪ Multi-passenger vehicles (e.g., buses) will be used to transport workers to site when practicable. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Construction.

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			Operation and Maintenance		▪ N/A	▪ During Maintenance, complete work as quickly as possible to shorten the duration of disturbance. ▪ The migratory bird nesting season and timing of activities should be considered during Maintenance. ▪ Posting and enforcement of an 80 km/hr speed limit to reduce vehicle speeds and associated noise and dust emission levels. ▪ Environmental approval conditions, permits, or authorizations issued for the Project, including those issued from Environment and Climate Change Canada, Ontario Ministry of the Environment, Conservation and Parks and Ontario Ministry of Natural Resources, will be followed during Operation and Maintenance. ▪ A Before-After Control-Impact study is proposed for Operation and Maintenance monitoring. Data from operations monitoring will be compared to data from reference sites (i.e., sites not affected by disturbance) and data collected prior to construction (i.e., baseline survey [2018-2022] point count and autonomous recording unit data) to determine population trends and determine if predictions made in the Environmental Assessment are valid.
BIRD-17	Ovenbird	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-18	Ovenbird	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-19	Ovenbird	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
BIRD-20	Dark-eyed junco	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-21	Dark-eyed junco	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-22	Osprey	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.

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BIRD-23	Osprey	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-24	Boreal owl	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-25	Wilson's snipe	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-26	Wilson's snipe	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-27	Mallard	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-28	Mallard	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird survival and reproduction by reducing individual's ability to detect approaching predators and species communications.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-29	Palm warbler	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-30	Palm warbler	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-31	Palm warbler	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.

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BIRD-32	Wilson's snipe	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-33	Wilson's snipe	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-34	Northern waterthrush	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-35	Northern waterthrush	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-36	Northern waterthrush	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
BIRD-37	Sora	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.
BIRD-38	Sora	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-39	Canada warbler	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ The Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible. ▪ See habitat loss mitigations presented for red-eyed vireo.	▪ See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo.

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BIRD-40	Canada warbler	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ The Project will be routed to avoid high quality habitats and sensitive areas for migratory bird species at risk to the extent feasible. ▪ See sensory disturbance mitigations presented for red-eyed vireo.	▪ See sensory disturbance mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo.
BIRD-41	Evening grosbeak	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-42	Evening grosbeak	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, use and connectivity (movement and behaviour), and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-43	Chimney swift, bank swallow, and barn swallow	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-44	Chimney swift, bank swallow, and barn swallow	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird survival and reproduction by reducing individual's ability to detect approaching predators and species communications.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-45	Common nighthawk and eastern whip-poor-will	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-46	Common nighthawk and eastern whip-poor-will	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.

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BIRD-47	Common nighthawk and eastern whip-poor-will	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
BIRD-48	Eastern wood-pewee	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-49	Eastern wood-pewee	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-50	Olive-sided flycatcher	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-51	Olive-sided flycatcher	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-52	Bald eagle	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-53	Bald eagle	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
BIRD-54	Short-eared owl	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-55	Short-eared owl	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-56	Short-eared owl	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Ministry of the Environment, Conservation, and Parks	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
BIRD-57	Lesser yellowlegs	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-58	Lesser yellowlegs	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada ▪ Ministry of the Environment, Conservation, and Parks	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-59	Rusty blackbird	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-60	Rusty blackbird	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
BIRD-61	Rusty blackbird	**Increase in edge habitat—**can change predator-prey dynamics and influence bird survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.
			Operation and Maintenance		▪ N/A	▪ Habitat loss may result in increased edge habitat. See habitat loss mitigations presented for red-eyed vireo.

ID	Valued Component	Environmental Concern and Potential Effect	Project Phase	Concerned Agencies	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Detailed Design	Mitigation, Protection, Monitoring, and Study Commitments to be Carried Forward to Construction / Operations
BIRD-62	Yellow rail	**Habitat loss—**the direct removal or alteration of soil and vegetation that may change habitat availability, use, and connectivity and influence bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See habitat loss mitigations presented for red-eyed vireo and Canada warbler.
BIRD-63	Yellow rail	**Sensory disturbance—**(e.g., lights, smells, noise, human activity) can alter bird habitat availability, distribution, and survival and reproduction.	Construction	▪ Environment and Climate Change Canada	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.
			Operation and Maintenance		▪ N/A	▪ See sensory disturbance mitigations presented for red-eyed vireo and Canada warbler.

N/A = not applicable; m = metre; °C = degree Celsius; % = percent.

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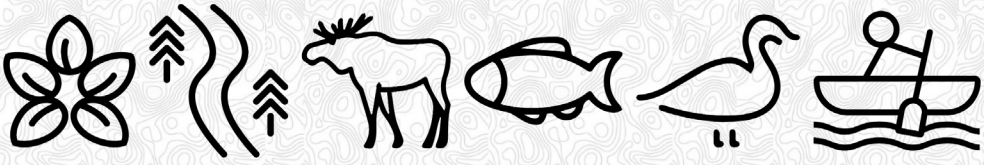
Attachment A – Draft and Final Study Plans and Regulator Comments

MARTEN FALLS FIRST NATION
ALL SEASON COMMUNITY ACCESS ROAD

FINAL

Birds Study Plan

May 2021



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Revision History

Rev #	Date	Revision Description
Draft	May 2020	Submitted “Study Plan – Wildlife DRAFT FOR DISCUSSION” to the Agency
Final	May 2021	Revised to address federal and provincial agency comments

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Appendices

Appendix A. Preliminary List of Data Sources
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Acronyms

Agency, the ... Impact Assessment Agency of Canada
ARU ..... Autonomous Recording Unit
CAR ..... Community Access Road
CWS ..... Canadian Wildlife Service
EA ..... Environmental Assessment
ECCC ..... Environment and Climate Change Canada
ELC ..... Ecological Land Classification
ENDM ..... Ontario Ministry of Energy, Northern Development and Mines
ESA ..... *Endangered Species Act*, 2007
FNLC ..... Far North Land Cover
GIS ..... Geographic Information Systems
GRTS ..... Generalized Random Tessellation Stratified
IA ..... Impact Assessment
IAA ..... *Impact Assessment Act*
IS ..... Impact Statement
km ..... kilometre
LSA ..... Local Study Area
MECP ..... Ontario Ministry of the Environment, Conservation and Parks
MFFN ..... Marten Falls First Nation
MNRF ..... Ontario Ministry of Natural Resources and Forestry
OBBA ..... Ontario Breeding Bird Atlas
PDA ..... Project Development Area
RSA ..... Regional Study Area
SAR ..... Species at Risk
SARA ..... *Species at Risk Act*, 2002
SARO ..... Species at Risk in Ontario
SOCC ..... Species of Conservation Concern
TISG ..... Tailored Impact Statement Guidelines
ToR ..... Terms of Reference
VC ..... Valued Component

1. Introduction

The Proponent of the Community Access Road (CAR or the Project) is Marten Falls First Nation (MFFN), a remote First Nation community in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres (km) from Thunder Bay, Ontario. The MFFN community is proposing an all-season Community Access Road that will connect the MFFN community to Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. MFFN, as the Proponent of the Project, has formed a MFFN CAR Project Team that includes MFFN CAR Community Member Advisors and MFFN CAR Project Consultants who act with input, guidance and direction from the MFFN Chief and Council.

This document outlines the Study Plan for Birds to support a coordinated Impact Assessment (IA) required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* (IAA) and Environmental Assessment (EA) required for Project review by the Ontario Ministry of the Environment, Conservation and Parks (MECP) under the Ontario *Environmental Assessment Act*.

1.1 Federal and Provincial Terminology

The study plans have been prepared using federal terminology, however, the respective provincial terminology has been provided in **Table 1-1** for reference. The terms can be used interchangeably.

Table 1-1: Equivalent Federal and Provincial Terms

Provincial Term	Federal Term
Criteria	Valued Component (VC)
Impact Management Measure	Mitigation Measure
Net Effects	Residual Effects
Record of Consultation	Record of Engagement

For the purposes of this Study Plan, Species at Risk (SAR) and Species of Conservation Concern (SOCC) are defined as the following:

- **SAR:**
  - Any species listed under Schedule 1 of the federal *Species at Risk Act*, S.C. 2002, c. 29 (SARA) as Threatened, Endangered, or Extirpated; and/or

- Any species listed under the provincial *Endangered Species Act, 2007*, S.O. 2007, c. 6 (ESA) as Threatened, Endangered, or Extirpated.

- **SOCC:**
  - Any species listed under Schedule 1 of SARA as Special Concern;
  - Any species designated Threatened, Endangered, or Extirpated by the Committee on the Status of Endangered Wildlife in Canada (unless otherwise listed as SAR under SARA or the ESA);
  - Any species listed under the ESA as Special Concern (unless otherwise listed as SAR under SARA); and/or
  - Any species with a subnational rank (SRank[1]) of S1 – S3[2] as designated by the Natural Heritage Information Centre [Ministry of Natural Resource and Forestry (MNRF 2019a)].

The *Provincial Policy Statement, 2020* (PPS) protects Significant Wildlife Habitat in Ontario. Significant Wildlife Habitat is defined in the *Natural Heritage Reference Manual* (Ontario Ministry of Natural Resources and Forestry [MNRF], 2010a) as the following:

- Habitats of seasonal concentrations of animals
  - areas where animals occur in relatively high densities for the species at specific periods in their life cycles and/or in particular seasons; and
  - seasonal concentration areas, which tend to be localized and relatively small in relation to the area of habitat used at other times of the year.
- Rare vegetation communities or specialized habitat for wildlife
  - rare vegetation communities include:
    - areas that contain a provincially rare vegetation community; and
    - areas that contain a vegetation community that is rare within the planning area.
  - specialized wildlife habitats include:
    - areas that support wildlife species that have highly specific habitat requirements;

---

1. *A Subnational rank or SRank is a conservation status of a species or plant community within Ontario considering factors such as abundance, distribution, population trends and threats.*
2. *S1 **Critically Imperiled** — Critically imperilled in Ontario. Species with S-ranks of S1 usually have 5 or fewer occurrences in the province or very few remaining individuals. Such species are often especially vulnerable to extirpation.*
   *S2 **Imperiled** — in Ontario. Such species usually have between 6-20 occurrences in the province or have many individuals in fewer occurrences. These species are often susceptible to extirpation.*
   *S3 **Vulnerable** — in Ontario. Such species usually have between 21-100 occurrences in the province. They may also have fewer occurrences but have a large number of individuals in some populations. These species may be susceptible to large-scale disturbances.*

  - areas with exceptionally high species diversity or community diversity; and
  - areas that provide habitat that greatly enhances species' survival.

- Habitat of SOCC
  - includes the habitat of species that are rare or substantially declining, or have a high percentage of their global population in Ontario;
  - includes Special Concern species identified under the ESA on the Species at Risk in Ontario (SARO) List (MECP 2020), which were formally referred to as "vulnerable" in the Significant Wildlife Habitat Technical Guide (MNRF 2000);
  - species identified as nationally Endangered or Threatened by COSEWIC, which are not protected in regulation under Ontario's ESA; and
  - excludes habitats of Endangered and Threatened species covered under PPS policy 2.1.3(a).
- Animal movement corridors
  - habitats that link two or more wildlife habitats that are critical to the maintenance of a population of a particular species or group of species; and
  - habitats with a key ecological function to enable wildlife to move, with minimum mortality, between areas of Significant Wildlife Habitat or core natural areas.

1.2 Project Study Plans

This Study Plan is one of a group of study plans created for the Project. **Table 1-2** includes the study plans for each environmental[3] discipline currently planned for the Project and the VCs covered by the study plans where applicable. The following factors were considered when selecting VCs:

- VC presence in the Study Area;
- the extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC;
- the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes;

3. *The use of the term environment in this document is inclusive of the components of the environment that are included in the Ontario Environmental Assessment Act definition, which includes a general description of the social, cultural, built and natural environments.*

- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies);
- the extent to which the VC is being addressed through any ongoing or completed regional assessment processes;
- the possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and/or monitored or would be better ascertained through the analysis of a proxy VC.

Table 1-2: Project Study Plans and Valued Components

Environmental Discipline	Study Plan Name	Valued Component(s)
Aboriginal and Treaty Rights and Interests	■ Aboriginal and Treaty Rights and Interests Study Plan	■ Indigenous Current Use of Lands and Resources for Traditional Purposes ■ Cultural Continuity (ability to practice and transmit cultural traditions)
Atmospheric Environment	■ Atmospheric Environment and Greenhouse Gases Study Plan	■ Air Quality ■ Greenhouse Gas Emissions
Climate Change	■ Climate Adaptation and Resiliency Study Plan	■ Climate Change
Acoustic and Vibration Environment	■ Acoustic and Vibration Environment Study Plan	■ Noise ■ Vibration
Physiography, Geology, Terrain and Soils	■ Physiography, Terrain and Soils Study Plan	■ Physiography, Terrain and Soils
Surface Water	■ Surface Water Study Plan	■ Surface Water
Groundwater and Geochemistry	■ Groundwater and Geochemistry Study Plan	■ Groundwater
Vegetation	■ Vegetation Study Plan	■ Wetland and Riparian Ecosystems ■ Upland Ecosystems ■ Designated Areas (Areas of Natural and Scientific Interest, Environmentally Significant Areas, Significant Woodlands, Critical Landform / Vegetation Associations) ■ Traditional Use Plants and SAR Plant Populations (including species with special conservation status or rarity in the province)
	■ Peatlands Study Plan	■ Peatland Ecosystems (bogs and fens)

Environmental Discipline	Study Plan Name	Valued Component(s)
Wildlife	■ Wildlife Study Plan	■ Bats (including SAR-bats such as: Little Brown Myotis [*Myotis lucifugus*], Northern Myotis [*Myotis septentrionalis*] and Tricolored Bat [*Perimyotis subflavus*]) ■ Fur Bearers (proxy VC[4] American Marten [*Martes americana*], Beaver [*Castor canadensis*] and Wolverine [*Gulo gulo*]) ■ Amphibians and Reptiles ■ Pollinating Insects
	■ Ungulates (Moose and Caribou) Study Plan	■ Moose (*Alces alces*) ■ Caribou, boreal population (*Rangifer tarandus*)
	■ Birds Study Plan	■ Forest Birds (proxy VC of Red-eyed Vireo [*Vireo olivaceus*] for deciduous forest, Ovenbird [*Seirus aurocapilla*] for mixedwood forest, Dark-eyed Junco [*Junco hyemalis*] for coniferous forest and disturbed forest ■ Raptors (proxy VC of Osprey [*Pandion haliaetus*] for diurnal raptors and Boreal Owl [*Aegolius funereus*] for nocturnal raptors ■ Shorebirds (proxy VC of Wilson's Snipe [*Gallingo delicata*]) ■ Waterfowl (proxy VC of Mallard [*Anas platyrhynchos*]) ■ Bog / Fen Birds and Other Wetland Birds (proxy VC of Palm Warbler [*Setophaga palmarum*] for bogs, Common Yellowthroat [*Geothlypis trichas*] for fens; and Northern Waterthrush [*Parkesia noveboracensis*] for swamps). ■ SAR birds: Canada Warbler (*Cardellina canadensis*), Chimney Swift (*Chaetura pelagica*), Common Nighthawk (*Chordeiles minor*), Eastern Whip-poor-will (*Antrostomus vociferous*), Eastern Wood-Pewee (*Contopus virens*), Evening Grosbeak (*Coccothraustes vespertinus*), Olive-sided Flycatcher (*Contopus cooperi*), Bald Eagle (*Haliaeetus leucocephalus)*, Peregrine Falcon (*Falco peregrinus*), Short-eared Owl (*Asio flammeus)*, Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Black Tern (*Childonias niger*), Rusty Blackbird (*Euphagus carolinus*), Yellow Rail (*Coturnicops noveboracensis*)
Fish and Fish Habitat	■ Fish and Fish Habitat Study Plan	■ Lake Sturgeon (*Acipenser fulvescens*) ■ Walleye (*Sander vitreus*) ■ Brook Trout (*Salvelinus fontinalis*) ■ Northern Pike (*Esox lucius*) ■ Lake Whitefish (*Coregonus clupeaformis*) ■ Chain Pickerel (*Esox niger*) ■ Yellow Perch (*Perca flavescens*) ■ Cisco (*Coregonus artedii*) ■ Burbot (*Lota lota*)

4. A proxy VC is used when looking at the effects of one species that represents many others.

Environmental Discipline	Study Plan Name	Valued Component(s)
		■ Longnose Sucker (*Catostomus catostomus*) ■ White Sucker (*Catostomus commersonii*) ■ Forage / Prey Species (including species such as Lake Chub [*Couesius plumbeus*]) ■ Lower Trophic Organisms (e.g., benthic invertebrates)
Social	■ Social Study Plan	■ Housing and Accommodation ■ Community Service and Infrastructure ■ Transportation ■ Community Well-being ■ Populations and Demographics
Economy	■ Economic Study Plan	■ Regional Economy ■ Labour Force and Employment ■ Government Finances
Land and Resource Use	■ Land and Resource Use Study Plan	■ Land Use Compatibility ■ Parks and Protected Areas ■ Extractive Industry ■ Forestry Industry ■ Energy and Linear Infrastructure ■ Recreation and Tourism
Human Health and Community Safety	■ Human Health and Community Safety Study Plan	■ Public Safety ■ Public Health ■ Diet ■ Environmental Factors Influencing Health
Visual Aesthetics	■ Visual Aesthetics Study Plan	■ Visual Contrast / Character ■ Visibility ■ Visual Sensitivity
Archaeological and Cultural Heritage	■ Cultural Heritage Study Plan	■ Archaeological Sites and Resources ■ Built Heritage Resources and Cultural Heritage Landscapes

It should be noted that while there is not a consultation study plan, the Project has developed the *Consultation and Engagement Plan to Support the Environmental Assessment / Impact Statement* (AECOM 2020a) (referred to as the Impact Statement [IS] / EA Consultation Plan).

2. Purpose and Objectives

The key objectives of conducting an IA / EA are to describe the existing environment, gather sufficient information to predict Project-related effects (positive and negative, direct and indirect) of the Project and alternatives on the environment, determine measures needed to avoid or minimize adverse Project effects, and enhance beneficial Project effects where feasible, and to undertake consultation and engagement throughout.

The purpose of this Study Plan is to explain:

- The geographic extent of Project areas for birds and specific species associated with the direct and indirect effects of the Project works;
- A baseline[5] study methodology that will result in a comprehensive description of the existing environment potentially impacted by the Project;
- How efficient and transparent data management and analysis will be undertaken;
- Effects assessment scoping inputs specific to birds that will allow for potential effects of the Project on the existing environment to be appropriately assessed in the IS / EA Report; and
- How the Study Plan aligns with federal and provincial requirements and guidance, including the Agency's Tailored Impact Statement Guidelines (TISG; the Agency 2020a), dated February 24, 2020, for this Project and applicable provincial agency comments on the Draft Terms of Reference (ToR)[6] (AECOM 2019).

As required by the IAA and referenced in TISG Section 7.3 (the Agency 2020a), work plans will also be developed for disciplines as required. It is anticipated the work plans will include further details on how to action the study plans; for example, they would contain such information as location of sampling sites, scheduling, and sequencing.

For the purposes of establishing appropriate context, the Study Plan begins with background and relevant information on:

- Study plan related discussions with the Agency, the MECP and applicable agencies to date (**Section 3**);

5. *Baseline refers to the current conditions of the environment potentially impacted by the Project. Baseline conditions serve as a reference against which changes due the Project are measured.*
6. *If necessary, the Study Plan will be updated to reflect the approved ToR if approval is obtained.*

- The approach to Project consultation and engagement (**Section 4**);
- How Indigenous Knowledge will be collected and used in the IA / EA (**Section 5**); and
- The spatial and temporal boundaries that will be used for the IA / EA (**Section 6**).

2.1 Approach to Handling Confidential Information

2.1.1 Indigenous Knowledge

Permission from the Indigenous community will be sought before including Indigenous Knowledge in the IS / EA Report, regardless of the source of the Indigenous Knowledge. Sensitive and / or confidential information will be specifically collected through the Indigenous Knowledge Program to inform the IS / EA Report, and its use and publication will be governed by Indigenous community-specific Indigenous Knowledge Sharing Agreements. Sensitive and / or confidential information collected through Indigenous Knowledge Sharing Agreements will be protected from public or third-party disclosure and will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information. Instances where Indigenous Knowledge sharing has taken place during consultation activities (e.g., meetings) will be recorded in the Record of Consultation and Engagement, including where Indigenous Knowledge was incorporated into Project decisions and into the IS / EA Report (i.e., specifics will not be included in the Record of Consultation and Engagement given the potential sensitivity and / or confidentiality of the information shared).

2.1.2 Species at Risk

Sensitive information related to SAR, such as those provided by the MECP or by the MNRF, will be presented in materials in accordance with the applicable Sensitive Data Licence Agreements applicable to this Project.

3. Study Plan Technical Discussions

To facilitate the development of satisfactory study plans and eventually a satisfactory IS / EA Report, MFFN previously submitted draft study plans in an effort to hold technical discussions with the Agency, the MECP and applicable agencies. A summary of technical discussions and correspondence held to date on this Study Plan has been provided in **Table 3-1** below.

Table 3-1: Study Plan Technical Discussions

Attendees / Responsible Party	Correspondence	Discussion Point(s)	Solution
■ **MFFN CAR Project Team** ■ **MECP** ■ **MNRF** ■ **Ontario Ministry of Energy, Northern Development and Mines (ENDM)** ■ **The Agency, Environment and Climate Change Canada (ECCC)**	■ Technical discussion to review the MECP comments on the Draft Wildlife Study Plan.	■ **11-September-2020:** A discussion to review comments and clarification questions received, including editorial comments, additional information requirements regarding the study plan, assessment and desktop analysis.	■ More details of the previous studies and existing information that were used to steer and inform this study plan have been included in the study plan and in **Appendix C.** ■ Following this meeting, it was decided that a new Study Plan would be developed to focus only on Birds (i.e., Birds were removed from the updated Wildlife Study Plan).
■ **MFFN CAR Project Team** ■ **MECP** ■ **ENDM** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **16-October-2020:** A discussion to review comments and hold a technical discussion pertaining to the breeding bird study design, modelling, and data collection logistics.	■ Follow-up meeting with ECCC arranged to discuss detailed conversations about modelling and simulations in a MFFN CAR Bird Technical (working group) discussion.
■ **MFFN CAR Project Team** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **04-December-2020:** MFFN CAR Bird Technical (working group) discussion. ECCC explanation of wanting to compare the bias and representativity of the existing breeding bird data compared to the TISG benchmark study design, how to use the existing data to see if more sampling is needed through modelling, and comparing study design options to fill the data gaps using simulations.	■ Provide a PowerPoint presentation for a follow-up meeting showing details of what was mentioned in the discussion points.
■ **MFFN CAR Project Team** ■ **The Agency** ■ **ECCC**	■ Technical discussion regarding bird study design and modelling techniques.	■ **2021-February-01**: A discussion about breeding bird study design bias and representativity described in the Power Point presentation.	■ Breeding bird study design bias and representativity summarized in **Section 7.2.1.1.2** and in more detail in **Appendix C**.

4. IS / EA Report Consultation and Engagement Process

4.1 Interested Persons and Government Agencies

The Proponent will provide Project notices and advise of opportunities for consultation and engagement with interested persons[7] which includes, at a minimum, members of the public outlined in the *Public Participation Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020b) (referred to as the Public Participation Plan). This will include the opportunity to provide input on the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures as applicable. A variety of activities will be offered so that members of the public are informed of the IS / EA Report as it progresses and are aware of the opportunities and means to provide their input. The study plans have recognized public and agency input received on the Project to date. Government agencies and interested persons will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process. The Project's approach to handling confidential and sensitive information is outlined in **Section 2.1**.

4.2 Indigenous Communities

The Proponent will provide Project notices and opportunities for consultation and engagement with Indigenous communities identified in **Table 4-1**, which is inclusive of all Indigenous communities identified in the *Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment* (the Agency 2020c) (referred to as the Indigenous Engagement and Partnership Plan).

Indigenous communities will be provided the opportunity to be involved at critical decision-making points throughout the IS / EA Report so that the Proponent can consider and incorporate, where appropriate Indigenous Knowledge and Indigenous land and resource use information into the Project as it pertains to the existing environment, VCs, effects assessment methods, effects assessment results, and mitigation and follow-up program measures. A variety of activities will be offered so that Indigenous communities are informed of the IS / EA Report as it progresses and are aware of the opportunities, means and timelines to

7. *Interested persons, as defined in the IS / EA Consultation Plan, are individuals and groups (e.g., associations, non-governmental organizations, industry and academia) who could have an interest in the Project, including but not limited to communities in the region, those with commercial interests (e.g., forestry, trappers, outfitters, other mineral tenure holders in the area) and recreational users or those with recreational interest (e.g., campers, hunters and environmental groups).*

provide their input. The study plans have recognized Indigenous community input received on the Project to date. Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process.

Table 4-1: Identified Neighbouring Indigenous Communities, including their Provincial Territorial Organizations and / or Tribal Council Affiliations

Tribal Council Affiliation	Indigenous Community or Organization
Matawa First Nations Management *(Nishnawbe Aski Nation)*	■ **Marten Falls First Nation** (Proponent and potentially affected Indigenous community) ■ Aroland First Nation ■ Constance Lake First Nation ■ Eabametoong First Nation ■ Ginoogaming First Nation ■ Neskantaga First Nation ■ Nibinamik First Nation ■ Webequie First Nation
Matawa First Nations Management and the Union of Ontario Indians / Nishnawbe Aski Nation	■ Long Lake #58 First Nation**
Mushkegowuk Council *(Nishnawbe Aski Nation)*	■ Attawapiskat First Nation ■ Fort Albany First Nation ■ Kashechewan First Nation
Shibogama First Nations Council *(Nishnawbe Aski Nation)*	■ Kasabonika Lake First Nation ■ Kingfisher Lake First Nation ■ Wapekeka First Nation ■ Wawakapewin First Nation ■ Wunnumin Lake First Nation
Independent First Nations Alliance *(Nishnawbe Aski Nation)*	■ Kitchenuhmaykoosib Inninuwug First Nation
Independent First Nations *(Nishnawbe Aski Nation)*	■ Mishkeegogamang First Nation ■ Weenusk First Nation
Nokiiwin Tribal Council	■ Animbiigoo Zaagi'igan Anishinaabek First Nation*
Métis Nation of Ontario	■ Métis Nation of Ontario; Region 2*
Independent Métis Nation	■ Red Sky Independent Métis Nation*

*Notes: * Indigenous communities or organizations identified by the MECP who should be consulted on the basis that they may be interested in the Community Access Road.*
*** The MECP indicated in a letter to MFFN that Long Lake #58 First Nation was moved from interest-based to rights-based.*

4.3 Consideration of Identity and Gender-Based Analysis Plus in Engagement

To fulfill requirements of the IAA, the Consultation and Engagement Program will consider a diverse range of perspectives from interested persons and interested Indigenous communities and their members identified in the Agency's Indigenous Engagement and Partnership Plan and the Public Participation Plan. This will include at a minimum providing ongoing opportunities for engagement to:

- **Neighbouring Indigenous communities, including relevant subpopulations:**
  - Women;
  - Youth; and
  - Elders.
- **Non-Indigenous communities including:**
  - Women;
  - Youth; and
  - Activity-based subgroups (e.g., recreationalists, snowmobilers, tourism establishment operators).

The Proponent will also consult and engage with other subpopulations identified by communities during consultation and engagement. The information from these activities and any additional identity groups identified by communities through consultation and engagement will be considered by applicable environmental disciplines for the purposes of data collection and considering disproportionate effects.

During consultation and engagement, these aforementioned groups will be consulted and engaged with on targeted input**.** Specialized knowledge will be gathered through other disciplines such as Social, Economic, Land and Resource Use and Aboriginal and Treaty Rights and Interests. The Socio-economic Data Collection Program is expected to include targeted interviews, focus groups, questionnaires and other niche tools to gather information from diverse populations to resolve gaps in socio-economic secondary data. These diverse populations include the aforementioned identity groups, which are also referenced in the IS / EA Consultation Plan, and those identified by communities during consultation and engagement. The importance of soliciting inputs and perspectives from diverse subgroups has also been factored into the Indigenous Knowledge Program and associated materials (see **Section 5**).

When feedback is received from interested persons and Indigenous communities, issues, comments and questions will be tracked, which is consistent with the process described in the IS / EA Consultation Plan. Specific to Gender-Based Analysis Plus objectives, this will include efforts to engage with diverse populations. It is expected this will include activities specific to subgroups and tabulation of consultation and engagement participation with respect to identity factors. This will provide summary statistics to demonstrate the diversity achieved in consultation and engagement.

5. Consideration of Indigenous Knowledge in the IS / EA Report

The following provides a general description of how Indigenous Knowledge will be considered in the IA / EA process. The extent to which Indigenous Knowledge is considered by each specific VC will vary depending on the nature of the VC, the potential for Project effects on the VC and whether Indigenous knowledge that relates to a VC is provided / obtained. As such, not all aspects of the general approach described below may apply to all VCs / study plans.

There are two concurrent and complementary avenues for Indigenous communities and groups to be engaged with and provide input on the Project: the Indigenous Knowledge Program and the Consultation and Engagement Program. Both programs serve to support the collection of Indigenous perspectives, values, and input on the Project, including Aboriginal and Treaty Rights and how they may be impacted by the Project, to be integrated throughout the IA / EA process. However, the Indigenous Knowledge Program specifically aims to solicit and incorporate information that is considered sensitive and may have confidentiality requirements, including Indigenous Knowledge and information on Indigenous land and resource use. Indigenous Knowledge Sharing Agreements will be established between the Proponent and Indigenous communities participating in the Indigenous Knowledge Program prior to the sharing and use of any sensitive information.

All Indigenous communities and groups identified by the MECP and the Agency through the Indigenous Engagement and Partnership Plan have the opportunity to participate in the Indigenous Knowledge Program. The Indigenous Knowledge Program provides interested Indigenous communities an opportunity to: share existing Indigenous Knowledge and information on Indigenous land and resource use and cultural values that may be relevant to the Project, and / or complete Project-specific studies to collect and share Indigenous Knowledge and information on Indigenous land and resource use and cultural values. The Indigenous Knowledge Program includes opportunities for Indigenous communities and groups to meet with the Proponent to discuss the program, ask questions, and share concerns and interests. In support of this, the Proponent has created an Indigenous Knowledge Program Guidance Document (the Guidance Document) that provides:

- An overview of the Indigenous Knowledge Program and information on how Indigenous Knowledge, Indigenous land and resource use and cultural values and practices can be collected and / or shared;

- Information on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values and practices may be used in the planning and design processes; and
- A suite of guidance materials that were developed based on the information requirements of both the federal and provincial assessment processes, including: question guides to support the collection of information on historical and current community context; Indigenous Knowledge that may be relevant to the various technical disciplines; information on Indigenous land and resource use, cultural values and practices and associated spatial data, and perspective on potential Project-related effects and associated mitigation and / or enhancement measures.

The Guidance Document will also support participating Indigenous communities in providing Project-specific information in a manner that facilitates meaningful incorporation into the IS / EA Report.

The IS / EA Consultation Plan outlines the process for obtaining information and feedback about the Project from Indigenous communities (i.e., the Consultation and Engagement Program). All Indigenous communities identified by the MECP and the Agency have the opportunity to participate in the Consultation and Engagement Program through community-specific meetings, Public Information Centres, web conferences, and other formats. All Indigenous communities identified by the MECP and the Agency will be provided information related to the Project and invited to participate at various points throughout the IA / EA process.

There are also opportunities for technical teams to engage with Indigenous communities to solicit perspectives and information relevant to the Project, including information related to collection of existing information and the development of the IS / EA Report. The Proponent also invites feedback and inputs throughout the Project via the Project website and ongoing communications with the Proponent.

The Indigenous Knowledge and Consultation and Engagement programs are designed to be complementary and provide multiple opportunities for communities to offer feedback and information, including perspectives on Aboriginal and Treaty Rights and interests and how these may be impacted by the proposed Project. Relevant information collected through both the Indigenous Knowledge and Consultation and Engagement programs, including potential effect pathways on Aboriginal and Treaty Rights and interests, will be shared with each of the relevant disciplines throughout the IA / EA to: guide and inform VCs; support characterization of the existing environment; identify the potential effects of the Project on VCs; help identify mitigation measures and potential monitoring programs; and ultimately guide Project planning. The nature of how the Indigenous Knowledge becomes integrated into the IS / EA Report will be dictated by the specific information provided by each Indigenous community and the parameters set out in the Indigenous Knowledge Sharing Agreements. A description of how Indigenous Knowledge was considered in the IA / EA and in each of the technical discipline areas will be included in the IS / EA Report.

It is also important to note that information collected through the various activities (e.g., field studies and programs, effects assessments) of each discipline area (e.g., wildlife, vegetation, cultural heritage) will be shared with the Indigenous Knowledge Program leads. This will support the establishment of the existing environment and the effects assessment for the Aboriginal and Treaty Rights and Interests environmental discipline, as well as the identification of potential mitigation measures and monitoring programs, given the interrelated nature of Indigenous peoples and other environmental disciplines.

The Proponent will strive to respectfully collaborate with Indigenous communities on how Indigenous Knowledge and information on Indigenous land and resource use and cultural values will become part of the IS / EA Report, and how potential effects to Aboriginal and Treaty Rights and interests will be assessed. It is expected that measures to support this may include but are not limited to: engaging Indigenous communities to solicit information on Indigenous Knowledge and Indigenous land and resource use and cultural values to inform baseline conditions, providing Indigenous communities with draft sections of the IS / EA Report to illustrate how Indigenous Knowledge and information on Indigenous land and resource use and cultural values has been integrated and to confirm it has been presented appropriately, and completing collaborative working sessions with Indigenous communities for the effects assessment on Aboriginal and Treaty Rights and Interests. Further information on how potential effects on Indigenous rights will be assessed is provided in the Aboriginal and Treaty Rights and Interests Study Plan.

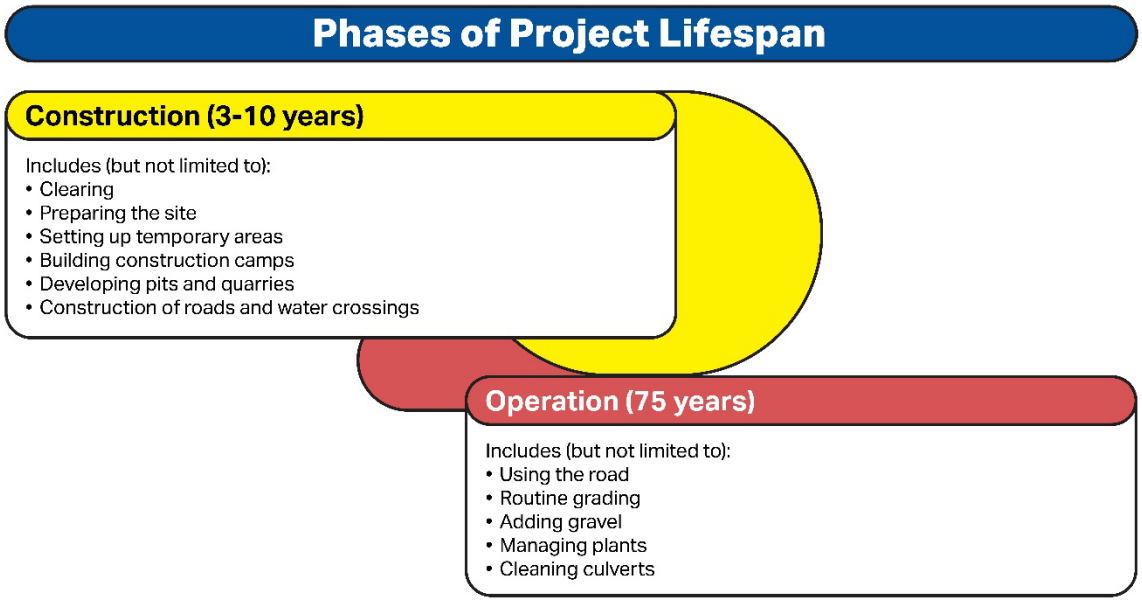
6. Assessment Boundaries

6.1 Temporal Boundaries: Project Phases

Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered in the IS / EA Report. The Project is planned to occur in two phases, which are briefly described below and shown in **Figure 6-1**.

- **Construction Phase:**
  The time from start of construction, including site preparation activities, to the start of operations and maintenance of the CAR. Decommissioning of construction works is included in the construction phase. The construction phase is anticipated to take approximately 3 to 10 years to complete
- **Operations and Maintenance Phase:**
  The operations and maintenance phase starts once construction activities are complete and lasts for the life of the Project. The operations and maintenance phase of the Project is considered to be 75 years based on the expected timeline for when major refurbishment of road components (e.g., bridges), is anticipated.

Figure 6-1: Project Schedule



There are currently no plans to decommission the CAR as there is no expected / known end date for its need. Therefore, future suspension, decommissioning and eventual abandonment of the CAR will not be considered in the IS / EA Report. It will be considered if and when a decommissioning or abandonment application is made for the road.

In determining the temporal boundaries, in particular the long operations and maintenance phase, consideration was given to the long-term effects on the well-being of present and future generations (Sustainability Principle #2[8]). The final temporal boundaries to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation process.

6.2 Spatial Boundaries: Study Areas

6.2.1 General Information

Study areas identify the geographic extents within which potential effects of the Project are likely to occur and will be considered in the IS / EA Report. The existing conditions and potential effects are documented for three study areas selected for the Project:

- **Project Development Area (PDA)**: area of direct disturbance;
- **Local Study Area (LSA)**: the area where most of the direct effects of the Project are likely to occur; and
- **Regional Study Area (RSA)**: the area where indirect effects of the Project are likely to occur.

The PDA encompasses the 100 metre (m) wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and pits, quarries and associated access roads. The preliminary LSA currently being considered within the scope of the ongoing provincial regulatory review process generally includes the area within 2.5 km of the centreline of Alternative 1 and Alternative 4. The preliminary study area generally allows for the documentation of existing conditions and prediction of potential environmental effects for the Project. A 5 km wide study area also allows for route refinements during development of Project design (e.g., adjustment of the alignment to avoid sensitive features).

8. *Sustainability Principles #2 is one of four sustainability principles included in Section 25 of the Project's TISG as further elaborated on Section 9.7.*

The specific location of Project components, including the roadway, quarries, pits and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted.

The study area for each environmental discipline may vary from the above-described general study area based on the potential for the Project to directly or indirectly affect each environmental discipline; therefore, discipline-specific LSAs and RSAs have been defined for the Project. In defining the final LSAs and RSAs, each environmental discipline will consider:

- Location and other characteristics of the environmental discipline relative to the Project;
- The anticipated extent of the potential Project effects;
- Federal, provincial, regional, and local government administrative boundaries;
- Indigenous groups listed in **Table 4-1**;
- Community knowledge and Indigenous Knowledge;
- Current or traditional land and resource use by Indigenous communities;
- Exercise of Aboriginal and Treaty Rights of Indigenous peoples, including cultural and spiritual practices; and
- Physical, ecological, technical, social, health, economic and cultural considerations.

The study areas included in this document are preliminary, covering the extent to which readily available information suggests the Project may have noticeable effects on the environment. The size, nature and location of past, present and reasonably foreseeable projects will be taken into consideration in the development of the cumulative effects assessment study area(s). The appropriate study area(s) to assess cumulative effects are dependent on the VCs predicted to have direct residual adverse effects as a result of the Project, and therefore, cannot be defined until the IS / EA Report has sufficiently advanced.

6.2.2 Bird Study Areas

For the Bird VC, spatial boundaries were defined using an ecosystem-centred approach for the LSA and RSA, as certain ecological features are more likely to be affected than others. The LSA was defined to consider the range of land cover types in its spatial extent, the spatial distribution of these land cover types,

and the rate of change in land cover composition with increasing distance from the PDA. This approach results in an LSA that allows for the documentation of existing conditions and prediction of potential environmental effects for the Project to the RSA.

LSA boundaries for the Bird VC were defined following the methods outlined in Section 7.4.1 of the TISG (the Agency 2020a). Land cover within the limits of the PDA was first calculated using the Ontario Far North Land Cover (FNLC; MNRF 2014a). Buffers were applied to the limits of the PDA in increments of 100 m, continuing to 15 km, and the percentage of each of the major land cover types within each increment was calculated. The rate of change between successive buffers was then calculated to determine the maximum calculated rate of change across all buffer increments. The first buffer increment was calculated using the percent difference between the PDA and that buffer increment (100 m). Once the maximum calculated rate of change for each land cover type was calculated, the LSA boundary was defined as the buffer width that was the maximum of:

- 500 m from the PDA boundary, or
- the buffer increment where
  - All major land cover types have a rate of change in land cover composition of less than or equal to 5% of the maximum rate of change, and
  - The increment is beyond (i.e., further away from the PDA) where the maximum rate of change is found.

Using the methods outlined above it was found that the LSA boundary should extend to 2.8 km from the limits of the PDA. We have rounded the LSA to 3 km on either side of centreline to capture the 100 m PDA. This LSA exceeds setback buffers of possible bird species in the Study Areas (Environment Canada 2009).

A similar approach was employed to define the boundary of the RSA using the calculated percent cover within the LSA (3 km) as a starting point. The result of this exercise suggested that the RSA boundary should extend 10.7 km from the limits of the PDA. As such we have included an RSA of 11 km from centreline.

This approach is intended to: lead to LSA boundaries that represent land covers found within the PDA; RSA boundaries that represent the land cover that comprises both the PDA and LSA (especially rarer habitats); represent the rapid land cover change that occurs along the edges of these features; and represent a portion of the broader landscape matrix (**Table 6-1**).

Table 6-1: Land Cover in the Study Areas

Study Area	PDA[a]		LSA[b]		RSA[c]	
Land Cover	**Area (ha)**	**% of Total Area**	**Area (ha)**	**% of Total Area**	**Area (ha)**	**% of Total Area**
Coniferous Treed	562.0	16.0	21,150.7	11.2	66,760.5	11.4
Coniferous / Thicket Swamp	1,021.3	29.1	51,019.3	26.4	157,263.0	26.8
Deciduous Treed	79.3	2.3	2,892.5	1.5	9,541.9	1.6
Disturbance – Non and Sparse Woody/2012 Fire	374.1	10.6	16,313.1	8.4	45,810.7	7.8
Disturbance – Treed and/or Shrub/Sparse Treed	340.5	9.7	14,136.0	7.3	34,663.4	5.9
Mixed Treed	188.3	5.4	7,387.6	3.8	22,767.1	3.9
Treed / Open Bog	351.9	10.0	34,159.5	17.8	108,446.0	18.5
Treed / Open Fen	549.0	15.6	35,251.0	18.3	107,498.7	18.3
Total	**3,466.4**	**98.7**	**182,309.7**	**94.7[b]**	**552,751.3**	**94.1[c]**

Notes: Land cover types include those that represent key habitats for Bird VCs, including SAR. The balance of cover types not included in the above table are as follows:

a. Bedrock accounts for 0.1%
Clear Open Water accounts for 1.4%
b. Freshwater, Marsh, Bedrock, Turbid Water and Community / Infrastructure account for less than 0.1%
Clear Open Water accounts for 5.3%
c. Freshwater, Marsh, Bedrock, Turbid Water and Community / Infrastructure account for less than 0.1%
Clear Open Water accounts for 5.9%
0.5% of the RSA is not covered by the FNLC dataset

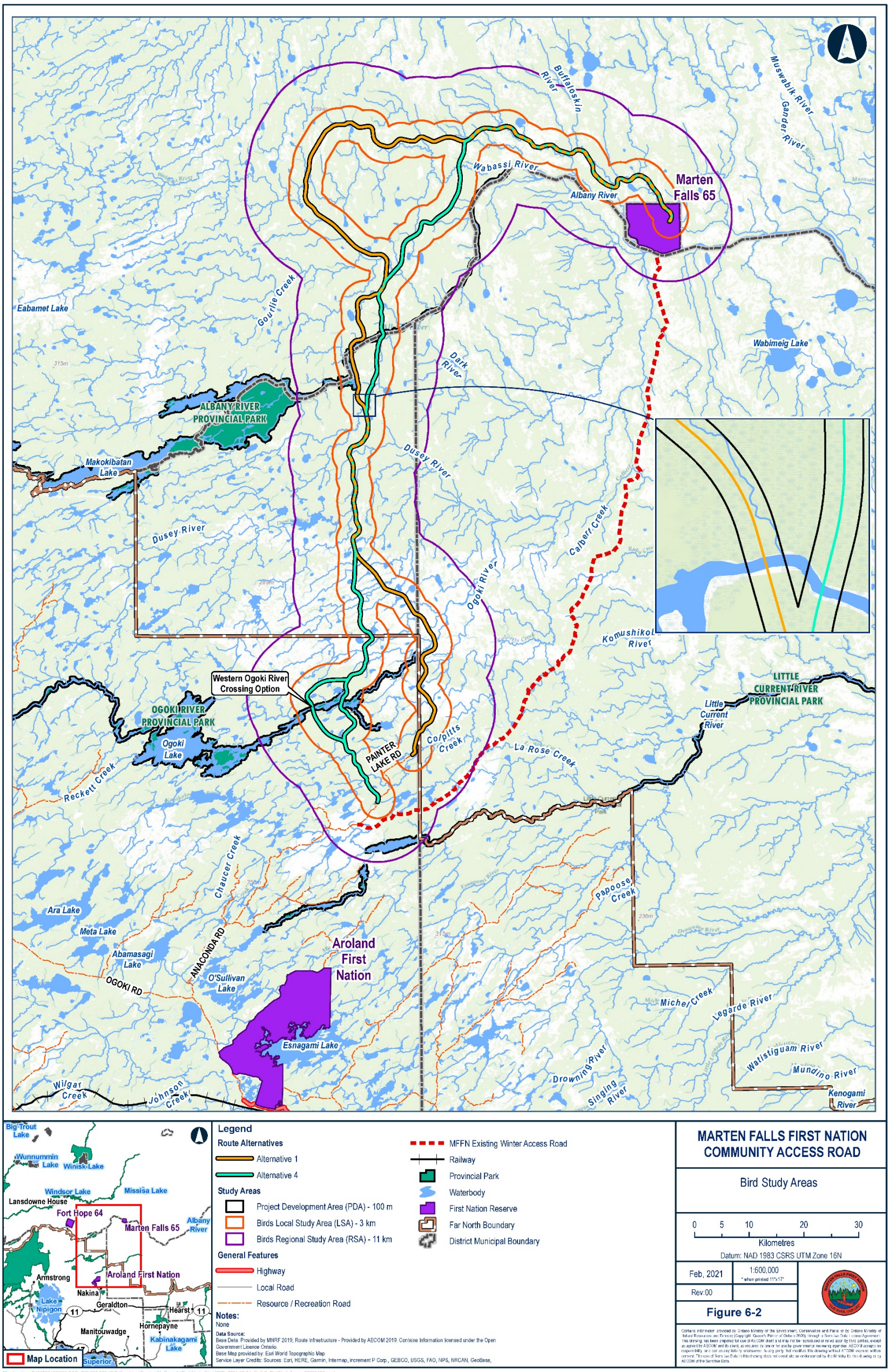
As further detailed in **Section 4**, the Proponent will continue to provide opportunities for neighbouring Indigenous communities and interested persons to provide input and inform the effects assessment, including the LSAs and RSAs.

The LSA and RSA boundaries for Birds are defined in **Table 6-2** and shown on **Figure 6-2**.

Table 6-2: Birds Study Areas

Study Area	Geographic Extent	Rationale
LSA	■ 3 km buffer from centreline for all Birds.	■ Area where direct effects of the Project are likely to occur. Considers the range of land cover types in its spatial extent, the spatial distribution of these land cover types, and the rate of change in land cover composition with increasing distance from the PDA.
RSA	■ 11 km buffer from centreline.	■ Using a boundary of 11 km will allow for assessment of indirect effects of the Project on the broader landscape, while remaining representative of the land cover types found within the Project Area.

Figure 6-2: Birds Local and Regional Study Areas



7. Baseline Study Design

7.1 Desktop Assessment

A desktop review of existing information sources for birds will be completed to identify information gaps that will need to be addressed through further study. A preliminary list of applicable information sources has been included in **Appendix A** and reflects federal and provincial guidance received to date. Data sources are relevant in spatial and temporal coverage to the Project and are suitable as baseline information for northern areas where there are no roads. This Study Plan focuses on the additional studies that are anticipated to be required to gather information beyond what is currently available through existing information sources, including those as described in Section 7.2 'Sources of baseline information' in the Agency's TISG for this Project (the Agency 2020a).

7.2 Study Methods

The following study methods have been designed to address elements of the TISG required for field investigations the Agency 2020a). This includes implementing best practices, incorporating Indigenous Knowledge and implementing survey protocols that may be identified for critical habitats under the Schedule of Studies as outlined in various SAR recovery strategies that exist for species protected under SARA (Environment Canada 2015a, b; Environment Canada 2016a, b; ECCC 2018), provincial recovery strategies (MECP 2019a, MECP 2019b, Ontario Peregrine Falcon Recovery Team 2010, Heagy *et al.* 2014), government response statements (MNRF 2010b, MNRF 2014b, MNRF 2017a, MNRF 2019b, MNRF 2019c), and General Habitat Descriptions (MNRF 2013a, MNRF 2015a, MNRF 2017b, MNRF 2018).

Table 7-1 lists the migratory and non-migratory Bird VCs based on the Section 8.9 of the TISG (the Agency 2020a), including a number of SAR listed under Schedule 1 of SARA and provincially listed SAR under the ESA.

For each Bird VC group, at least one representative species was selected as a proxy VC based on habitat association (multiple species if represented by several land covers), expected abundance or behaviour (i.e., diurnal or nocturnal). The SAR VC includes the key habitats associated with each proxy VC SAR species, and its critical habitat as applicable.

Table 7-1: Bird Valued Components

Bird VC	Proxy VC		COSEWIC Status	SARA Schedule 1 Status	ESA Status
	Common Name	Scientific Name			
Forest Birds	Red-eyed Vireo (deciduous forest)	*Vireo olivaceus*	-	-	-
	Ovenbird (mixedwood forest)	*Seiurus aurocapilla*	-	-	-
	Dark-eyed Junco (coniferous forest and disturbed [forestry or fire] forest)	*Junco hyemalis*	-	-	-
Raptors	Osprey (diurnal raptor)	*Pandion haliaetus*	-	-	-
	Boreal Owl (nocturnal raptor)	*Aegolius funereus*	Not at Risk	Not on Schedule 1	-
Bog / Fen Birds and Other Wetland Birds	Palm Warbler (bog)	*Setophaga palmarum*	-	-	-
	Common Yellowthroat (fen)	*Geothlypis trichas*	-	-	-
	Northern Waterthrush (swamp)	*Parkesia noveboracensis*	-	-	-
	Sora (marsh)	*Porzana carolina*	-	-	-
Waterfowl	Mallard	*Anas platyrhynchos*	-	-	-
Shorebirds	Wilson's Snipe	*Gallinago delicata*	-	-	-
Species at Risk (SAR)	Canada Warbler	*Cardellina canadensis*	Special Concern	Threatened	Special Concern
	Chimney Swift	*Chaetura pelagica*	Threatened	Threatened	Threatened
	Common Nighthawk	*Chordeiles minor*	Special Concern	Threatened	Special Concern
	Eastern Whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened	Threatened
	Eastern Wood-pewee	*Contopus virens*	Special Concern	Special Concern	Special Concern
	Evening Grosbeak	*Coccothraustes vespertinus*	Special Concern	Special Concern	Special Concern
	Olive-sided Flycatcher	*Contopus cooperi*	Special Concern	Threatened	Special Concern
	Bald Eagle	*Haliaeetus leucocephalus*	Not at Risk	Not on Schedule 1	Special Concern
	Peregrine Falcon	*Falco peregrinus*	Not at Risk	Special Concern	Special Concern
	Short-eared Owl	*Asio flammeus*	Special Concern	Special Concern	Special Concern
	Bank Swallow	*Riparia*	Threatened	Threatened	Threatened
	Barn Swallow	*Hirundo rustica*	Threatened	Threatened	Threatened
	Black Tern	*Chlidonias niger*	Not at Risk	Not on Schedule 1	Special Concern
	Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	Special Concern
	Yellow Rail	*Cotornicops noveboracensis*	Special Concern	Special Concern	Special Concern

Two fen specialists (i.e., LeConte's Sparrow – *Ammospiza leconteii* and Sedge Wren – *Cistothorus platensis*) were examined as proxy VCs for fen birds. Preliminary data indicates that there are insufficient observations of these fen specialists for future modelling. Although Common Yellowthroat is not a fen specialist, it is common in a variety of wet areas including fens (Guzy and Ritchison 1999) and had sufficient data for preliminary modelling (**Appendix C**).

7.2.1 Field Surveys

Bird indicator data will be collected using a combination of methods including point count surveys, autonomous recording units (ARUs), marsh bird call playback surveys, species-specific surveys, and aerial surveys. As a requirement of the TISG, the following sections describe survey methods to collect indicator data to account for temporal sources of variation including within a 24-hour daily cycle, within and among seasons (e.g., spring migration, breeding season, late summer / fall migration, and late winter), and among years (two years) (the Agency 2020a).

One year of bird indicator data has already been collected by point count surveys (2018-2019), ARU surveys of Eastern whip-poor-will (2019), marsh bird call playback surveys (2018), and aerial raptor nest surveys (2018) with sample sizes provided in the following subsections where appropriate. Results of these bird surveys will be provided in a separate baseline report.

Information described below is related to future field studies.

7.2.1.1 Breeding Bird Point Count

Breeding bird point count surveys will primarily target Bird VCs in the Forest Birds and Bog / Fen and Other Wetland Birds groups due to the abundance of forest, bog, fen and other wetland habitats in the LSA (94.7%). The objective of breeding bird point count surveys is to determine the presence, distribution, abundance, and density of breeding birds.

7.2.1.1.1 Study Design

The breeding bird point count study design was developed through discussions with ECCC / Canadian Wildlife Service (CWS), in particular Russ Weeber (Head, Terrestrial Assessment Unit, CWS). The study design takes into consideration limited site accessibility combined with a Project that is expected to impact less common geologic features (i.e., eskers) and associated land cover types in greater proportion to their availability. Oversampling of less common land cover types was planned due to the Project's expected bias towards these land cover types as shown in **Table 6-1**.

Breeding bird point count stations were selected using a Generalized Random Tessellation Stratified (GRTS) study design which allows for spatial coverage of the entire survey area (Stevens and Olsen 2004). GRTS incorporates stratification, unequal probabilities for habitat types, and oversampling. An advantage of GRTS is that survey stations can be added dynamically to sample if pre-selected survey stations are discovered to be non-target or inaccessible while maintaining a spatially well-balanced sample.

A GRTS survey design was established using the R Package ‘s survey’ (Kincaid and Olsen 2011). Samples were stratified by land cover categories of the FNLC data set (MNRF 2014a) as well as recently burned areas from the Fire Disturbance Area data set. Sample allocation was based on the proportions of each habitat type within the LSA. Land cover categories with similar characteristics were combined if a land cover type comprised less than 1% of the total LSA because allocation of sufficient samples in these rare land cover types was not feasible. Treed bog was combined with open bog, and treed fen was combined with open fen, following the rationale of ECCC that “treed” is a continuum, rather than a discrete characteristic of these wetlands (Zooetica 2018)

Land cover types (representing Bird VCs key habitats) were given unequal probabilities (i.e., weighted values) using three qualitative values based on their importance to breeding bird species in the region. ECCC recommended a general and defensible ranking of High, Medium and Low species richness for each habitat type. Deciduous and mixedwood forests were classified as high species richness; coniferous, second-growth / regenerating, and burned / disturbed forests were classified as medium species richness; and swamp, bog, and fen were classified as low species richness. These qualitative rankings were converted into values of 3 = high; 2 = medium; and 1 = low; for GRTS sampling.

In addition to FNLC categories, riparian habitats were distinguished amongst the FNLC spatial data because many bird species utilize the riparian areas of wooded habitats. Riparian habitat was designated by establishing a 100 m buffer surrounding each water body using the Ontario Hydro Network 1:100,000 watercourse and waterbody data sets (Ontario GeoHub 2021), within each “forest“ category of the FNLC spatial data. These riparian habits were given the same unequal probability as the associated non-riparian forest habitats. Samples were allocated in proportion to the total area of each forest habitat that was classified as riparian.

Three additional constraints were applied to the point count selection procedures: 1) minimum of 200 m between points to avoid double counting birds; 2) minimum of 100 m from existing human-made features (e.g., settlements, corridors) that may influence results; and 3) contiguous habitat within 100 m point count radius where possible to allow for analysis of bird-habitat relationships and habitat-dependent density calculations. GRTS was able to enforce the first criterion, but not the latter two. The TISG requirement for edge-associated species also needed to be considered (the Agency 2020a). However, randomized sampling of GRTS resulted in selection of some points near habitat edges; therefore, data collected at these sites can be included in the analysis of bird species and edge habitats.

Breeding bird point counts were conducted from June 5 to June 14, 2018 and June 28 to July 7, 2018 at 101 survey stations within the LSA (Zoetica 2018a). Breeding bird point counts were conducted at 70 survey stations from June 13 to June 17, 2019 to fill data gaps and minor realignments (Golder 2019). The

allocation of breeding bird survey stations within each land cover type (riparian habitats excluded in the table) are shown in **Table 7-2.** Due to safety concerns from helicopter pilots or limited time, 101 of the 171 survey stations were visited at least twice as per CWS (2008) guidelines for a total of 273 site visits. Breeding bird survey stations are spatially distributed across the full extent of the current LSA with the exception of a 20.7-km route option added in August 2020 (**Figure 7-1**).

Table 7-2: Breeding Bird Sampling in the LSA[9] (2018-2019)

Land Cover Type*	Area (hectares [ha])	% of Total Area	CWS Rank	No. Survey Stations Visited 1x	No. Survey Stations Visited 2x	Total Survey Stations	% of Total Survey Stations
Coniferous Treed	21,142.3	10.9	2	13	17	30	17.5
Coniferous / Thicket Swamp	50,938.8	26.4	1	15	15	30	17.5
Deciduous Treed	2,878.1	1.5	3	2	4	6	3.5
Disturbance - Non and Sparse Woody / 2012 Fire	16,288.3	8.4	2	9	15	24	14.0
Disturbance - Treed and/or Shrub / Sparse Treed	14,071.0	7.3	2	3	12	15	8.8
Mixed Treed	7,359.0	3.8	3	3	13*	16	9.4
Treed / Open Bog	34,149.0	17.7	1	12	12	24	14.0
Treed / Open Fen	35,095.0	18.2	1	13	13	26	15.2
Total	**182,309.7**	**94.7**	-	70	101	171	-

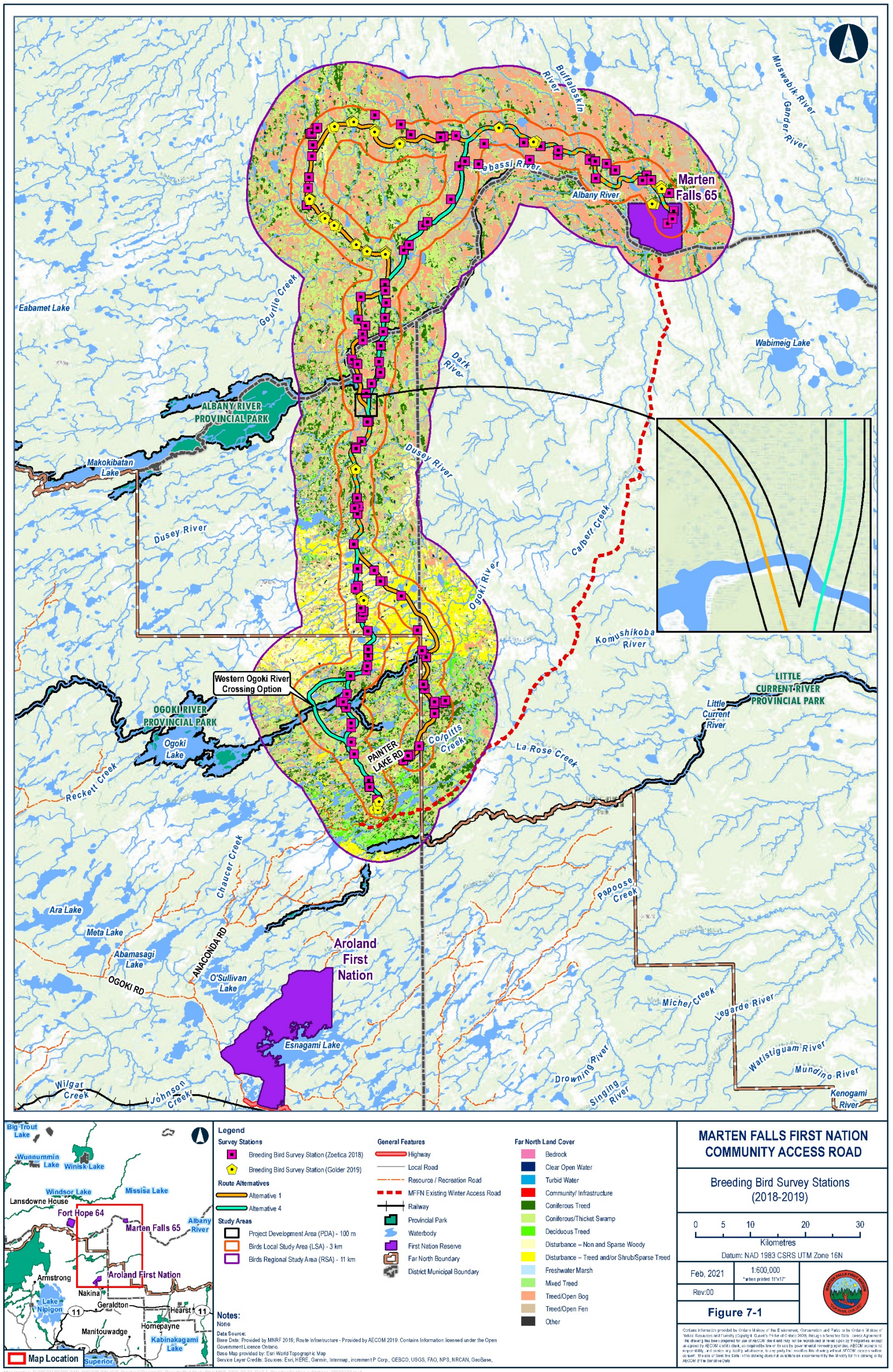
Notes: Land cover types include those that represent key habitats for Bird VCs, including SAR.
One survey station (in mixed tree land cover type) was visited three times.

7.2.1.1.2 Study Design Bias and Representativity

As per Section 8.9 of the TISG (the Agency 2020a), simulations were conducted using simple models with point count data (Zoetica 2018a, Golder, 2019) to determine the “optimal” breeding bird sample size to fill any data gaps while reducing variances and producing non-biased estimates representing all land cover types (**Appendix C**). Three options were tested for filling any data gaps: (1) using the existing GRTS study design for additional sampling (60% using existing survey stations and 40% new survey stations); (2) using a simple random study design for additional sampling; and (3) using the TISG benchmark study design for additional sampling (the Agency 2020a).

9. *Zooetica (2018) LSA 0.5 from centreline for breeding birds, 2 km from centre line for raptors; Golder (2019) LSA 2.5 km from centreline for breeding birds*

Figure 7-1: Breeding Birds Survey Stations (2018-2019)



The bird species models for the existing 273 site visits selected with the GRTS study design shows initial signs of decreasing variance (**Appendix C**). The mean and variance in the TISG benchmark study design is stable at a fairly low number of site visits (**Appendix C**). The variance in the other study design options stabilize by 573 site visits (**Appendix C**). This indicates that 300 additional site visits (two site visits at 150 survey stations) on top of the 273 site visits already completed (Zoetica 2018b, Golder 2019), is a reasonable "optimal" sample size that stabilizes the precision of model estimates and minimizes bias relative to the TISG benchmark study design. The GRTS study design is the preferable option for selecting additional survey stations based on the lower variance and mean bias by 573 site visits for SAR such as Canada Warbler and Olive-sided Flycatcher (**Appendix C**)

The GRTS study design was compared with the TISG benchmark study design for habitat and covariate representativity. As expected, the GRTS study design oversampled deciduous treed and mixed tree forest and undersampled coniferous / thicket swamp, treed / open bog and treed / open fen compared to the TISG benchmark study design (**Appendix C**). This is an acceptable level of representativity given that the TISG recommends oversampling land cover types associated with eskers (the Agency 2020a). Furthermore, covariate representativity was adequately achieved for 20 of 50 model simulations for the additional 150 survey stations selected using the GRTS study design.

GRTS will be used to select additional survey stations to fill data gaps and provide increased sampling of cover types that will be disproportionally affected by the Project (**Appendix C**). Following Section 8.9 of the TISG (the Agency 2020a), the GRTS study design will allocate 60% of surveys stations (90) to point count surveys and 40% of survey stations (60) to autonomous recording units (ARU). The allocation of survey stations between point counts and ARUs by land cover will be described in further detail in the Work Plan.

7.2.1.1.3 Survey Protocol

Breeding bird point count surveys will be conducted at each station, separated by a minimum distance of 200 m where possible, twice during the breeding bird season (June 1 through July 10 in the Northern Ontario Ecozone; June 1 through July 17 in Hudson Bay Lowlands Ecozone), and 10 days apart. Observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts.

Point counts will be modified from standard breeding bird programs such as the Forest Bird Monitoring Program Survey Instructions (CWS 2008) and the Atlas of the Breeding Birds of Ontario (Cadman *et al*. 2007). Point counts will begin as soon as possible after sunrise (because of safety issues with flying helicopters in low light conditions, manned pre-dawn surveys are not possible) and will end no later than 11:00 AM. Each visual and auditory observation will be recorded during a standardized 10-minute point count, recording each individual bird in the first minute interval which it was detected. Estimated distances

to each bird will be recorded as: 0 m to 50 m, 50 m to 100 m, and beyond 100 m. Birds flying over the station and/or greater than 100 m from the station centre will be categorized as incidental observations. Surveys will only be completed with little or no precipitation and when wind is calm or less than four on the Beaufort Scale.

Surveyors of breeding birds may be subject to biases in bird recognition and identification depending on skill level and hearing ability. To minimize bias, and as indicated previously, observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts. Furthermore, bias will be further minimized by recording bird vocalizations during point counts using a high-quality portable recording device (Zoom H2n digital handheld recorder or equivalent) mounted on a tripod. Observer and recorder data will be compared for surveyor bias as described in **Section 8**.

7.2.1.2 Autonomous Recording Unit (ARU)

ARUs will be deployed to collect avian data to complement breeding bird point count, marsh bird call playback, and species-specific surveys during the breeding bird season and will be the sole source of avian data collected during migration (spring and fall) and winter. ARUs will complement traditional point counts by providing more frequent data collection which will be valuable in detecting rare species.

The objective of the ARU surveys is to determine the presence, distribution, and abundance of birds in the Forest Bird, Raptors, and Bog / Fen and Other Wetland Birds VC groups by season and among years . Density will not be determined because ARUs are unlimited distance point counts which make it problematic to estimate density (Yip *et al.* 2017).

7.2.1.2.1 Study Design

ARU survey station selection for the breeding season will follow the study design described for point counts in **Section 7.2.1.1.1.** Based on Section 8.9 of the TISG (the Agency 2020a), ARUs will be deployed at approximately 40% of the proposed 150 breeding bird survey stations during the breeding season. To inform estimates of site use by birds among seasons, a subset of approximately 50% of the ARUs will be programmed to record data during spring migration, fall migration, and winter (the Agency 2020a).

During migration, ARU survey station selection will emphasize potential migration corridors along watercourses and ridges (including eskers). A subset of ARU survey stations during migration and all ARU survey stations during winter will be deployed in the land cover types described in **Section 7.2.1.1.1** to provide information about migration stopover or overwintering. ARUs will be spaced at least 800 m apart to avoid double counting based on the detection distances recorded for a suite of 24 bird species (Yip *et al.* 2017).

7.2.1.2.2 Survey Protocol

ARUs will be programmed during the breeding bird season from June 1 through July 10 (Northern Ontario Ecozone) or July 17 (Hudson Bay Lowlands Ecozone) to collect data every second day during two phases. Each phase is programmed to target bird species that vocalize during different times of the 24-hour daily cycle:

- Phase one will start at midnight with a schedule of 3-minutes ON and 12-minutes OFF until five hours after local sunrise.
- Phase two will start 30-minutes before local sunset with a schedule of three-minutes ON and 12-minutes OFF until midnight.

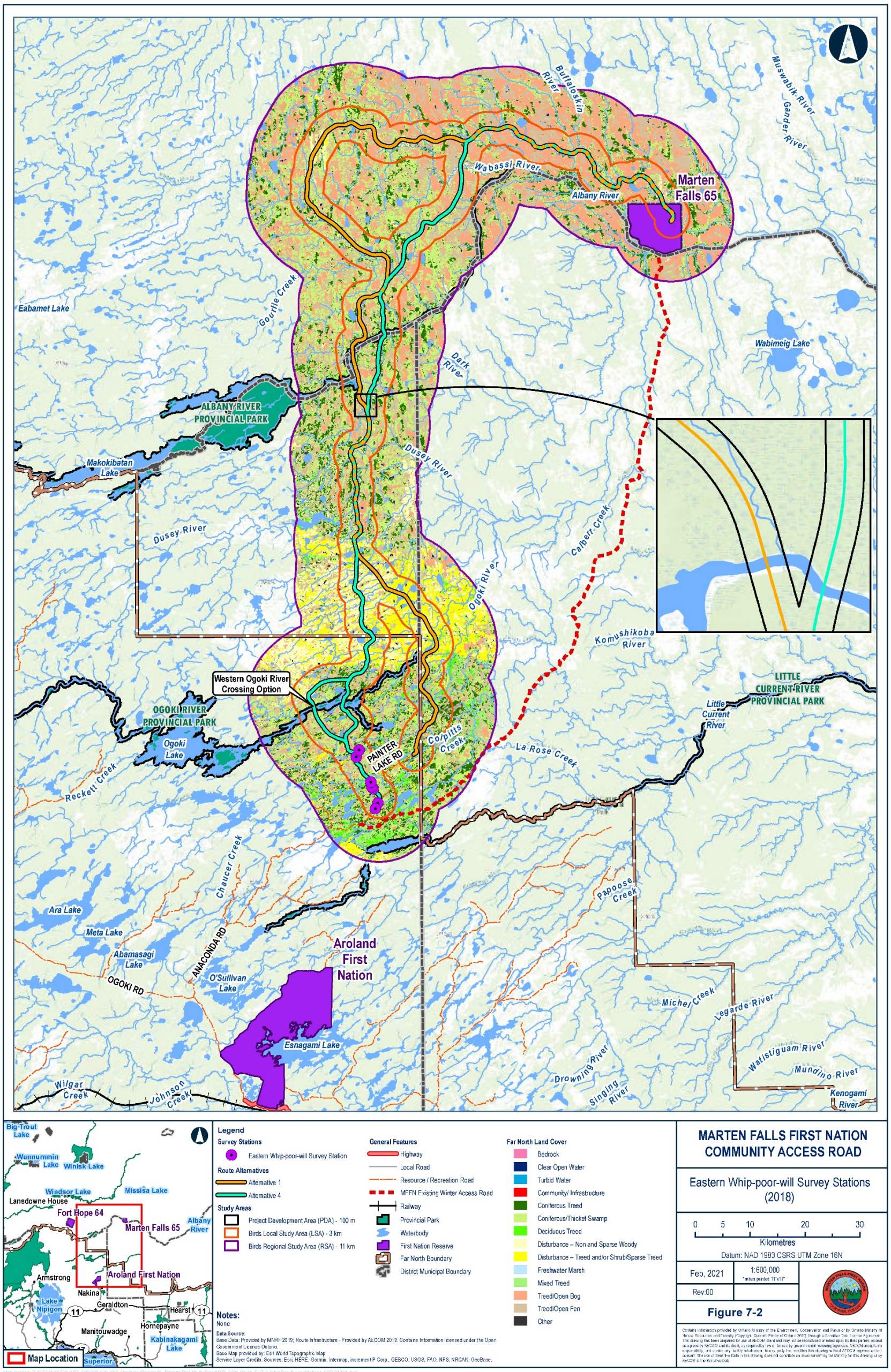
A three-minute data segment was selected instead of a standardized 10-minute point count (CWS 2008) because shorter data segments allow new species to be detected more rapidly for the equivalent sampling effort (Bayne *et al.* 2017). ARUs will be relocated to new locations during the middle of the breeding bird season to provide better spatial replication in the LSA (Bayne *et al.* 2017). ARUs will be set to record using a sampling rate of 44.1 kilohertz (kHz).

ARUs will be programmed to record data during Phase one through spring migration (April 15 to May 31; Ontario Breeding Bird Atlas [OBBA] 2020), fall migration (August 1 through September 30), and either early winter (December 1 to December 31) or late winter (March 1 to March 31). ARUs deployed for spring migration and the breeding season will also record data during Phase two because it overlaps the recommended period for standardized owl surveys (OBBA 2002). Avian vocalization is expected to be reduced during fall migration, but frequent sampling will provide evidence of species absence which suggests possible departure times. Winter sampling is limited due to ARU design limitations related to temperature extremes.

ARUs will be the sole source of data collection for bird SAR (Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail) requiring species-specific surveys at dusk or during the evening due to safety concerns. ARUs will be deployed in suitable habitat for each of these species as identified during the desktop review with the sample size per species to be provided in the work plan. Golder (2019) deployed eight ARUs targeting Eastern Whip-poor-will in suitable habitat within a 2.5 km buffer LSA (**Figure 7-2**). ARU deployment in future programs will target the same locations and will identify additional locations in the expanded 3.0 km buffer LSA based on a desktop review.

For bird SAR where ARUs are the sole source of data collection, survey windows and survey timing will be species-specific and located in suitable habitat as described in **Section 7.2.1.5.**

Figure 7-2: Eastern Whip-poor-will Survey Stations (2019)



7.2.1.2.3 ARU Data Collection

The sampling effort per ARU is described in **Table 7-3** for each season. The time of survey divides Phase one and Phase two of ARU programming into the Morning Period (1 hour before sunrise to 5 hours after sunrise), Dusk Period (30 minutes before sunset to 2 hours after sunset) and Night Period (midnight to 1 hour before sunrise). The sampling depth for several SAR most easily detected during the Dusk Period (Common Nighthawk, Eastern Whip-poor-will and Short-eared Owl) will be based on published detection probabilities. As a result, the Dusk and Night Periods have been combined to target owls (Raptor VC) from April 15 to July 17 which coincides with the peak period for targeted and non-targeted owl species (OBBA 2002).

Table 7-3: Sampling Effort Per ARU

Season	Survey Window	No. of Data Segments	Time of Survey	Bird VC
Spring Migration	■ April 15 – May 31*	30	■ Morning Period (15 segments); ■ Dusk and Night Period (15 segments)	■ Morning Period: All bird groups ■ Dusk and Night Period: nocturnal raptors (owls)
Breeding	■ June 1 – July 17	30	■ Morning Period (15 segments); ■ Dusk and Night Period (15 segments)	■ Morning Period: All bird groups ■ Dusk and Night Period: nocturnal raptors (owls)
Fall Migration	■ August 1 – September 30	27	■ Morning Period	■ All bird groups
Early Winter or Late Winter	■ December 1 – December 31 or March 1 – March 31	15	■ Morning Period	■ All bird groups

Source: OBBA 2020

The ARU data sampling effort will follow Section 8.9 of the TISG (the Agency 2020a) or be based on existing data if the sampling effort is greater. For instance, Zoetica's (2018a) species accumulation curve model determined that 15 data segments would detect most breeding bird species in the LSA and will be applied to the time of survey for spring migration, the breeding season, and winter.

Survey sampling effort for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be based on a binomial expansion (Correia 2015) of published detection probabilities that provide at least a 95% certainty of estimating their population sizes:

$$Cumulative\ probability\ of\ detection\ (\geq 95\%) = 1 - (1 - p)^k$$

Where: p = probability of detection
k = sampling replicates

ARU data for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be analyzed from species-specific time periods with the highest detection probability based on published literature. Detection of these species outside of specified time periods and during other analyses will be classified as incidental observations.

For Common Nighthawk, ARU data collection will be partially based on the *MNR Eastern Whip-poor-will (Caprimulgus vociferous) and Common Nighthawk (Chordeiles minor) Survey Protocol* (MNRF 2013b) which is designed for roadside surveys. ARU survey stations will be selected based on a desktop review of suitable Common Nighthawk habitat in open areas of the LSA with little or no ground vegetation such as logged or burned areas, forest clearings, rock barrens, peat bogs, and lakeshores (MECP 2019a). The number and location of survey stations will be provided at a later date. ARU data segments will be randomly selected from the last week of May to the first week of July. Data segments will be selected with no precipitation, calm or light winds (< 12 kilometres per hour [km/h]), and temperature above 10°C (MNRF 2014c). Common Nighthawk had a detection probability of 0.273 using ARUs during the period of sunset to one hour after sunset in Eastern Ontario (Vala *et al.* 2020). Binomial expansion applied to the detection probability of 0.273 indicates that analyzing ten data segments provides a 95.9% certainty of estimating the Common Nighthawk population size (**Table 7-4**).

Table 7-4: Sampling Effort Per ARU for Select SAR

Species	Survey Window	No. of Data Segments	Segment Length	Time of Survey
Common Nighthawk	May 23 – July 7	10	3-minutes	■ Sunset to one hour after sunset
Eastern Whip-poor Will	May 23 – July 7	8	3-minutes	■ Sunset to one hour after sunset
Short-eared Owl	May 15 – July 15	15	3-minutes	■ One hour before sunset to one hour after sunset
Yellow Rail	May 20 – July 5	3	1-minute	■ 2:00 AM

For Eastern Whip-poor-will, ARU data collection will be partially based on the *MNRF Draft Survey Protocol for Whip-poor-will (Caprimulgus vociferous) in Ontario* (MNRF 2014c) which is designed for roadside surveys. In 2019, Golder placed eight ARUs in suitable Eastern Whip-poor-will habitat in open woodlands or openings in mature deciduous, coniferous and mixedwood forest based on a desktop review of the LSA (MECP 2019b). Efforts will be made to randomly select data segments from the last week of May to the first week of July when the moon (greater than 50% illuminated) is above the horizon and the sky is clear or partly cloudy to maximize chances of detecting calling individuals (Cink *et al.* 2017). Data segments will be pre selected with no precipitation, calm or light winds (< 12 km/h), and temperature above 10°C (MNRF 2014c). Eastern Whip-poor-will had a detection probability of 0.332 using ARUs during the period of sunset to one hour after sunset in Eastern Ontario (Vala *et al*. 2020). As no protocol exists for using ARUs to detect Eastern Whip-poor-will, binomial expansion was applied to the detection probability of 0.332 which indicates

that analyzing eight data segments provides a 96.0% certainty of estimating the Eastern Whip-poor-will population size (**Table 7-4**). This is a conservatively high estimate of the number of data segments to be analyzed because Vala *et al.* (2020) only analyzed the first 5-minutes of a 10-minute segment. In 2019, three data segments per ARU were analyzed for Eastern Whip-poor-will and analysis of additional data segments is required to achieve greater than a 95% certainty of detection.

For Short-eared Owl, ARU data collection will be partially based on *Ontario Breeding Bird Atlas Standardized Owl Surveys* (2002) for the northern region, but without the use of call playback. ARUs will be placed in open areas in the LSA where Short-eared Owls are likely to vocalize or produce “wing-claps” during courtship displays over the nest territory (Holt 1992). The number and location of survey stations will be provided in the upcoming work plan. ARU data segments will be randomly selected from one hour before sunset to 30 minutes after sunset from May 15 to July 15 (10 weeks) with no precipitation and when winds are below 20 km/h. Information on detection probability is lacking for auditory surveys, but detection probability from visual surveys range from 0.300 to 0.400 (Calladine *et al.* 2008). Given that there is no information on the use of ARUs to detect this species, Zoetica’s (2018a) species accumulation curve model will be used to determine sampling effort. Approximately 15 data segments (three every two weeks) will be used to estimate the Short-eared Owl population. (**Table 7-4**).

For Yellow Rail, ARU data collection will be partially based on the Marsh Monitoring Program (BSC 2000). ARUs will be placed near suitable Yellow Rail habitat in the LSA including graminoid fens, the herbaceous vegetation of bogs, and floodplains of rivers and streams (COSEWIC 2001). The number and location of survey stations will be provided at a later date. ARU data segments will be randomly selected from the breeding season between May 20 and July 5. Data segments will have no precipitation and wind speeds below 20 km/h (as per BSC 2000). Unlike the Marsh Monitoring Program, a one-minute ARU data segment will be randomly selected at 2:00 AM where a detection probability of 0.630 for Yellow Rail was reported in Northern Alberta (Hedley *et al.* 2020). Binomial expansion applied to the detection probability of 0.630 indicates that analyzing three data segments provides a 95.2% certainty of estimating the Yellow Rail population size (**Table 7-4**).

Acoustic files collected by ARUs will be analyzed by skilled interpreters familiar with bird communities in the RSA. Acoustic files containing substantial environmental (wind, rain) or non-avian (e.g., frogs) noise will be excluded from the analysis.

7.2.1.3 Marsh Bird Call Playback Surveys

Marsh bird call playback surveys will target marsh birds in the Bog / Fen and Other Wetland Birds VC. The objective of marsh bird call playback surveys is to determine the presence, distribution, abundance, and density of breeding marsh birds.

Marsh habitats comprise less than 0.1% of the LSA. A total of 10 marsh bird call playback survey stations sampled by Zoetica (2018a) fall within the LSA (**Figure 7-3**). A desktop review and ground reconnaissance by Golder (2019) revealed no additional marsh habitat along within a 2.5 km buffer LSA. Marsh bird call playback surveys will be repeated at survey stations identified by Zoetica (2018a) to complete two years of data collection. Survey stations will be established at marshes identified through a desktop review in the 3 km buffer LSA for two years of data collection.

Surveys will be conducted twice during the breeding season between May 20 and July 5, no less than 10 days apart (BSC 2000). A 10-minute survey will be conducted at each identified station in accordance with the Marsh Monitoring Program (BSC 2000). Each survey includes a 5-minute sequence alternating between 30 seconds of broadcasted calls and 30 seconds of silence for each of the targeted species (Yellow Rail, Sora , Virginia Rail [*Rallus limicola*], American Bittern [*Botaurus lentiginosus*] and Pied-billed Grebe [*Podilymbus podiceps*]) to elicit calls from these typically elusive marsh bird species (BSC 2003). All birds of the targeted species detected within 100 m radius will be recorded for the survey. Flyovers and detections of targeted species greater than 100 m will be classified as incidental observations. Surveys will only be completed with little or no precipitation and during calm winds or wind less than four on the Beaufort Scale.

7.2.1.4 Species-specific Survey

Species-specific surveys will be conducted for breeding bird SAR. The objective of species-specific surveys is to determine the presence, distribution, abundance, and density of breeding bird SAR species.

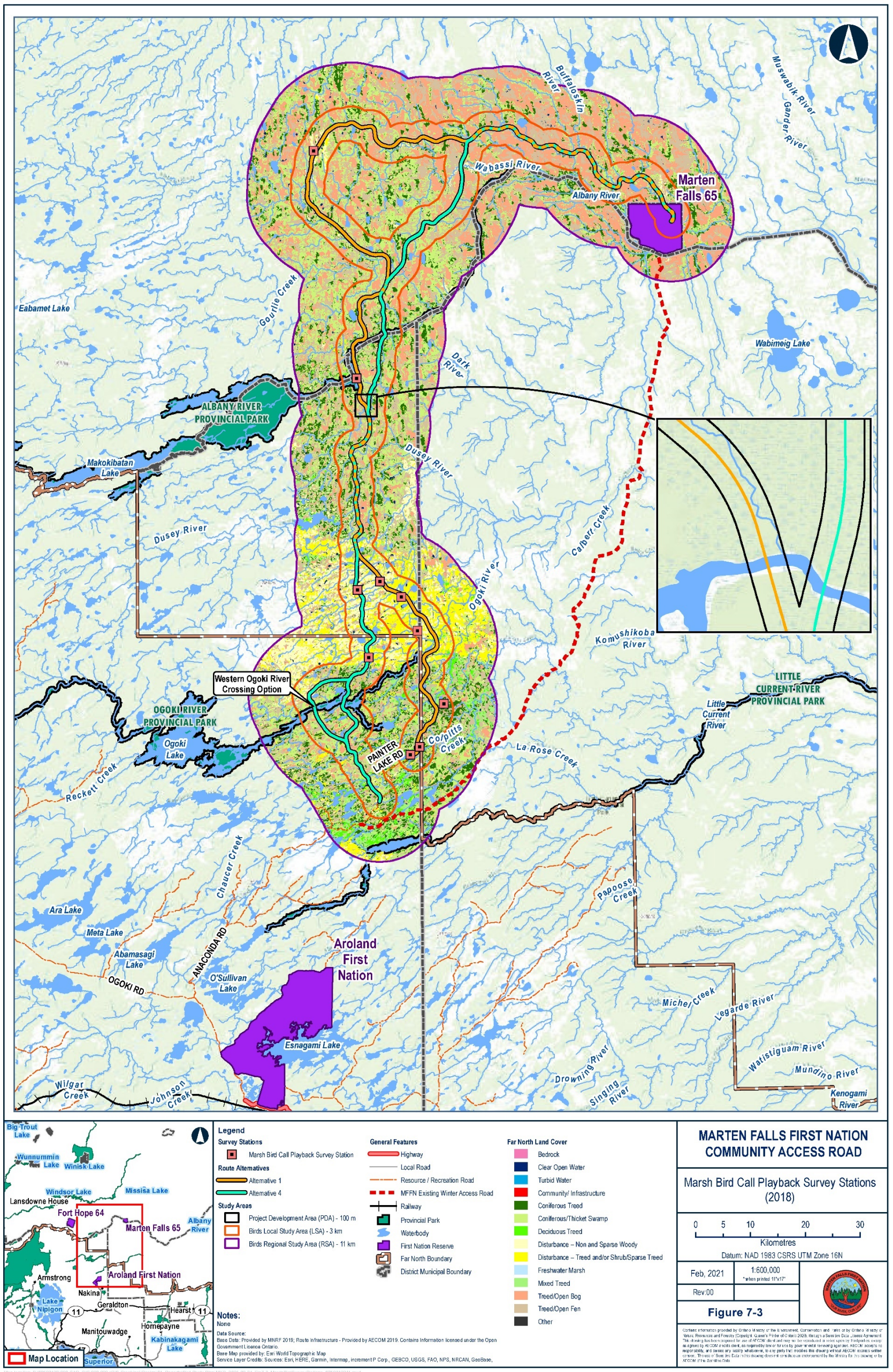
7.2.1.4.1 Desktop Review

Potential nesting habitat for Bank Swallow (i.e.., vertical riverbanks and bluffs), Barn Swallow (i.e. man-made structures), Chimney Swift (i.e.., hollow trees, tree cavities, caves) and Peregrine Falcon (i.e.., cliffs close to large bodies of water) will be identified through interpretation of aerial imagery where possible.

7.2.1.4.2 Field Surveys

Potential nesting habitat identified through desktop review as well as locations where Bank Swallow, Barn Swallow, Chimney Swift and Peregrine Falcon were will be searched for within the PDA and LSA in conjunction with vegetation and bat habitat identification surveys as described in the *VC-Vegetation Study Plan* and *VC-Wildlife Study Plan*. Golder (2019) identified no suitable nesting habitat for Barn Swallow or Bank Swallow within a 2.5-km buffer LSA based on a desktop review and aerial / ground reconnaissance. Future desktop review and aerial / ground reconnaissance in will expand the search area to the additional 20.7 km route option (including the 3 km buffer LSA).

Figure 7-3: Marsh Bird Call Playback Survey Stations (2018)



7.2.1.5 Aerial Surveys

Aerial surveys will be conducted to target the Waterfowl (spring stopover / staging, breeding pairs, broods, fall stopover / staging), Shorebirds (spring and fall stopover / staging), and Raptors (nesting) VC in the LSA (**Table 7-5**). The objective of this study is to estimate seasonal distribution (excluding Raptors), abundance and density among years for these Bird VCs.

Table 7-5: Sampling Effort for Aerial Bird Surveys

Season	Survey Window	No. of Surveys	Time of Survey	Bird VC		
				Raptors	Waterfowl	Shorebirds
Spring Migration	April 15 – May 31*	2	Anytime during the day	X	X	X
Breeding	June 1 – July 17	2	Anytime during the day	X	X	-
Fall Migration	August 1 – Sept. 30	2	Any time during the day	X	X	X

*Source: * OBBA 2020*

7.2.1.5.1 Desktop Review

A desktop review of aerial imagery will identify areas of suitable open habitats (e.g., wetlands and lakes) where waterfowl and shorebird may occur. Bald Eagle and Osprey may also nest in riparian habitat along the shoreline of wetlands and lakes. When surveying larger wetlands and lakes, the shoreline perimeter survey will be flown 100 m from the shore with parallel transects spaced 400 m apart across the basin. When surveying small and narrow basins, coverage is most efficient if the flight path is oriented parallel to the length of the basin. Unless basin orientation dictates otherwise, transects will be along an east-west axis to minimize glare from the sun for observers.

Aerial surveys will target raptors when moving among wetlands and lakes by following parallel transects in the LSA with the spacing between transects varying depending on tree density in forested habitat. Transect spacing may be as close as 400 m apart to allow for complete coverage of densely forested habitat, assuming a field of view of 200 m on either side of the aircraft. Transect spacing in treed fens may be as far as 1 km apart assuming a wide field of view of 500 m on either side of the aircraft due to low tree density.

7.2.1.5.2 Survey Protocol

Aerial surveys will be conducted in the LSA on two occasions during spring and fall to capture early to late migration of waterfowl and shorebirds and on two occasions during the breeding season for waterfowl and raptors (**Table 7-5**).

Potential stopover / staging areas will be examined by circling areas of suitable open habitats and counting the number of individual waterfowl and shorebirds, identified to lowest taxonomic level possible. Aerial surveys conducted during the breeding season will focus on identifying breeding pairs / broods and incubating adults of conspicuous waterfowl species (**Table 7-5**).

Zoetica (2018b) conducted aerial surveys to identify inactive stick nests during the late winter of 2018 with confirmation of nest activity during the spring and summer of 2018. All stick nests identified in 2018 and during planned spring migration aerial surveys will be verified during subsequent aerial and ground surveys to confirm breeding status. Raptor stick nests will be identified to species, where possible, based on nest and stick size if no raptors are found near the nest. The Universal Transverse Mercator (UTM) location of all waterfowl, shorebird, and raptors observations will be recorded to map their seasonal abundance and distribution by habitat type in the LSA.

Aerial surveys will be conducted using helicopters if possible, as they are generally preferable to fixed-wing aircraft given the lower flight speed and better outward visibility and thereby improved ability to detect birds (Ministry of Environment, Lands and Park Resources Inventory Branch 1999). Surveys will be consistent as possible with respect to altitude, time of day, flight speed, etc. and conducted during calm weather conditions (little to no precipitation and wind speeds less than four on the Beaufort Scale).

7.2.1.6 Habitat

Habitat data will be collected for breeding bird, marsh bird call playback, species-specific, ARU, and aerial surveys in order to develop models to predict the Project effects on Bird VCs as described in **Section 9.4**. Habitat within 100 m of the breeding bird, marsh bird call playback, species-specific survey, and ARU site centroids will be documented with photographs as described in Section 8.9 of the TISG (the Agency 2020a). Qualified individuals will review photographs to classify habitat by *Ecological Land Classification (ELC) Ecosite* (Banton *et al.* 2009) or *Canadian Wetland Classification Class* (National Wetlands Working Group 1997) as described under the *VC-Vegetation Study Plan* for modelling purposes. For aerial surveys, habitat data will be based on ELC ecosites or wetland classification modelled across the Study Areas. Fire history of survey sites will be determined using the MNRF FNLC database (MNRF 2014a) and Ontario's Provincial Satellite Derived Disturbance Mapping digital resource. Elevation of survey sites will be determined using Provincial Elevation Models (MNRF 2020a). Surficial geology of survey sites will be described using the KGS Group (2019) helicopter reconnaissance of surficial geology or other sources, where available.

For bird SAR where ARUs are the sole source of data collection for field safety concerns (Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail), standard ARU microphone arrays lack the ability to effectively triangulate location within habitat types. The territorial call of Eastern whip-poor-

will (Cink 2012 pers. comm.) and Common Nighthawk (Yip *et al.* 2019) can be heard from up to 500 m under good conditions, so the centre point of a breeding territory will be anywhere within 500 m of the survey station. For these two species, a desktop review of aerial imagery and/or aerial habitat reconnaissance will be conducted to characterize habitat. For Eastern whip-poor-will, this will follow *General Habitat Description of the Eastern Whip-poor-will (Caprimulgus vociferous)* (MNRF 2013a). For Short-eared Owl, the only reported distance for hearing a Short-eared Owl during a courtship display is at a minimum distance of 121 m for the “wing-clap” (Carson 1962). A desktop review and/or aerial habitat reconnaissance will be used to characterize the habitat within 620 m of this centre point based on 121 ha maximum reported territory size (Clark 1975). For Yellow Rail, a detection radius of 250 m will be used to identify the centre point of a breeding territory based on the detection distance used for Yellow Rail population modelling (Hedley *et al.* 2020). A desktop review and/or aerial habitat reconnaissance will be used to characterize the habitat within 250 m of this centre point based on a 19.8 ha maximum reported territory size (Robert 1996).

8. Data Management and Analysis

Data management including quality assurance / quality control (QA / QC) will be employed to minimize potential for data entry and analysis errors, prepare data sets for analysis and limit sensitive data distribution in accordance with established agreements.

Data collection in the field will be completed by field staff using a combination of electronic field forms and mapping software where possible. However, when digital data collection is not feasible, paper data sheets will be used as a back up. Data collected will be backed up daily and uploaded onto servers when the internet is accessible. Field data will be reviewed for quality control purposes before any analysis is conducted.

Differences in species detection are expected between point count and ARU data due to variable detection between landcover types, observers, weather, time of year, and species. Paired sampling data from breeding bird point counts and handheld recorders (a surrogate for ARUs) will be used to estimate statistical offsets for each species when there is sufficient data. These offsets will be used to calibrate count data by ARUs to correct for biases in ARU data relative to human observers following the methods of Van Wilgenburg *et al.* (2017) and Bombaci and Pejchar (2018).

Data from point count surveys, call playback surveys, ARUs, species-specific surveys, and aerial surveys will be summarized for 1) all birds, 2) each Bird VC, and 3) Bird Conservation Regional Priority Species (ECCC 2017) to show:

- frequency of occurrence and abundance (i.e., percentage of survey points) by season;
- abundance (i.e., breeding density in territories/ha except for ARU data) and percentage of observations in each habitat type; and
- distribution maps in the LSA showing areas of highest concentration.

Information on habitat requirements and key habitat areas for Bird VCs will be provided. Written descriptions and maps of ecozones, ecoregions, and ecodistricts will be provided as per Ontario's Ecological Land Classification, along with landscape features and sensitive or protected areas, and will be completed during desktop analysis and field habitat assessment.

8.1 Species at Risk

SAR data collected from desktop review, existing data and field studies will be used to describe the distribution and abundance of SAR within the PDA, LSA and RSA. Desktop studies will include published studies and recovery strategies that describe the regional importance of SAR. The most up to date recovery documents and species statuses will be consulted.

Mapping will be provided displaying the PDA and LSA for the Bird VCs in terms of their habitat. All SAR observations will be mapped within the PDA and LSA. Where critical habitat is noted to occur within the Study Areas, it will also be mapped. A summary of each SAR will provide distribution across survey sites at which they were detected and abundance in each habitat type where possible. A map showing the areas of highest concentrations or areas of use will be provided.

Baseline information will be used to evaluate impacts to SAR within the defined study areas through the effects assessment process. The effects assessment will describe how the general life history of SAR, including their critical habitat where defined, may be affected by the Project through potential direct, incidental, and cumulative adverse effects.

8.2 Geographic Information Systems (GIS)

Where baseline data are available in GIS format, this information will be provided to the Agency as electronic geospatial data files compliant with the Industrial Standards Organization (ISO) 19115 standard. This will support the Government of Canada's commitment to Open Science and Data and facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. In addition, all baseline data available in GIS format will also be provided to the MECP's Species at Risk Branch and MNRF's Natural Heritage Information Centre as complete data sets from all surveys.

Complete data sets from all survey sites will be provided. They will be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation / visit information and with observations and measurements in un-summarized form. Documentation and digital files will be provided for all results of analyses that allow for a clear understanding of the methods and a replication of the results.

9. Effects Assessment

The following sections provide discipline-specific input and considerations as they pertain to the methodology for effects assessment. The Project is in the early stage of the IS / EA Report preparation and it is expected that the effects assessment methodology will be refined iteratively based on regulatory agency guidance, professional judgment and input received through the Project consultation and engagement process.

9.1 Project-Environment Interactions

The Project activities that may result in changes to the environment are described within the identified temporal and spatial boundaries. This includes identification of both direct and indirect changes by comparing the existing setting to the conditions anticipated to occur as a result of the Project. For each environmental discipline, the likely Project-environment interactions will be identified based on professional judgment, activities listed in TISG Section 3.2 (the Agency 2020a) as well as projects of similar magnitude and / or location.

A preliminary analysis of Project-environment interactions for the Birds VC is provided in **Table 9-1** and will be confirmed during the IA / EA process to identify the Project-environment interactions that are likely to have a potential effect, and to identify measures to avoid or minimize potential negative effects and enhance benefits.

Table 9-1: Project – Environment Interactions

Project Phases	Project Activities	Birds
Construction Phase	*Mobilization of Equipment and Supplies*	X
	Temporary Construction Staging Areas[1]	X
	Temporary Access Roads and Trails[1]	X
	Temporary Construction Camps[1]	X
	ROW Clearing and Grubbing	X
	Brush and Timber Disposal	X
	Pits and Quarries[1]	X
	Drilling / Blasting / Aggregate Production	X
	Road Construction (stripping, subgrade excavation, embankment fill placement, grading, ditching)	X
	Bridge and Culvert Installation (approach embankments, foundations, substructures, superstructures, traffic protection, erosion controls)	X
	Construction Site Restoration	X
Construction Phase: Decommissioning	*Pits and Quarries*	X
	Temporary Camps, Roads / Trails and Staging Areas	X

Project Phases	Project Activities	Birds
Operations Phase	*Road Usage*	**X**
	Maintenance[2]	**X**

Notes: 1. Includes construction and use of
2. Includes General Maintenance (e.g., grading, erosion control, quarrying, pits), Seasonal Maintenance (e.g., snow clearing, bridge and culvert maintenance), and Special Maintenance (e.g., slope failures, road settlement / break-up.).

9.2 Valued Components and Indicators

VCs are the environmental, health, social, economic or additional elements or conditions of the natural and human environment that may be impacted by a proposed project and are of concern or value to the public, Indigenous peoples, federal authorities and interested parties (the Agency 2020b). Indicators represent the resource, feature, or issue related to the VC that, if changed, may demonstrate an effect on the environment. The indicators and rationale for selection and measurement of potential effects to be used to assess and evaluate the alternative routes in the IS / EA Report are provided in **Table 9-2**. The table includes both quantitative and qualitative indicators. The final list of VCs and indicators to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.

The Bird VCs have been determined by taking an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components within the ecosystem (i.e., areas of Indigenous cultural importance, descriptions of ecosystem health and integrity, the presence of protected areas and critical habitat for SAR species) through consideration of the following factors listed in the TISG[10] (the Agency 2020a):

- VC presence in the study area;
- the extent to which the VC is linked to the interests or exercise of Aboriginal and Treaty Rights of Indigenous peoples, and whether an Indigenous group has requested the VC;
- the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the VC;
- the extent to which the VC may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes;

10. The TISG also states that information from ongoing and completed regional assessments in the proposed area of the Project should be used to inform VCs for the Project. In February 2020 a regional assessment of the Ring of Fire region commenced; however, it is not sufficiently advanced at this time to inform the Project VCs. The VCs will be consulted and engaged on early in the IA/ EA process and finalized taking into consideration the input received. Therefore, only information relevant to the Project that arises from the regional assessment of the Ring of Fire within an appropriate timeline will inform the VCs for the Project.

- the extent to which the VC is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies);
- the possibility that adverse or positive effects on the VC would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and
- whether the potential effects of the Project on the VC can be measured and / or monitored or would be better ascertained through the analysis of a proxy VC.

Inputs received to date from Indigenous communities, agencies and interested persons through the Consultation and Engagement Program, including inputs received on the Draft ToR, have also been used to inform the selection of the VCs and indicators for the Bird Discipline.

Table 9-2: Bird Indicators

Valued Component	Indicators	Rationale for Selection
Forest Birds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Raptors	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Shorebirds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Waterfowl	■ Species presence ■ Relative abundance (spatially and temporally) ■ Survival and reproduction (population state) ■ Habitat availability and distribution (spatially and temporally) ■ Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.
Bog / fen Birds and Other Wetland Birds	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) Predator-prey dynamics	■ Cultural and social significance associated with this VC. ■ Functional role in the ecosystem and food web.

Valued Component	Indicators	Rationale for Selection
SAR Birds *Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood-Pewee, Evening Grosbeak, Olive-sided Flycatcher, Bald Eagle, Peregrine Falcon, Short-eared Owl, Bank Swallow, Barn Swallow, Black Tern, Rusty Blackbird, Yellow Rail*	■ Species presence ■ Relative abundance (spatially and temporally) ■ Habitat availability and distribution (spatially and temporally) including critical habitat (where known), where defined for SAR ■ Predator-prey dynamics	■ SAR (both federally under SARA and provincially under the ESA). ■ Cultural and social significance associated with these VCs. ■ Functional role in the ecosystem and food web.

9.3 Indirect Effects

A direct effect occurs through the direct interaction of an activity with an environmental discipline. The Project-environment interactions currently anticipated, based upon preliminary analysis, to result in direct effects to Birds have been identified in **Table 9-1**. The potential direct effects resulting from the Project-environment interactions will be confirmed during the IA / EA process and will be based on input received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement.

An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in groundwater could indirectly affect birds). **Table 9-3** provides a preliminary identification of how changes to Birds may result in indirect effects to other environmental disciplines.

Table 9-3: Potential Discipline Interactions

Discipline and Associated Valued Components	Aboriginal Treaty Rights and Interests	Atmospheric Environment	Acoustic Environment	Physiography, Geology, Terrain and Soils	Surface Water	Groundwater	Vegetation	Wildlife (Birds)	Fish and Fish Habitat	Social	Economy	Land and Resource Use	Human Health and Community Safety	Visual Aesthetics	Archaeological and Cultural Heritage
Birds ■ **Forest Birds** ■ **Raptors** ■ **Shorebirds** ■ **Waterfowl** ■ **Bog / Fen Birds and Other Wetland Birds** ■ **SAR Birds:** *Canada Warbler, Chimney Swift, Common Nighthawk, Eastern Whip-poor-will, Eastern Wood Pewee, Evening Grosbeak, Olive-sided Flycatcher, Bald Eagle, Peregrine Falcon, Short-eared Owl, Bank Swallow, Barn Swallow, Black Tern, Rusty Blackbird, Yellow Rail*	X	X	X	X	X	X	X		X	X	X	X	X	-	-

Notes: X = Potential pathway for indirect effect as a result of the Project.
- = No pathway for indirect effect is anticipated as a result of the Project.

9.4 Methods for Predicting Future Conditions

With respect to quantitative models and predictions, the IS / EA Report must detail the model assumptions, parameters, the quality of the data and the degree of certainty of the predictions obtained.

A variety of modelling approaches suggested in Section 8.9 of the TISG (the Agency 2020a) were explored to explain the spatial and temporal patterns for each Bird VC as a function of environmental variables to predict future conditions. These include Boosted Regression Trees, Generalized Additive Models (GAM), and Generalized Linear Models (Elith *et al*. 2008). Preliminary modelling using Generalized Linear Models are described in **Appendix C.** The following section explains the general approach to modelling.

9.4.1 Bird Habitat Model Development

Bird habitat models will be developed for proxy VCs in the Forest Birds, Raptors, Bog / Fen and Other Wetland Birds, Waterfowl, and Shorebirds VCs including SAR (**Table 7-1**) when there are sufficient survey data. Ontario's Provincial Satellite Derived Disturbance Mapping digital resource will be utilized to describe fire disturbed land cover for potentially affected habitats of the Forest Birds VC and Bog / Fen Birds and Other Wetland Birds VC.

Bird habitat models will be developed by first providing an account summarizing known preferences for biotic and abiotic variables for each bird species selected. Models will be developed to evaluate how these biotic and abiotic predictor variables best explain the spatial and temporal patterns of presence / absence, abundance, density and/or distribution of each species (**Table 9-4**). All model assumptions, predictor variables, data quality, and the degree of certainty of the predictions will be described. Bird habitat model predictions in the RSA will be compared with maps, data, and model predictions developed through the Boreal Avian Modelling Project (University of Alberta 2020), where possible.

Table 9-4: Model Variables

Dependent Variables	Independent Variables	
	Biotic	Abiotic
Presence / Absence, Abundance, Density, Distribution	■ Ecozone – Northern Ontario – Hudson Bay Lowlands ■ Land Cover – coniferous treed – coniferous / thicket swamp	■ Surficial Geology – organic deposits - in fen wetlands – organic deposit – in bog wetlands – fluvial deposits (recent) – fluvial deposits (abandoned) – marine beach and nearshore deposits

Dependent Variables	Independent Variables	
	Biotic	**Abiotic**
	– deciduous treed – disturbance – non and sparse woody – disturbance – treed and / or shrub / sparse treed – mixed treed – treed and open bog – treed and open fen ■ ELC ecosites (see Banton *et al*. 2009) ■ Wetland Class – bog (basin, blanket, collapse scar, domed, flat, lowland polygon, mound, palsa, peat mound, peat plateau, plateau, polygonal peat plateau, riparian, slope, string, veneer) – fen (basin, channel, collapse, scar, feather, horizontal, lowland polygon, palsa, riparian, slope, spring, string) – marsh (basin, hummock, lacustrine, riparian, slope, spring – swamp (discharge, flat, mineral-rise, raised peatland, riparian, slope) – shallow water (basin, lacustrine, riparian) ■ Habitat arrangement and connectivity – core area – shape – proximity / isolation – contrast – contagion / interspersion	– glaciolacustrine beach and nearshore deposits – glaciolacustrine basin deposits – glaciofluvial ice-contact deposits – till: massive to bedded diamicton, clayey silt to… – till: massive to bedded diamicton: sandy silt to… – till: massive to bedded diamicton, silty sandy to… – thin sediment over bedrock – bedrock ■ Provincial Digital Elevation Model (m) – local – aspect – surface roughness ■ Disturbance Type and Year (1985-2010) ■ Climatic variability – temperature (ºC) – cloud cover (%) – wind velocity (Beaufort scale) – thawing degree-days (for aerial tracking surveys) ■ Time – year – season (dummy variable: breeding season or non-breeding season – survey date – survey time ■ Other Effects – Observer ■ Location (UTM easting and northing)

9.4.1.1 Bird Species Accounts

For each bird species model, a summary will be provided of its geographic distribution, life requisites, and seasonal habitat requirements. This information will be summarized following a literature review of the species biology, including information on preferred biological and physical habitat features. Important habitat features may include certain preferred biotic variables, such as vegetation types that may provide forage and shelter and / or abiotic variables such as climatic conditions, surficial geology, elevation limitations, slope, or aspect preferences. Published studies that describe the regional importance, abundance and distribution of SAR, including critical habitat descriptions, recovery strategies and plans will also be used as available and referenced in the IA / EA.

9.4.1.2 Predictor Variables

Biotic variables for bird species models will be examined at larger spatial scales by ecozone, land cover, distance to stream, above ground biomass, dynamic habitat index, and habitat arrangement and connectivity **(Table 9-4**). Ecozones are included in models to explore differences in presence / absence, abundance and distribution between the Northern Ontario Ecozone and the Hudson Bay Lowlands. Land cover will describe bird habitat based on the MNRF FNLC database (MNRF 2014a) modified to describe fire disturbed habitats using Ontario's Provincial Satellite Derived Disturbance Mapping digital resource. Another indirect biotic variable is year of disturbance, as detected from changes in satellite datasets (CCFM 2020). Distance to stream has been found to be an important predictor for Canada Warbler presence and will be included as a general predictor variable (Ball *et al*. 2016). Aboveground biomass and dynamic habitat index using the Normalized Difference Vegetation Index (NDVI) will be explored for species-specific bird models (CCFM 2020). To examine the influence of habitat arrangement and connectivity in bird models, GIS measurements of landscape pattern metrics of fragmentation may include core area, shape, proximity / isolation, contrast, and contagion/interspersion (Wang *et al*. 2014).

Biotic variables for bird models will be examined at finer spatial scales by ELC ecosites or wetland class as described in the Vegetation Study Plan (**Table 9-4**). Vegetation characteristics of the ELC ecosites describe forest structural stage and canopy closure. Structural stage will be divided into multiple classes ranging from unvegetated to old growth forest which may be suitable for different species, depending on the season. Canopy closure will be measured in percent closure and can affect the distribution and relative abundance of understorey growth, which in turn affects habitat selection by birds. ELC ecosites also describe soil types which are strong drivers of vegetation community composition. Wetland class / form combinations can describe their "type" based on vegetation communities associated with them (National Wetlands Working Group 1997) and their importance as bird habitat.

Abiotic variables for Bird VCs will include surficial geology (KGS Group 2019) and elevation (m) based on the Provincial Digital Elevation Model (DEM) (MNRF 2020a) with calculations made for surface roughness (**Table 9-4**). Surface roughness is a degree of surface irregularity and is calculated by the largest inter-cell difference of a central pixel and its surrounding cell. The QGIS Roughness module was used to calculate surface roughness (QGIS Project 2021). Temporal patterns of climatic variability will be examined by year, specific seasons (i.e., all seasons, spring, summer, fall, winter, growing season), survey date (i.e., survey round date, ARU data segment date), and survey time (i.e., hour of day) especially in regard to weather data such as temperature (ºC), cloud cover, wind velocity (Beaufort scale); and moon phase (for Eastern Whip-poor-will).

9.4.1.3 Model Fit and Selection

Candidate models will be compared using metrics that represent model accuracy and will penalize models with a greater number of covariates, by utilizing Akaike's Information Criterion (AIC) (Akaike 1978). The best candidate models will be selected using step-wise model selection, and covariate adjustments will be made to the initial candidate models to maximize the amount of variance explained by the model, minimize the mean model bias, and minimize AIC. Leave-one-out cross-validation will be used to examine within-sample model bias relative to each covariate, which entails withholding one point and re-fitting the model on the rest of the observations, then repeating this process for each available observation (Allen 1974). By comparing the residuals (observed vs. predicted) of each of these model predictions from the leave-one-out cross-validation to each covariate, one may get a sense of the bias each covariate may be contributing to any model biases. Other models will be selected if model diagnostics such as deviance squared, Spearman Rho, and Chi-square are higher than a minimum AIC. All models will target 95% confidence intervals on estimates of presence / absence, abundance, and / or distribution.

The variance inflation factor (VIF) of models will be examined to quantify the multi-collinearity of all predictor variables (Longnecker and Ott 2004). If the VIF exceeds five (Longnecker and Ott 2004), multivariate analysis such as principal component analysis (PCA) will be used for linear models or non-metric multi-dimensional scaling (NMDS) for non-linear models to simplify the dataset by yielding fewer unrelated factors (McCune et al. 2002).

9.4.2 Predicted Effects of the Project

The direct, incidental and cumulative predicted positive and / or adverse effect of the Project on each Bird VC will be predicted using species-specific models based on anticipated changes to habitat availability, fragmentation, ground instability and species abundance with respect to anticipated activities during the Project construction and operations phases.

A Framework for the Scientific Assessment of Potential Project Impacts on Birds (Hanson *et al.* 2009*)* will be consulted to assist in analyzing predicted effects for all Bird VCs including non-linear, indirect, and synergistic responses to the Project where possible. Pre-construction baseline data will be used to calculate the following as summarized for select bird species in each Bird VC in **Section 8**:

- frequency of occurrence;
- abundance (density when possible);
- abundance (density when possible) in each habitat type; and
- a map showing distribution and areas of highest concentration.

Models will be used to extrapolate abundance (i.e., mean across years or density when possible) and distribution (i.e., mean across sites) at the PDA, LSA and RSA scale. The following individual effects on Bird VCs will be predicted using models and/or desktop review:

- Site preparation / vegetation removal;
- Air emission and dust;
- Deposit of harmful substances in waters;
- Changes to the aquatic flow regime and sediment load;
- Changes to geological features;
- Introduction of invasive species and spread of disease;
- Sensory disturbance;
- Increased predation opportunities;
- Disruption of bird migration corridors;
- Increased hunting, poaching and recreational resource use opportunities; and
- Site reclamation.

Models will be used to extrapolate abundance of select bird species in each Bird VC to the RSA scale based on habitat availability. Direct habitat loss for some Bird VCs is likely at the PDA scale; whereas, habitat fragmentation is likely at the LSA scale and possibly at the RSA scale. Models will be used to estimate the probability of select bird species in each Bird VC being present at each survey point post-construction in consideration of habitat loss and fragmentation. Any assumptions of displacement will be justified with scientific references and best management practices. Long- and short-term habitat changes and food sources of avifauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to migratory and non-migratory birds.

The IA / EA will consider the resilience of Bird VCs and associated habitat to the effects of the Project. Ecological processes will be evaluated for potential susceptibility to adverse effects from the Project such as considerations for patterns and connectivity of habitat patches and continuation of key natural disturbance regimes. This evaluation will include the predicted impact of new habitat types such as clearings on SAR (i.e., Eastern Whip-poor-will and Common Nighthawk). The IA / EA will also consider potential adverse effects from the Project on hydrological processes associated with fen and bog complexes. More specifically, the IA / EA will examine how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay / James Bay Lowlands and the resulting changes to land cover and vegetation associated with SAR habitat (e.g., Rusty Blackbird, Yellow Rail).

Potential direct, incidental, and cumulative adverse effects of the Project will be assessed for SAR including critical habitat where applicable (e.g., the effects of quarries built on or near eskers on SAR). For each SAR, a summary will be provided of survey results with detailed mapping of habitat, including important habitat features, for all lands including federal lands. Provincial, territorial or federal permits that may be required in relation to SAR will be described. Reasonable alternatives to the Project will be described to avoid potential effects on SAR and their habitat. Particular attention will be paid to critical habitat and habitat of species important to current use of lands and resources for traditional purposes such as breeding areas for birds. The IS / EA Report will describe all feasible measures to eliminate, avoid or minimize the effects of the Project on SAR and their habitats, including critical habitats. Critical timing windows (e.g., breeding), setback distances, or other restrictions that will be imposed or followed will be considered in assessing predicted effects on each Bird VC. The IS / EA Report will provide an account of how the Project and mitigation measures are consistent with the recovery strategy, action plan, or management plan for each SAR. The IS / EA Report will include a list of mitigation measures including offsetting and compensation as necessary that will be employed by the Project.

The residual effects that are likely to result from the Project after avoidance and minimization measures have been applied, including the extent, duration, and magnitude of the effects on birds will be described by:

- the number of individuals killed, harmed, harassed;
- the number of residences damaged or destroyed; and
- the area, biophysical attributes and location of habitat including critical habitat affected.

9.5 Mitigation and Enhancement Measures

Once potential effects have been identified, the effects assessment will explore technically and economically feasible mitigation measures to avoid or minimize the identified negative effects and enhancement measures to increase positive effects beyond those that are already inherent to the design. These measures will consist of industry-standard practices, federal and provincial standard specifications, regulator-mandated measures, best management practices, Indigenous and community recommendations and recommendations from industry and environmental professionals based on expertise, scientific publications, experience and judgement.

It is important that mitigation and enhancement measures are achievable, measurable and verifiable and monitored for compliance and effectiveness during all temporal phases as part of the Project follow-up monitoring plan. Required environmental monitoring will verify the potential environmental effects predicted in the IS / EA Report, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective.

9.5.1 TISG Section 20 Requirements

The TISG Section 20 requirements for birds are listed below (the Agency 2020a). The applicability of these requirements will be determined in the IA / EA.

- In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the IS. In addition, the following mitigation measures should be considered by the Proponent.
  - To avoid harm to migratory birds, clearing and construction should be conducted outside of the core breeding period. Follow ECCC guidance for avoiding harm;
  - Refer to ECCC guidance for nesting periods; and
  - It should be noted that these dates cover the core period for nesting activity of migratory birds, reducing the risk of taking a nest or eggs of a migratory bird. This recommendation does not authorize the disturbance, destruction, or take of a migratory bird, its nest, or its eggs outside of these data ranges.
- Include measures to address sensory disturbance and the resulting functional loss of habitat.
- Identify measures to prevent and mitigate the risk of engaging in harmful, destructive or disruptive activities in key sensitive periods and locations (e.g., breeding bird season, migration and nesting) to migratory birds, their nests and eggs, in areas frequented by migratory birds.
- Identify measures to prevent and mitigate the risk of engaging in harmful, destructive or disruptive activities in key sensitive periods and locations (e.g., hunting season) to birds and bird habitat.
- Identify measures to avoid the deposit of substances harmful to migratory birds in water or areas frequented by migratory birds.
- In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the IS. In addition, the following mitigation measures should be considered by the Proponent:
  - Specifically address mitigation of effects to eskers and related features rich in aggregate material, as these features are likely to be strongly impacted, to a degree much higher than their prevalence on the landscape.
  - Describe, at a landscape scale rather than a single assessment of multiple hectares, how these measures address this uncommon high value landcover for forest birds during migration and breeding; and
  - Describe the cumulate effects of development on this type of landscape;

- Provide best technically and economically feasible mitigation approaches to habitat mitigation that follow the hierarchy:
  - Avoid potential impact.
  - Minimize potential impact.
  - Provide biodiversity offsets to address any residual adverse environmental effects that cannot be avoided or sufficiently minimized; and
  - Provide justification for moving from one mitigation alternative to the next.
- Provide offsetting or compensation plans to address all residual effects to SAR, and their critical habitat, migratory birds, and/or wetland functions (if applicable) for review during IA process; the plans should:
  - Describe the baseline condition of the SAR, critical habitat, migratory birds and wetland functions potentially impacted by the Project;
  - Apply the mitigation hierarchy.
  - Identify and describe residual effects.
  - identify a compensation ratio with rationale, including how any policies or guidance provided by federal authorities, provincial authorities and Indigenous groups have been considered.
  - Identify the location and timing of implementation of compensation projects (where feasible);
  - identify and describe the success criteria.
  - Identify and detail non-habitat measures.
  - Describe how the proposed measures align with published provincial and federal recovery, management, or action plans and strategies for SAR;
  - Identify the parties responsible for implementation, including monitoring and review.
  - identify indicator species for setting compensation objectives. Identification should be based on baseline data, Bird Conservation Strategies, and other information where available (note: SAR should not be used as indicator species; compensation efforts need to be directed specifically to these species);
  - Describe the functions gained at the compensation site(s);
  - Provide evidence that functions can be replaced by the proposed offset activities.
  - Describe the process of selecting proposed compensation site(s) and associated baseline condition(s); and
  - Provide a description of the monitoring schedule and activities to be completed to monitor the success of compensation activities.

9.6 Residual Effects

Residual effects are the effects remaining after the application of mitigation measures. The IS / EA Report will describe in detail the potential adverse and positive residual effects in relation to each temporal phase of the Project (e.g., construction, operation). Residual effects will be described using criteria to quantify or qualify adverse and positive effects, taking into account any important contextual factors. The residual effects will therefore be described in terms of the direction, magnitude, geographic extent, duration, frequency, likelihood, and whether effects are reversible or irreversible[11]. Ecological and socio-economic context may also be relevant when describing a residual effect. Context relates to the existing setting, its level of disturbance and resilience to adverse effects. Context can also relate to timing as it applies to assessing the worst-case scenario (e.g., effect during breeding season for birds). Where appropriate, information regarding residual effects will be disaggregated by sex, gender, age and other community relevant identifying factors to identify disproportionate residual effects for diverse subgroups.

For magnitude, environmental discipline-specific definitions are required and are proposed below in **Table 9-5** and are based on professional judgment and applicable regulator guidance, where available.

Table 9-5: Birds Magnitude Definition

Magnitude Level	Definition	Rationale
Negligible	■ Small scope of effect and slight severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 1-10% of their occurrence, distribution, relative abundance or habitat availability within the Study Area and are likely to be only slightly degraded in function or reduced in population by 1-10% within ten years or three generations.
Low	■ Restricted scope of effect and moderate severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 11-30% of their population, distribution or availability within the Study Area and will likely be moderately degraded in function or reduced in population by 11-30% within ten years or three generations.
Medium	■ Large scope of effect and serious severity of effect to Bird VCs.	■ Birds and their habitat will be affected across 31-70% of their population, distribution or availability within the Study Area and will likely be seriously degraded in function or reduced in population by 31-70% within ten years or three generations.
High	■ Large to pervasive scope and high to extreme severity of effect to Bird VCs.	■ Birds and their habitat will be affected across all or most (71-100%) of their population, distribution or availability within the Study Area and will likely be destroyed or eliminated or reduced in population by 71-100% within ten years or three generations.

11. TISG Section 13.1 identifies additional effects characteristics for certain disciplines (e.g., wetlands, birds, terrestrial wildlife, species at risk). These additional effects characteristics are described in the respective discipline-specific study plans.

9.7 Consideration of Meeting Canada's Environmental Obligations

The environmental obligations assessment for the Project will be undertaken on the preferred alternative and will characterize the contribution of the Project to Canada's ability to meet its environmental obligations incorporating the requirements set out in Section 24 of the TISG (the Agency 2020a).

Federal environmental obligations identified for this Project include:

- Convention on Biological Diversity and Canada's supporting national framework (e.g., Canadian Biodiversity Strategy, Canada's Biodiversity Outcomes Framework, and current Biodiversity Goals and Targets for Canada); and legislation that supports how the implementation of Canada's biodiversity commitments including the *SARA (2002)*, and the *Canada Wildlife Act (1985)*, as well as supporting guidance.
  - Recovery Strategies and Action Plans developed under the *SARA* for all species potential affected by the Project
- The *Migratory Birds Convention Act* (1994) and supporting guidance on conservation objectives arising from Bird Conservation Region Strategies.

The IS / EA Report will describe:

- How the Project's effects (including contribution to cumulative effects) may contribute to Canada's ability to meet its obligations (e.g., related to biodiversity); and
- How the Project's effects (including contribution to cumulative effects) may hinder Canada's ability to meet its obligations.

Where the Project may contribute to Canada's ability to meet these obligations, the ISA / EA Report will describe plans and commitments to help to ensure that positive contributions are met. As well, where the Project may hinder Canada's ability to meet these obligations, the IS / EA Report will describe how the Project will first try to avoid and then to mitigate these potential effects, including management plans, risk assessment, and relevant follow-up and monitoring activities. The IS / EA Report will include expected indicators and data collection methods to support any of these plans.

In assessing whether the Project may contribute or hinder meeting these obligations, the IA / EA will also include how community and Indigenous Knowledge will be incorporated through consultations.

9.8 Consideration of Sustainability Principles

The following provides a generic description of how sustainability principles will be considered in the effects assessment. The extent to which sustainability principles apply to a specific VC will vary depending on the nature of the VC and the potential for Project effects on the VC.

The effects assessment approach for the Project has included the consideration of the sustainability principles outlined in the Project TISG and the Agency's guidance on sustainability. The sustainability principles that have been considered include:

1. Consider the interconnectedness and interdependence of human-ecological systems;
2. Consider the well-being of present and future generations;
3. Consider positive effects and reduce adverse effects of the Project; and
4. Apply the precautionary principle by considering uncertainty and risk of irreversible harm.

The interconnectedness and interdependence of human-ecological systems will be considered through the assessment of potential indirect effects of each alternative. An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in groundwater could indirectly affect birds). A preliminary assessment of indirect effects has been included in **Section 9.3**.

The well-being of present and future generations will be considered in the effects assessment through the application of the long-term operations phase temporal boundary of 75 years (**Section 6.1**) and through the effects characteristics description of duration and reversibility for each residual effect predicted.

The consideration of positive effects and reducing adverse effects of the Project is fundamental to the effects assessment methodology through the identification of mitigation measures to reduce potential adverse effects and the identification of the preferred alternative through the evaluation of advantages (e.g., positive effects) and disadvantages (e.g., adverse effects).

The effects assessment will apply the precautionary principle by clearly describing and documenting all uncertainties and assumptions underpinning the analysis and identifying information sources. The effects assessment will consider risk of irreversible harm through the effects characteristics description of reversibility for each residual effect predicted and will describe any uncertainty associated with the assessment of residual effects.

The scope of the sustainability assessment will be defined by issues of importance identified by Indigenous communities and interested persons through consultation and engagement activities, while also ensuring to be inclusive of the diversity of views expressed. The selection of VCs that will be the focus of the sustainability assessment will be aligned with the issues of importance identified by Indigenous communities and interested persons, as well as residual effects identified through the effects assessment process. The sustainability assessment will describe how the planning and design of the Project, in all phases including follow-up monitoring, considered the sustainability principles.

9.9 Consideration of Identity and Gender-Based Analysis Plus in Effects Assessment

The Proponent recognizes that communities and sub-populations within those communities may be impacted differently by the Project with respect to VCs and indicators. As such, the Project aims to collect baseline information for the purpose of assessing differential effects and establishing relevant mitigation measures, as further elaborated on in **Section 4.3**. Gender-Based Analysis Plus will not be limited to community feedback; when offered or discussed in secondary texts, additional sub-population information as is applicable to the relevant assessment will be incorporated.

9.10 Follow-up Programs

A follow-up program verifies the accuracy of the effects assessment and evaluates the effectiveness of mitigation measures. Identification of follow-up programs for the Project are not described in this Study Plan as the information needed to determine environmental monitoring requirements is dependent on the outcome of the effects assessment and consultation with Indigenous communities, agencies and interested persons. ESA or SARA permitting, if required for this project, may require commitments related to a follow-up program. Therefore, the Proponent will include information on follow-up programs, that address the requirements outlined in Section 26 of the TISG (the Agency 2020a), in the IS / EA Report and will identify the compliance and effects monitoring activities to be undertaken during all phases of the Project, as required.

10. Assumptions

Any assumption used in the effects assessment, for example the assumed average daily traffic on the CAR, will be clearly identified and a rationale provided in the IS / EA Report.

11. Concordance with Federal and Provincial Guidance

This section provides the best information currently available on how federal and provincial requirements identified for the Project to date will be addressed. The final concordance with federal and provincial requirements will be included in the IS / EA Report, and will be based on regulatory agency guidance, professional judgement and input received through the Project consultation and engagement process.

Table 11-1: Study Plan Federal Concordance – Conformance with Requirements

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	TISG Section 1.1, page 4	■ The Guidelines correspond to factors to be considered in the impact assessment. These factors are listed in subsection 22(1) of IAAC and prescribe that the impact assessment of a designated project must take into account any change to the designated project that may be caused by the environment;	■ The potential effects of the project on the environment and the potential effects of the environment on the Project will be assessed in accordance with applicable standards and guidance.	■ Section 9.1
2	TISG Section 2.3, pages 6-7	■ The description should focus on aspects of the Project and its setting that are important in order to understand the potential environmental, health, social and economic effects and impacts of the Project. The following information must be included and, where appropriate, located on map(s): – geographic co-ordinates (i.e., longitude/latitude using international standard representation in degrees, minutes, seconds) for the beginning and end points of the proposed road; – current land and/or aquatic uses within the study areas; – distance of the project components to any federal lands and the location of any federal lands within the study areas; – all waterbodies and their location on a map; – navigable waterways; – the environmental significance and value of the geographical setting in which the Project will take place and the study areas; – environmentally sensitive areas, such as national, provincial, territorial and regional parks, UNESCO World Heritage Sites, geological heritage sites, ecological reserves, ecologically and biologically sensitive areas, wetlands, and habitats of federally or provincially listed species at risk and other sensitive areas; – Dedicated Protected Areas and any other areas of ecological and social significance identified by the community during the community-based land use planning processes with the Province of Ontario (e.g., Enhanced Management Areas; see Section 6.1 for requirements related to confidentiality); – lands subject to conservation agreements; – current mineral development proposals, and areas of early and advanced mineral exploration in the study areas; – current areas of aggregate extraction; – description and locations of all potable drinking water sources (i.e., municipal or private), including spring water sources ; – description of local communities and Indigenous groups that is culturally relevant and gender sensitive; – if the information is not confidential, provide a description and location of Indigenous traditional territories and/or consultation areas, Treaty and/or Title lands, Indian Reserve lands, Indigenous harvesting regions (with permission of Indigenous groups), Métis settlements; and – culturally important features of the landscape.	■ The information requested will be provided in the IS / EA Report, if applicable.	■ No Reference, will be addressed in IS.
3	TISG Section 3.1, page 11	■ The Impact Statement must describe all project components including but not limited to: – borrow pits, gravel or aggregate pits and quarries (footprint, geographic location, ownership, and development plans including pit phases and lifespan), including their location in relation to upland habitats and the presence of rare, limited and/or significant habitat (e.g., federal, provincial, or Indigenous protected and conserved areas, ANSIs (Areas of Natural and Scientific Interest), Ramsar sites, critical habitat identified under the Species at Risk Act, etc.;	■ The information requested will be provided in the IS / EA Report, if applicable.	■ Section 6.2 ■ Section 8 ■ Section 9.4.2
4	TISG Section 5.1, page 22	■ Any proposed mitigation measures are to be clearly linked, to the extent possible, to valued components in the Impact Statement as well as to specific project components or activities, as well as comments raised during engagement activities	■ Once potential effects have been identified, the effects assessment will explore technically and economically feasible mitigation measures to avoid or minimize the identified negative effects and enhancement measures to increase positive effects.	■ Section 9.5
5	TISG Section 7.1, page 29	■ In describing the biophysical environment, the Impact Statement must take an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components with the ecosystem using scientific, community and Indigenous knowledge regarding ecosystem health and integrity, as applicable. The Impact Statement must provide a description of the indicators and measures used to determine ecosystem health and integrity, identified during early planning and reflected in the TISG. The presence of habitat (e.g., federal, provincial, or Indigenous protected areas, ANSIs, RAMSAR sites, critical habitat identified under the Species at Risk Act, etc.), such as but not limited to spawning shoals, aquatic vegetation or overwintering pools, potentially effected by the Project should be included in the description of the biophysical baseline conditions.	■ We will take an ecosystem approach that considers how the project may affect structure and functioning of biotic and abiotic ecosystem components and the potential residual effects as a result of these changes. This includes areas of indigenous cultural importance, descriptions of ecosystem health and integrity, the presence of protected areas and critical habitat for SAR species.	■ Section 9.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
6	TISG Section 7.1, page 30	■ The Impact Statement must consider the resilience of relevant species populations, communities and associated habitats to the effects of the Project. Ecological processes should be evaluated for potential susceptibility to adverse effects from the Project. Considerations include patterns and connectivity of habitat patches; continuation of key natural disturbance regimes; structural complexity; hydrogeological or oceanographic patterns; nutrient cycling; abiotic-biotic and biotic interactions; population dynamics, genetic diversity, Indigenous knowledge relevant for the conservation and sustainable use of relevant species populations, communities and associated habitats.	■ The IA / EA will consider the resilience of relevant populations, communities and associated habitat to the effects of the Project. Ecological processes will be evaluated for potential susceptibility to adverse effects from the Project such as considerations for: patterns and connectivity of habitat patches, continuation of key natural disturbance regimes.	■ Section 9.4.2
7	TISG Section 7.1, page 30	■ The Impact Statement must establish appropriate study area boundaries to describe the baseline conditions. The study area boundaries need to encompass the spatial boundaries of the Project, including any associated project components or activities, and the anticipated boundaries of the Project effects, including all potentially impacted local communities, municipalities and Indigenous groups. Considerations in assigning appropriate study areas or boundaries would include, but not be limited to: – areas potentially effected by changes to water quality and quantity or changes in flow in the watershed and hydrologically connected waters; – areas potentially effected by airborne emissions or odours; – areas determined by dispersion and deposition modelling; – areas within the range of vision, light and sound and the locations and characteristics of the most sensitive receptors; – species habitat areas, usage timing and migratory patterns; – emergency planning and emergency response zones; – the geographic extent of local and regional services; – any impacted local communities, including municipalities; – all potentially impacted Indigenous groups; – areas of known Indigenous land, cultural, spiritual and resource use; and – existing effected infrastructure.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2
8	TISG Section 7.1, page 30	■ If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas. Ensure baseline data are representative of project site conditions. If surrogate data from reference sites are used rather than site-specific surveys, the proponent should demonstrate that the data are representative of project site conditions.	■ We will include details on modelling methods and discuss confidence in using desktop and / or field studies when describing baseline conditions.	■ Section 7 ■ Section 8 ■ Section 9.4
9	TISG Section 7.1, page 31	■ Where baseline data are available in geographic information system (GIS) format, this information is to be provided to the Agency as electronic geospatial data file(s) compliant with the ISO 19115 standard19. This would support the Government of Canada's commitment to Open Science and Data and would facilitate the sharing of information with the public through the Canadian Impact Assessment Registry Internet Site and the Government's Open Science and Data Platform. The Agency intends to make the geospatial data files available to the public under the terms of the Open Government License – Canada20.	■ Data provided will meet ISO 19115 standards.	■ Section 8.2
10	TISG Section 7.2, page 32	■ The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7 ■ Appendix A
11	TISG Section 7.2, page 33	■ Data directly relevant to the area surrounding the Project are limited. With the exception of existing count data that have been collected within the regional study area, the use of existing information sources should be limited to the goals of estimating the species likely to occur in the study areas, and to identifying the potential timing of migration passage (for species that migrate through) or the general dates of breeding (for species that breed in the area).	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7
12	TISG Section 7.2, page 33	■ Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ We will include details on modelling methods and discuss confidence in using desktop and/or field studies when describing baseline conditions.	■ Section 7 ■ Section 9.4 ■ Appendix A

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
13	TISG Section 7.2, page 33	■ If using existing data sources, the Impact Statement must provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project. Some data sources may have good coverage in Southern Ontario or existing road networks but be unsuitable as a baseline for these northern areas where there are not roads.	■ Data sources are being reviewed for their appropriateness and are included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7.1
14	TISG Section 7.2, page 33	■ With regard to field studies, survey work must be planned to include multiple sampling locations and multiple visits to each location to support all required assessment analyses. Existing data should be considered as a limited augmentation of this new data. See the "Establishing Baseline Conditions" (sections 8.5, 8.9, 8.10, 8.11) in this Tailored Impact Statement Guidelines for recommendations on survey design and methodology. Surveys and analyses should be conducted by qualified experts. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to.	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS /EA Report and are summarized in this Study Plan.	■ Section 7 ■ Section 9.4 ■ Appendix A
15	TISG Section 7.2, page 33	■ Consult the Species at Risk Public Registry for information on the list of species at risk and available recovery documents and reference the documents and dates consulted. Ensure the most up to date documents are used and species statuses are up to date23	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1
16	TISG Section 7.2, pages 31-33	■ Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of the following sources of information. For specific sources of baseline information, see Appendix 1. – Federal government (e.g., Environment and Climate Change Canada, Health Canada, Indigenous Services Canada, Statistics Canada, Women and Gender Equality Canada); – Ontario provincial government (e.g., Ministry of Environment, Conservation, and Parks, Ministry of Natural Resources and Forestry; – Bird Conservation Region plans21; – academic institutions; – field studies, including site-specific survey methods; – database searches, including: – federal, provincial, territorial, municipal and local data banks; – Breeding Bird Atlas - Ontario (2001-2005)22 – monitoring program databases protected areas, watershed or coastal management plans; – natural resource management plans; – species recovery and restoration plans; – field measurements to gather data on ambient or background levels for air, water, soil and sediment quality, light levels or acoustic environment (soundscape); – land cover data, including: • terrestrial ecosystem mapping products; • forest cover maps; • remote sensing resources; • important habitats and features to include: ○ water bodies, wetlands, watercourses; ○ riparian habitat; ○ river banks or other eroded habitats; ○ artificial water sources; ○ forest, tree patches, solitary trees (especially old decaying trees); ○ forest edges and tree rows; ○ ridges, including eskers; ○ caves and mines; ○ cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; ○ buildings, bridges, and other anthropogenic features, including linear features;	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7 ■ Appendix A

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
		○ sources of artificial lighting attracting insects; ○ critical habitat; and ○ and any other habitat features known to be important in the area. – Published literature, such as peer reviewed journals, reports by think tanks, non-government organizations and government reports; – environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area; – regional studies, project assessments and strategic assessments; – renewable harvest data; – Indigenous knowledge, including oral histories and knowledge gathered by spending time on the land with knowledge holders; – community based monitoring and studies conducted by Indigenous communities; – expert, community, public and Indigenous engagement and consultation activities, including workshops, meetings, open houses, surveys; – qualitative information gathered from interviews, focus groups or observation; – census data; – baseline human health risk assessments; – community and regional economic profiles; – community well-being studies; and – statistical surveys, as applicable.		
17	TISG Section 7.3, page 34	■ The list of valued components must be informed, validated and finalized through engagement with the public, Indigenous groups, lifecycle regulators, jurisdictions, federal authorities, and other interested parties. The Impact Statement must describe valued components, processes, and interactions that are identified to be of concern or that the Agency considers likely to be impacted by the Project and are included in the Guidelines.	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4
18	TISG Section 7.3, page 35	■ The valued components must be described in sufficient detail to allow the reviewer to understand their importance and to assess the potential adverse and positive environmental, health, social and economic effects and impacts arising from the Project activities.	■ The EA/IS will include detailed descriptions of the VCs and the rationale for their inclusion to describe their importance and the predicted residual effects (adverse and positive) as a result of the Project.	■ Table 1-2 ■ Table 2-1 ■ Section 9
19	TISG Section 7.3, page 35	■ For each of the valued components that will be assessed in the Impact Statement, the proponent must create a study plan and a work plan to be validated by the Agency. Upon receipt of a study plan, the Agency may request that the proponent present and discuss the study plan at technical meetings, which will be scheduled during the impact statement phase.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan.	■ Section 3
20	TISG Section 7.3, pages 34-35	■ In selecting a valued component to be included, the following factors should be considered: – valued component presence in the study area; – the extent to which the valued component is linked to the interests or exercise of Aboriginal and Treaty rights of Indigenous peoples, and whether an Indigenous group has requested the valued component; – the extent to which the effects (real or perceived) of the Project and related activities have the potential to interact with the valued component; – the extent to which the valued component may be under cumulative stress from other past, existing or future undertakings in combination with other human activities and natural processes; – the extent to which the valued component is linked to federal, provincial, territorial or municipal government priorities (e.g., legislation, programs, policies); – the extent to which the valued component is being addressed through any ongoing or completed regional assessment processes; – the possibility that adverse or positive effects on the valued component would be of particular concern to Indigenous groups, the public, or federal, provincial, territorial, municipal or Indigenous governments; and – whether the potential effects of the Project on the valued component can be measured and/or monitored or would be better ascertained through the analysis of a proxy valued component.	■ The IS / EA Report will include detailed descriptions of the VCs and the rationale for their inclusion to describe their importance and the predicted residual effects (adverse and positive) as a result of the Project.	■ Section 1.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
21	TISG Section 7.4.1, pages 35-36	■ The Impact Statement must describe the spatial boundaries, including project, local and regional study areas, for each valued component included in assessing the potential adverse and positive environmental, health, social and economic effects of the Project and provide a rationale for each boundary. Spatial boundaries are defined taking into account the appropriate scale and spatial extent of potential effects and impacts of the Project; community knowledge and Indigenous knowledge; current or traditional land and resource use by Indigenous groups; exercise of Aboriginal and Treaty rights of Indigenous peoples, including cultural and spiritual practices; and physical, ecological, technical, social, health, economic and cultural considerations. The size, nature and location of past, present and foreseeable future projects and activities are factors that should be included in the definition of spatial boundaries. It should be noted that in some cases, spatial boundaries might extend to areas outside of Canada. These transboundary spatial boundaries should be identified where transboundary effects are expected.	■ The Study Areas are defined and described in the Study Plan. ■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in Section 4 of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4 ■ Section 6.2
22	TISG Section 7.4.1, page 36	■ For biophysical valued components, spatial boundaries should be defined using an ecosystem-centred approach for the project study area, local study area, and regional study area, as wetlands and eskers are features that are likely to be most effected. Ecoregion boundaries or their derivatives should not be used since the Project occurs on, near and across ecoregion boundaries. See Technical Guidance for Assessing Cumulative Environmental Effects under the Canadian Environmental Assessment Act, 2012 for more guidance on determining spatial boundaries. Delineate spatial boundaries (i.e., regional study area, local study area, and project study area) to meet the following objectives: a. range of land cover types should be representative of the defined spatial extent; b. the spatial pattern of the land cover types should be well distributed across the defined spatial extent (e.g., revise if one or more land cover types is concentrated in one sub-area and uncommon in other parts of the area); and c. low to moderate rate of change in the prevalence of one or more land cover types with increasing distance from the (i.e., to use land cover patterns to constrain the distances within which comparisons should be made).	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
23	TISG Section 7.4.1, page 36	■ For valued components establish three study area spatial boundaries to assess impacts to each valued component: 1) Project Study Area: defined as the project footprint for each alternative route; " 2) Local Study Area: defined for each valued component – see below; 3) Regional Study Area: defined for each valued component – see below ■ Provide a rationale for boundaries of the project study area, local study area, and regional study area for each valued component and indicate how the above objectives were met in establishing the boundaries.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2
24	TISG Section 7.4.1, page 37	■ For Habitat valued components: The spatial extent of the habitat and the habitat functions should influence the determination of an appropriate local study area and regional study area, considering objectives a-c above. The local study area should be at a minimum: project study area plus a 500-metre buffer. For habitat valued components potentially affected by the Project, a land cover analysis should be conducted to determine if a 500-metre buffer appropriately reflects ecological boundaries.	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
25	TISG Section 7.4.1, page 37	■ For Species valued components: The local study area should correspond to the project study area plus a buffer defined with objectives a-c above. Use simulation modelling to help define a buffer that captures objectives a-c for each species or species group.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2 ■ Table 6-1
26	TISG Section 7.4.2, page 37	■ The temporal boundaries of the impact assessment span all phases of the Project determined to be within the impact assessment. If potential effects are predicted after project decommissioning or abandonment, this should be taken into consideration in defining specific boundaries. In order to assess a project's contribution to sustainability, consideration should be given to the long-term effects on the well-being of present and future generations. When defining temporal boundaries, the proponent should consider how elements of environmental, health, social and economic well-being that local communities, including municipalities, and Indigenous groups identify as being valuable could change over time.	■ The Study Areas are defined and described in the Study Plan. ■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available.	■ Section 4 ■ Section 6 ■ Table 9-1 ■ Section 9.7
27	TISG Section 8.5, page 42	■ The Impact Statement must provide data files of mapped features depicting natural areas and wildlife presence within, and use of, the study area;	■ The information requested will be provided in the IS / EA Report.	■ Section 8 ■ Section 9.4.2

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28	TISG Section 8.5, pages 43-44	■ This assessment should be quantitative and include the collection of site-specific baseline information on wetland functions, including: – Surveys to assess for the presence, abundance, density, and distribution of migratory birds and federally listed species at risk, provincially listed species at risk, and species assessed by COSEWIC as at-risk in relation to potentially effected wetlands and associated riparian areas. Surveys should meet appropriate standards (see sections 8.9, 8.10, and 8.11), be species or bird group specific as appropriate, and be conducted during the appropriate times of the year as specified in section 8.9-8.11 of this document. Surveys for species at risk should assess species individually where possible (typically, an indicator approach is not appropriate for species at risk). Surveys should not be limited to species or groups of species that are wetland-obligate, but rather should include any species known to use wetland habitats as part of its lifecycle. Data should be sufficiently robust to identify which wetland classes are important to which species (and for how many). – The spatial location and a description of the biological characteristics of each potentially effected wetland and the ecological services and functions (hydrology, biochemical cycling, habitat, and climate) they provide. The functions assessment should be as specific as possible to the biological characteristics of the wetland and to the ecological services and functions it provides. – A supporting rationale and detailed description of the methods used in completing the wetland functions assessment, including sampling design.	■ The study will be designed in such a way as to be able to describe the distribution and abundance of birds in relation to the Study Areas but in particular SAR birds. Data collected will generally be consistent with methods employed by Zoetica (2018a and 2018b) and Golder (2019) for Forest Birds, Bog / Fen Birds, and Other Wetland birds Criteria. Aerial surveys will be used to document Raptors, Shorebirds, and Waterfowl and their habitat. ■ Details on wetland functions assessments are provided in the Vegetation Study Plan.	■ Section 7.2.2 ■ Section 8 ■ Vegetation VC Study Plan
29	TISG Section 8.9, page 49	■ The following groups of migratory and non-migratory birds should be considered as valued components: – forest birds; – raptors; – shorebirds; – waterfowl; and – bog/fen birds, and other wetland birds.	■ The Bird VCs include the migratory and non-migratory birds identified.	■ Table 1-2 ■ Section 7.2
30	TISG Section 8.9, page 49	■ The Impact Statement must:-describe biodiversity of bird species and their habitats that are found or are likely to be found in the study area, including identification of Bird Conservation Regions and Bird Conservation Region strategies. Possible information sources include, but are not limited to: wildlife experts/naturalists, Canadian Conservation Data Centres, Bird Conservation Region strategies, E-Bird, Breeding Bird Atlases, Environment and Climate Change Canada's guidance on Bird Surveys (see Appendix 1);	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 8
31	TISG Section 8.9, page 50	■ Survey protocol planning should include modelling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: – collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;	■ Data for birds are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons, and within a 24-hour daily cycle. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons, and within 24-hour periods). Sampling effort will be determined through the use of modelling and simulations.	■ Section 7.2 ■ Section 7.2.2
32	TISG Section 8.9, page 50	■ Key habitat associated with species at risk should be considered valued components, including eskers and similar geologic features, wetlands and peatlands;	■ Key habitat for SAR will be described in the IA / EA and will be considered valued components.	■ Section 7.2 ■ Section 9.4
33	TISG Section 8.9, page 50	■ Sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc;	■ Sample size will be planned to support evaluation of the Project within the context of the LSA and RSA. Study designs will implement multiple survey locations to cover multiple habitat classes and land cover types.	■ Section 7.2.2
34	TISG Section 8.9, page 50	■ The Impact Statement must collect bird data to adequately represent the following temporal sources of variation: – among years; – within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and – within the 24-hour daily cycle.	■ The study plan includes point counts, ARUs, call playback, and aerial surveys to collect bird data among years, within and among seasons (spring migration, breeding, fall migration, early winter), and within the 24-hour daily cycle.	■ Section 7.2

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35	TISG Section 8.9, page 50	■ The Impact Statement must collect explanatory (i.e., covariate) data necessary for modelling in such a way as to adequately represent the following spatial and temporal sources of variation: – spatial variation in: • land cover composition • soil type, geomorphology • hydrological processes, and • climatic conditions; and, – temporal, especially annual, variation in local weather inter- and intra-annual climatic variability.	■ A variety of modelling approaches will be explored to explain the spatial and temporal patterns for each Bird VC as a function of explanatory variables (biotic and abiotic) to predict future conditions.	■ Section 9.4
36	TISG Section 8.9, page 50	■ The Impact Statement must collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): · design surveys so that they represent the spatial and temporal targets of modelling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modelling techniques based on current and recent scientific literature;	■ Data will be collected in ways that enable reliable extrapolations in space and in time. Surveys will be designed to represent the spatial and temporal targets of modelling and extrapolations. Justification of modelling approaches taken will be supported by current scientific literature.	■ Section 7.2 ■ Section 9.4.2
37	TISG Section 8.9, page 51	■ Provide documentation and digital files for results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
38	TISG Section 8.9, page 51	■ Simulation modelling should be used to assess bias and precision between project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks.	■ Simulation modelling was conducted using preliminary point count data collected in the PDA and LSA. An "optimal" sample size was selected for additional sampling where the precision of model estimates is stabilized and minimizes bias relative the TISG benchmark study design. Given that a land cover analysis was conducted to demonstrate that the Local Study Area and Regional Study Area have similar representativity, bird models will be used to predict presence/absence, distribution, abundance, and density in the Regional Study Area.	■ Section 7.2.2 ■ Section 9.4
39	TISG Section 8.9, page 51	– at minimum, the combined information from existing data and field surveys needs to be detailed enough to describe the distribution and abundance of all bird species in relation to the study areas;	■ The data obtained from existing field studies and proposed field surveys will provide detail about the distribution and abundance of multiple species of birds, proxy VCs to represent bird groups described in the TISG, and bird species at risk VCs.	■ Section 7.2.2 ■ Section 8
40	TISG Section 8.9, page 51	– rare species require more survey effort to detect than common species, and species rarity should be accounted for in survey design by increasing the number and duration of surveys; and	■ Rare species will be accounted for in the statistical analysis recognizing that they may be more difficult to detect.	■ Section 7.2.2
41	TISG Section 8.9, page 51	■ Sampling effort per unit area - field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact birds within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible;	■ Survey design sampling effort will be most intense within the PDA. Efforts outside the PDA will be carefully implemented to remove biases when comparing areas from within the PDA.	■ Section 7.2.2.1 ■ Section 9.4.1
42	TISG Section 8.9, page 51	■ Submit complete data sets from all survey sites. These should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form. Databases and GIS files should be accompanied by detailed metadata that meets ISO 19115 standards;	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
43	TISG Section 8.9, page 51	■ The Impact Statement must provide raw survey data and analysis results for 1) all birds, 2) each valued component, and 3) Bird Conservation Region Priority Species showing the species ranked according to:o frequency of occurrence,o abundance,o abundance in each habitat type, ando map showing areas of highest concentrations of species.	■ The information requested will be provided in the IA / EA Report.Data provided will meet ISO 19115 standards.	■ Section 8

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44	TISG Section 8.9, page 53	■ Point Count Transects: Each site should be sampled by human observers using a standardized 10-minute point count. To enable observer: recorder comparisons, observers should also record the survey visit using a high quality portable recording device (i.e., with 360- degree recording in WAV format, selectable sampling rate, and adjustable microphone gain), mounted on a tripod. Observers should be skilled in bird identification by sight and sound and should use 1- minute intervals within the 10-minute point count duration such that each individual bird is entered in the first minute interval in which it was detected. Estimated distances from observers to each bird should be recorded as: 0-5 0 m, 50 m-100 m, and beyond 100 m.	■ Surveyors of breeding birds may be subject to biases in bird recognition and identification depending on skill level and hearing ability. Only observers skilled in bird identification by sight and sound will be used for breeding bird surveys. Furthermore, additional bias will be removed by recording all bird vocalizations during breeding bird surveys using a high-quality portable recording device mounted on a tripod. Observer and recorder data will be compared for further analysis.	■ Section 7.2.2.1.3
45	TISG Section 8.9, page 53	■ Regarding “Geomatics and habitat typing”: – Each site visited at any time between the dates of June 10 and August 30 should be photographically documented with 13 photos. At each cardinal direction (N, E, S, W): 1 photo at shoulder height with arm and camera extended parallel to ground, 1 photo with arm at 45-degrees (from body position) pointing down, and 1 photo with arm extended at 135-degrees (from body position) pointing up. And finally, one photo with arm extended straight up (i.e., vertically). Photos should be interpreted by qualified individuals as precisely as possible according to one or each of the classification schemes: – Ontario Ministry of Natural Resources and Forestry’s Boreal Ecosites, Wetland Ecosystem Classification for Northern Ontario (W-type), Forest Ecosystem Classification for Northern Ontario (V-type), and NRCan’s Canadian National Vegetation Classification (vegetation association).	■ Breeding bird, marsh bird call playback, species-specific survey, bird ARU site centroids will be documented with photographs as described in the TISG. Qualified individuals will review photographs to classify habitat by Ecological Land Classification (ELC) Ecosite (Banton 2009) or Canadian Wetland Classification Class (NWWG 1997) as described under the Vegetation Study Plan for modelling purposes.	■ Section 7.2.2.6 ■ Vegetation VC Study Plan
46	TISG Section 8.9, page 54	■ Data analysis methods should be clearly described and transparent (e.g., annotated scripts), extract the maximum information from the data, and be appropriate for the data and protocols: 1. Generalized linear mixed models or suitable alternatives (e.g., boosted regression trees, generalized additive models, or models developed under a Bayesian framework) may be suitable approaches for analyzing data obtained from the described design and for addressing a goal of predicting patterns beyond the sites and times sampled; 2. Analysis of ARU and point count data should account for differences in the survey methods (e.g., ability to detect, visit/sample timing and frequency). Offsets may be used to help account for variation in detection ability. Consider expert guidance on the proper use of offsets in modelling. Detection rates are unlikely to remain constant between visits so, if occupancy modelling is used it should be well justified.	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 3 ■ Section 8 ■ Section 9.4
47	TISG Section 8.9, page 54	■ All candidate survey sites should be attributed to a 100 m buffer around site centroid, areal coverage and percentage of each land cover class be assigned to sites, and these values used as inputs to evaluations of retrospectivity and options for design modifications.	■ Habitat within 100 m of the survey site centroid will be classified by ELC Ecosite or Canadian Wetland Classification Class as described under the Vegetation Study Plan for modelling purposes.	■ Section 7.2.2.6 ■ Vegetation Study Plan
48	TISG Section 8.9, page 54	■ Use the Ontario Ministry of Natural Resources and Forestry’s Far North Land cover (version 1.4 or later, as available) and augmentation with fire history, digital elevation models, surficial geology and other data sources; and	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Section 7.2.2.1.1 ■ Section 7.2.2.6 ■ Section 9.4.1
49	TISG Section 8.9, page 55	■ Provide detailed descriptions of bird habitat that includes at a minimum, characterization of biophysical conditions with regard to ecoregion, Bird Conservation Region, and with respect to the conditions of boundary regions. The Project crosses and is in close proximity to ecoregion and Bird Conservation Region boundaries. Since the project study area is at the edges of the ecoregions and Bird Conservation Regions, habitat patterns are likely to reflect these border characteristics, with one of the outcomes being that habitat types common elsewhere in the ecoregion may be relatively uncommon and potentially more ecologically important in the border region. Surveys need to be detailed enough within the local study area and regional study area to put the project study area into context of these wider areas: – mixed wood forest landcover and other upland vegetation types may be particularly important for many forest associated birds, supporting birds during migration, breeding and through the winter. Eskers and related features are uncommon and potentially ecologically important elements of the landscape and are likely to be disproportionately affected by these projects. River riparian corridors are another relatively uncommon feature with adjacent mixed wood forest; and – should there be some displacement of nesting birds, baseline data should provide evidence that there is enough equivalent habitat for birds to be displaced to and that the vegetation being removed (e.g., eskers) is not unique to the project study area.	■ Detailed descriptions of the habitat within the context of the LSA and RSA will be provided as described under the Vegetation Study Plan and will examine the potential displacement of birds.	■ Section 7.2.2.6 ■ Vegetation Study Plan

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		– to the conditions of boundary regions. The Project crosses and is in close proximity to ecoregion and Bird Conservation Region boundaries. Since the project study area is at the edges of the ecoregions and Bird Conservation Regions, habitat patterns are likely to reflect these border characteristics, with one of the outcomes being that habitat types common elsewhere in the ecoregion may be relatively uncommon and potentially more ecologically important in the border region. Surveys need to be detailed enough within the local study area and regional study area to put the project study area into context of these wider areas:		
50	TISG Section 8.9, page 55	■ Biodiversity metrics for each valued component should include: – distribution in space; – frequency of occurrence; – patterns of occurrence and abundance in time; – abundance and, if possible, density; and – associated habitat type(s) and strength of associations.	■ Biodiversity metrics for the Bird VC will consider: – frequency of occurrence and abundance (i.e., percentage of survey points) by season; – abundance (i.e., breeding density in territories / ha) and percentage of observations in each habitat type; and – distribution maps in the LSA showing areas of highest concentration.	■ Section 8
51	TISG Section 8.9, page 55	■ Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline avifauna biodiversity and discuss the rationale for their selection:o species communities should not be collapsed into diversity metrics or the focus narrowed to indicator species. Species identity, distribution, abundance and where possible estimates of breeding status should be the primary targets of quantification.o biodiversity metrics for each valued component should include:· distribution in space;· frequency of occurrence;· patterns of occurrence and abundance in time;· abundance and, if possible, density; and· associated habitat type(s) and strength of associations.	■ The VCs have been determined by taking an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components within the ecosystem. Metrics as well as biotic and abiotic indicators that are used to characterise the baseline biodiversity for birds will be identified and discussed as part of the rationale for their selection.o Biodiversity metrics for the Birds VC will consider: – frequency of occurrence and abundance (i.e., percentage of survey points) by season; – abundance (i.e., breeding density in territories / ha) and percentage of observations in each habitat type; and – distribution maps in the LSA showing areas of highest concentration.	■ Section 8 ■ Section 9.2
52	TISG Section 8.9, pages 55-57	■ • Provide estimates of the abundance and distribution, and information on the life history of migratory and non-migratory birds (including, but not limited to, waterfowl, raptors, shorebirds, marine birds, marsh birds and other land birds) in the study area. Estimates may be based on existing information, or additional surveys, as appropriate, to provide current data sufficient for reliable estimates. In doing so: – " generate measures of abundance and distribution using spatially balanced, randomly selected sample locations. Sampling should include edges and transitions between habitat types and should not be focused exclusively within homogeneous patches of a given habitat type: • use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions; and • sampling within temporal boundaries should be spatially and temporally balanced so that all spatial areas receive comparable temporal coverage. " – "Provide estimates of confidence or error for all estimates of abundance and distribution. Estimates should be defined (e.g., mean across years, mean across sites, modelled prediction) and, if appropriate, confidence or other intervals should be defined (e.g., 95% confidence intervals, credible intervals). Use of hypothesis testing p - values is generally not appropriate in this context and their use should be justified; " – "whenever estimating densities for species, consider observer-induced detection error for comparisons among counts (e.g., between, before and after surveys, or between effected and un-effected sites) to be valid. When accounting for detection error the method used should account for variable detection between landcover types, observers, weather, time of year, species, as well as random variation between visits. Simulation methods can help determine if a specific method is appropriate for a given survey design and analysis. Care should be taken to avoid affecting the reliability of abundance estimates; – a spatially dispersed stratified random sampling approach should be used to maximize efficiency. Sample sites should be selected with a randomization procedure that accounts for the project design footprint. To select specific sampling sites, care should be taken to ensure sites	■ The abundance and distribution of forest birds and bog / fen / other wetland birds will be described over time during spring and fall migration. The abundance and distribution of waterfowl and shorebirds (including species / guilds) will be calculated. The timing of migration and changes in composition of the waterfowl and shorebird communities will be described using maps and tables. For raptors, the abundance and distribution of nest sites will be summarized using maps and tables. Simulations and models will be used to determine appropriate sampling effort. Details regarding simulation / model parameters are presented in this Study Plan. ■ All criteria used to choose plot locations will be included in the impact statement. For ground investigations, a GIS function that will consider both access (i.e., proximity to existing helipad locations) and the need to survey all vegetation community types present within the Study Area will be employed with minimal to no bias.	■ Section 7.2 ■ Section 9.4

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		are spatially distributed across the area of interest and coverage is obtained across habitat types. Site locations should be randomly selected using an approach that avoids implicit bias in site selection; – provide a justification on the approach chosen. If necessary to constrain or adjust site selection based on access limitations, simulation modelling should provide evidence that this sampling strategy has not resulted in the introduction of bias. Survey vegetation features of concern in a manner that is not disproportionate to other types. Avoid bias in estimates of abundance and impair extrapolation and statistical inference; and – include all criteria used to choose plot locations in the Impact Statement.		
53	TISG Section 8.9, page 57	■ Identify areas of concentration of migratory birds, including sites used for migration, staging, breeding, feeding and resting. The following must be considered when identifying areas of concentration of migratory birds: – migratory bird concentrations can vary within year and between years. It is therefore important to survey across the project study area, local study area, and regional study area both temporally and spatially; · – migratory bird counts can vary strongly between years and so survey length must be able to estimate the variation accurately; and – migratory bird counts are dependent on length of stay as well as presence. ■ Attempt to estimate abundances across a migratory period should incorporate an estimate of inter and intra-annual trends and estimates of lengths of stay. Irruptive species may act in ways similar to migrants in terms of abundance. They may be absent from an area until conditions change (such as a mast event), during which time the habitat becomes vital to these species.	■ Aerial surveys will be conducted to collect data on raptors (nesting), waterfowl (spring stopover / staging, breeding pairs, broods, fall stopover / staging), and shorebirds (spring and fall stopover / staging) in the PDA and LSA. ■ Aerial surveys will be conducted along transects parallel to the proposed route spaced according to tree density and landscape on two occasions each during the spring and fall migration periods as well as the breeding bird window. ■ Data for the Bird VCs are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, late summer / fall migration and early winter season), and within a 24-hour daily cycle.	■ Section 7.2.2 ■ Section 7.2.2.5
54	TISG Section 8.9, page 57	– describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada Goose, Snow goose, Swans, Gyrfalcon, Loon, Peregrine Falcon, and duck species); and	■ This information will be collected as described in the Land and Resource Use Study Plan. ■ The historic and current use of birds as a source of country foods (traditional foods) and where use has Indigenous cultural importance will be described.	■ Section 4 ■ Land and Resource Use Plan
55	TISG Section 8.9, page 57	– identify any and all federal Species at Risk and/or Critical Habitat in the study area; sites that are likely to be sensitive locations and habitat for birds or environmentally significant areas. These include National Parks, Areas of Natural or Scientific Interest, Migratory Bird Sanctuaries or other priority areas or sanctuaries for birds, National Wildlife Areas or World Biosphere Reserves, offshore Marine Protected Areas and Ecologically and Biologically Significant Marine Areas.	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Table 2-1 ■ Table 7-1 ■ Section 9
56	TISG Section 8.9, page 57	– include all criteria used to choose plot locations in the Impact Statement.	■ The information requested will be provided in the IS / EA Report.	■ Section 7.2
57	TISG Section 8.9, page 57	– provide a characterization of habitat features found in the project area that are associated with the presence of those bird species that are likely to be effected, based on the best available existing information (e.g., land cover types, vegetation, aquatic elements), including habitat fragmentation. Classification should include local aerial and on-site photos;	■ Habitat features in the project area associated with migratory bird species will be characterized by the best available information acquired from the study period.	■ Section 7.2.2.6
58	TISG Section 8.9, page 57	– provide an estimate of year-round bird use of the area (e.g., winter, spring migration, breeding season, fall migration), based on data from existing sources and surveys to provide current field data if required to generate reliable estimates. In each portion of the year, survey effort must account for differences in species movements including: winter usage of highly habitat reliant species and highly mobile species that will accurately characterize the use of a site;	■ Bird data will be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, late summer / fall migration and early winter season), and within a 24-hour daily cycle using both desktop resources and field surveys in order to get an accurate estimate of year-round bird use of an area	■ Section 7.2.1 ■ Section 7.2.2
59	TISG Section 8.9, page 57	– Provide written description and maps of ecozones, ecoregions, and ecodistricts as per Ontario or Canada's Ecological Landscape Classification;	■ The information requested will be provided in the IS / EA Report.	■ Section 8

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60	TISG Section 8.9, page 58	■ The description of bird species and their habitat in the study area may be based on existing sources, but supporting evidence is required that demonstrates that the data used are representative of the avifauna and habitats in the study area. Existing data must be supplemented by surveys, if required to produce a representative sample of the avifauna and habitats of the study area.	■ Descriptions of bird species and their habitat will be developed through desktop reviews, field investigations, and data analysis.	■ Section 7.2 ■ Section 7.2.2.6 ■ Section 8
61	TISG Section 8.9, page 58	■ Avian surveys should be designed based on a thorough review of the available scientific literature pertinent to the specific region, bird groups and anticipated effects. The Canadian Wildlife Service's Framework for the Scientific Assessment of Potential Project Impacts on Birds provides examples of project types and recommended techniques for assessing effects on migratory birds (see Appendix 1).	■ Descriptions of specific data sources, data collection, sampling, survey, and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7.2 ■ Appendix A
79	TISG Section 8.11, page 60	■ Collect species at risk data to represent the following temporal sources of variation: – among years; – within and among seasons (e.g., spring dispersal, breeding, late summer/fall migration and swarming, hibernation); and – within the 24 hour daily cycle.	■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 7
80	TISG Section 8.11, page 60	■ The Impact Statement must [identify] key habitat associated with species at risk should be considered valued components, including eskers and similar geologic features, wetlands and peatlands;	■ SAR and Significant Wildlife Habitat will be considered in the IS / EA Report.	■ Section 7 ■ Section 8
81	TISG Section 8.11, page 60	■ The Impact Statement must: – provide a list of all provincially listed protected species at risk and species assessed by the COSEWIC that have the status of extirpated, endangered, threatened or of special concern and that may be directly or indirectly effected by the Project. Use existing data and literature as well as surveys to provide current field data that reflects the natural inter-annual and seasonal variability;	■ The information requested will be provided in the IS / EA Report. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 2.1.2 ■ Table 2-1 ■ Section 8.1
82	TISG Section 8.11, page 60	■ Provide a list of all species at risk listed under Schedule 1 of the federal Species at Risk Act that may be directly or indirectly effected by the Project. Use existing data and literature as well as surveys to provide current field data that reflects the natural inter-annual and seasonal variability of each species. Species at risk which may inhabit the project area include: · – Lake sturgeon (Acipenser fulvescens); – Northern Myotis (Myotis septentrionali); – Little Brown Myotis (Myotis lucifugus); – Caribou (Rangifer tarandus; Provincial: Missisa, Nipigon, and Pagwachuan ranges; Federal: Far North range); – Rusty Blackbird (Euphagus carolinus); – Bank Swallow (Riparia riparia); – Barn Swallow (Hirundo rustica); – Canada Warbler (Cardellina canadensi); – Chimney Swift (Chaetura pelagica); – Common Nighthawk (Chordeiles mino); – Eastern Whip-poor-will (Antrostomus vociferu); – Evening Grosbeak (Coccothraustes vespertinus); – Olive-sided fly-catcher (Contopus cooperi); · – Peregrine Falcon (Falco peregrinus); · – Short-eared Owl (Asio flammeus); · – Yellow Rail (Coturnicops noveboracensis); and · – Wolverine (Gulo gulo);	■ The information requested will be provided in the IS / EA Report. ■ Data (desktop and field-based) will be collected to represent temporal sources of species variation (i.e., among years, among seasons and within 24-hour periods).	■ Section 2.1.2 ■ Section 8.1
83	TISG Section 8.11, page 61	■ Account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys: – collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is being suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability; – Sample size must be planned to support a robust evaluation of the project study area within the context of the local study area and regional study area;	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan. Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7.2 ■ Section 8.1

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
		– Design of surveys will need to consider multiple number of survey locations in order to represent the habitat heterogeneity of the regional study area, and to plan the number of survey locations per land cover or habitat class so that aggregation of habitat classes post-hoc is not required; – In terms of sampling effort per unit area, field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact species at risk within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing and across the project study area, local study area and regional study area are unbiased and precise; – A habitat-stratified random sampling approach should be used. Sample sites should be selected with a randomization procedure such as a GIS grid overlay; and – Where Critical Habitat has not been defined or has been partially identified, a Schedule of Studies may have been created to identify gaps in information for these species. The Schedule of Studies information should be referred to when implementing or assessing survey protocols, in order to provide necessary information for these species.		
84	TISG Section 8.11, page 61	■ Contain complete data sets from all survey sites. These should be in the form of complete and quality assured relational databases, with precisely georeferenced site information, precise observation/visit information and with observations and measurements in un-summarized form. Databases and GIS files should be accompanied by detailed metadata that meets ISO 19115 standards;	■ The information requested will be provided in the IS / EA Report. ■ Data provided will meet ISO 19115 standards.	■ Section 8.2
85	TISG Section 8.11, page 61	■ Ensure that, at minimum, the combined information from existing data and field surveys must be able to describe the distribution and abundance of species at risk in relation to the study areas;	■ The combined information from existing data and field surveys will describe the distribution and abundance of SAR in relation to the study areas.	■ Section 8.1
86	TISG Section 8.11, page 61	– provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);	■ The information requested will be provided in the IS / EA Report.	■ Section 8.2
87	TISG Section 8.11, page 64	■ Provide data and summary lists for each species at risk ranked according to: – abundance; – Distribution across survey sites (i.e., percentage of survey stations at which they were recorded); · – Abundance in each habitat type; and – Map showing areas of highest concentrations or areas of use by species. ■ Data must be supplemented by surveys, as required;	■ The information requested will be provided in the IS / EA Report.	■ Section 7; Section 8.1
88	TISG Section 8.11, page 64	■ For the species identified: – provide any published studies that describe the regional importance, abundance and distribution of species at risk, including recovery strategies or plans; " – consult relevant published studies that describe suitable survey methodologies for caribou and wolverine based on winter track observations including but not limited to: • caribou resource selection probability functions describing the probability of resource use at the range scale (see Hornseth & Rempel 2016); • caribou, moose, and wolf occupancy models describing their distribution in the far north (see Poley et al. 2014); and • wolverine occupancy models describing the distribution of wolverine in the far north (see Ray et al. 2018). – provide data and summary lists for each species at risk ranked according to: • abundance; " • distribution across survey sites (i.e., percentage of survey stations at which they were recorded); • abundance in each habitat type; and • map showing areas of highest concentrations or areas of use by species. – data must be supplemented by surveys, as required; – survey protocols should optimize detectability and survey effort should provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during breeding season, stopover habitat during migration); – survey protocols should provide a rationale for the scope of and the methodology used for surveys including design, sampling protocols and data manipulation; and – where using recognized standards, provide details of any modifications to the recommended methods and rationale for these modifications and indicate who was consulted in the development of the baseline surveys (e.g., federal/provincial wildlife experts, specialists and local Indigenous groups).	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7; Section 8; Section 9.4.1.1

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
89	TISG Section 8.11, page 65	■ Identify and map all species at risk, critical habitat, and residences on federal land within the project study area and local study area (provincial and/or local government authorities should be contacted to determine any additional data sources and survey methodologies)	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1
90	TISG Section 8.11, page 65	■ - Provide information and/or mapping at an appropriate scale (The project study area and local study area, as defined above for each valued component, constitute the appropriate scale) for residences, seasonal movements, movement corridors, habitat requirements, key habitat areas, identified or proposed Critical Habitat and/or recovery habitat (where applicable). Describe the general life history of species at risk (e.g., breeding, foraging) that may occur in the project area, or be affected by the Project;	■ The information requested will be provided in the IS / EA Report.	■ Section 8.1 ■ Section 9.4.2
91	TISG Section 8.11, page 65	■ Survey protocols should optimize detectability and survey effort should provide for comprehensive coverage at the appropriate time of year (e.g., survey breeding habitat during breeding season, stopover habitat during migration);	■ Seasonal-specific survey protocols are described in **Section 7.2** and will be provided in the IS / EA Report.	■ Section 7.2
92	TISG Section 8.11, page 65	■ The project study area and local study area, as defined above for each valued component, constitutes the appropriate scale.	■ The Study Areas are defined and described in the Study Plan.	■ Table 6-1
93	TISG Section 8.11, page 65	■ Where using recognized standards, provide details of any modifications to the recommended methods and rationale for these modifications and indicate who was consulted in the development of the baseline surveys (e.g., federal/provincial wildlife experts, specialists and local Indigenous groups).	■ The information requested will be provided in the IS / EA Report.	■ Section 7.2
94	TISG Section 13, pages 80-83	■ This section of the TISG describes the methodology for the effects assessment, including definitions of scope, severity, and irreversibility.	■ The IS / EA Report will include a description of the methodology of the effects assessment including definitions as required.	■ Section 9
95	TISG Section 14.1, page 86	■ The IA must describe the locations and characteristics of the most sensitive receptors including species at risk and differential effects for sensitive receptors.	■ Data will be gathered as outlined in the Acoustic Environment Study Plan. Locations and characteristics of sensitive receptors as they pertain to Bird SAR are described in the Study Plan and will be addressed in the IS / EA Report.	■ Section 7.2 ■ Acoustic Environment VC Study Plan
96	TISG Section 14.3, Page 88	■ The Impact Statement must provide an overall description of changes related to landscape disturbance including fragmentation of habitats and project effects on areas of ground instability;	■ The direct, incidental, and cumulative predicted positive and / or adverse effects of the Project on the Birds VCs will be predicted based on anticipated changes to habitat availability, fragmentation, ground instability, and species abundance, as well as individual effects, to be provided in the IS / EA Report.	■ Section 9
97	TISG Section 14.3, page 89	■ Describe the methodology used to identify effects;	■ Methodology related to effects assessment has been provided in the Study Plan.	■ Section 9
98	TISG Section 15.2, page 92	■ Consult A Framework for the Scientific Assessment of Potential Project Impacts on Birds Appendix 2 and 3 for overview of potential impacts to birds from road projects; · analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to ensure final impacts estimates show the best available estimate of precision; · non-linear, indirect and synergistic responses to the project should be explicitly explored where reasonable; · any assumption of displacement should be justified with scientific references and surveys should provide evidence that there is available habitat to accommodate displacement under a range of population scenarios. For example, it should be clear that a growing population will not be limited by the habitat loss along the project study area	■ A Framework for the Scientific Assessment of Potential Project Impacts on Birds will be consulted to assist in analyzing predicted effects for all birds including non-linear, indirect, and synergistic responses where possible and applicable. Any assumptions of displacement will be justified with scientific references and BMPs.	■ Section 9.4.2
99	TISG Section 15.2, page 92	■ The Impact Statement must describe direct, incidental and cumulative predicted positive and/or adverse effects to migratory birds and non-migratory birds, including population level effects that could be caused by all project activities, including but not limited to: – site preparation/vegetation removal; – air emissions and dust; – deposit of harmful substances in waters that are frequented by migratory birds; – changes to the aquatic flow regime and sediment load; – sensory disturbance; – increased predation opportunities; – disruption of wildlife movement corridors; – increased poaching opportunities; and – site reclamation.	■ The direct, incidental, and cumulative predicted positive and/or adverse effects of the project on the Birds VC will be predicted based on anticipated changes to habitat availability, fragmentation, and species abundance, as well as individual effects, to be provided in the IS / EA Report.	■ Section 9

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
100	TISG Section 15.2, page 93	■ The Impact Statement must describe the potential direct, incidental and cumulative adverse effects of the Project on migratory bird species (such as SARA-listed Yellow-Rail) who inhabit the project area during breeding season as well as during migration (as staging and stopover sites);	■ Effects to birds will consider potential direct, incidental, and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitat.	■ Section 9
101	TISG Section 15.2, page 93	■ Consult the maps, data, and models developed through the Boreal Avian Modelling Project, and describe how these materials have been incorporated where relevant.	■ Maps, data, and models developed through the Boreal Avian Modelling Project will be consulted, where possible.	■ Section 9.4.1
102	TISG Section 15.2, page 93	■ The Impact Statement must describe the effects caused by the new habitat types created in the project area by clearing vegetation. The new habitats created may attract migratory birds, which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how these species at risk may be impacted by the project.	■ The expressions of change to newly created habitat through the activities of the project will be described in the IS / EA Report.	■ Section 9.4.2
103	TISG Section 15.2, page 93	■ describe short term and long term changes to habitats and food sources of migratory and non-migratory birds (types of cover, ecological unit of the area in terms of quality, quantity, distribution and functions), with a distinction made between these two birds categories, including losses, structural changes and fragmentation of riparian habitat (aquatic grass beds, intertidal marshes), terrestrial environments (e.g., uplands, grasslands, forested, old growth, post fire) and wetlands frequented by birds. Describe changes in terms of the health, integrity, and availability of habitats. Important habitats to consider include eskers, (and similar upland features), forest, riparian, bog/fen/peatlands, other wetlands, and open water;	■ Long- and short-term habitat changes and food sources of birds will be described and documented in the IS / EA Report, including changes in terms of the health, integrity, and availability of habitats related to migratory and non-migratory birds.	■ Section 9.4.2
104	TISG Section 15.2, page 93	■ The Impact Statement must account for changes in detection pre- and post-project construction. For instance, roads allow for greater detection distances and therefore any estimates of abundance or presence need to account for differential detectability;	■ Changes in detectability will be accounted for in the IA / EA.	■ No Reference
105	TISG Section 15.2, page 93	■ The Impact Statement must describe the change in mortality risk, including as a result of collision of migratory birds with any project infrastructure, vessels and vehicles;	■ These were outlined as Indicators and Expressions of Change in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.2
106	TISG Section 15.2, page 93	■ The Impact Statement must describe the changes to the bird-habitat relationships; the change in biodiversity, abundance, and density of the avian community that utilise the various habitat types or ecosystems;	■ Biodiversity metrics for the Birds VC will consider: – Distribution in space; – Frequency of occurrence; – Patterns of occurrence and abundance in time; – Abundance and, if possible, density; and – Associate habitat types and strength of associations	■ Section 9.4.2
107	TISG Section 15.2, page 93	■ The Impact Statement must ensure surveys cover temporal window that incorporates a variety of road usage by both diurnal and nocturnal species	■ Surveys are proposed to incorporate both diurnal and nocturnal species usage.	■ Section 7.2
108	TISG Section 15.2, page 94	■ The Impact Statement must account for indirect effects such as the increased movement of predators in the predictions of mortality effects;	■ This was outlined as an Indirect Effect in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.3
109	TISG Section 15.2, page 94	■ The Impact Statement must describe the incidental effects caused by increased disturbance (e.g., sound, artificial light, presence of workers), relative abundance movements, considering the critical periods for the birds, including but not limited to breeding, migration and overwintering.	■ These were outlined as Indicators and Expressions of Change in the updated Study Plan. Additional information will be provided in the IS / EA Report.	■ Section 9.2
110	TISG Section 15.2, page 94	■ The Impact Statement must support any assumption of temporary displacement during construction and operation of the Project through evidence or through study and monitoring within the project study area.	■ Monitoring programs studying temporary displacement effect will be identified as part of the IS / EA Report, if applicable. Environmental monitoring, if required by regulatory approvals, will verify the potential environmental effects predicted in the IS / EA Report, evaluate the effectiveness of mitigation and enhancement measures, and identify the process the Proponent will follow if mitigation and enhancement measures are not effective. ■ Additional information will be provided in the IS / EA Report.	■ Section 9.5
111	TISG Section 15.4, page 100	– provide an account of how the project and mitigation measures are consistent with the recovery strategy, action plan, or management plan for the species.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 9.4.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
112	TISG Section 15.4, page 95	■ The Impact Statement must: – describe the potential direct, incidental and cumulative adverse effects of the project on species at risk listed under Schedule 1 of the Species at Risk Act and, where applicable, its critical habitat (including its extent, availability and presence of biophysical attributes); – analyses predicted effects for each species at risk. To fully understand the effects and/or benefits of one alternative versus another, all relevant metrics and evaluators for species at risk should be considered; – include separate analyses for each project activity, component, and phase; – consider potential effects to species at risk from bioaccumulation and biomagnification of contaminants of dust and other pollutants resulting from the project; and conduct post-construction surveys to verify predicted effects. – conduct post-construction surveys to verify predicted effects.	■ Effects to SAR will consider potential direct, incidental, and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitatPredicted effects for each SAR will be analyzed and addressed in the IA / EA.Each project activity, component, and phase will be analyzed separately in the IA / EA. A thorough list of impact management measures including offsetting and compensation as necessary that will be employed by the Project will be included in the IS / EA Report.	■ Section 8.1 ■ Section 9.4.2 ■ Table 9-1
113	TISG Section 15.4, Page 95	– analyses predicted effects for each species at risk. To fully understand the effects and/or benefits of one alternative versus another, all relevant metrics and evaluators for species at risk should be considered;	■ Predicted effects for each SAR will be analyzed and addressed in the IA / EA.	■ Section 9.4.2
114	TISG Section 15.4, Page 95	– include separate analyses for each project activity, component, and phase;	■ Each project activity, component, and phase will be analyzed separately in the IA / EA.	■ Section 9.1
115	TISG Section 15.4, Page 95	– consider potential effects to species at risk from bioaccumulation and biomagnification of contaminants of dust and other pollutants resulting from the project; and conduct post-construction surveys to verify predicted effects.	■ All potential effects to SAR including from pollutants will be discussed, and follow-up programs such as post-construction monitoring will be included in the IA / EA.	■ Section 9.3 ■ Section 9.4.2
116	TISG Section 15.4, page 99	– demonstrate that avoidance and minimization measures will be applied for species at risk. Recovery Strategies will provide information such as Population and Distribution Objectives, and Strategic Direction for Recovery;	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 8.1 ■ Section 9.4.2
117	TISG Section 15.4, page 99	– clearly identify the locations of federal lands/non-federal lands within the study area and differentiate between these land tenures in the presentation of information regarding all species at risk. For example, total habitat disturbance for boreal caribou should be presented at the range scale, but it should also be presented in a way that clearly indicates habitat disturbance specifically within federal lands;	■ The information requested will be provided in the IS / EA Report.	■ Section 9.4.2
118	TISG Section 15.4, page 99	– clearings created for the Project may create new habitat types thereby attracting Species at Risk which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how new habitat types will impact species at risk in the project area	■ The IA / EA will consider the resilience of Bird VCs and associated habitat to the effects of the Project including the predicted impact of new habitat types such as clearings on SAR i.e., Eastern Whip-poor-will and Common Nighthawk.	■ Section 9.4.2
119	TISG Section 15.4, page 99	– describe all feasible measures that will be taken to avoid or lessen the impact of the Project on the species and its critical habitat;	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5 ■ Section 9.4.2
120	TISG Section 15.4, page 99	– describe all reasonable alternatives to the Project that would avoid the potential effects on species and their habitat, with particular attention to critical habitat, and important habitats such as upland habitat which is used as movement corridors by caribou, breeding areas for birds, and which contains roosting habitat for bats;	■ Reasonable alternatives to the Project will be described to avoid potential effects on SAR and their habitat, and will be included in the IS / EA Report.	■ Section 9.4.2
121	TISG Section 15.4, page 99	– Describe the area, biophysical attributes and location of habitat including critical habitat affected (e.g., destroyed, permanently altered, disrupted); describe all feasible measures that would be taken to eliminate the effects of the work or activity on species and their habitats, including critical habitat; and	■ The IA / EA will describe the biophysical attributes and locations of habitat, as well as all feasible measures to eliminate, avoid or minimize the effects of the Project on SAR and their habitats, including critical habitats.	■ Section 9.4.2
122	TISG Section 15.4, page 99	– describe the effects of construction pits and quarries on or near esker deposits on species at risk;	■ The effects of construction pits and quarries on or near esker deposits on SAR will be discussed in the IS / EA Report.	■ Section 9.4.2
123	TISG Section 15.4, page 99	– describe the potential adverse effects of the Project on species protected by provincial statutes and assessed by the COSEWIC as extirpated, endangered, threatened or of special concern (flora and fauna) and their habitat that are not currently listed under the Species at Risk Act;	■ Potential effects on species protected by provincial statutes and assessed by COSEWIC will be described along with those listed under SARA in the IS / EA Report	■ Table 2-1 ■ Section 9.4.2
124	TISG Section 15.4, page 99	– identify critical timing windows (e.g., denning, rutting, spawning, calving, breeding, roosting), setback distances, or other restrictions related to these species;	■ Critical timing windows (e.g., breeding), setback distances, or other restrictions that will be imposed or followed will be considered in assessing predicted effects.	■ Section 9.4.2

ID #	Federal TISG Reference	Requirement / Comment / Concern	Response	Study Plan Reference
125	TISG Section 15.4, page 99	– identify provincial, territorial or federal permits or authorizations that may be required in relation to the species at risk;	■ Provincial or federal permits or authorizations in relation to SAR that may be required will be identified in the IS / EA Report.	■ Section 9.4.2
126	TISG Section 15.4, page 99	– provide survey results and detailed mapping of each species at risk and their habitat, including important habitat features, for all federal lands;	■ The information requested will be provided in the IS / EA Report.	■ Section 8 ■ Section 9.4.2
127	TISG Section 15.4, page 99	– describe the residual effects that are likely to result from the project after avoidance and minimization measures have been applied, including the extent, duration and magnitude of the effects on: • the number of individuals killed, harmed, harassed; and • the number of residences damaged or destroyed.	■ Residual effects will be described in terms of the magnitude, geographic extent, timing, duration, frequency, social and ecological context, likelihood, and whether effects are reversible or irreversible. They will be described by – the number of individuals killed, harmed, harassed, and – the number of residences damaged or destroyed; and – the area, biophysical attributes and location of habitat including critical habitat affected.	■ Section 9.4.2 ■ Section 9.6
128	TISG Section 17.6, Page 110	■ The Impact Statement must assess potential impacts to surrounding communities, including local Indigenous communities. The spatial and temporal boundaries for the assessment should be determined with the input from the community based on pre-contact in consideration of aspects that are relevant to the community's understanding of their culture. The Impact Statement must assess changes to: – culturally significant plants or wildlife.	■ This information will be collected as described in the Land and Resource Use Study Plan. ■ The historic and current use of ungulates as a source of country foods (traditional foods) and where use has Indigenous cultural importance will be described.	■ Section 9.5 ■ Land and Resource Use Study Plan
129	TISG Section 20, page 119-128	■ Section 20 of the TISG describes the requirements around mitigation and enhancement measures that must be considered in the Impact Statement.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
130	TISG Section 20, Page 119	■ In relation to birds, mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the proponent: – to avoid harm to migratory birds, clearing and construction should be conducted outside of the core breeding period. Follow ECCC guidance for avoiding harm; • refer to ECCC guidance for nesting periods70; ■ It should be noted that these dates cover the core period for nesting activity of migratory birds, reducing the risk of taking a nest or eggs of a migratory bird. This recommendation does not authorize the disturbance, destruction, or take of a migratory bird, its nest, or its eggs outside of these date ranges.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
131	TISG Section 20, Page 123	■ in relation to Birds mitigation measures should be developed in collaboration with federal authorities and included in the Impact Statement. In addition, the following mitigation measures should be considered by the proponent: – specifically address mitigation of effects to eskers and related features rich in aggregate material, as these features are likely to be strongly impacted, to a degree much higher than their prevalence on the landscape. Describe, at a landscape scale rather than a single assessment of multiple hectares, how these measures address this uncommon high value landcover for forest birds during migration and breeding; – and at a minimum, the following mitigation should be applied:	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Section 9.5
132	TISG Section 21, pages 129-130	■ Section 21 of the TISG describes the requirements and guidance associated with determining residual effects.	■ Residual effects will be assessed in the IA / EA.	■ Section 9.6
133	TISG Section 22, pages 131-133	■ Section 22 of the TISG describes the guidance around conducting cumulative effects assessment for the project.	■ Cumulative effects assessment will be conducted as part of the IA / EA.	■ Section 9
134	TISG Section 26, Page 141	■ Section 26 of the TISG includes a description of the considerations for developing a follow-up program for environmental, health, social or economic effects, as applicable.	■ Monitoring programs will be identified as part of the IA / EA.	■ Section 9.10

Table 11-2: Study Plan Provincial Concordance – Conformance with Requirements

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
1	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ For each potential impact to species at risk or their habitat, measures will have to be identified to first avoid any adverse effects and in cases where there are no practical or feasible alternatives, identify measures that minimize or mitigate the adverse effects. Such measures may be general, site-specific, or activity-specific in nature. For caribou, the province has developed Best Management Practices (BMPs) for some sectors to provide guidance to avoid, minimize or mitigate adverse effects to the species and their habitat. Where possible, it is always preferential to avoid, given that if any adverse impacts exist, the associated activities would require authorization under the ESA.	■ The IS / EA Report will identify suitable impact management measures to avoid, eliminate or minimize potential effects of the Project, including potential effects SAR.	■ Section 9
2	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ In addition to land use policy, any resource management direction for the study area including forest management plans and fisheries management plans/objectives should be reviewed and considered	■ Applicable resource management plans will be reviewed and considered in the IA / EA.	■ Appendix A
3	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Refer to the MNRF's "Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (a.k.a. the Stand and Site Guide) for stand and site level direction that could be applied during planning and construction activities.	■ Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	■ Draft ToR ■ Appendix A ■ Section 9
4	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ The proposed all-season road will enable access to areas that previously have been essentially inaccessible to mechanized travel except during the winter. The creation of new access can result in impacts on fish and wildlife populations (e.g., due to new or increased hunting pressure), "remoteness" and remote or "wilderness" recreation / tourism experiences, among other effects. The MNRF will consider the effects of creating new access when making decisions to issue authorizations under legislation administered by MNRF.	■ Effects to wildlife and fish populations from the creation of new access and recreational opportunities will be considered in the IA / EA. Additional information can be found in the Land and Resource Use Study Plan.	■ Section 9 ■ Land and Resource Use Study Plan
5	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Project documentation will need to consider the direction within the Ogoki FMP regarding forestry activities, wildlife objectives and access, and address how the proposed project may impact those activities and objectives. There is also the need to consider the impacts to Kenogami Forest with respect to existing roads and the associated use management and responsibility.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Draft ToR ■ Appendix A ■ Section 9
6	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ There are likely a number of species that are considered provincially rare which occur within and adjacent to the proposed road corridor. The MNRF encourages using the best conservation measures available to protect these species.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Section 9
7	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ The project proposal and other documentation will need to identify these natural heritage features and fully consider potential impacts to and mitigation for the respective features.	■ Mitigation measures will be informed by best management practices, applicable resource management and / or recovery plan, Indigenous input, and industry standards.	■ Draft ToR
8	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ In the identification of alternative methods, the Environmental Assessment should document consideration of methods including an assessment of potential impacts to species at risk and their respective habitats and identify methods that can avoid or minimize potential impacts to individuals of the species and all categories or protected habitat to the extent possible.	■ The information requested will be provided in the IS / EA Report, if applicable.	■ Draft ToR
9	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ Study areas are missing and lack clarity – maps show study area for 4 routes even though only 2 (or 1?) routes are proposed to be assessed; no indication of local and regional study areas for each environmental component (e.g., groundwater, surface water, caribou, etc.).	■ The Study Areas are defined and described in the Study Plan.	■ Section 6
10	MECP	■ Completeness Review Memorandum compiled from MECP emails and August 2019 meetings with MECP and ENDM	■ MECP recommends that the EA contain commitments to monitoring to verify the expected effects of the proposed undertaking on species at risk and their habitat and to determine if additional impact mitigation measures or adjustments to any measures are required. Monitoring methodology for these species and their habitat should be included in the monitoring plan developed as part of the EA. If impact management measures are proposed, monitoring of the effectiveness of these measures should be included in the monitoring plan. The monitoring plan should include steps the proponent will take if impact management measures are not effective (e.g., application of additional impact management measures, changing how and where the activity will be performed, etc.).	■ The IS / EA Report will include a monitoring framework for the Preferred Route to verify the prediction of effects and the effectiveness of the impact management measures implemented, including those related to SAR and their habitat. These plan(s) will identify the compliance and effects monitoring activities to be undertaken during all phases of the Project, as required.	■ Section 9

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
11	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#17 Section 8 Page 54** – Consultation on Assessment Methodology - MFFN acknowledges that the proposed methodology will be open to input during the draft ToR review, but also says a more detailed method will be presented in the EA. Page 47 indicates the effects assessment criteria will be developed during the EA. While it is appropriate to defer some detailed work planning to the EA phase, the ToR should include commitments for how technical reviewers, and other interested persons, will be consulted during the development of specific evaluation methodologies or technical work plans. It is strongly recommended that those opportunities for review occur prior to the completion of studies (e.g., prior to the submission of a draft or final EA document).It is not clear whether MFFN plans to consult on the more detailed methodology and criteria during the EA phase or if the ToR phase is the main opportunity to provide input. – Please indicate how consultation on the ToR has informed the preliminary criteria and indicators. Please clarify when MFFN will consult and provide opportunity for input on the detailed assessment method, including criteria and indicators (and work plans as MECP has proposed), with agencies, communities and stakeholders during the EA phase in order to finalize the methodologies before EA studies get advanced.	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the Proposed ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with the MECP and the Agency once available. ■ A summary of technical discussions with agencies can be found in the Study Plan.	■ Section 4 ■ Section 5
12	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#21 Section 10.2.4 Page 73 Technical Work Plans** – Page 73 states that MECP has indicated it will not be commenting on work plans associated with field work until the ToR is finalized. This statement does not reflect MECP's guidance to the project team. MECP's guidance, which is documented on page 69 of the RoC, is that the ToR is the mechanism to seek technical review of work plans and that discipline- specific work plans should be included with the ToR. As well, discussions that MECP has had with the project team to date are considered pre-consultation, since it is the ToR that sets out what work is to be done during the EA phase.Please revise the statement on page 73 to state: "MFFN provided MECP and MNRF work plans associated with field work planned during 2019 for review, however MECP advised this is considered-consultation and that discipline-specific work plans should be appended to the ToR to allow full technical review. "As the draft ToR did not include detailed discipline-specific work plans, the other option the ministry strongly recommends is to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in Section 3 of the Study Plan.	■ Section 3
13	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **Assessment Methods** – For the most part, section 7.2 provides a description of potential environmental effects for each discipline. However this section also includes assessment methodologies for some subsections (7.2.1 and 7.2.2 AERMOD modelling, quantitative noise assessment) while the majority do not (7.2.3 – 12). The level of detail in the ToR about assessment methods should be consistent for all environmental components. – It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others. The work plans should include assessment methodology appropriate for each environmental component. The ToR could include a high level summary table for each environmental discipline listing data collection and assessment methods, with a commitment to develop the work plans at the outset of the EA phase to provide more details. Consider where the information about air and noise modelling is best placed.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in Section 3 of the Study Plan.	■ Section 3
14	MECP	■ Email from Agni Papageorgiou & Sasha McLeod, Special Project Officer Environmental, MECP Assessment Services Section, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#16 Section 8 Page 54** – Work Plans - Section 8 describes the approach that will be taken to evaluate alternative methods during the EA, including proposed criteria and indicators (presented in Appendix A). The information presented is high level and does not provide an opportunity for technical review of the methodologies that will be applied to evaluate those specific criteria and indicators. – It is strongly recommended to include commitments to develop work plans at the outset of the EA phase, including opportunities for technical review by agencies and others.	■ The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in **Section 3** of the Study Plan.	■ Section 3

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
15	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ Recommendation to prevent delays should ESA authorization be required. It is strongly recommended that the project be planned, and the environmental assessment prepared, with the requirements of the Endangered Species Act, 2007 (ESA) in mind. This can potentially facilitate the authorization process under the ESA, where authorization is required. In order to inform any future ESA authorization requirements, reasonable route / project alternatives should be assessed for impacts to all species at risk and their respective habitats, and at least one avoidance alternative should be included. Please refer to the MECP "Avoidance Alternatives Form" for activities that may require an overall benefit permit under clause 17(2)(c) of the Endangered Species Act" and accompanying guide forreference. (http: / /www.forms.ssb.gov.on.ca/mbs/ssb/forms/ssbforms.nsf/MinistryResults?Openform&SRT=T&MAX=5&ENV=WWE&STR=1&TAB=PROFILE&MIN=018&BRN=21&PRG=31)	■ The requirements of the ESA process were considered in the development of this Study Plan.	■ Section 7 ■ Section 9
16	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.9 / pg. 32** – Based on the information provided in this section, it is unclear what data collection has already been conducted versus what data collection will be conducted during the development of the EA for SAR. For example, it is unclear whether the information provided on page 32 for the Bat maternity Roost Monitoring and Bird Surveys have already occurred or are being planned. If they have already occurred, additional information on the methodology, survey extent, dates, etc. is required. Further, there is no mention of the 2018 Winter aerial caribou survey conducted by Zoetica, as mentioned in the Response to MFFN – Request for Information dated 2019-07-30, or any of the field work proposed in the Technical Memorandum provide to MECP on June 6, 2019 which outlined the planned breeding bird point count surveys, marsh bird call back surveys, bank swallow and barn swallow visual habitat assessments, Eastern Whip-poor-will surveys, Bat Maternity Roost Monitoring Surveys, Remote Camera Surveys, Vegetation Surveys, and Aerial Reconnaissance Survey. All previous field work related to SAR should be identified and summarized in the Draft ToR. This will assist in determining whether additional SAR surveys are required (i.e., to identify occupancy, distribution, etc.) Specifically for Caribou, Winter Aerial Surveys, Summer Calving Survey, Telemetry Studies and (to a more limited extent) Camera Trap Surveys each provide valuable information that can provide inform on baseline conditions and impacts. Refuge from predation is the ultimate factor influencing caribou distribution and habitat use in the Boreal forest. One of the key threats to caribou is habitat fragmentation due to development activities, particularly those that increase and / or introduce linear features to the landscape. These types of disturbances increase predator efficiency which may have a detrimental effect on caribou populations within the LSA and RSA. Understanding how caribou respond to habitat fragmentation and increased predator access will be an important aspect to assessing the impacts of the Project. Particularly, the deployment of radio satellite collars on caribou within proximity of the alternative corridors under consideration (e.g., LSA), that would enable tracking of caribou before / during / after construction, provides important baseline information and contributes towards assessing impacts of the Project on caribou habitat movement and habitat selection / use within proximity to new linear features. Update the draft ToR to clearly identify any data collection (i.e., surveys) for SAR that have already been conducted. In each case, provide survey methodology, dates, etc. Update the draft ToR to clearly identify any data collection that will be conducted for SAR during the development of the EA (i.e., data collection and monitoring work plan). Include a brief description of the data collection methodology that will be used. This should include details for surveys and methods MFFN is committing to carry out during the EA, including, but not limited to, the following: • Caribou (e.g., aerial / ground surveys, telemetry study, camera traps, etc.) • Wolverine (e.g., telemetry study, hair traps, camera traps, etc.) • Northern Myotis and Little Brown Myotis (e.g., bat hibernaculum screening, bat maternity roost habitat assessments, bat acoustic surveys, etc.) • Bank Swallow (e.g., nesting surveys, etc.) • Barn Swallow (e.g., nesting surveys, etc.) • Eastern Whip-poor-will (e.g., habitat assessments, breeding surveys, etc.)	■ Information about field studies conducted to date, as part of this program are summarized in the Study Plan.	■ Section 7

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17	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ Additional information should be provided, in table format, for each SAR that have the potential to occur in the area of the Project, including, but not limited to: – Scientific name- Common name- Species Status under SARA (Federal)- Species Status under ESA (Provincial) – Conservation Ranking (i.e., N-Rank, S- Rank)- Information Source(s) used to identify potential occurrence within the area of the Project – Indication of whether a field survey(s) has been conducted already to identify species presence and, if so, whether or not it was observed – General list of habitat requirements – Indication of whether the required habitat exists within the Study Area (i.e., as per comment 5, should include Project Footprint, Local Study Area and Regional Study Area) Update the draft ToR to include additional information for each SAR that have the potential to occur in the area of the Project.	■ The information requested will be provided in the IS / EA Report.	■ No reference
18	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.7 pg 30 File surveys conducted in Spring"** – will the results from this be included in the ToR or in the EA? A Work plan should be committed to in the ToR for field work to be completed and where necessary should be designed to target specific Species at Risk. MECP would like to advise on survey methodology. This will make sure that the proponent does not apply efforts that are not required or likewise they will not miss aspects that will require repeated effort.	■ This Study Plan has been designed to target SAR and will be provided to the MECP for their review.	■ Section 7
19	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.7.1.4.9 / pg. 32** – Submit the acoustic monitoring design and data collected for review and further advice.	■ The information requested will be provided in the IS / EA Report.	■ Section 8.2
20	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **s.5.2.2 / pg. 13** – If ESA authorization is required, project details including location and extent of infrastructure (e.g., road, temporary access roads, laydown areas, etc.) will need to be identified prior to permitting to ensure complete assessment of impacts to SAR.	■ Study Plan **Section 6.2** indicates that the Project Development Area (PDA) encompasses the 100 m wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, quarries, borrow areas, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report.	■ Section 6.2
21	MECP	■ Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist – Species at Risk Branch – Permissions & Compliance, Email from the Ministry of the Environment, Conservation and Parks with comments of the Draft ToR, received on 24-Jan-2020	■ **#7 s.7.1.1 / pg. 19** – The draft ToR limits the Study Area to only a 5 km width (2.5 km on either side of the ROW). This limited extent is inappropriate to assess the impacts to SAR that use broad landscapes, specifically Caribou (Boreal population) and Wolverine.Multiple spatial extents need to be considered as part of the Study Area (e.g., Project Footprint, Local Study Area, Regional Study Area) to appropriately consider and assess impacts of the Project to SAR.Update section 7.1.1 and Figure 6-1 in ToR to identify the Study Area at multiple spatial scales, including Project Footprint, Local Study Area and Regional Study Area. Update information provided in section 7 of ToR to reflect the updated Study Area in the Existing Environment and Potential Environmental Effects.	■ The Study Areas are defined and described in the Study Plan.	■ Section 6.2

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22	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#10 s.7.1.4.9 / pg. 31** – The Bank Swallow is not included in the list of Wildlife species that have the potential to occur in the area of the Project. We do note that it is identified under Bird Surveys on page 32. As a Threatened species, they receive both species and habitat protection under the ESA. There is potential for them to occur in the area of the Project, specifically along steep, sandy portions of the banks on the Albany or Ogoki Rivers. This species should be included in the list on page 31 of the draft ToR and the impacts of the Project should be assessed for this species. Update the draft ToR to include Bank Swallow in the list of Wildlife species in which the impacts of the Project will be assessed.	■ The Study Plan has been updated to indicate that the conclusion of no potential Barn Swallow or Bank Swallow habitat present in the LSA was based on desktop review and aerial / ground surveys. Additional results of previous surveys will be provided at a later date.	■ Table 2-1 ■ Table 7-1
23	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#18 Table 7-4 / s. 7.2 / pg. 47 and s.7.2.9 / pg. 52** – Preliminary consideration of potential effects to SAR needs to be included, above and beyond those applicable to vegetation (s.7.2.6), wildlife (s.7.27) and fish and fish habitat (s.7.2.8). – Both Table 7-4 and s.7.2.9 are lacking any information specific to SAR (e.g., increased mortality risk to caribou resulting from predator efficiencies related to additional linear features, increase in predator/prey populations, etc.). – This should include a preliminary list of potential effects, in a table format, including, but not limited to, the following: • Project Component or Activity ○ Field surveys, staking, layout ○ Vegetation clearing and grubbing ○ Construction of supportive infrastructure (e.g., storage and laydown yards, temporary access roads, construction camps, aggregate extraction areas) ○ Construction of the road ○ Aggregate extraction and production ○ Emissions, discharge and waste ○ Operations and maintenance • Potential Effects • Mitigation Measures – Update the draft ToR to include additional information for preliminary potential effects of the Project components specific to SAR.	■ Impacts on SAR by individual project activities will be described in detail in the IS / EA Report.	■ Section 9.4.2
24	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ The Draft ToR indicates that MFFN provided MECP and MNRF work plans associated with field work planned during 2019 for review, but that the agencies indicated they will not be commenting on work plans until the ToR is finalized.As per comment ID#174, MECP SARB is seeking a data collection and monitoring work plan to be included in the ToR outlining the data collection methodology that will be conducted for SAR during the development of the EA to inform baseline and environmental effects to SAR. Update the draft ToR to clearly identify any data collection that will be conducted for SAR during the development of the EA (i.e., data collection and monitoring work plan). Include a brief description of the data collection methodology that will be used. This should include details for surveys and methods MFFN is committing to carry out during the EA, including, but not limited to, the following: – Caribou (e.g., aerial / ground surveys, telemetry study, camera traps, etc.) – Wolverine (e.g., telemetry study, hair traps, camera traps, etc.) – Northern Myotis and Little Brown Myotis (e.g., bat hibernaculum screening, bat maternity roost habitat assessments, bat acoustic surveys, etc.) – Bank Swallow (e.g., nesting surveys, etc.) – Barn Swallow (e.g., nesting surveys, etc.) – Eastern Whip-poor-will (e.g., habitat assessments, breeding surveys, etc.)	■ The updated Study Plan will be reviewed by relevant federal and provincial agencies.	■ No reference

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25	MECP	■ Email from Kevin Green, Species at Risk Recovery Biologist; Michelle Karam, Management Biologist; Nikki Boucher, A/Species at Risk Specialist - Species at Risk Branch – Permissions & Compliance, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ **#22 Appendix A – Ungulates – Wildlife – Potential Data Sources / pg. 2** – Additional published sources of information should be included for all SAR: • Policy Guidance on Harm and Harass under the Endangered Species Act (2014) • Categorizing and Protecting Habitat under the Endangered Species Act (2012) • Endangered Species Act Submission Standards for Activity Review and 17(2)(c) Overall Benefit Permits (2012) • Wolverine Government Response Statement (2016) • Wolverine Recovery Strategy (2013) • Little Brown Myotis, Northern Myotis and Tri-colored Bat in Ontario – Ontario Recovery Strategy Series (2019) – Update the draft ToR to include additional data sources.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Appendix A
26	MECP	■ Email from Nikki Boucher, A/Species at Risk Specialist, Permissions and Compliance, Species at Risk Branch, Ministry of the Environment, Conservation and Parks with comments of the Draft ToR	■ We have carried out our review with a view to both the EA and future regulatory authorizations in order to provide you with information that will help enable an efficient approach to project planning and preparation of applications for any necessary Endangered Species Act (ESA) authorizations. Specifically, attention should be paid to the following requirements that form the basis of many of our ESA authorizations:· Minimize adverse effects – you must take reasonable steps to minimize the adverse effects of your activity on the species at risk and their habitat that are likely to be affected by your activity.o Ways to minimize adverse effects of your activity on species at risk & their habitat may include modifying the:* location of the activity* geographic scale of the potential effects* activity design (e.g., engineering and technological)§ timing of the activity* duration and frequency of the effects* approaches and timing for any site restoration or rehabilitation (such as doing progressive rehabilitation while other parts of the activity are still happening)* general operational protocols· Consider reasonable alternatives – you will need to show the Ministry of the Environment, Conservation and Parks that you have considered reasonable alternatives to your activity.o Alternative approaches to your activity include:* Changing the location of the activity* Using alternative methods, equipment or technical designs* Changing the timing of the activity to avoid times when the species is there or is most sensitive to disturbance* Changing the geographic scale, duration and/or frequency of the potential adverse effects* Adding or changing approaches and timing of site restoration or rehabilitation after the activity is doneo When considering reasonable alternatives to your activity, you must:* Consider at least one alternative that would completely avoid any adverse effects on species at risk* Identify alternatives that you considered but did not think were reasonable because of biological, technical, social or economic limitations§ Explain why the approach you have chosen is the best alternativeIn addition, should an Overall Benefit Permit be required for the project, as determined through MECP's review and assessment of all the project details, the following requirement would also need to be considered:· Achieve overall benefit – providing an overall benefit to a species means undertaking actions that contribute to improving the circumstances for the species. It must include more than steps to minimize adverse effects on the species or habitats.o Achieving an overall benefit to a species may involve providing the species with a range of benefits, such as:* increasing the number of individuals of the species living in the wild and capable of reproducing§ increasing the distribution of the species within its natural range§ increasing the viability or resilience of existing populations of the species§ slowing or reversing population declines by addressing key threats to the species' survival§ increasing the quality or amount of habitat for the specieso Activities such as filling information gaps, education and outreach may contribute to an overall benefit plan for a species at risk. However, alone they are unlikely to meet the overall benefit requirement.o Recovery strategies and government response statements, where available provide information that can be used to form plans to achieve an overall benefit for species at risk.	■ The requirements of the ESA process were considered in the development of this Study Plan.	■ Section 9
27	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **13. Other Permits and Approvals Table 13-1 pg. 84** – As migratory birds are mentioned on page 30, Migratory Birds Convention Act should be included and listed under the jurisdiction of Environment and Climate Change Canada (ECCC). – Please confirm with ECCC for the additional listing in the table of the Migratory Birds Convention Act, and if migratory birds should be listed as an evaluation criterion.	■ The information requested will be provided in the IS / EA Report.	■ N/A

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28	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 5.2 Pg.11** – The Western road corridor alternatives 1 & 4 were chosen to move forward to the EA from the Supplemental Information comparing several alternatives. One of the reasons for relocating away from the existing winter road corridor was access to higher ground (and aggregates). – The higher ground (rock knobs and aggregate) are limiting features in the Far North, and as such possibly provide unique benefits to fish and wildlife. It is recognized that the EA should address concerns related to construction of an all weather road in this northern wetland environment. That said locating the road in higher ground presents concerns related to the limited nature of these features in the northern environment. This is another angle that will need to be evaluated in the EA ie the limit of the higher ground and implications towards ecosystems (wildlife, fisheries, etc.).	■ The effects of disturbance or loss of these areas on birds and other environmental components will be considered as part of the IA / EA.	■ Draft ToR ■ Section 6.2 ■ Section 7.2
29	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 7.1.1 (pg. 19), Sec. 7.1.4 (pg. 22), Sec 10.2.4 (pg. 72),** – Appendix A ToR indicates that the study area is 2.5 km on each side of the centreline of each alternative route. Given the range of some of the wildlife species, the distance that some fish species will travel to spawn and the potential impacts on remote tourism operations. The study area described may not be adequate to assess the full range of impacts Please provide rationale for the study area. A data share agreement between the MFFN project team and the Crown is in place. This should be recognized in the ToR and included as a potential data source. Please describe how Crown provided data and data collected for the project will be used and shared amongst organizations. The ToR should recognize the Crown Data Share Agreement and include reference to it in the listing of potential data sources for the criteria and indicators alternatives evaluation.	■ The study areas are defined and described in the Study Plan.The data share agreement is recognized in **Appendix A** of the Study Plan.	■ Section 6 ■ Appendix A
30	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 7.1.4.9 Pg. 31** – It is recommended a more thorough review is conducted of species that have the potential to be impacted by the proposed undertaking that are listed as Special Concern on the Species at Risk list of Ontario as well as species that are currently only listed under the Species at Risk Act. For consideration in the EA.	■ The information requested will be provided in the IS / EA Report.	■ No reference
31	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Sec. 14 - References 85+ Additional resources from:** – Catalogue of natural resource scientific and technical publications. Search a list of the scientific and technical publications issued since 2004 see Catalogue-natural-resource-scientific-and-technical-publications – To request a publication issued by the Ministry of Natural Resources and Forestry, or if you have a question related to MNRF scientific and technical publications, please contact us by email with the title of the publication. For journal articles, please contact the journal publisher directly. – For MNRF climate change publications see MNRF_Climate_Change_Publications – Information about Ontario's species of conservation concern, plant communities, wildlife concentration areas and natural areas see https://www.ontario.ca/page/get-natural-heritage-information – Ontario Geohub https://geohub.lio.gov.on.ca/ provides spatial data and mapping applications such as OFAT (Ontario Flow Assessment Tool) that is used to better understand water flow in Ontario. https://www.ontario.ca/page/watershed-flow-assessment-tool – Some selected publications that may be of interest: • Wester, M.C. et al. 2018. The Ecosystems of Ontario, Part 2: Ecodistricts. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Technical Report TR-26. 474 p. + appendices Catalogue-natural-resource-scientific-and-technical-publications • Ontario Ministry of Natural Resources and Forestry. 2019. Far North Information Knowledge Management Plan Progress Report 2008-2018. Ontario Ministry of Natural Resources and Forestry, Far North Branch, Peterborough, ON. 80p. contact: farnorthfeedback@ontario.ca • Riley, J. 2011. Wetlands of the Hudson Bay Lowland: An Ontario Overview. Nature Conservancy of Canada, Toronto ON 156 pp. ISBN 978-1-897386-27-9 link	■ Descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental condition will be provided in the IS / EA Report and are summarized in this Study Plan.	■ Section 7 ■ Appendix A

ID#	Comment from Regulatory Agency	Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response	Study Plan Reference
			• Marshall, T.R. and Jones, N.E. 2011. Aquatic ecosystems of the Far North of Ontario state of knowledge. Ontario Ministry of Natural Resources. 43 p.+ appends. ISBN 978-1-4435-6512-7 Catalogue-natural-resource-scientific-and-technical-publications • Metcalfe, R.A. et al., 2013. Aquatic Ecosystem Assessments for Rivers. Science and Research Branch, Ministry of Natural Resources, Peterborough, Ontario. 210 pp. Link		
32	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Appendix A Missing source information:** – MNRF Natural Heritage Reference Manual (NHRM), 2014. Please add MNRF Natural Heritage Reference Manual (2014) to the list of published sources of information for existing conditions. The Natural Heritage Reference Manual can be referenced in conjunction with the Significant Wildlife Habitat Technical Guide (SWHTG) 2000, which are not mandatory for the EA, but provide clear guidance. The NHRM outlines evaluation processes of habitat and other natural heritage features. The SWHTG offers guidance to evaluate and identify the significance of wildlife habitat. Appendix A 1 The EA should expand upon the criteria and indicators that are provided and develop indicators that can readily be quantified (e.g., number of water crossings required, number of wetlands, number of kms of wetlands to be crossed, or sensitive areas impacted). Appendix A of the ToR should be revised to include indicators for the proposed criteria that are quantitative in nature.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report. Indicators have been identified based on background information, consultation with regulatory agencies, public and indigenous consultation.	■ Appendix A ■ Section 9
33	MNRF	■ Letter received from Dave Barker, Resources Management Supervisor, Nipigon District, MNRF on the Draft Terms of Reference	■ **Draft Criteria and Indicators for Alternatives Evaluation Appendix A** – Available resources to help inform the draft criteria and indicators include research publications and expert knowledge on topics such as stressor-effects pathways, cumulative effects, and associated environmental components and indicators. – Contacting researchers such as Rob Mackereth (MNRF) who has published research on these topics and related subjects is encouraged. – Rempel, R.S., et al. 2016. Support for development of a long term environmental monitoring strategy for the Ring of Fire area. Ontario Ministry of Natural Resources and Forestry, Science and Research Branch, Peterborough, ON. Science and Research Information Report IR-08. 34 p. + append. Catalogue-natural-resource-scientific-and-technical-publications – While no specifics are provided in this submission, MNRF welcomes a discussion with MECP and ENDM to explore what (if any) role this project could play in advancing baseline information and long-term environmental monitoring for the Ring of Fire in partnership with First Nations communities.	■ Data sources are being reviewed for their appropriateness and will be included in Study Plans where applicable. Information on specific data sources and their relevance to the Project will be included in the IS / EA Report.	■ Appendix A

Table 11-3: Study Plan Federal and Provincial Concordance – Requirement Deviations

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
1	TISG Section 8.9, page 52	■ Design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation; – transects and sites: • transects should be spaced every 2 kilometres along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centreline of the route. A maximum length of 5 kilometres is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features in alignment with the route. Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point; • Survey sites along transect should be located as follows: 1 site on centreline of route, sites spaced every 250 meters up to 1 kilometre, then spaced every 500 meters to end of transect. A 5-kilometre transect should have 15 survey sites; • Every 100 kilometres of route should contain 50 transects. Of these, 20 transects should be sampled using Automated Acoustic Recorders (ARU) and 30 transects sampled by human observers (Point Count Transects); and	■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design was used for initial sampling in the PDA and LSA and is planned for additional sampling to maintain a standardized design. This selection was based on comparisons of data simulations with alternative study designs including the TISG recommended benchmark study design of transects. ■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality rather than the TISG recommendation of transects. The same ratio of ARUs to point counts will be applied to the bird study design as described in the TISG Section 8.9, Page 52.	■ A GRTS study design was used for initial sampling in the PDA and LSA following consultations with ECCC rather than the TISG recommended study design of transects. As outlined in the TISG, simulation modelling was used to provide evidence that this sampling strategy has not resulted in the introduction of bias. Model simulations of data collected during initial sampling determined an "optimal" sample size to fil data gaps while reducing variances and producing non-biased estimates representing all land cover types. The GRTS study design was the preferred option over a simple random study design and the TISG benchmark study design for selecting additional sampling based on the lower variance and mean bias at the "optimal" sample size. A land cover analysis was used in planning to expand the LSA to 6 km. ■ Study design will not implement point count survey sites along 5 km-long transects for the following reasons: – The number of survey point using this approach (estimated 2,500) goes beyond what is needed for precise and non-biased bird modelling as demonstrated in simulation modelling. Transects at this density are not reasonable / feasible given limited accessibility to the landscape (e.g., dense forest, blow down, water features, etc.) and for field staff health and safety considerations, – Evenly spaced transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted). – A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. Model simulations have been competed to demonstrate the optimal sampling to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	■ Suggest revising this requirement to read: – ‘design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following suggested survey design should be considered as inputs to design planning and evaluation; – transects and sites: • transects should be spaced every 2 kilometres along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centreline of the route. A maximum length of 5 kilometres is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features in alignment with the route. Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point; • Survey sites along transect should be located as follows: 1 site on centreline of route, sites spaced every 250 meters up to 1 kilometre, then spaced every 500 meters to end of transect. A 5-kilometre transect should have 15 survey sites; • Every 100 kilometres of route should contain 50 transects. Of these, 20 transects should be sampled using Automated Acoustic Recorders (ARU) and 30 transects sampled by human observers (Point Count Transects); and

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
			■ The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As outlined in the TISG, simulation modelling was used to provide evidence that this sampling strategy has not resulted in the introduction in bias. The same ratio of ARUs to point counts will be applied to the bird study design as described in the TISG Section 8.9, Page 52.	■ Study design will not implement point/ARU transects for the following reasons: – Transects are provided as a recommendation and not requirement, serving as a benchmark study design. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As per the TISG, model simulations have been competed to demonstrate the optimal sampling for the GRTS study design to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	
4	TISG Section 8.9, page 52	■ Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width.	■ The requirement cannot be addressed at this time as:Project components other than the route itself are unknown. However, the PDA and LSA will be adjusted accordingly as the Project design progresses. The use of transects is not a requirement, but a recommendation as outlined in the TISG. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality rather than the TISG recommendation of transects.	■ Study design will not implement point/ARU transects for the following reasons: – Transects are provided as a recommendation and not requirement, serving as a benchmark study design. A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. As per the TISG, model simulations have been competed to demonstrate the optimal sampling for the GRTS study design to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	■ Suggest revising this requirement to read: Project components other than the route itself should be sampled. Such components ~~that are linear (e.g., access or service roads)~~ should be sampled following a statistically robust survey design which is comparable to the suggested transect method ~~surveyed using the sample design described transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart~~ and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. ~~As with transect lengths,~~ modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width.
5	TISG Section 8.9, pages 52-53	■ Regarding “bird sampling”: – 1. ARU Transects: Deployment of ARUs should be used to inform estimates of site use by birds across a broad range of dates (including seasons) and times of day. Since ARUs capture bird movements across dates and times, sampling on ARU Transects should be conducted on a subset of sites within transects. This subset should include the route centreline site, with the remaining sites at 500-metre spacing out to the transect endpoint: a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity;	■ ARUs will follow this protocol with the exception of a sampling period of June 1 to July 10 for more accurate breeding recordings in northern Ontario and a reduced sampling period either during early winter (December 1 to December 31) or late winter (March 1 to March 31) and not sampling within transects.	■ Due to minimum temperature limitations of ARUs, winter ARU deployment will be for one month at the beginning or end of the winter season as defined the TISG. ■ Study design will not implement point count survey sites along 5 km-long transects for the following reasons: – The number of survey point using this approach (estimated 2,500) goes beyond what is needed for precise and non-biased bird modelling as demonstrated in simulation modelling. Transects at this density are not reasonable / feasible given limited accessibility to the landscape (e.g., dense forest, blow down, water features, etc.) and for field staff health and safety considerations,	■ Suggest revising this requirement to read: – Regarding “bird sampling”: 1. ARU Placement: Deployment of ARUs should be used to inform estimates of site use by birds across a broad range of dates (including seasons) and times of day. Since ARUs capture bird movements across dates and times, sampling on ARU locations should be conducted on a subset of sites ~~within transects. This subset should include the route centreline site, with the remaining sites at 500-metre spacing out to the transect endpoint:~~ a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of June 1 through July 10 (Breeding Recordings). Use

ID #	Federal TISG Reference or Provincial Draft ToR Comment Reference	Requirement / Comment / Concern	Response (Rationale for not meeting requirement)	Justification (for not complying with requirement including for example scientific research, precedence)	Proposed TISG Amendment
		b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day, with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would start at 00:00 (HH:MM), with a schedule of 3-minutes On and 12-minutes Off until 5 hours beyond local sunrise (i.e., SR+5hr). Phase 2 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d) ARUs should be set to record using a sampling rate of 44.1 kHz. "		– Evenly spaced transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted). – A GRTS study design will be used for sample site selection with consideration of access and differences in habitat quality. Model simulations have been competed to demonstrate the optimal sampling to fill data gaps while reducing variances and producing non-biased estimates representing all land cover types.	deployments that maximize full use of battery and sound card capacity; b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites ~~may be a subset of either entire ARU transects or sites along transects but~~ should use statistical methods to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day, with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would start at 00:00 (HH:MM), with a schedule of 3-minutes On and 12-minutes Off until 5 hours beyond local sunrise (i.e., SR+5hr). Phase 2 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d) ARUs should be set to record using a sampling rate of 44.1 kHz. "
6	TISG Section 8.9, page 54	■ Acoustic file and data analysis: – acoustic files should be analyzed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface (https://www.wildtrax.ca/home), with each individual detected recorded as a data point and referenced to the first 1-minute interval it was detected: • Prior to interpretation, acoustic files suitable for analysis should be identified by examining spectrograms and listening to a short segment of the file. Files with substantial wind, rain or other noise (e.g., frogs) should be excluded.	■ The requirement to use a specific software for analysis should be removed as a requirement.	■ Acoustic storage and analysis software packages are continuously improved and updated. The technical team will select the best available software, appropriate for the analysis to be conducted, at the time when analysis is being conducted. The software used will be described in the IA/EA.	■ Suggest revising this requirement to read: – Acoustic file and data analysis: • acoustic files should be analyzed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface (https://www.wildtrax.ca/home), or other suitable software with each individual detected recorded as a data point and referenced to the first 1-minute interval it was detected: ○ Prior to interpretation, acoustic files suitable for analysis should be identified by examining spectrograms and listening to a short segment of the file. Files with substantial wind, rain or other noise (e.g., frogs) should be excluded.

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Appendix A

Preliminary List of Data Sources

Information requests and publicly available data (i.e., data banks and databases) from the following sources:

- Federal government (e.g., ECCC, Health Canada)
- Ontario provincial government (e.g., the MECP, the MNRF, the ENDM)
- Natural Heritage Information Centre Make-a-Map: Natural Heritage Areas and Rare Species Records (MNRF, 2020b)
- Crown Land Use Policy Atlas (MNRF 2005)
- Land Information Ontario base mapping data for ANSIs (Area of Natural or Scientific Interest) (MNRF 2020c),
- Ontario Land Cover Compilation V 2.0 (MNRF 2020d)
- Ontario's Provincial Satellite Derived Disturbance Mapping digital resource (Government of Ontario 2020)
- Ontario's FNLC Layer (MNRF 2014a) Ramsar Canada Sites (Ramsar Canada 2020)
- Significant Wildlife Habitat Criteria Schedules (Ecoregions 3E and 3W) (MNRF 2015b, MNRF 2017c)
- Local Governments (i.e., Municipalities of Greenstone and Thunder Bay, local First Nations (i.e., Indigenous Knowledge)
- Natural Resource Management Plans; Wetland guidance documents from other Canadian Provinces, and federal guidance documents [i.e. Far North Biodiversity Project (Ontario Biodiversity Council 2020); Forest Management Plans (Long Lake Forest Products Inc. 2008), Alberta Wetland Policy (Government of Alberta 2013); The Wetland Ecological Functions Assessment (Environment Canada 2008), The Wetland Network (2020)]
- Species Recovery and Restoration Plans
- Atlases (i.e., Ontario Breeding Bird Atlas [Cadman *et al.* 2007], iNaturalist [2020])

Other sources of data

- Academic institution and academic journal articles (i.e., Hedley *et al.* 2020; Vala *et al*. 2020; Yip *et al.* 2019)
- Field studies, including site-specific survey methods.

- Monitoring program databases protected areas, watershed or coastal management plans (i.e., Ring of Fire Baseline Environmental Monitoring Program [MECP 2019c]).
- Land cover data, including: terrestrial ecosystem mapping products, forest cover maps, remote sensing resources.
- Important habitats and features to include:
  - water bodies, wetlands, watercourses;
  - riparian habitat;
  - river banks or other eroded habitats;
  - artificial water sources;
  - forest, tree patches, solitary trees (especially old decaying trees);
  - forest edges and tree rows;
  - ridges, including eskers;
  - caves and mines;
  - cliffs, rock outcrops, exposed bedrock, talus, and other karst topography;
  - buildings, bridges, and other anthropogenic features, including linear features; artificial water sources;
  - forest, tree patches, solitary trees (especially old decaying trees);
  - forest edges and tree rows;
  - ridges, including eskers;
  - sources of artificial lighting attracting insects;
  - critical habitat; and
  - any other habitat features known to be important in the area.
- Published literature, such as peer reviewed journals, reports by think tanks, nongovernment organizations and government reports (e.g., COSEWIC Recovery Strategies).
- Environmental assessment documentation, including monitoring reports, from prior projects in the area and similar projects outside the area, regional studies, project assessments and strategic assessments.
- Renewable harvest data.

Appendix B

Agency Comments on the Draft Study Plan

Draft Study Plan Comments – Federal

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
GC	■ GC	■ Sections 5, 6, 7, 13, 19.2 and 25	■ In addition to the required actions detailed below, other required actions to be addressed in the update to this study plan are detailed in a separate table titled "2020-07-02 – IAAC to MFCAR - General Comments on MFCAR Draft Study Plans". The Agency has provided these other required actions to highlight common sections of the GUIDELINES where requirements were not met in the draft study plans submitted to the Agency. These additional actions must be addressed in the updated study plans.	■ We have reviewed the relevant comments and incorporated where appropriate. Please refer to the General Comments Table Response submitted separately to the Agency for specific responses.		■ Various Sections in Birds and Wildlife Study Plans
Editorial Comment	■ Section 4.1.2.1 2019 Golder Bat Surveys – "Wildlife Acoustics Song Meter SM4BAT FS acoustic monitors were deployed at 167 stations within the LSA in suitable habitats to record bat activity during the maternity roosting period (June 1 to June 30) to determine if SAR bats are present in these communities. The acoustic detectors were set to record from 30 minutes before sunset to 30 minutes after sunrise for a period of at least 10 days. The detectors were set up June 13-17, 2019 in the maternity roosting window and collected from September 2-4, 2019. One bat detector failed to function, and another bat detector was stolen, therefore data was collected from 15 stations."	■ Editorial Comment	■ Typo in either the number of units deployed (167) or the number from which data were collected (15)	■ Clarify the number of acoustic monitors deployed and from which monitors data were collected.	■ The Study Plan has been updated from 167 to 17.	■ Wildlife Study Plan: Section 7.2.1.2.2
WH-01	■ Section 3: Spatial Boundaries: Study Areas – "The LSA currently being considered for wildlife within the scope of the ongoing regulatory review process generally includes the area within 2.5 km of the centreline of Alternative 1 and alternative 4, with the exception of studies related to Wolverine (Gulo gulo) where 10 km beyond the PSA will be considered as per the TISG. The Study Area generally allows for	■ Section 7.4.1 – "Delineate spatial boundaries (i.e., regional study area, local study area, and project study area) to meet the following objectives: a. range of land cover types should be representative of the defined spatial extent; b. the spatial pattern of the land cover types should be well distributed across the defined spatial extent (e.g., revise if one or more land	■ It is unclear if the planned PSA, LSA, or RSA boundaries were defined with respect to items a-c in Section 7.4.1 of the Guidelines, including if simulation modelling was used. ■ Omission of project components other than the route itself are likely to provide an incomplete understanding of baseline conditions relating to the overall project. ■ LSA is defined to include PSA adjustments, but if PSA is adjusted, the LSA should also be adjusted to	■ Provide details to demonstrate that the planned PSA, LSA or RSA boundaries were defined with respect to the requirements described in Section 7.4.1 of the Guidelines. ■ Provide details to demonstrate that project components other than the route itself will be included in the PSA and consequently what areas are included in surveys discussed as relating to the PSA.	■ Study Plan **Section 6.2** indicates that the Project Development Area (PDA) encompasses the 100 metre-wide CAR right-of-way (ROW), temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet	■ Birds and Wildlife Study Plans: Section 6.2

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
	the documentation of existing conditions and prediction of potential environmental effects for the Project. A 5 km wide Study Area also allows for route refinements during development of Project design (e.g., adjustment of the alignment to avoid sensitive features). – The PSA encompasses the 100 m wide CAR right-of-way, temporary construction" ■ Section 7: Concordance with federal and provincial guidance – "Project components other than the route itself are unknown at this time"	cover types is concentrated in one sub-area and uncommon in other parts of the area); and c. low to moderate rate of change in the prevalence of one or more land cover types with increasing distance from the (i.e., to use land cover patterns to constrain the distances within which comparisons should be made)….For Species valued components: The local study area should correspond to the project study area plus a buffer defined with objectives a-c above. Use simulation modeling to help define a buffer that captures objectives a-c for each species or species group." ■ Section 8.9 – "Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width…. Design suggestions for Project Study Area and Local Study Area scales... Transect lengths less than 5 kilometres may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point."	encompass changes in expected direct effects from new PSA. PSA should encompass all potential project footprints and LSA expand beyond that. To assist with providing the information needed, an illustration is offered relating to land cover analysis to help define transect lengths. The following is an illustration of the land cover analysis referred to in this section of the Guidelines, for the purpose of defining study area boundaries in relation to the Esker VC. 1. Identify the eskers and similar geological features (e.g. moraines) potentially affected by the project. For those features, identify the land cover types that occur within the geologically defined esker (or moraine) polygon. 2. Identify the major land cover types by calculating, across all the individual eskers (and moraines) potentially affected by the project, the types of land cover that make up 80% or more of the surface area of these features. 3. For each esker (or moraine), determine the individual percentages of each of the major land cover types within the PSA on each esker (and moraine). 4. In increments (e.g. 100 metres) extend a buffer from the edge of the PSA to 15 kilometres from the edge of the PSA, and calculate the percentage of each of the major land cover types within each increment. 5. For each major land cover type, calculate the rate of change between successive buffer increments in land cover composition (i.e. the difference in percentages between a given buffer increment and the increment one step closer to the PSA boundary). For the first buffer increment, calculate the percent difference between the PSA and that buffer increment.		known and will be included in the IS / EA Report.	

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			6. For each major land cover type, determine the maximum calculated rate of change across all buffer increments (i.e. 100 metres to 15 kilometres out from PSA boundary). 7. The LSA boundary for each esker or moraine would then be defined as the buffer width that is the maximum of: a. 500 metres from the PSA boundary, or b. the buffer increment where i. All major land cover types have a rate of change in land cover composition of less than or equal to 5% of the maximum rate of change found in (5), and ii. The increment is beyond (i.e. further away from the PSA) where the maximum rate of change found in (5). 8. This approach is intended to lead to LSA boundaries for eskers and similar geological features that include the esker-related land cover types, the rapid land cover change that occurs along the edges of these features, and a portion of the broader landscape matrix. An ecologically defined LSA should therefore serve as a useful reference for comparing patterns and survey results with the PSA and the RSA. ■ This approach could be used to define LSA boundaries for the Wetland VC and any other habitat VCs.			
WH-02	■ Section 4.1.1 Birds – "Bird surveys were performed for the purpose of the project in 2018 by Zoetica and in 2019 by Golder. A summary of their methods and results are included herein"	■ Section 7.2 – "With regard to field studies, survey work must be planned to include multiple sampling locations and multiple visits to each location to support all required assessment analyses. Existing data should be considered as a limited augmentation of this new data…. …. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to	■ The 2018, 2019 bird survey data were collected prior to the development to the TISG. The designs do not appear to be compliant with the Guidelines but, if used correctly, may be useful for the proponent in their efforts to develop a TISG-compliant design. More detail would be required to evaluate and provide advice about the use of those data. ECCC provided advice on early designs for these surveys that was consistent with the principles outlined in	■ Provide detail about the final 2018 and 2019 designs and how ECCC advice was incorporated, as well as results and analysis plans, and detailed plans for using those data to inform upcoming survey designs.	■ The Study Plan is updated to outline the 2018 and 2019 study designs in greater detail including coordination with ECCC. Sample sizes have been added where appropriate. Results have been incorporated into determining the sampling frequency for ARU use. Results will also be used for developing preliminary models that will be further refined with additional field data.	■ Birds Study Plan: Section 7.2.1.2

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
		estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options. – Ethical guidelines and relevant cultural protocols governing research, data collection and confidentiality must be adhered to. Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. – Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options."	the TISG, but did not receive revised plans. ■ The 2018 and 2019 surveys were conducted prior to development of the Guidelines. As such they should be treated as existing data for the IA. They can be of use (e.g. estimates of variance) in developing a bird focused survey design and assessing sample sizes. They can also be included in modelling of baseline conditions to help incorporate more than two years of surveys, so long as the limitations of the survey design are accounted for, in the analysis.			
WH-03	■ Section 4.2 Desktop Assessment – "The background review….as well as identifying potential rare, SAR and species of Indigenous importance that may be present within the Study Areas." ■ Section 4.3.4 Mammals – "The terrestrial mammals currently of importance to our study will be determined using SAR data, ecological composition of the Study Areas and Indigenous Knowledge provided from consultation."	■ Sections 6, 8.10, 15.3 – Section 6 • "The proponent must engage with all Indigenous groups that may be impacted by the Project. The Indigenous Engagement and Partnership Plan, issued by the Agency, is available to assist the proponent in further developing or refining their engagement strategy and supporting ongoing trust and relationship-building. In addition to	■ It is unclear what information about species of Indigenous importance will be collected through the desktop assessment and what will be collected through engagement. As per Section 6 of the Guidelines, the Agency expects the proponent to engage with, at a minimum, the Indigenous groups listed in the Indigenous Engagement and Partnership Plan.	■ Provide details to demonstrate that all of the Indigenous groups listed in the Indigenous Engagement and Partnership Plan will be engaged with and provided opportunities to provide input on current use of terrestrial wildlife as a source of country foods and where use or harvesting has Indigenous cultural importance. This includes incorporating into the plan where Indigenous groups will be provided with opportunities to:	■ A summary of the consultation plan for Indigenous communities, government agencies, and interested persons has been provided in **Section 4** of the Study Plan; further details can be found in the IS / EA Consultation Plan included as Appendix B of the Proposed ToR. Specific consultation and engagement activities and schedules are currently in development and will be shared with MECP and the Agency once available.	■ Wildlife and Birds Study Plans: Section 4.2 and Section 5.

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
	■ Section 7 – "Documentation of the historic and current use of terrestrial wildlife resources will be identified as a source of country food or of cultural importance to indigenous peoples, including harvesting of fur bearing mammals…. – …potential adverse effects to species of indigenous significance and their habitat will be collected through desktop assessment and provided in the IA/EA."	the requirements set out in section 6.1, 6.2 and 6.3, the proponent must provide Indigenous groups with an opportunity to: provide Indigenous knowledge during baseline data collection; comment on the list of valued components and indicators…" – Section 8.10 • "describe the historic and current use of terrestrial wildlife as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., black bear, caribou, deer, moose, beaver, arctic fox, fisher, wolverine, rabbits, marten, muskrat, and otter)… …describe the use and harvesting of fur-bearing species and whether its harvesting has Indigenous cultural importance" – Section 15.3 • "describe the potential adverse effects of the Project on species noted as important to Indigenous groups and local communities and their habitat that are not currently listed under the Species at Risk Act or provincial statutes"		– provide Indigenous knowledge during baseline data collection; – comment on the list of valued components and indicators; – inform the effects assessment and review its conclusions; and – inform the development of mitigation measures and follow-up programs.		
WH-04	■ Section 4.1.2.1 2019 Golder Bat Surveys	■ Section 8.11 – "clearly describe methods used to define a bat "pass" and be consistent with the definition used for any comparison group. Provide a rationale for the chosen method; clearly describe methods used for acoustic identification, including any validation procedures used, criteria used for deciding on species classifications, and software used (including versions and settings);"	■ It is unclear what methods and rationale were used to define a bat pass in the 2019 Bat Surveys.	■ Provide details to demonstrate the methods used to define a bat "pass" during the 2019 Bat Surveys. Provide a rationale, as required in Section 8.11 of the Guidelines.	■ The Study Plan is updated to incorporate the 2019 bat surveys and the definition for a "bat pass" . Methods rationale will be provided in the IS / EA Report.	■ Wildlife Study Plan: Section 8.1
WH-05	■ Section 4.3 Study Methods	■ Section 8.11 – "survey protocols should provide a rationale for the scope of and the methodology used for surveys including design, sampling protocols and data manipulation"	■ Rationales are not always present or clear for all surveys in Section 4.3 of the study plan.	■ Provide details to ensure that survey protocols, design, methodology, sample size, and data manipulation are clearly explained and rationalized in terms of appropriateness and adequacy to address requirements of the Guidelines.	■ The Study Plan is updated to include details on survey protocols, design, methodology and data manipulations, which are explained and rationalized in terms of appropriateness and adequacy to address requirements of the Guidelines. Sample sizes have been added to the fur bearers.	■ Birds and Wildlife Study Plans: Section 7.2

Comment # / Ref #	Draft Study Plan Section	TISG Section	Comment / Context	Action Item	Final Response	Study Plan Section Reference
WH-06	■ Section 4.3.1.1 Field Study Design – "Data collected will generally be consistent with methods employed by Golder (2019) for forest birds and bog / fen birds and other wetlands birds due to the abundance of such habitats… A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Note that pre-selected Ground Investigation locations may be revised based on site conditions observed during field investigations." – (Comment is relevant to several sections of 4.3.1.1 in the proponent's plan that relate to the intended sampling)	■ Section 8.9 – -Refer to original comment PDF from IAAC and TISG if more context is required – [Also Applicable or partly applicable to other sections of the Guidelines that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ Clarifications on the survey design advice and intended uses of modeling and simulations are offered. ■ Section 8.9 of the Guidelines describes and recommends tools and approaches for Design Planning, including developing and selecting a survey design from design options. ■ The intention of this section of the Guidelines for the Design Planning phase is to identify a series of principles that should be used to guide and evaluate survey design options; offer detailed design elements as inputs and as a starting point for developing alternative design options; and recommend modeling, using existing and/or simulated data to evaluate those design options against a series of criteria that would include the design principles. ■ An important element is that the proponent is uniquely able to include information and data specific to the project (e.g. detailed plans of road construction and routing, detailed imagery and existing proponent-collected data). Integrating this proponent-held information enables the proponent to develop design options (or scenarios) that incorporate detailed local information along with the Guidelines-derived design principles and tools. Departures from the offered design should be justified, explained in detail and should clearly demonstrate how the chosen design adheres to the design principles provided in the Guidelines. Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines. Following this approach should lead to a detailed platform for evaluating the sufficiency of the selected design, for communicating the rationale for choosing that design, and for	■ Submit an updated survey design in consideration of the project context and the instructions provided.	■ The Study Plan is updated to incorporate details on survey design and data analysis recommendations including simulation modelling per Section 8.8 of the TISG (the Agency 2020a).	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4

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			communications regarding clarifications, suggestions and recommendations. ■ Simulation modeling is the process of generating and analysing hypothetical data, often in the context or with the purpose of comparing with actual data. Evaluation of survey design options can benefit from a simulation modeling approach through comparison of the representativeness of a potential sampling design relative to more intensive design options. This is a broad and diverse field but a search in the ecological literature (e.g. with keywords power analysis) should produce relevant examples of approaches and methods. Survey results from the 2018 and 2019 preliminary data collection can be very useful to assess sample size sufficiency and guide simulations, so long as analysis and interpretations account for the limitations of these designs and surveys. ■ (NOTE: Detail provided is insufficient to fully understand the 2018, 2019 designs and results.) ■ Section 8.9 of the Guidelines describes and recommends tools and approaches for data analysis, including conducting analysis using the data, both pre-existing and those data collected during the bird (or other) surveys. ■ The intention of Section 8.9 of the Guidelines for data analysis is to guide data acquisition to ensure that the necessary quantitative data would be available to ensure appropriate analysis and reliable interpretations and ensure these covariates were included in the analysis of the collected bird (and perhaps other) survey data. ■ The purposes of these covariate data are to enable the evaluation of their influence on the bird (or other) survey results, and to quantify that influence and account for it in the extrapolation and results-interpretation stages. Doing so reduces the chance that			

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			interpretations about the birds are made in error through a misunderstanding of the patterns and statistical results. ■ For example, if the esker sites A, B and C were surveyed on days with no wind and the peatland sites D, E and F on days with light wind and occasional rain (which may affect both detection and bird vocal behaviour), the lower bird species richness of sites D, E and F might be entirely (and mistakenly) attributed to habitat differences. Modeling that included wind and rain covariates would be more likely to differentiate these effects and lead to better extrapolations and interpretations of the data. Likewise, surveying in one or two years increases the risk having unexplained abundances in the baseline estimate. For example if surveys were conducted in a year that involved a 'masting' event, measured abundances of baseline conditions could be much higher than an average across several years. A similar event could occur if surveys were only conducted in a particularly cold or warm season, relative to the long-term average. ■ Resources and examples for the use of covariates in modelling are abundantly available through scientific journals and statistical texts. Examples of potential key words for searches include: hierarchical modeling, generalized linear (mixed) models, boosted regression trees, Bayesian modeling. Modelling should aim to generate predictive estimates of abundance (or density/occurrence if justified) across the LSA, PSA, and RSA and to provide predictive estimates with associated margins of error at scales that are justified at the scale and shape of the study areas. Total area may not be an appropriate measure of scale for linear projects that are small scale at any point, but stretch along a large area due to length. Modelling should be able to predict			

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			local effects along the project as well as larger scale patterns along the length of the project. Useful predictions require data inputs from each of the study areas to which extrapolations will be made.			
WH-07	■ Section 4.3.1.1 Field Study Design – "Prior to field investigations and as part of study design, vegetation communities will be characterised (pre-typed) and delineated by GIS analysts and vegetation specialists through a desktop exercise for both the PSA and LSA. Following which, a representative subset of vegetation communities (upland, wetland and riparian) will be selected for field verification through a stratified random sampling technique…" – (Comments relevant to other text in the Design section of the plan)	■ Section 8.9 – Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years):... • …design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation…" – (see list that follow in the Guidelines for all requirements)	■ Adding bird sampling to a design that was created for the purposes of a vegetation study is not likely to provide robust bird results as per the Guidelines. The planned bird survey design should be described in such a way as to enable an evaluation of the steps taken to create the design and clearly describe sample sizes and locations. ■ Design the study of birds using point count and ARU locations in a way that is not dependent on the study design for vegetation verification. The goals are different between the two and therefore sample sizes and distribution of samples will need to differ between the two studies. ■ A series of ground level photos at each site visited for bird surveys and Ecosite typing of each site visited for the bird surveys using the ground level photos is required, as per the requirements in Section 8.9 of the Guidelines. FNLC should be used as land cover input.	■ Provide details about the proposed bird survey design that includes the steps taken to determine the sample sizes and locations. Provide ground level photos and Ecosite typing at each site visited for bird surveys.	■ The Study Plan is updated to include a revised study design for birds that is independent of the Vegetation VC Study Plan and outlines the steps taken to determine sample size and survey locations. Habitat will be documented with photographs as described in the Guidelines and classified by ELC Ecosite or Canadian Wetland Classification Class as described under the Vegetation Study Plan for modelling purposes.	■ Birds and Wildlife Study Plans: Section 7.2 ■ Vegetation Study Plan
WH-08	■ Section 4.3.1.1 Field Study Design – "To reduce potential bias associated with selecting locations where access can be achieved by helicopter and for a robust subset of sites, a secondary analysis will be run to determine if any vegetation community types will be missed through this approach to assure all individual pre-typed vegetation communities are represented. Should additional sites require Ground Investigations, additional helipads may need to be cut. This approach will be used to assure that rare habitats and features receive adequate sampling that is not biased due to limited access."	■ Section 8.9 – "use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions."	■ It is unclear if simulation modelling has been used prior to sampling to ensure coverage is broad enough to provide unbiased estimate of abundance and distribution, as required in Section 8.9 of the Guidelines. Refer to comment WH-06 for further clarifications on the survey design advice and intended uses of modeling and simulations. Limiting bird sample locations to those easily accessible will likely lead to habitat biases in the sample.	■ Provide details about survey design and simulation modelling used to demonstrate how habitat bias will be avoided.	■ The Study Plan is updated to incorporate details on survey design and data analysis recommendations including simulation modelling and methods to avoid bias.	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4 ■ Vegetation Study Plan

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WH-09	■ Section 4.3.1.1 Field Study Design – "PSA Based on the anticipated size of the PSA (greater than 4000 hectares [ha]), the intent of the field program is to complete field verification on 15-25% of the vegetation communities within the PSA. This percentage represents a Survey Intensity Level 4 according to the Standard for Terrestrial Ecosystem Mapping in British Columbia (EWG 1998). Although these guidelines originate in British Columbia, a similar guideline to provide consistency across projects has not been developed for Ontario and therefore should be an acceptable approach. This sampling intensity is the survey intensity level recommended for most mapping and is appropriate for a Project of this size and represents a respectable compromise between costs and meaningful data collection."	■ Section 8.9 – [Also applicable or partly applicable to other sections of the TISG that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ The sampling intensity guideline referenced in the study plan (i.e. Standard for Terrestrial Ecosystem Mapping in British Columbia; EWG 1998) is for ecosystem or vegetation mapping at a 1:20000 to 1:50000 scale. This does not provide acceptable justification for sample size or distribution when it comes to collecting bird data and modelling bird abundances or distributions.	■ Provide details about survey design and simulation modelling used to demonstrate that the proposed sampling intensity will provide unbiased estimates of abundance and distributions, as per the requirements in Section 8.9 of the Guidelines.	■ The Study Plan is updated to incorporate details on survey design and describes methods proposed to avoid bias.	■ Birds and Wildlife Study Plans: Section 8 and Section 9.4 ■ Vegetation Study Plan
WH-10	■ Section 4.3.1.1 Field Study Design – "PSA & LSA Although every effort will be made to adhere to this sampling intensity, the Project is located in a remote part of Canada with limited access. Access to vast portions of the proposed CAR will only be available by air, therefore survey locations will be limited to where a helicopter is capable of landing (i.e., cut helicopter landing pads, grassy riparian areas)."	■ Section 8.9 – "If necessary to constrain or adjust site selection based on access limitations, simulation modelling should provide evidence that this sampling strategy has not resulted in the introduction of bias." – [Also applicable or partly applicable to other sections of the TISG that refer to modeling and/or simulations, e.g. 7.1, 7.2, 7.4.1, 8.1, 8.2, 8.5, 8.11, 13.1, and 21]	■ The study plan should designate, according to the design principles in the Guidelines, oversample locations to assist with situations of limited access. This will help reduce the potential for bias in the collected data, while still accommodating some degree of access limitation.	■ Provide details to demonstrate how the potential of bias will be reduced when issues related to limited access occur.	■ The Study Plan includes oversample locations selected using Generalized Random Tessellation Stratified (GRTS) to assist with situations of limited access.	■ Birds Study Plan: Section 7.2.2.1
WH-11	■ Section 4.3.1.1 Field Study Design – "RSA Baseline information for the RSA will need to be robust enough to support an assessment of indirect effects on vegetation. Considering the level of existing information on vegetation communities within the RSA (FNLC and FRI mapping), field investigations for vegetation will not be conducted within the broader RSA. Effects on vegetation with the RSA are not expected to be wide ranging and therefore effects can adequately be	■ Section 8.9 – "Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible… – …sample size must be planned to support a robust evaluation of the project study area within the context of the local study area and regional study area… – "Simulation modelling should be used to assess bias and precision between	■ It is unclear how the text provided in Section 4.3.1.1 of the study plan is related to the bird survey. It is not clear what level of sampling will take place in RSA for wildlife VCs. The rationale provided is in relation to vegetation sampling. ■ The study plan does not indicate that bird surveys will be done in the RSA. More detail is needed to determine how the requirements of Section 8.9 will be met. ■ Sample sizes and designs must support evaluation of the three study area scales	■ Provide details to demonstrate how the text in Section 4.3.1.1 is relevant to the bird survey. ■ Provide detail to demonstrate how the requirement in Section 8.9 of the Guidelines regarding field surveys in the regional study area will be met. Detailed information is needed showing the intended sample size within each of the study area scales, along with estimates of the variability in expected metrics (e.g. species level abundance, species richness) within each of those scales.	■ A simulation was completed which indicates that the LSA is representative of the RSA based on the percentage composition of land cover types. ■ Results of simulation modelling using data collected in the LSA provides unbiased models for making predictions in the RSA. The Study Plan describes how models will used to extrapolate abundance of bird species in each Bird VC to the RSA scale based on habitat availability.	■ Birds Study Plan: Section 9.4.2

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	assessed using the existing and desktop derived information" ■ Section 7 Conformance with Federal and Provincial Guidance – "The requirement cannot be addressed as: • It should be sufficient to collect background data for the regional study area and extrapolate results from the project and local study area."	project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks."	(PSA, LSA, RSA), so detailed information is needed that shows intended sampling within each of these scales along with estimates of variability within each of those scales.			
WH-12	■ Section 4.3.1.1 Field Study Design – "Bird indicator are to be collected to account for temporal sources of variation including among years (two years minimum), within and among seasons (e.g., spring migration, breeding season, and late summer / fall migration), and within a 24-hour daily cycle." ■ Section 4.3.1.8 Data Collection – "During migration (spring and fall), three 3-minute segments per week will be randomly selected from the Morning Period (1 hour before sunrise to 5 hours after sunrise)."	■ Section 7.4.2 – "For valued components related to wetlands, eskers, birds, wildlife, and Species at Risk, define temporal boundaries in a manner that enables detection of all species that use the project study area, local study area, and regional study area throughout the year and between years, and to estimate their temporal pattern of use (e.g., breeding, or migrants stopping on northward and/or southward migration). Baseline data collection for all biophysical valued components is to be provided for a minimum of two years, unless specified otherwise. Temporal boundaries spanning more than one year will enable accounting for variation due to irregular events (e.g., masting events, storms on migration, late snowfalls)." ■ Section 8.9 – "collect bird data to adequately represent the following temporal sources of variation: • among years; • within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and • within the 24 hour daily cycle. – …collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;"	■ More information is needed to determine how the requirements in Sections 7.4.2 and 8.9 related to temporal sources of variation will be met. ■ It is unclear how the approach provided in Section 4.3.1.8 will account for the temporal sources of variation. Singing frequency may be less during spring migration than during the nesting phase. Singing frequency may be much less during fall migration but migrating mixed-species flocks do call regularly enough to be detected and identified by appropriate sampling of acoustic files and with skilled interpreters. Recordings may need to be evaluated to determine if planned sampling frequency is sufficient.	■ Provide specific detail, including methods and approaches, to demonstrate how these requirements related to temporal boundaries and collection of data required in the Guidelines will be achieved.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in section 8.9 of the Guidelines (page 54). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2

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WH-13	■ Section 4.3.1.1 Field Study Design – "The location of survey sites is expected to be spatially uneven due to differences in habitat diversity across the RSA. Furthermore, the proposed routes are remote with limited access to important habitats and features. To reduce potential bias associated with selecting locations where access can be achieved by helicopter and for a robust subset of sites, a secondary analysis will be run to determine if any vegetation community types will be missed through this approach to assure all individual pre-typed vegetation communities are represented. Should additional sites require Ground Investigations, additional helipads may need to be cut. This approach will be used to assure that rare habitats and features receive adequate sampling that is not biased due to limited access."	■ Section 8.9 – "1. Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity; – 2. A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 though March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites."	■ It is unclear if the requirements in Section 8.9 of the Guidelines will be met. More information is needed to identify the locations of ARU deployments and a detailed treatment of the location schedule.	■ Provide details to demonstrate an alignment with the Guidelines, including numbers of ARUs, specific dates of their deployment and re-deployment to new locations, and explanations of the rationale for the selected schedules.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in Section 8.9 of the TISG (the Agency 2020a). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2
WH-14	■ Section 4.3.1.1 Field Study Design – "Bird indicator data will be collected within the following important habitats and features identified in the TISG: • Water bodies, wetlands, watercourses; • Riparian habitat; • Riverbanks of eroded habitats; • Artificial water sources; • Forest, forest patches, solitary trees (especially old decaying trees); • Forest edges and tree rows; • Ridges, including eskers; • Cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; • Building, bridges, and other anthropogenic features; and • SAR critical habitat."	■ Section 7.2 – "Information sources and data collection methods used for describing the baseline environmental, health, social and economic setting may consist of the following sources of information. For specific sources of baseline information, see Appendix 1. – Important habitats and features to include: • water bodies, wetlands, watercourses; • riparian habitat; • river banks or other eroded habitats; • artificial water sources; • forest, tree patches, solitary trees (especially old decaying trees); • forest edges and tree rows; • ridges, including eskers; • caves and mines; • cliffs, rock outcrops, exposed bedrock, talus, and other karst topography; • buildings, bridges, and other anthropogenic features, including linear features; • sources of artificial lighting attracting insects;	■ Detail on proposed survey location selection is sufficient, but it does not align with the Guidelines. ■ This plan uses the list of important habitats and features in Section 7.2 of the Guidelines as an explanation of survey location selection, but that is not how the list was presented in the Guidelines. The Guidelines present this list with respect to potential sources of baseline information in general. It is not intended as a basis for sampling or a list of recommended features to survey for birds.	■ Provide details to demonstrate that the proposed survey design, including location selection and data collection, will meet the requirements in Section 8.9 of the Guidelines.	■ Important habitats described in Section 4.3.1.1 of the TISG (the Agency 2020a) have been integrated into the breeding bird study design using point counts and ARUs (forests, forest edges, ridges/eskers, riparian, watercourses) or through marshbird call playback (wetlands), species-specific surveys (river banks, cliffs, rock outcrops, exposed bedrock, talus, and other karst topography), and aerial surveys (wetlands, waterbodies, watercourses).	■ Birds Study Plan: Section 7.2.2.1 and Table 7.2.

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		• critical habitat; and • any other habitat features known to be important in the area."				
WH-15	■ Section 4.3.1.1 Field Study Design – "A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Note that pre-selected Ground Investigation locations may be revised based on site conditions observed during field investigation… Based on the anticipated size of the PSA (greater than 4000 hectares [ha]), the intent of the field program is to complete field verification on 15-25% of the vegetation communities within the PSA. This percentage represents a Survey Intensity Level 4 according to the Standard for Terrestrial Ecosystem Mapping in British Columbia (EWG 1998). Although these guidelines originate in British Columbia, a similar guideline to provide consistency across projects has not been developed for Ontario and therefore should be an acceptable approach. This sampling intensity is the survey intensity level recommended for most mapping and is appropriate for a Project of this size and represents a respectable compromise between costs and meaningful data collection. Ground Inspections and Visual Checks will be conducted in accordance with the survey intensity levels (EWG 1998) at a ratio of 25:75 respectively. Although every effort will be made to adhere to this sampling intensity, the Project is located in a remote part of Canada with limited access. Access to vast portions of the proposed CAR will only be available by air, therefore survey locations will be limited to where a helicopter is capable of landing (i.e., cut helicopter landing pads, grassy riparian areas)."	■ Section 7.2 – "Baseline data must be collected in a manner that enables reliable analysis, extrapolations and predictions. Resulting data should be suitable for analyses to estimate pre-project baseline conditions, derive predictions of impacts, and evaluate and compare post-project conditions and at scales of within and across the Project, Local and Regional Assessment areas. Modelling methods, error estimates and assumptions should be reported (as per section 7.1). Modelling and simulations should be used early in the planning phase to estimate the necessary sampling intensity and to quantitatively evaluate the effectiveness of design options."	■ Rationale is provided for this level of sampling in relation to mapping vegetation communities, but rationale is needed to indicate that this sampling intensity is adequate for each wildlife VC.	■ Provide detail to demonstrate how the requirements in Section 7.2 of the Guidelines will be integrated into survey design, including providing a rationale for the selected sample size for all surveys discussed in Section 4.3 of the study plan.	■ Simulation modelling using preliminary bird data was conducted to determine the total number of site visits required to adequately sample the various bird VCs and bird SAR VCs beyond the initial 2018-2019 field season. The upcoming work plan will provide a breakdown of the number of survey stations by land cover. The sample frequency and intensity for various bird SAR have been provided based on a beta diversity analysis / species accumulation curve using preliminary data or a binomial expansion of published detection probabilities. ■ The Study Plan is updated to provide detail on how the sampling locations for bat surveys are determined by habitat suitability in the desktop review. Wolverine aerial tracking survey transects are based on a modified protocol for aerial caribou surveys (MNRF 2018), due to the relatively low density of wolverine. Survey design for furbearer winter tracking, motion sensitive camera tracking, and wolverine hair snag trap surveys are described in the Study Plan.	■ Wildlife Study Plan: Section 7.2.1.2 and Section 7.2.3.2 ■ Birds Study Plan: 7.2.2.1 and 7.2.2.5

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WH-16	■ Section 4.3.1.2 – Breeding Bird Point Counts "Only observers skilled in bird identification by sight and sound will be used for breeding bird surveys. Furthermore, additional bias will be removed by recording all bird vocalizations during breeding bird surveys using a high-quality portable recording device mounted on a tripod. Observer and recorder data will be compared for further analysis."	■ Section 8.9 – "Observers should be skilled in bird identification by sight and sound, and should use 1- minute intervals within the 10-minute point count duration such that each individual bird is entered in the first minute interval in which it was detected. Estimated distances from observers to each bird should be recorded as: 0-50m, 50m-100m, and beyond 100m… acoustic files should be analysed by interpreters skilled in identifying birds by sound and familiar with bird communities of the region sampled. Interpretation of acoustic files should be done using the Wildtrax interface"	■ Observers should have skills in relation to northern Ontario birds since bird communities differ geographically and some species sing with regional dialects. ■ Recordings using the Zoom H2n digital recorder or equivalent in conjunction with observers is an appropriate approach.	■ Provide details to demonstrate that that the observers have skills specifically related to northern Ontario birds.	■ The Study Plan is updated to indicate that only observers skilled in Northern Ontario bird identification by sight and sound will be used for breeding bird point counts, and will capture bird calls using the Zoom H2n digital recorder to remove additional bias.	■ Birds Study Plan: Section 7.2.2.1
WH-17	■ Section 4.3.1.3 Marsh Bird Call Playback Surveys – "where suitable habitat is encountered during the breeding bird point counts"	■ Section 8.9 – "Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years)…. – ….design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation…."	■ It is unclear how the requirements in Section 8.9 of the Guidelines related to survey design and sampling will be met.	■ Provide details to demonstrate how the survey design requirements in Section 8.9 of the Guidelines were integrated into the Marsh Bird Call Playback Surveys described in Section 4.3.1.3 of the study plan.	■ Marshes account for less than 0.1% of the LSA and will be examined separately from the breeding bird survey design due to their small numbers. To survey the largest number of marshes that can practicably be reached, a desktop review combined with aerial reconnaissance were used to identify suitable marsh habitat in proximity to breeding bird survey stations selected using the Generalized Random Tessellation Stratified Study Design. A total of 10 survey stations were identified. Efforts will be made to identify additional marsh bird call playback survey stations.	■ Birds Study Plan: Section 7.2.2.3

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WH-18	■ Section 4.3.1.8 Data Collection – "During the breeding season, one 3-minute segment per week will be randomly selected from the Night Period (midnight to 1 hour before sunrise), two 3-minute segments per week from the Morning Period (1 hour before sunrise to 5 hours after sunrise), and one 3-minute segment per week from the Dusk Period (30 minutes before sunrise to 2 hours after sunset)."	■ Section 7.2 – "The Impact Statement must provide detailed descriptions of specific data sources, data collection, sampling, survey and research protocols and methods followed for each baseline environmental, health, social and economic condition that is described, in order to corroborate the validity and accuracy of the baseline information collected." ■ Section 8.9 – "survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options:"	■ The information provided in Section 4.3.1.8 of the study plan does not align with the requirements in Sections 7.2 and 8.9 of the Guidelines. More information is needed to corroborate the validity and accuracy of the baseline information collected.	■ Provide detailed descriptions of the survey protocols and methods followed to demonstrate that the planned survey will enable modelling for reliable conclusions about breeding bird abundances. Provide anticipated sample sizes.	■ The Study Plan is updated to include details on survey protocols, design, methodology and data manipulations to address requirements of the Sections 7.2 and 8.9 of the TISG (the Agency 2020a). ■ Additional information regarding sampling dates and locations will be provided at a later date.	■ Birds Study Plan: Section 8 and Section 9.4
WH-19	■ Section 4.3.2.2 Acoustic Surveys – "Acoustic surveys will be designed to account for inter-annual and within-season variability in habitat use by taking place during multiple nights in the late spring, summer and fall seasons to capture bat dispersal and identify breeding and roosting habitats. Field surveys will be conducted over a minimum of two years to improve the understanding of natural variability in populations." ■ Section 4.3.2.3 Data Collection – "The acoustic surveys targeted for maternity roosting structures will be conducted using Wildlife Acoustic Song Meter SM4BAT monitors. ARUs will be programmed to record ultrasonic activity nightly beginning 30 minutes before sunset to 30 minutes after sunrise for at least 10 days during the maternity roosting period of June 1 to June 30. In addition to maternity roost surveys, any suspected bat hibernacula features documented during the background review or aerial reconnaissance exercises will require similar acoustic surveys. The potential hibernacula will be searched to identify all possible entrances and ARUs will be installed within 10 m of all openings	■ Section 8.11 – "to augment existing information sources and collect data able to robustly establish baseline conditions and assess impacts, undertake site-specific surveys to: • compile a species inventory (species present/not detected); • quantify baseline bat activity to evaluate relative use of different habitats or features in the project area and to help support and evaluate project siting decisions and impact predictions; • document baseline conditions within the project Area and Local Assessment Area to support study of impacts; • the following types of surveys are required: ○ acoustic surveys, ensure study design is statistically valid, conducted in spring, summer, and fall to capture dispersal and migration (travel corridors), breeding, and roosting…"	■ Section 4.3.2.2 indicates that acoustic surveys will take place in spring, summer, and fall; however Section 4.3.2.3 only provides information for surveys in June and potentially August, if suitable hibernacula habitat is discovered. ■ In addition, targeting survey locations to only suitable roosting and hibernacula habitat may not capture dispersal and travel corridors.	■ Clarify and provide rationale for how bat survey design meets the requirements in Section 8.11 of the Guidelines.	■ The bat study design includes a desktop habitat suitability exercise to locate and identify maternity roosts, foraging areas, dispersal and travel (migration) corridors and hibernacula. ■ This section has been revised to indicate that acoustic surveys will take place in spring (maternity) and fall (swarming). ■ As discussed during the technical discussion on September 11, 2020, methods for bat migration surveys are not currently described in Ontario's guidance document, so potential migration corridors will be identified solely through desktop analysis.	■ Wildlife Study Plan: Section 7.2.2.1

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	following the above stated procedures during the peak swarming period of August 1 to August 31. They will be programmed to commence recording at dusk for five hours for up to 10 nights from August 1 to August 31, or until evidence of bat presence is found, whichever occurs sooner."					
WH-20	■ 4.3.3 Amphibians and reptiles – "Through the course of the field program, any incidental amphibian and reptile encounters will be documented. – The distribution and location, abundance and population status, information on life cycles and movements and habitat requirements of species identified by these practises will be quantified wherever possible." ■ Section 4.3.4 Mammals – "Any mammal species that are likely to be directly or indirectly effected by the activities taking place within the PSA and LSA will be identified. The distribution and location, abundance and population status, information on life cycles and movements and habitat requirements of species identified will be quantified and recorded where possible."	■ Section 8.10 – "identify wildlife species, other than avian species, of ecological, economic or human importance (particularly to Indigenous peoples), within the study area (including moose, rabbit, beavers, otters, muskrat, and frogs), that are likely to be directly or indirectly effected and describe each species: biodiversity, distribution and location; abundance and population status; life cycle; seasonal ranges, migration and movements; habitat requirements; and sensitive periods (e.g., seasonal, diurnal and nocturnal). For the species identified above, describe and quantify the habitat type, including its: function; location; suitability; structure; diversity; relative use, natural inter-annual and seasonal variability, and; abundance as it existed before project construction"	■ It is unclear under what circumstances it would not be possible to provide the required information. ■ It is unclear how baseline data will be collected for amphibians and reptiles that will allow for comparison to the "Expression of Change" listed in Table 6-1 if only incidental observations are being documented. ■ It is unclear how the requirements in Section 8.10 will be met in relation to frogs if only incidental observations are being documented. ■ Additionally, biodiversity, seasonal ranges, migration, movements, sensitive periods and habitat type also need to be described, as per Section 8.10 of the Guidelines.	■ Provide detail to demonstrate that biodiversity, distribution and location; abundance and population status; life cycle; seasonal ranges, migration and movements; habitat requirements; sensitive periods (e.g., seasonal, diurnal and nocturnal) and habitat type will be described for wildlife species, other than avian species, of ecological, economic or human importance (particularly to Indigenous peoples), per Section 8.10 of the Guidelines. ■ Provide information regarding the methods and approaches used for each aspect of the requirement and each species.	■ Amphibian acoustic surveys are proposed as a systematic approach to collect data over space and time during the breeding and non-breeding season. Mammal data analysis methods have been updated to fit requirements of Section 8.10 of the TISG (the Agency 2020a).	■ Wildlife Study Plan: Section 7.2.2, Section 8.2, Section 7.2.3.2, and Section 8.3.
WH-21	■ Section 5.2 Birds – "The number of species detected by different methods at the same time and at the same point will be compared using a multiple regression statistical analysis, such as a Generalized Linear Mixed Model, with survey point ID defined as a subject and various survey methods as repeated measurements. We will compare the number of species detected during breeding bird point counts, breeding bird point counts corrected by a high-quality portable recording device, and ARU performed at the same time. In the model, we will include survey type (breeding bird point counts, breeding	■ Section 8.9 – "Identify the biodiversity metrics, biotic and abiotic indicators that are used to characterize the baseline avifauna biodiversity and discuss the rationale for their selection: • species communities should not be collapsed into diversity metrics or the focus narrowed to indicator species. – Species identity, distribution, abundance and where possible estimates of breeding status should be the primary targets of quantification. • biodiversity metrics for each valued component should include: ○ distribution in space; ○ frequency of occurrence;	■ The study plan does not align with the Guidelines. Differences in species detection based on sampling method should be incorporated directly into the species community modelling.	■ Provide detail to demonstrate how differences in species detection will be incorporated into the species community modelling, as required to be compliant with Section 8.9 of the Guidelines.	■ The Study Plan is updated to include paired sampling from breeding bird point counts and handheld recorders (a surrogate for ARUs) to estimate statistical offsets that correct biases in ARU data relative to human observers. These offsets will be used to calibrate count data by ARUs using the methods of Val Wilgenburg et al. (2017) and Bombaci and Pejchar (2018). For surveys with human observers only, the observer will be added as a covariate in modelling.	■ Wildlife Study Plan: Section 8.1 Birds Study Plan: Section 8

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	bird point counts corrected by a high-quality portable recording device, and ARU), observer, and habitat type. – …. Species diversity in each habitat type will be calculated using the Shannon-Weiner Diversity Index (Shannon and Weaver 1949) during spring migration, the breeding season, and fall migration."	○ patterns of occurrence and abundance in time; ○ abundance and, if possible, density; and ○ associated habitat type(s) and strength of associations."				
WH-22	■ Section 5.2 Birds – "Rare species will be accounted for in the statistical analysis recognizing that they may be more difficult to detect."	■ Section 8.9 – "rare species require more survey effort to detect than common species, and species rarity should be accounted for in survey design by increasing the number and duration of surveys"	■ The survey design must address sampling for rare species. An intention to account for rare species in the statistical analyses does not replace ensuring that sufficient data has been collected via the survey design to enable modeling their abundance and distribution.	■ Provide detail to demonstrate how species rarity has been accounted for in the survey design, as per the requirement in Section 8.9 of the Guidelines.	■ The Study Plan is updated to include two approaches for sampling for rare species in the study design for ARUs. The first is based on a beta diversity analysis / species accumulation curve of preliminary breeding bird data in 2018 which indicated that a sample size of 15 was sufficient to identify rare species. This is used as a general ARU sampling frequency per season (winter, spring migration, breeding, fall migration). The second is specific to rare species identified only through ARUs where scientific literature is available on species-specific detection rates using ARUs (Common Nighthawk, Eastern Whip-poor-will, Yellow Rail). A binomial expansion of these detection rates targeting a 95% cumulative probability of detection is used for these species.	■ Birds Study Plan: Section 7.2.2.
WH-23	■ Section 6.1 <u>Indicators and Expression of Change</u> – [Table 6-1. column Expression of Change]	■ Section 7.1 – "In describing the biophysical environment, the Impact Statement must take an ecosystem approach that considers how the Project may affect the structure and functioning of biotic and abiotic components with the ecosystem using scientific, community and Indigenous knowledge regarding ecosystem health and integrity, as applicable. The Impact Statement must provide a description of the indicators and measures used to determine ecosystem health and integrity, identified during early planning and reflected in the TISG. The presence of habitat, such as but not limited to spawning shoals, aquatic vegetation or	■ It is unclear whether these are potential mechanisms of change that will not be measured or whether these are responses that will be measured. If these are intended as measured responses, justification for these should be provided, explanations of why more common measures (e.g. relative abundance) are not being used, and detailed explanations of methods should be provided.	■ Provide details to clarify and justify the measures chosen for the expression of change and provide detailed explanations of the methods that will be used.	■ The Study Plan is updated to clearly show that the indicators have been selected and how they were selected. Expressions of change are quantifiable and measurable, and relative abundance has been added as expression of change.	■ Table 9-2

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		overwintering pools, potentially affected by the Project should be included in the description of the biophysical baseline conditions."				
WH-24	■ Section 6.1 Indicators and Expression of Change – "The indicators and rationale for selection and measurement of potential effects, to be used to assess and evaluate the alternative routes in the IA / EA are provided in Table 6-1. Breeding Birds (including SAR-olive-sided flycatcher, rusty blackbird and common nighthawk)"	■ Section 8.9 – "the following groups of migratory and non-migratory birds should be considered as valued components: forest birds; raptors; shorebirds; waterfowl; and bog/fen birds, and other wetland birds." ■ Section 15.2 – "analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to insure final impacts estimates show the best available estimate of precision"	■ As valued components, each specified bird group should be included in the effects assessment.	■ Provide detail about the effects assessment methodology for each valued component identified in the Guidelines related to this study plan (birds, wildlife, species at risk).	■ The Study Plan is updated to indicate that breeding birds are categorized into their respective bird group (including species at risk) in the effects assessment. Methods for the effects assessment are described for each group.	■ Birds Study Plan: Table 9-2 and Section 9.2
WH-25	■ Section 6.1 Wildlife Indicators – "Habitat availability and distribution • Survival and reproduction (Population state) • Disruption to breeding behaviour • Fragmentation of habitat • Effects to prey population or access to food • Change in wildlife behaviour (during and after construction) – Change in wildlife mortality (due to increase anthropogenic stressors; hunting, trapping, vehicle travel, etc.)"	■ Section 15.2 – "account for indirect effects such as the increased movement of predators in the predictions of mortality effects"	■ It is unclear if the effects of increased movement of predators in the predictions of mortality effects will be included.	■ Provide detail to demonstrate how the requirement to account for increased movement of predators in the prediction of mortality effects will be addressed, per Section 15.2 of the Guidelines.	■ Predictions of mortality effects from increased predator movements will be estimated using motion sensitive tracking camera data. ■ Pre- construction data of predators and herbivores along planned linear features (i.e., the routes and secondary access roads) will be compared against estimates based on a desktop review to account for increased movement of predators in predictions of mortality effects.	■ Wildlife Study Plan: Section 8.3.4
WH-26	■ Section 6.1 Indicators and Expression of Change – "Effects to SAR will consider potential direct, incidental and cumulative adverse effects of the Project on SAR and, where applicable, its critical habitat." ■ Section 7 Conformance with Federal and Provincial Guidance – "…will be analyzed and addressed in the IA/EA"	■ Section 15.4	■ Section 15.4 of the Guidelines includes additional specific considerations for the effects assessment, as well as considerations when describing potential and predicted effects. ■ It is unclear if all relevant requirements from Section 15.4 of the Guidelines will be addressed for each species at risk.	■ Provide detail to demonstrate that all requirements from Section 15.4 of the Guidelines will be met for all SAR. Describe the methods and approaches taken to meet the requirements for each SAR.	■ The Study Plan has been updated to describe the methods for meeting the requirements in Section 15.4 of the TISG (the Agency 2020a) with respect to data collection and considerations for the effects assessment are generally described for SAR. Specific methods and approaches will be described in greater detail in the IS / EA Report.	■ Wildlife and Birds Study Plans: Section 8 and Section 9.4.2.

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WH-27	■ Section 6.2 Methods for predicting future conditions – "Modelling methods, error estimate and assumption will be reported when possible." ■ Section 6.2.1.3 Model Confidence and Resolution – "That being said, models will be based on best available science and will be thoroughly described including assumptions, calculations of margins of error and other relevant statistical information when possible."	■ Section 7.1 Methodology – "If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas" ■ Section 8.9 – "Provide estimates of confidence or error for all estimates of abundance and distribution. Estimates should be defined (e.g., mean across years, mean across sites, modeled prediction) and, if appropriate, confidence or other intervals should be defined (e.g., 95% confidence intervals, credible intervals). Use of hypothesis testing p - values is generally not appropriate in this context and their use should be justified"	■ It is unclear if estimates of confidence or error for all estimates of abundance and distribution of birds will be provided, as per the requirement in Section 8.9 of the Guidelines. Published studies are unlikely to be sufficient replacement for data collection, data analysis and area specific modeling for this project area. ■ Section 7.1 of the Guidelines requires that modelling methods be described and must include assumptions, calculations of margins of error and other relevant statistical information. ■ It is unclear under what circumstances it would not be possible to provide this information. The Agency would like to reiterate that the Impact Statement is expected to address all requirements from the Guidelines.	■ Provide detail to demonstrate that estimates of confidence and error for all estimates of abundance and distribution of birds will be provided. Ensure that modelling methods, including assumptions, calculations of margins of error and other relevant statistical information are provided for any quantitative model used (including for other wildlife presented in this study plan).	■ The Study Plan is updated to provide the modelling methods, including assumptions, calculations of margins of error and other relevant statistical information for all models proposed for birds and other wildlife.	■ Wildlife and Birds Study Plans: Section 9.4.1
WH-28	■ Section 6.2.1 Wildlife Habitat Development – "HSI models will be developed by gathering background information on wildlife indicators which will be summarized into species accounts, developing wildlife habitat ratings based on this background information, and evaluating the models against field conditions. – HSI models are a simplification of the relationships among environmental parameters and habitat quality based on expert opinion. These models are limited by the extent of knowledge about a species, species-specific habitat use, and the ecosystems. The HSI models developed will be based on the evaluation of ELC units and their assumed relationships to a wildlife VC's habitat suitability in the LSA. That being said, models will be based on best available science and will be thoroughly described including assumptions, calculations of margins of error and other relevant statistical information when possible."	■ Section 7.1 – "If the baseline data have been extrapolated or otherwise manipulated to depict environmental, health, social and/or economic conditions within the study area, modelling methods must be described and must include assumptions, calculations of margins of error and other relevant statistical information. Models that are developed should be validated using field data from the appropriate local and regional study areas." ■ Section 7.2 – "If using existing data sources, the Impact Statement must provide justification to show that the data sources are relevant in spatial and temporal coverage to the Project. Some data sources may have good coverage in Southern Ontario or existing road networks but be unsuitable as a baseline for these northern areas where there are not roads…. – ….Existing data should be considered as a limited augmentation of this new data."	■ It is not clear whether and how collected data will be incorporated into the process described in this section. Qualitative information can often be valuable to augment data but the Guidelines recommends the collection and analysis of study-area specific, quantitative data, using current and accepted quantitative analytic approaches. ■ It should be made clear how assumptions based on published information, much of which is likely to be of limited or unknown relevance to the particular project area, will be sufficiently valid in the absence of quantitatively including collected, local data.	■ Provide details to demonstrate how collected data will be incorporated into the process described in Section 6.2.1 of the study plan. ■ Provide details to demonstrate how the data sources are relevant in spatial and temporal coverage to the Project and how the models will be validated using field data from the study areas, as per the requirements in Sections 7.1 and 7.2 of the Guidelines.	■ The Study Plan is updated to describe how the quantitative, locally collected data will be incorporated in model development and that all data sources will be spatially and temporally relevant to the Project.	■ Wildlife Study Plan: Section 9.4.2

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WH-29	■ Section 6.2.2 Predicted Effects of the Project – "For migratory birds, A Framework for the Scientific Assessment of Potential Project Impacts on Birds (Hanson et al. 2009) will be consulted to assist in analyzing predicted effects for all birds including non-linear, indirect and synergistic responses where possible and applicable. Any assumptions of displacement will be justified with scientific references and best management practices."	■ Section 8.9 – [all content] ■ Section 15.2 – "analyze predicted effects for all birds, each valued component, and for Bird Conservation Region Priority Species and include relevant effects from Appendix 2 and 3. Include separate analyses for each project activity, component, and phase. Incorporate sources of error for all analyses to insure final impacts estimates show the best available estimate of precision;"	■ Based on the information provided in Section 6.2.2 of the study plan, It is unclear if *A Framework for the Scientific Assessment of Potential Project Impacts on Birds* (Hanson et al. 2009) will be consulted to assist in analyzing predicted effects for all birds or migratory birds only. ■ To reliably analyze predicted effects, per Section 15.2 of the Guidelines, baseline data must be designed, collected, and analyzed according to the direction provided in Section 8.9 of the Guidelines. Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines.	■ Provide details to demonstrate that baseline data will be collected according to the direction provided in Section 8.9 of the Guidelines. ■ Generate predictive estimates of abundance (or density/occurrence if justified) across the LSA, PSA, and RSA and provide predictive estimates with associated margins of error at scales that are justified at the scale and shape of the study areas through modelling. Total area may not be an appropriate measure of scale for linear projects that are small scale at any point, but stretch along a large area due to length. Use modelling to predict local effects along the project as well as larger scale patterns along the length of the project. Useful predictions require data inputs from each of the study areas to which extrapolations will be made.	■ The Study plan is updated to show that Hanson et al. (2009) will be consulted for all indicators. This includes detailed descriptions of the design process and outcomes.	■ Birds Study Plan: Section 8
WH-30	■ Section 7 Conformance with Federal and Provincial Guidance – "Outlined as Indicators and Expressions of Change. To be addressed in the IA/EA"	■ Section 15.3 – "describe changes to insects, pollinating species in particular"	■ Section 7 of the study plan states that changes to insects is outlined as indicators and expressions of change. It is not clear how the indicators and expressions of change in Sections 6.1 and 6.2 will enable description of changes to insects.	■ Provide detail to demonstrate how changes to insects will be described, as per the requirement in Section 15.3 of the Guidelines.	■ Changes to insect habitat availability and spatial and temporal distribution will be assessed in the effects assessment.	■ Wildlife Study Plan: Section 8.4 and Section 9.2
WH-31	■ Section 7 Conformance with Federal and Provincial Guidance – "This requirement is partially addressable as: • Overwintering surveys are not feasible as the lower limit of a SM3BAT operating temperature is -20 degree Celsius"	■ Section 8.9 – "Collect bird data to adequately represent the following temporal sources of variation: • among years; • within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and • within the 24-hour daily cycle."	■ The model noted in the plan text (i.e. SM3BAT) is for bat monitoring and is not suitable for surveying birds. ■ ARUs can be deployed in late winter to provide an index of overwintering bird use of sites. Although extreme cold impair some individual programmed recording events, site use by overwintering birds should not be eliminated from data collection efforts (note 2: Wildlife Acoustics. Climate Change Canada – Landbird Monitoring Along Winter Roads. https://www.wildlifeacoustics.com/customer-stories/climate-change-canada-landbird-monitoring-along-winter-roads)	■ Provide details to demonstrate how overwintering surveys will be conducted, as per the requirements in Section 8.9 of the Guidelines and the information provided in the context column.	■ The Study Plan is updated to indicate that ARUs will be deployed in either early winter (December 1 to December 31) or late winter (March 1 to March 31). ARU bird studies are outlined in detail in the Study Plan to meet section 8.9 of the guidelines with respect to overwintering bird surveys.	■ Birds Study Plan: Section 7.2.2 and Table 7-3

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WH-32	■ Section 7 Conformance with Federal and Provincial Guidance – "The requirement cannot be addressed as: • Project components other than the route itself are unknown at this time"	■ Section 8.9 – "Project components other than the route itself should be sampled. Such components that are linear (e.g., access or service roads) should be surveyed using transects as above. Non-linear components (e.g., aggregate pits) should be surveyed using a grid of sites spaced 250 metres apart and be sufficient to cover the Project component, plus a maximum 3-kilometre buffer. As with transect lengths, modification of buffer width to a minimum of 500 metres may be justifiable if land cover analysis demonstrates no further change in land cover classification with increasing buffer width"	■ A sampling plan was not presented for baseline conditions in relation to service roads, aggregate pits and project components other than the road itself. Information about these project components and sampling plans enable the evaluation of the plans relative to the Guidelines. ■ Section 8.9 of the Guidelines require that project components other than the route itself are sampled. If the exact locations of the other components are not known at this time, the study plan should outline how this requirement will be met once the locations are confirmed. ■ Include potential project components in the study design. For example, Figure 1-2 in document IA#13143E, the detailed project description shows potential sources of aggregate.	■ Provide details to demonstrate how project components, other than the route itself, will be sampled. Include information about the methods and approaches that will be used to address the requirement in Section 8.9 of the Guidelines.	■ Study Plan **Section 6.2** indicates that the PDA encompasses the 100 m wide CAR right-of-way, temporary construction access roads, work areas, worker camps, and long-term aggregate sources and associated access roads. The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report.	■ Birds and Wildlife Study Plans: Section 6.2
WH-33	■ Section 7 Conformance with Federal and Provincial Guidance – "This requirement is partially addressable as: • According to the Atlas of the Breeding Birds of Ontario, the window for the standard breeding surveys (e.g., point counts) in northern Ontario is June 1 to July 10 and in the Hudson Bay Lowlands is June 1 to July 17. • Overwintering surveys not feasible as lower limit of SM3BAT operating temperature is -20 degree Celsius"	■ Section 8.9 – "Regarding "bird sampling"… a) Within each sampling year, ARUs should be deployed at sites as long as possible, with a minimum period of May 1 through July 10 (Breeding Recordings). Use deployments that maximize full use of battery and sound card capacity; b) A subset of at least 50% of the ARU sites should have ARUs deployed to align with periods during which sites are used by birds in fall migration (August 1 through September 30) and during the winter (December 1 through March 31) (i.e., collectively, Fall/Winter Recordings). These fall and winter sites may be a subset of either entire ARU transects or sites along transects but land cover analysis should be used to ensure the subset is an unbiased sample of the population of ARU sites; c) ARU deployments for Breeding Recordings should be programmed to record daily or every 2nd day,	■ Species vary in their peak breeding and detectability periods. Guidelines from the 2nd Ontario Breeding Bird Atlas were intended to focus human surveys within a period of peak breeding by many or most species. Sampling with ARUs should capture the full extent of the breeding period, not only the restricted peak time for most species. ■ Since eskers may serve as migration corridors for many bird species, use ARUs to sample earlier spring and fall periods to provide information on migrating species using the project area.	■ Provide details to demonstrate how sampling with ARUs will be conducted, as per the requirements in Section 8.9 of the Guidelines and the information provided in the context column.	■ The Study Plan has been revised to include ARU deployment during spring migration (April 15-May 31), fall migration (August 1-September 30) and early winter (December 1-December 31) or late winter (March 1-31). Proposed winter sampling is reduced due to temperature limitations of ARU. ■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in Section 8.9 of the TISG (the Agency 2020a). ■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.4

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		with a morning and an evening schedule. Recording should occur in two phases to avoid single recordings spanning two dates. Phase 1 would start at 00:00 (HH:MM), with a schedule of 3-minutes On and 12-minutes Off until 5 hours beyond local sunrise (i.e., SR+5hr). Phase 2 would start 30 minutes before local sunset, with a schedule of 3-minutes On and 12-minutes Off until 23:56 (HH:MM); d)ARUs should be set to record using a sampling rate of 44.1 kHz."				
WH-34	■ Section 7 Conformance with Federal and Provincial Guidance – "Data will be collected in ways that enable reliable extrapolations in space and in time. Surveys will be destined to represent the spatial and temporal targets of modeling and extrapolations… – Sample size will be planned to support evaluation of the project within the context of the local study area and regional study area. Study designs will implement multiple survey locations to cover multiple habitat classes and land cover types…. – Survey design sampling effort will be most intense within the project study area. Efforts outside the PSA will be carefully implemented to remove biases when comparing areas from within the PSA."	■ Section 8.9 – "Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): • design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modeling techniques based on current and recent scientific literature; Sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. – Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey	■ Information provided in the study plan is not sufficient to verify the assertion that data will be collected in ways that enable reliable extrapolations in space and time, and represent the spatial and temporal targets of modeling and extrapolations. ■ Detailed descriptions of design process and design outcomes (including maps, sample sizes overall and by landcover type) are required to understand and evaluate the design relative to the Guidelines. Following this approach should lead to a detailed platform for evaluating the sufficiency of the selected design, for communicating the rationale for choosing that design, and for communications regarding clarifications, suggestions and recommendations.	■ Provide specific details to demonstrate how the data collection design incorporates and addresses the requirements in Section 8.9 of the Guidelines.	■ The Study Plan is updated to provide the modelling methods, including assumptions, calculations of margins of error and other relevant statistical information for all models proposed for birds and other wildlife.	■ Wildlife and Birds Study Plans: Section 7 and Section 9.4.1

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		locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc; Sampling effort per unit area - field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area but should be scaled to the likelihood that project effects will impact birds within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible;"				
WH-35	■ Section 7 Conformance with Federal and Provincial Guidance – "A point count survey location will be conducted within each vegetation community identified for Ground Investigations, within 1 km of helicopter landing pads. Study design will not implement point count survey sites along 5 km long transects for the following reasons: • Length of transect not reasonable / feasible method given landscape (e.g., dense forest, blow down, water features, etc.) and field staff health and safety considerations, • Evenly space transects conflicts with randomized selection of habitats or if specific (i.e., rare habitats are to be targeted)."	■ Section 8.9 – "design suggestions for Project Study Area and Local Study Area scales: • Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation; • transects and sites: ○ transects should be spaced every 2 kilometers along the route, oriented perpendicular to the route, and with the mid-point of each transect located on the centerline of the route. A maximum length of 5 kilometers is likely suitable for sampling most habitat types, including those associated with eskers and similar linear features	■ The suggested design was offered as a foundation for modification, with justifications. Adjustments of suggested design are anticipated and application of proponent-held knowledge and information is likely necessary for those adjustments. ■ Adding bird counts to a Vegetation Study design is unlikely to address the bird information needs described in the Guidelines. ■ Remote fieldwork can often be challenging but can be done safely. Direct and recent field experience by the reviewers and colleagues indicates that it is feasible to deploy acoustic recorders at remote locations that have been pre-selected according to a random, spatially dispersed design. With helicopter drop-offs and overland travel, crews have deployed acoustic recorders on and across eskers, in peatlands, and at forest sites in remote parts of northern Ontario, including in the ecoregions of interest here. With some additional constraints (e.g. daylight, weather) this is also possible to do for bird point counts.	■ Provide detail to demonstrate how the design suggestions in Section 8.9 of the Guidelines were used a basis to develop alternative designs in the study plan. Provide rationale for any modifications.	■ Planned sampling frequency and analysis proposed during spring and fall migration and early winter (i.e., three 3-minute segments randomly selected from the Morning Period per week) is in line with recommendations in section 8.9 of the Guidelines (page 54).	■ Birds Study Plan: Section 7

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		in alignment with the route. Transect lengths less than 5 kilometers may be suitable but should be justified with respect to an analysis of land cover that demonstrates no further change in land cover composition with increasing distance from the intersection of route and transect mid- point"				
WH-36	■ Section 7 Conformance with Federal and Provincial Guidance – "Wildlife data will be collected to represent temporal sources of species variation (i.e. among years, among seasons and within 24 periods)'	■ Section 8.10 – "Collect wildlife data to represent the following temporal sources of variation: • among years • Within and among seasons (e.g., spring dispersal, breeding, late summer/fall migration and swarming, hibernation); and • Within the 24-hour daily cycle. Rare species require more survey effort to detect than common species, and this needs to be accounted for in survey design by increasing the number and duration of surveys."	■ More information is needed on the timing of surveys outlined in Section 4.3 to determine whether variation among years and seasons is represented.	■ Provide a schedule for all surveys to be conducted along with detailed survey designs that demonstrates how temporal variation requirements for wildlife data collection would be met, per Section 8.10 of the Guidelines.	■ The Study Plan has been updated with timing information, where available. Further information regarding future sampling locations and dates will be provided in the future Work Plan.	■ Wildlife Study Plan: Table 7-1 and Table 7-2 ■ Birds Study Plan: Table 7-3, Table 7-4, and Table 7-5.
WH-37	■ Section 7 <u>Conformance with Federal and Provincial Guidance</u> – "Section 4.3.1.3?"	■ Section 8.9 – "describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada Goose, Snow goose, Swans, Gyrfalcon, Loon, Peregrine Falcon, and duck species)"	■ It is unclear how or if the use of migratory and non migratory birds as a source of country foods and species that have Indigenous cultural importance will be described. ■ Note: Table 7.1 has this requirement listed, but the "response" section is blank. Additionally, the referenced section in the study plan has a question mark, which may be an editorial error. However, there is no mention of country foods in the section that is referenced.	■ Provide detail to demonstrate how use of migratory and non migratory birds as a source of country foods and species that have Indigenous cultural importance will be described. Include information about the methods and approaches that will be used to meet the requirement in Section 8.9 of the Guidelines. ■ Update table 7.1 to include a response to section 8.9 TISG requirements.	■ Specific locations and dates of ARU deployment will be provided at a later date.	■ Birds Study Plan: Section 7.2.1
WH-38	■ Section 7 Conformance with Federal and Provincial Guidance – "Long- and short-term habitat changes and food sources of wetland fauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to wildlife, migratory and non-migratory birds"	■ Section 15.2 – "describe short term and long term changes to habitats and food sources of migratory and non-migratory birds (types of cover, ecological unit of the area in terms of quality, quantity, distribution and functions), with a distinction made between these two birds categories, including losses, structural changes and fragmentation	■ It is unclear how all aspects of the requirement in Section 15.2 of the Guidelines will be met. The information provided in Section 7 only refers to wetlands, but the Guidelines require that riparian and terrestrial environments be described as well.	■ Provide detail to demonstrate how all aspects of the requirement in Section 15.2 of the Guidelines will be included in the effects assessment.	■ Long- and short-term habitat changes and food sources of fauna will be described and documented including changes in terms of the health, integrity and availability of habitats related to wildlife, migratory and non-migratory birds.	■ Birds and Wildlife Study Plans: Section 9.4.2

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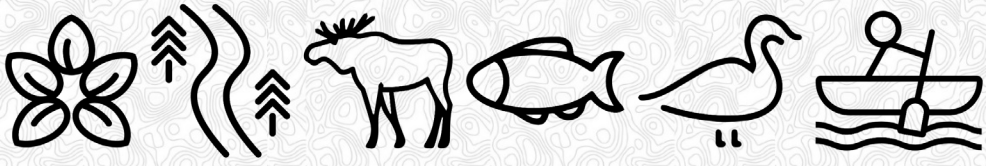
		of riparian habitat (aquatic grass beds, intertidal marshes), terrestrial environments (e.g., uplands, grasslands, forested, old growth, post fire) and wetlands frequented by birds. Describe changes in terms of the health, integrity, and availability of habitats. Important habitats to consider include eskers, (and similar upland features), forest, riparian, bog/fen/peatlands, other wetlands, and open water;"				
WH-39	■ Section 7 Conformance with Federal and Provincial Guidance – "Will be accounted for in the IA/EA – The expressions of change to newly created habitat through the activities of the project will be described in the IA/EA"	■ Section 15.2 – "Account for changes in detection pre- and post-project construction. For instance, roads allow for greater detection distances and therefore any estimates of abundance or presence need to account for differential detectability; describe the effects caused by the new habitat types created in the project area by clearing vegetation. – The new habitats created may attract migratory birds, which were not present before (such as the Eastern Whip-poor-will or the Common Nighthawk). Describe how these species at risk may be impacted by the project."	■ There is not enough information provided to determine if the requirements in Section 15.2 of the Guidelines will be met. There is no discussion about methodologies or studies that will take place.	■ Provide detail in the study plan to demonstrate the proposed approaches and methods to be used to integrate the requirements from Section 15.2 of the Guidelines into the assessment.	■ Post-construction survey requirement will be determined based on the results of the IA / EA, and changes in detectability will be accounted for in the IS / EA Report if impacts are determined.	■ Birds Study Plan: Table 11-3
WH-40	■ Section 7 Conformance with Federal and Provincial Guidance – "Biodiversity metrics for the Wildlife VC will consider: • Distribution in space; Frequency of occurrence; Patterns of occurrence and abundance in time; Abundance and, if possible, density; and Associate habitat types and strength of associations"	■ Section 15.3 – "describe effects to terrestrial wildlife biodiversity considering biodiversity metrics, effects of habitat fragmentation, changes to regional biodiversity"	■ It is unclear how the effects of fragmentation on terrestrial wildlife biodiversity and changes to regional biodiversity will be studied.	■ Provide further detail to demonstrate how changes to regional biodiversity and the effect of fragmentation on terrestrial wildlife biodiversity will be described, as per the requirements in Section 15.3 of the Guidelines.	■ The Study Plan is updated to describe how the effect of fragmentation on biodiversity metrics will be examined pre- and post-construction at the PDA and LSA level.	■ Birds and Wildlife Study Plans: Section 9.4.1.2, 9.4.2

Draft Study Plan Comments – Provincial



Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
1	■ Page 2, s. 2 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ Key objectives of conducting an EA include the elements mentioned in the work plan and also describing the existing environment, describing potential effects (positive and negative) of the project and alternatives, and consult about the project.	■ Suggest the following revisions to add additional key objectives of the EA process: – *The key objectives of conducting an IA / EA are to describe the existing environment, gather sufficient information to predict Project-related effects (positive and negative) of the project and alternatives on the environment, ~~on Ungulates (moose and woodland caribou) and~~ determine measures needed to avoid or minimize adverse Project effects and enhance beneficial Project effects where feasible, and undertake consultation.*	■ Changes made.	■ Birds and Wildlife Study Plans: Section 2
2	■ Page 2, footnote – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ The footnote is appreciated though requires clarification. Will the study plans be updated to reflect any other comments during the ToR review process or post-ToR, e.g. federal, Indigenous, public?	■ Please clarify if the study plans will be included with the ToR submission. ■ If not included in the ToR submission, please clarify if and when the project team intends to consult broadly on the work plans. The footnote should also be revised to state that the study plans will be updated to reflect the approved ToR if approval is obtained.	■ The Study Plans will not be included with the ToR submission. They have considered public, agency, and Indigenous input received on the Project to date. Government agencies, interested persons, and Indigenous communities will have the opportunity to comment on components of the study plans throughout the IS / EA Report consultation and engagement process. Further details have been provided in Section 3 of the Study Plans. ■ The revision regarding the footnote has been incorporated into the updated Study Plan.	■ Birds and Wildlife Study Plans Section 4 and Section 5
3	■ Pages 6-7, Figures 3-1 and 3-2 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ Figures 3-1 and 3-2 are missing locations for other project infrastructure – can this be added to the maps?	■ Please add locations of other project infrastructure and associated study areas to Figures 3-1 and 3-2, or clarify when these locations will be known.	■ As noted in **Section 6.2** of the Study Plan "The specific location of Project components, including the roadway, pits and quarries, aggregate source areas and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted."	■ Birds and Wildlife Study Plans: Section 6.2
4	■ Page 27, Table 6-1	■ MECP, Environmental Assessment Branch	■ Minor typo in the 2nd row, 3rd column: “Little **Brow** Myotis.”	■ Fix typo.	■ Typo addressed.	■ Wildlife Study Plan: Table 2-1

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5	■ Page 28, s. 6.2	■ MECP, Environmental Assessment Branch	■ Minor typo in 1st paragraph of section 6.2: “The IA/EA will provide describe the anticipated activities..."	■ Fix typo.	■ Phrase has been removed.	■ No Reference
6	■ Page 30, s. 6.3 – Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ A few comments on the first paragraph: – It is stated that project phases include construction and operation. It would be helpful if this section clarifies that the construction phase includes decommissioning of temporary infrastructure, per page 14 of the draft ToR. – Residual effects are mentioned but not explained. For clarity, there should be a statement that residual effects (net effects using provincial language) are the effects left over after application of impact management measures, per Ontario’s EA Code of Practice. – The paragraph states the residual effects will “be described in terms of the magnitude, geographic extent, **timing, duration,** frequency, **social and ecological context,** likelihood, and whether effects are reversible or irreversible.” These characteristics are not all the same as what was stated in the draft ToR: “direction, magnitude, geographic extent, direction [sic], frequency, reversibility and likelihood” (p. 54-55 of draft ToR). Bolded font added to show differences. The remainder of section 6.3 describes further effects assessment methodology. The work plan and final ToR should align in methodology.	■ Please add to this section that the construction phase includes decommissioning of temporary infrastructure, using consistent language as the ToR. ■ Please add to this paragraph that ‘residual (net) effects are the effects remaining after the application of impact management measures.’ ■ Please align the work plan methodology with the final ToR methodology in terms of assessing effects and alternatives, or provide sufficient rationale if methodologies are different. Per Ontario’s EA Code of Practice, the evaluation method(s) chosen must be able to produce an assessment that is clear, logical and traceable.	■ The requested revisions have been made.	■ Birds and Wildlife Study Plans: Section 6.1 and Section 9.6.
7	■ Indigenous knowledge Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ The work plan indicates that the EA will consider Indigenous knowledge to inform the effects assessment. The work plan does not provide a proposed methodology for how the proponent intends to seek Indigenous knowledge, from whom, and how it will be incorporated.	■ Please provide further details about how Indigenous knowledge will be collected and incorporated. Alternatively it may be helpful to include a reference to the relevant components of the ToR and ToR consultation plan that provide further details.	■ As identified in **Section 4.2** of the Study Plan, the Proponent will provide opportunities for consultation and engagement with Indigenous communities identified in **Table 4-1**, which is inclusive of all Indigenous communities identified in the Indigenous Partnership and Engagement Plan for the Marten Falls Community Access Road Project Impact Assessment (the Agency 2020a). ■ Further information on how Indigenous Knowledge will be considered in the IS / EA Report has been included in **Section 5** of the Study Plan. **Section 5** of the Study Plan provides further details on the two concurrent and complementary avenues for Indigenous communities and groups to be engaged with and provide input on the Project: the Indigenous Knowledge Program and the Consultation and Engagement Program.	■ Birds and Wildlife Study Plans: Section 4 and Section 5

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8	■ Criteria and indicators table ■ Same comment in Wildlife, Ungulates and Vegetation work plans	■ MECP, Environmental Assessment Branch	■ For the tables containing criteria and indicators, some work plans include the three columns Valued Component, Indicators and Rationale for Selection. Other work plans include the columns Indicator, Expression of Change and Rationale for Selection. The table formats of criteria and indicators should be consistent across work plans. ■ There are also differences between the criteria/indicators in the draft work plans vs. the criteria and indicators in the draft ToR	■ Please review draft work plans to achieve consistent format in how criteria and indicators are presented in the tables. ■ Where there are differences between the criteria/indicator tables in the draft work plans and the draft ToR Appendix A, please ensure the work plans and final ToR align so that the assessment methodology is consistent and to avoid confusion.	■ Study Plans have been updated to ensure consistent format in how criteria and indicators are presented. ■ The criteria and indicators have evolved through input from Indigenous communities, government agencies and interested stakeholders and will continue to do so. The starting point for the criteria/indicator tables in the updated Study Plans was Appendix A of the Proposed ToR. However, there are a few circumstances where agency comments were provided on criteria/ indicators following the finalization of the Proposed ToR and so there are a few circumstances where the criteria/indicators included in the updated Study Plans deviate slightly from that provided in Appendix A of the Proposed ToR.	■ Birds and Wildlife Study Plans: Section 9
9	■ Pg. 4 / Table 3-1	■ MECP, Species At Risk Branch	■ Limited rationale has been provided to substantiate the use of tertiary watersheds to define the Regional Study Area (RSA). The identification of the RSA for Wolverine should be based on Wolverine specific considerations, such as their geographic extent within and across the study areas (e.g., broad use of large landscapes, etc.). This may also include consideration of ecosystem-based considerations relevant to Wolverine (e.g., ecoregions/ecodistricts, Wildlife Management Units, etc.) where appropriate. If watersheds are to be used to identify the RSA, appropriate rationale/ justification needs to be included describing their relevance to Wolverine.	■ Update the draft Work Plan to provide appropriate rationale that supports the use of tertiary watersheds for Wolverine.	■ The Wolverine RSA has been updated to include all WMUs that intersect the Wolverine LSA. The rationale for this selection has been provided in the Study Plan.	■ Wildlife Study Plan: Section 6.2
10	■ Pg. 9 – 10 / s.4.1.1.2 – ■ Crepuscular Bird Acoustic Surveys	■ MECP, Species At Risk Branch	■ Insufficient information is provided on the number and areas of potential habitat that were identified and surveyed for Eastern Whip-poor-will.	■ Update the draft Work Plan to include a map of the potential habitat that was identified and surveyed for Eastern Whip-poor-will.	■ The requested revision has been made.	■ Birds Study Plan: Figure 7-2
11	■ Pg. 10	■ MECP, Species At Risk Branch	■ Document states “ARUs recorded data for two hours starting 30 minutes after sunrise…” – given that the species being targeted (Whip-poor-will and Common Nighthawk) are crepuscular, was this meant to say..”for two hours starting 30 minutes after sunset..”?	■ Correct typo or provide rationale for timing of acoustic studies meant to target crepuscular bird species	■ Changes made.	■ Birds Study Plan: Section 7.2.2
12	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ Document states “This survey program is based on the Ontario Ministry of Natural Resources and Forestry’s (MNRF) Draft Survey Protocol for Eastern Whip-poor-will in Ontario (2014)” however the MNRF protocol does not speak to this method of survey (i.e. the use of acoustic song-meters in lieu of point counts). The use of acoustic song-meters is not typically a recommended approach given the difficulties associated with triangulating calls and thus determining locations of calling Whip-poor-will and delineating breeding territories.	■ Update the draft Work Plan to appropriately acknowledge that only some aspects of the referenced survey protocol were used and provide rationale describing why the full draft protocol was not followed.	■ The Study Plan has been updated to include language to show which parts of protocols were followed.	■ Birds Study Plan: Section 7.2.2.5

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13	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ Regarding the selection of segments from the ARUs – no mention of selection of periods based on their proximity to full moon occurrence, which is one of the most important criteria when conducting surveys for Whip-poor-will. It is recommended that proximity to full moon be a primary consideration in the selection of ARU segments.	■ Update the draft Work Plan to provide rationale for selection of segments from the ARUs, including, but not limited to, proximity to full moon, moon illumination, weather, etc.	■ The Study Plan has been updated to include a rationale for selection of ARU segments when conducting surveys for Whip-poor-will.	■ Birds Study Plan: Section 7.2.2.5
14	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Crepuscular Bird Acoustic Surveys)	■ MECP, Species At Risk Branch	■ No mention of the results of the surveys for Whip-poor-will are included. Considering an appropriate survey protocol was not followed, if no birds were heard, these results may be deemed inconclusive and additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of previous surveys will be provided at a later date.	■ No Reference
15	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ Document states that areas of potential suitable habitat identified from the air were surveyed on the ground, wherever access permitted (i.e., within proximity to a safe helicopter landing location). However, no definition is provided on what distance was considered to be 'within proximity'. Were areas of potential habitat excluded from ground surveys because they were deemed to be too far away from a safe helicopter landing location?	■ Update draft Work Plan as appropriate.	■ The Study Plan has been updated to specify "within proximity" to mean within 1-km from a helicopter landing location.	■ Birds Study Plan: Section 7.2.2.3
16	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ Document states that no habitat or potential habitat of Bank Swallow or Barn Swallow were identified within the LSA. It is unclear if this conclusion was made during the desktop exercise using aerial imagery to identify features, and therefore no ground surveys actually took place; or whether the desktop exercise resulted in the identification of potential habitat that was subsequently surveyed from the ground and determine to not be used/occupied.	■ Update the draft Work Plan to clearly indicate whether the conclusion the no potential Barn Swallow or Bank Swallow habitat is present in the LSA was a result of the desktop exercise or the aerial/ground surveys. ■ If this conclusion was based on the desktop exercise, update the draft Work Plan to clearly indicate that aerial/ground surveys were not conducted.	■ The Study Plan has been updated to indicate that the conclusion of no potential Barn Swallow or Bank Swallow habitat present in the LSA was based on desktop review and aerial / ground surveys. Additional results of previous surveys will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.3
17	■ Pg. 10 / s.4.1.1.2 – 2019 Golder Bird Survey (Bank Swallow and Barn Swallow)	■ MECP, Species At Risk Branch	■ No mention of the results of the surveys for Barn Swallow or Bank Swallow are included in the draft Work Plan. Considering the results concluded that no potential Bank Swallow and Barn Swallow habitat were identified within the LSA, the results of the desktop exercise and/or areas searched by air/ground are required to determine if additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of Golder's field reconnaissance were added to the study plan showing that no habitat was identified. Additional results of previous surveys will be provided at a later date.	■ Birds Study Plan: Section 7.2.2.3
18	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan identifies that Acoustic Monitors were deployed at 167 stations within the LSA, but further describes that data was collected from 15 stations. Is there an error in the reported number of stations acoustic monitors were deployed or in the reported number of stations that data was collected from?	■ Update draft Work Plan accordingly.	■ Changes made.	■ Wildlife Study Plan: Section 7.2.2.2.2
19	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ Insufficient details are provided regarding the number and placement of acoustic monitors. The draft Work Plan only indicates that final bat acoustic station locations were identified in the field based on suitable habitat and proximity to safe helicopter landing locations. Additional detail on the selected locations and placement of acoustic monitor locations (e.g., candidate roost trees, snag tree density, surrounding objects, height, etc.) is required to confirm appropriate placement and whether additional surveys may be required to accurately confirm presence.	■ Update draft Work Plan to include additional details regarding the location (i.e., maps) and specific placement of acoustic monitors for surveys conducted to date.	■ The Study Plan has been updated to include a map of bat ARU placement in support of the study design. A description of the habitat at ARU sites will be provided at a later date. Additional bat acoustic monitoring survey locations will be outlined in the upcoming work plan.	■ Wildlife Study Plan: Section 7.2.1.2.2.

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20	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that acoustic monitors were deployed between Jun 13-17, 2019 and retrieved between Sept. 2-4, 2019. Acoustic monitors should be deployed throughout the maternity period (May 1 to August 31) and swarming period (August 1 to September 30) to provide sufficient information to quantify baseline bat activity and evaluate habitat use (i.e., maternity roosting, foraging, travel, swarming).	■ Update the draft Work Plan to address how all aspects of bat activity and habitat use will be addressed.	■ No bat hibernacula habitat was identified, so data was not collected during the swarming period. Future surveys will occur for at least 10 days between June 1 and June 30 in appropriate maternity habitat and from August 1 to August 31 if potential hibernacula are identified.	■ Wildlife Study Plan: Section 7.2.1.2.2 and 7.2.1.2.3
21	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ Notwithstanding previous comments, bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc.).	■ No action required.	■ Comment noted.	■ No Reference
22	■ Pg. 11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that, based on a desktop review of the Abandoned Mine Information System (AMIS) and subsequent field surveys, no potential hibernacula were identified. Considering these results, it is reasonable to assume that there are no hibernacula present.	■ No action required.	■ Comment noted.	■ No Reference
23	■ Pg. 10-11 / s.4.1.2.1 – 2019 Golder Bat Surveys	■ MECP, Species At Risk Branch	■ No mention of the results of the 2019 bat surveys are included in the draft Work Plan and no initial conclusions are presented (e.g., presence/absence of SAR bats, etc.).	■ Update draft Work Plan to include results of surveys conducted to date.	■ The results of previous surveys will be provided at a later date.	■ No Reference
24	■ Pg. 11-12 / s.4.1.4 – Wildlife Cameras	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that 21 wildlife cameras were deployed across the LSA. No information on the intended purpose of these cameras is provided (e.g., habitat use, presence/absence, abundance, etc.) and no results are presented. It is unclear what these were intended to inform and/or how this information will be used. Additional details on methodology and intended application are required.	■ Update draft Work Plan to include additional details on methodology, intended purpose and results of surveys conducted to date.	■ The requested revision has been made. The results of previous surveys will be provided at a later date.	■ Wildlife Study Plan: Section 7.2.3.2.4 and Section 8.3.4.
25	■ Pg. 11-12 / s.4.1.4 – Wildlife Cameras	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the wildlife cameras were deployed between mid-June to early September. Depending on the intended application of this data (e.g., abundance, presence/absence) this is insufficient to adequately identify habitat use across seasons and across years for Boreal Caribou and Wolverine.	■ Pending additional information on intended application of wildlife cameras, additional data collection with wildlife cameras may be required.	■ Motion sensitive cameras will be used to estimate the seasonal distribution, abundance, and density of mammals (including Caribou and Wolverine) in the LSA among years. Surveys completed in 2019 are intended to represent one year of data, an additional year of data is proposed in the Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.4
26	■ Pg. 12 / s.4.3 – Study Methods	■ MECP, Species At Risk Branch	■ It is identified that the following study methods have been designed to support addressing elements of the TISG as well as implementing survey protocols that may be identified for Critical Habitat under the Schedule of Studies as outlined in various SAR recovery strategies that exist for species protected under SARA. It is recommended that the study methods be designed to also consider provincial direction (i.e., recovery strategies, government response statements, general habitat descriptions [GHD's], etc.) ensuring specific reference is made to appropriate policy and guidance documents.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include the following: " The following study methods have been designed to address elements of the TISG required for field investigations... recovery strategies that exist for species protected under SARA (Environment Canada 2015; Environment Canada 2016), provincial recovery strategies (Ontario Wolverine Recovery Team. 2013, Humphrey and Fotherby 2019), government response statements (MECP 2020; MNRF 2016), and General Habitat Descriptions (MNR 2017)."	■ Birds and Wildlife Study Plans: Section 7.2

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27	■ Pg. 13 / s.4.3.1.1 – Field Study Design	■ MECP, Species At Risk Branch	■ Insufficient information is provided regarding the number of sampling plots that will be established to survey for Eastern Whip-poor-will (i.e., number of ground survey stations / number of ARU stations in Eastern Whip-poor-will habitat) (see comment #20).	■ Update the draft Work Plan to clearly identify the number of survey stations that will be established for Eastern Whip-poor-will.	■ The Study Plan has been updated to include a map of ARU station locations. Additional survey locations will be provided in the upcoming work plan.	■ Birds Study Plan: Figure 7-1
28	■ Pg. 13 – 14 / s.4.3.1.1 – Field Study Design	■ MECP, Species At Risk Branch	■ Insufficient information is provided regarding the number of Ground Investigation sites. Several components of the proposed Wildlife Work Plan reference the Ground Investigation sites (e.g., Bat ARU stations, Wolverine Hair Snag Traps, etc.), however without understanding the number and distribution of these sites, it is difficult for MECP-SARB to provide appropriate comments on the adequacy of proposed surveys.	■ Update the draft Work Plan to clearly identify the number of Ground Investigation sites that will be established.	■ The Study Plan has been updated to indicate the number of Bat ARU stations and Wolverine hair snags and general distribution. Survey locations will be provided in the upcoming Work Plan.	■ Wildlife Study Plans: Sections 7.2.1.2.2 and 7.2.3.2.5
29	■ Pg. 16 / s.4.3.1.5 – Autonomous Recording Unit (ARU)	■ MECP, Species At Risk Branch	■ Ideally, MNRF's 2014 Draft Survey Protocol for Eastern Whip-poor-will should be followed as opposed to deployment of ARUs. However, if ARUs must be used, they should be set to record during a period when the moon is greater than 50 percent illuminated in order to maximize chances of catching calling individuals. If Whip-poor-will are captured during ARU deployment, how will their presence (and lack of ability to triangulate their location) as well as habitat be mapped?	■ Update the draft Work Plan to clearly describe how the application of ARUs will be used to inform the EA.	■ The requested revisions have been made to the updated Study Plan.	■ Birds Study Plan: Section 7.2.2.5 and Section 7.2.2.7
30	■ Pg. 17 – 18 / s.4.3.1.8 – Data Collection	■ MECP, Species At Risk Branch	■ Sufficient samples of ARU data specific to Eastern Whip-poor-will should be provided and rationalized. ARU data should be sampled during appropriate timeframes/conditions for Eastern Whip-poor-will (i.e., 30 minutes before sunset to 30 minutes after sunrise, during a period when the moon is greater than 50 percent illuminated, etc.) to maximize the chances of identifying calling individuals.	■ Update the draft Work Plan to clearly describe and rationalize the number of samples for Eastern Whip-poor-will and the criteria for selection.	■ The Study Plan has been updated to include a description of the ARU sampling strategy for Eastern Whip-poor-will based on binomial expansion of published detection rates during the time periods identified in the comments.	■ Birds Study Plan: Section 7.2.2.4 and Section 7.2.2.5
31	■ Pg. 18 / s.4.3.2 – Bats	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that Little Brown Myotis and Northern Myotis are known to have roosting habitat within the RSA. Recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include the Tri-colored bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1
32	■ Pg. 18 / s.4.3.2.1 – Habitat Identification	■ MECP, Species At Risk Branch	■ The referenced document (Bats and Bat Habitat: Guidelines for Wind Power Projects) was published in 2011, not 2019. ■ It is recommended that bat habitat be identified using direction provided in the draft Technical Note Species At Risk (SAR) Bats (2015) as this provides additional and up-to-date information.	■ Correct reference year ■ Update draft Work Plan to reflect that the draft Technical Note will be used to identify suitable bat habitat.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.1.1
33	■ Pg. 18 / s.4.3.2.1 – Habitat Identification	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that field surveys will be used to confirm bat habitat presence in high potential areas. It also indicates that the habitat suitability exercise will inform the locations of the acoustic surveys which will be designed to locate and identify high value habitat features such as maternity roosts, foraging areas and hibernacula. ■ As mentioned, the survey methods presented are reasonable approaches to identify presence/absence and general bat activity. However, while the identification of 'high potential' or 'high value' habitat can potentially inform appropriate locations to deploy acoustic monitors, assessment of impacts should consider all potential habitat.	■ Update the draft Work Plan to clarify that the acoustic surveys target 'high potential' habitat, as identified through the habitat identification exercise, is intended to inform presence/ absence and general bat activity for comparative purposes to inform the location of the road within the LSA and an assessment of impacts; and not to identify high/low quality habitat.	■ The Study Plan has been updated to clarify that acoustic surveys will target "high potential" bat habitat rather than "high quality" bat habitat.	■ Wildlife Study Plan: Section 7.2.1 and Section 8.1

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
			Bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (i.e., Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc. through the PSA, LSA and RSA.			
34	■ Pg. 18 / s.4.3.2 - Bats	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the study will be designed in such a way to be able to describe the distribution and abundance of bats in relation to the Study Areas. Information collected from stationary acoustic recorders won't be able to provide abundance measures as there is no way of separating individual bats with this method. However, the method can provide presence/absence data, and relative importance of different habitats for bats in different seasons using the proposed bat activity index.	■ Although currently limited due to existing access, actual counts of bats (to inform abundance) in the different habitats encountered along the route is possible using mobile acoustic recordings, as described in A Plan for the North American Bat Monitoring Program (NABat) (Loeb et al., 205). ■ Note: mobile acoustic recordings could also be obtained on the supply road after construction.	■ Stationary acoustic recorders are proposed as a method to provide presence data and to improve our understanding of natural variability in bat relative abundance within and among seasons and years in the PDA and LSA. ■ The possibility of using mobile acoustic recorders may be explored for post-construction monitoring of bat abundance.	■ Wildlife Study Plan: Section 7.2.1.2.2
35	■ Pg. 19 / s.4.3.2.2 – Acoustic Surveys ■ And s.4.3.2.3 – Data Collection	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that acoustic surveys will be designed to account for inter-annual and within-season variability in habitat use by taking place during multiple nights in the late spring, summer and fall seasons to capture bat dispersal and identify breeding and roosting habitats. However, the following section (Data Collection) only indicates that ARUs will be deployed during the roosting period of June 1 to June 30 and peak swarming period of August 1 to August 31. This is not sufficient to appropriately assess all timing and habitat used for migration. Bat acoustic surveys should be extended to September 30.	■ Update the draft Work Plan to describe how all aspects of bat habitat and timing will be assessed.	■ The Study Plan has been refined to indicate that a desktop review will be conducted to identify potential migration corridors.	■ Wildlife Study Plan: Section 7.2.1 and Section 7.2.1.2
36	■ Pg. 21 / s.4.3.4 – Mammals	■ MECP, Species At Risk Branch	■ Table 6-1: Wildlife Indicators (draft Work Plan) and Appendix A – Draft Criteria and Indicators for Alternatives Evaluation (draft Terms of Reference) identify the following example indicators for Wolverine: – Change to Habitat availability (quantity and quality) – Change to Habitat Distribution (i.e., configuration and connectivity) – Change to survival and reproduction ■ As described in both documents, the above indicators are preliminary and will be further refined in the EA, and are provided for the purposes of gathering feedback for the refinement in the EA. As such, it is recommended that additional indicators be considered for Wolverine, including impacts to the species (i.e., spatial and temporal distribution, abundance, den site selection and use, harvest). ■ The draft Work Plan does not adequately address necessary field studies to inform these indicators. Previous and proposed winter aerial surveys and proposed camera trap surveys, which identified the presence of wolverine, are not sufficient to inform the effects of the Project on all stated indicators.	■ Update the draft Work Plan to include additional recommended indicators for Wolverine. ■ Update the draft Work Plan to provide additional detail describing how all relevant indicators for Wolverine will be addressed in the EA. If no additional field studies are proposed, a thorough description of rationale and justification should be provided to MECP and all other relevant regulatory authorities to substantiate this decision.	■ The Study Plan has been updated to more clearly state the objectives of field studies to include determining the seasonal distribution, abundance, population status, movements, and habitat requirements. Interviews for harvest data has been included in a separate section to be more clearly visible. ■ Information about den site selection and use are not included in the Study Plan with the following justification: "Given the low population density of Wolverine in the Study Area, the risk of trapping and radiotracking individuals to obtain den site selection and use information will potentially cause undue harm to the population. This Study Plan assumes that Wolverine are present in the Study Areas and appropriate mitigation measures will be recommended in consultation with the MECP if any den sites are discovered incidentally."	■ Wildlife Study Plan: Section 7.2.3 and 7.2.3.1

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
37	■ Pg. 21 / s. 4.3.4.1 – Air Surveys for Mammals	■ MECP, Species At Risk Branch	■ In addition to recording the species, number, location, habitat and time of any observed mammal, evidence of caribou (e.g., tracks, cratering, slushing, etc.) and wolverine (e.g., tracks, etc.) should also be recorded.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.2
38	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ As stated, wolverine live at extremely low densities and the probability of encountering their tracks is low. As such, the proposed transect spacing of approximately 10.6 km apart is insufficient to adequately sample the RSA for wolverine. While MECP recognizes the proposed approach follows the recommended 'Ozhiski Protocol' for caribou (MNRF's Ozhiski Caribou Aerial Survey, 2018: Operating Procedures and Background), reduced transect spacing (i.e., more transects) would increase the sampling area and the likelihood of observing wolverine and/or evidence of wolverine (e.g., tracks). ■ It is recommended that the same hexagon grid referenced in the Ozhiski Protocol be used in the planning of transect layout to ensure consistency with and future range level monitoring for caribou (and wolverine), but that a 2 km spacing is used as per the Select Wildlife and Habitat Features: Inventory Manual (Ranta 1997).	■ Update the draft Work Plan accordingly.	■ Wolverine aerial tracking transect spacing details are provided in the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2.2
39	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ Additional detail is required on the number of surveyors that will carry out the proposed wolverine aerial surveys. It is recommended that in addition to the pilot, a navigator/lead surveyor and two additional surveyors in the rear of the aircraft (for a total of 4 surveyors) comprise the survey crew.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.3.2
40	■ Pg. 21 – 22 / s.4.3.4.2 – Wolverine Aerial Surveys	■ MECP, Species At Risk Branch	■ Additional detail is required regarding the survey area. The draft Work Plan indicates that the winter aerial Caribou surveys that will be completed, as per the draft Ungulate Work Plan, will also search for Wolverine. However, the survey area for Caribou is proposed to cover the Caribou LSA (i.e., 35 km buffer of PSA as per draft Ungulate Work Plan) which differs from the Wolverine LSA (i.e., 10 km buffer of PSA).	■ Update the draft Work Plan to provide clarity on the survey area for Wolverine aerial surveys.	■ The study areas are defined in **Section 6** of the Study Plans.	■ Wildlife Study Plan: Section 6 Ungulates Study Plan
41	■ Pg. 22 / s.4.3.4.3 – Motion Sensitive Camera Tracking for Fur Bearers and Small Mammals	■ MECP, Species At Risk Branch	■ Additional detail is required on the intent of the wildlife cameras including a description of how any species at risk information will be used in the impact assessment.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 8.3.4
42	■ Pg. 22 / s.4.3.4.3 – Motion Sensitive Camera Tracking for Fur Bearers and Small Mammals	■ MECP, Species At Risk Branch	■ Additional detail is required on the specific targeted species. If this includes Wolverine, additional detail is required on the number and distribution of trail cameras that will be deployed (see comment #20), the considerations that will inform the placement of cameras, the dates/duration in which they will be deployed, and the information retrieval schedule.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been updated to include additional detail about the specific targeted species, the number and distribution of trail cameras, and considerations for placement of cameras. ■ Additional survey locations and dates will be provided in the upcoming work plan.	■ Wildlife Study Plan: Section 7.2.3.2.4

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
43	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that Wolverine hair snag traps will be deployed to determine the potential presence in the PSA and LSA. While presence/absence within the PSA and LSA is relevant information, the Wolverine Hair Snag Traps should also be designed to target collection of demographic information (i.e., determine reproductive female ranges within PSA, LSA and RSA). All aspects of the Wolverine Hair Snag Traps regarding intended purpose, how the information will be analysed and how it will inform the impact assessment need to be clearly identified and described in this section.	■ Update the draft Work Plan accordingly.	■ **Section 7.2.3.5** and **Section 8.3.5** have been updated to include more information.	■ Wildlife Study Plan: Section 7.2.3.2.5 and Section 8.3.5
44	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that two hair snags will be placed at each motion camera deployment location. As per comment #20 and #34, additional detail is required regarding the number of Ground Investigation sites and motion camera locations to clearly indicate how many Wolverine hair snag traps that will be deployed and their distribution.	■ Update the draft Work Plan accordingly.	■ Additional detail has been added about the number and distribution of Wolverine hair snag traps.	■ Wildlife Study Plan: Section 7.2.3.2.5
45	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ Additional detail is required related to how the camera information collected through hair snag traps will be analysed and be used to inform an assessment of impacts to Wolverine (e.g., unique pelage pattern for unique identification of individuals, sex, reproductive females, etc.)	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan Section 8.3.4
46	■ Pg. 22 / s.4.3.4.4 – Wolverine Hair Snag Traps	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that local interviews and harvest records from trapping can be used to gain an understanding of the local presence of fur bearers. It is unclear if and/or how this information will be used in the impact assessment. MECP-SARB recommends documenting incidental harvest within the RSA (potentially available through MNRF district offices) and, if possible, conducting local interviews to determine the extent of traditional harvest; as well as a commitment to monitoring harvest rates post-construction to determine the impacts of the road on wolverine populations. ■ The literature suggests the largest source of wolverine mortality is related to harvest (e.g., Krebs et al. 2010, J. Wildl. Manage. 68(3):493-502). The development of a road into an otherwise largely undisturbed landscape increases the risk of harvest as a result of easier access by trappers to these previously inaccessible areas.	■ Update the draft Work Plan to describe how harvest of Wolverine will be incorporated into the baseline studies and considered in the impact assessment.	■ Harvest data will be incorporated into the baseline studies and considered in the impact assessment.	■ Wildlife Study Plan: Section 7.2.3, Section 8.3.1, and Section 9.4.2 ■ Land and Resource Use Study Plan
47	■ Pg. 24 / s.5.1 – GIS	■ MECP, Species At Risk Branch	■ In addition to IAAC, all baseline data available in GIS format should also be provided to the MECP's Species at Risk Branch and MNRF's Natural Heritage Information Centre (NHIC) as complete data sets from all surveys.	■ Update draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 8.6 ■ Birds: Section 8.1
48	■ Pg. 24 / s.5.2 – Birds	■ MECP, Species At Risk Branch	■ As it relates to Eastern Whip-poor-will, the identification of each breeding territory should be used to categorize habitat according to the General Habitat Description (GHD).	■ Update draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Birds Study Plan: Section 7.2.2.7

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
49	■ Pg. 25 / s.5.3 – Bats	■ MECP, Species At Risk Branch	■ Similar to comment #25, the survey methods presented are reasonable approaches to identify presence/absence and general bat activity. ■ However, while the identification of 'high potential' or 'high value' habitat can potentially inform appropriate locations to deploy acoustic monitors, assessment of impacts should consider all potential habitat. Bat roosts in forested environments are particularly difficult to identify without more intensive methods (i.e., trapping and attaching transmitters). Bats are also known to shift roost locations. As such, where existing evidence already confirms presence of SAR Bats (i.e., Little Brown Myotis, Northern Myotis, Tri-Coloured Bat) it can be assumed that bats will be roosting in certain forest types based on stand composition and tree characteristics (i.e., cavities, crevices, cracks, loose bark, etc.) through the PSA, LSA and RSA.	■ Update the draft Work Plan to clarify that the acoustic surveys target 'high potential' habitat, as identified through the habitat identification exercise, is intended to inform presence/absence and general bat activity for comparative purposes to inform the location of the road within the LSA and an assessment of impacts; and not to identify high/low quality habitat.	■ The requested revision has been made to the updated Study Plan.	■ Wildlife Study Plan: Section 7.2.1 and Section 8.1
50	■ Pg. 26 / s.5.4.2.1 – Aerial and Track Surveys	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that data acquired from the aerial surveys and remote camera tracking in the PSA will be correlated with specific habitat and environments in the PSA and LSA to determine wildlife activity hotspots. Additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's. ■ This comment is also broadly applicable to all proposed monitoring and analyses applicable to species at risk.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include more detail to the data analysis to describe how baseline information will be used to identify wildlife hotspots.	■ Wildlife Study Plan: Section 8.3, Section 8.5, and Section 9 ■ Birds: Section 8 and Section 9
51	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ Not all species at risk birds (e.g., Eastern Whip-poor-will) are specifically identified under the Breeding Birds indicator along with Olive-sided flycatcher, rusty blackbird and common nighthawk.	■ Update draft Work Plan accordingly.	■ The Study Plan has been revised to include all avian SAR in the table.	■ Birds Study Plan: Table 2-1
52	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ As per comment #23, recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include Tri-colored Bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1;
53	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ Additional factors (i.e., identified as Expressions of Change in the draft Work Plan) should be considered, including changes to predator/prey dynamics. ■ Changes in prey densities (e.g., moose) as a result of changes in landcover (e.g., increased browse) results in increased predator (e.g., wolf) densities. This can often have an impact on caribou and wolverine populations through opportunistic predation.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include changes to predator / prey dynamics as an expression of change. ■ Additional details are provided in the Ungulate Study Plan.	■ Wildlife Study Plan: Table 9-2 ■ Ungulates Study Plan
54	■ Pg. 27 / Table 6-1: Wildlife Indicators	■ MECP, Species At Risk Branch	■ The Indicators identified in the draft Work Plan are listed as Criteria in the draft Terms of Reference and the Expression of Change in the draft Work Plan are listed as Indicators in the draft Terms of Reference. Consistent terminology needs to be used across documents.	■ Update the draft Work Plan accordingly.	■ The requested revision has been made to the updated Study Plan.	■ Birds and Wildlife: Study Plans Section 9.2

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
55	■ Pg. 28 / s.6.2 – Methods for Predicting Future Conditions	■ MECP, Species At Risk Branch	■ Ecological processes that will be evaluated for potential susceptibility to adverse effects from the Project should also include hydrological processes associated with fen and bog complexes typical of this land base, specifically how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay/James Bay Lowlands (i.e., ecodistricts 2W-2, 2E-4, 2E-1) resulting in changes to landcover and vegetation associated with species at risk habitat (e.g., caribou, wolverine, etc.).	■ Update the draft Work Plan to indicate that the evaluation of ecological processes will include consideration of Project impacts on hydrological processes that could result in a change to species at risk habitat availability and distribution.	■ The Study Plan has been updated to include the following: "The IA / EA will also consider potential adverse effects from the Project on hydrological processes associated with fen and bog complexes, specifically how the Project may affect the flow of water through the transitional zone between the Ontario Shield and Hudson Bay / James Bay Lowlands and the resulting changes to land cover and vegetation associated with SAR habitat (e.g., Rusty Blackbird, Yellow Rail, Wolverine)."	■ Birds and Wildlife Study Plans: Section 9.4.2 ■ Vegetation Study Plan ■ Surface Water Study Plan
56	■ Pg. 29 / s.6.2.1.2 – Wildlife Habitat Ratings	■ MECP, Species At Risk Branch	■ As per comment #42, additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to include potential impacts to SAR based on baseline information.	■ Birds and Wildlife Study Plans: Section 9.4.2
57	■ Pg. 29 / s.6.2.1.2 – Wildlife Habitat Ratings	■ MECP, Species At Risk Branch	■ The referenced HSI models were developed in Western Canada where Wolverine use of the landscape may vary to that in Ontario (i.e., use of elevation resulting in smaller home range sizes). As such, the conditions referenced (i.e., Distance from Linear Feature [0-400m / 400-800m / >800m]) may not be as directly relevant to Ontario wolverine. The Variable and Suitability Index for wolverine presented in Table 6-2 should consider the broader landscape scale and, where available, fine-scale considerations related to den site selection (e.g., avoidance of roads) by Wolverine in Ontario when defining the model variables in the design of HSI models. ■ Wolverine utilize large landscapes with minimal overlap between male home ranges. Evidence specific to Ontario estimated average home range sizes for males and females of 2,563 km2 and 428 km2 respectively (Dawson et al., 2010). These are considerably larger than those cited in the referenced paper associated with North America (Blouin et al., 2004), suggesting Wolverine in Ontario utilize larger landscapes. ■ Additionally, Wolverine are very sensitive to human-caused disturbances, particularly during the denning period. Human contact may cause females to abandon den sites (Myrberget 1968, Copeland 1996; both cited in Copeland and Krucera 1997). Available information suggests that dens are generally located considerable distances from roads, generally supporting large buffers between dens and human activities that range from 2 to 8 km (e.g., Univ. Wyoming 2000, BCMWLAP 2002, Blouin 2006). Current direction in Ontario's Forest Management Guide for Conserving Biodiversity at the Stand and Site Scales (2010) prescribes an AOC with a radius between these extremes (i.e., 4 km). ■ As such, the various modelling variables (i.e., distance to linear features) in the Habitat Suitability Index should also reflect wolverine avoidance of linear features, such as roads, in den site selection to carry out their life processes.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to describe how models will be developed in the IA / EA. The Habitat Suitability Index (HSI) modeling approach is no longer being proposed.	■ Wildlife Study Plan: Section 9.4, Section 3

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
58	■ Pg. 29 / s. 6.2.1.3 – Model Confidence and Resolution	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that the HSI models will be based on the evaluation of ELC units and their assumed relationships to a wildlife VC's habitat suitability in the LSA. As per comment #42, additional detail is required to describe how baseline information will be used to evaluate impacts to species at risk within the defined RSA's.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been revised to identify the potential impacts to SAR based on baseline information. The HSI modeling approach is no longer being proposed.	■ Wildlife Study Plan: Section 9.4
59	■ Pg. 30 / s.6.2.2 – Predicted Effects on the Project	■ MECP, Species At Risk Branch	■ Additional effects should be considered as they relate to wolverine, such as increased trapping/harvest of wolverine (e.g., incidental trapping, etc.). ■ The literature suggests the largest source of wolverine mortality is related to harvest (e.g., Krebs et al. 2010, J. Wildl. Manage. 68(3):493-502). The development of a road into an otherwise largely undisturbed landscape increases the risk of harvest as a result of easier access by trappers to these previously inaccessible areas.	■ Update the draft Work Plan to identify increased trapping and/or harvest as one of the predicted effects that will be assessed for wolverine.	■ The Study Plan has been revised to include increased trapping / harvesting (i.e., Wolverine) to predicted effects.	■ Wildlife Study Plan: Section 9.4
60	■ Pg. 30 / s.6.2.2 – Predicted Effects on the Project	■ MECP, Species At Risk Branch	■ Additional effects on habitat use by SAR should be considered, including bat habitat (e.g., roosting, foraging, swarming, hibernacula, etc.), Eastern Whip-poor-will (e.g., nesting, foraging, etc.) and Wolverine (e.g., landscape-scale habitat, fine-scale habitat such as denning).	■ Update the draft Work Plan accordingly.	■ The effects assessment describes how the general life history of SAR as well as their Critical Habitat may be affected by the Project.	■ Wildlife Study Plan: Section 8.5 ■ Birds Study Plan: Section 8
61	■ Pg. 31 / s. 6.3 – Magnitude of Effect	■ MECP, Species At Risk Branch	■ The draft Work Plan indicates that 'severity' is defined as the level of damage to the VC from the effect that can reasonably be expected. It is typically measured as the degree of destruction or degradation within the scope or the degree of reduction of the population within the scope. This definition should include reference to not just degree of destruction or degradation within the scope of the degree of reduction of the population, but also the function of their habitat. ■ The Endangered Species Act, 2007 defines damaging habitat as "an activity that alters the habitat in ways that impair the function (usefulness) of the habitat for supporting one or more of the species' life processes" and destroying habitat as "an activity that alters the habitat in ways that eliminate the function (usefulness) of the habitat for supporting one or more of the species' life processes".	■ Update the draft Work Plan to provide clarity that 'severity' includes both the degree of destruction or degradation within the scope or the degree of reduction of the population and function of habitat.	■ The requested revision has been made to the updated Study Plan.	■ Birds and Wildlife Study Plans: Section 9.6
62	■ Pg. 33 / Table 7-1 - ID#3	MECP, Species At Risk Branch	■ Although Project components other than the route itself are unknown at this time, it is important to recognize that potential impacts from these components of the Project (i.e., aggregate pits, quarries, access roads, etc.) to species at risk will need to be assessed under the Endangered Species Act, 2007 to determine if an ESA authorization is required. As such, additional field studies may be required for species at risk where sufficient information does not already exist.	■ No action required at this time.	■ Comment noted.	■ No Reference
63	■ Pg. 35 / Table 7-1 - ID#24	■ MECP, Species At Risk Branch	■ As per comment #42, all sensitive areas for species at risk need to be identified within the PSA, LSA and RSA, not just the PSA and LSA.	■ Update the draft Work Plan accordingly.	■ Identification of sensitive areas for SAR in the RSA will be conducted through desktop analysis.	■ Wildlife Study Plan: Section 8.5 ■ Birds Study Plan: Section 8

Comment # / Ref #	Draft Study Plan Section	Agency/Regulatory Body Comments Received From	Comment / Context	Action Item	Final Response	Study Plan Section Reference
64	■ Pg. 35 / Table 7-1 - ID#29	■ MECP, Species At Risk Branch	■ As per comment #23, recent evidence from Layng et al., 2019 identified Tri-colored Bat within the general vicinity of the Project. As such, the potential for this species to be present within the PSA, LSA and/or RSA cannot be ruled out. The draft Work Plan should clearly indicate how this species at risk will be considered.	■ Update draft Work Plan accordingly.	■ The Study Plan has been updated to include Tri-colored Bat.	■ Wildlife Study Plan: Table 2-1 and Section 7.2.1;
65	■ Pg. 35 / Table 7-1 - ID#48	■ MECP, Species At Risk Branch	■ As per comment #4, modifications were made to Ontario Ministry of Natural Resources and Forestry's (MNRF) Draft Survey Protocol for Eastern Whip-poor-will in Ontario (2014) through the use of ARU's. However, this is not identified in the draft Work Plan as committed to in Response #48 of Table 7-1.	■ Update the draft Work Plan accordingly.	■ The Study Plan has been updated to indicate that the study design will partially follow the MNRF draft protocol and cited published scientific papers on the use of ARUs to determine the sampling frequency for Eastern Whip-poor-will.	■ Birds Study Plan: Section 7.2.2.5
66	■ Comment on Wildlife, Ungulates and Vegetation work plans	■ MNRF, Nipigon District	■ MNRF staff have reviewed these draft field work plans. We found that they address the field work needs related to our mandates. However MNRF may have items/comments to contribute during the further development of the ToR and the EA.	■ N/A	■ Comment noted.	■ No Reference

Appendix C

MFFN Bird Study Design and Modelling Memo

AECOM Imagine it. Delivered.

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Date: March 2, 2021
Project #: 60593122

From: Douglas Baldwin, Ph.D
Hugo Gee, Ph.D
AECOM Canada Ltd.

Memorandum

Subject: **Marten Falls First Nation Community Access Road Breeding Bird Study Design Bias and Representativity**

1. Summary

Comparisons were made between the Generalized Random Stratified Tessellation (GRTS) breeding bird study design used for Marten Falls First Nation Community Access Road Project and the Tailored Impact Statement Guidelines' (TISG; the Agency 2020) benchmark study design of transects through: (1) model development; (2) model simulations to identify a relatively "optimal" sample design, and (3) by describing habitat and covariate representativity compared to the TISG benchmark study design.

1. Abundance models were developed for six proxy valued component bird species and two species at risk (Canada Warbler [*Cardellina canadensis*] and Olive-sided Flycatcher [*Contopus cooperi*]).
2. Given an existing 273 site visits, model simulations (n = 50) of the bird abundance models indicate that an additional 300 site visits (150 survey stations visited twice) will stabilize the precision of model estimates and minimize bias relative to a TISG benchmark study design.
3. Compared to the TISG (the Agency 2020) benchmark study design, the GRTS study design oversampled deciduous forest and mixedwood forest and undersampled treed to open fen, treed to open bog, and coniferous swamps. This is an acceptable habitat representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous forest and mixedwood forest and fulfills our objective of covering existing data gaps in these areas. Covariate representativity was adequately achieved for 20 of 50 model simulations with a sample size of 150 survey stations selected with the GRTS study design compared to the TISG (the Agency 2020) benchmark study design.

2. Introduction

Marten Falls First Nation (the Community) is proposing an all-season Community Access Road (the Project) that will connect the Community to the Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. The Community has retained AECOM Canada Ltd. to assist with the Impact Assessment required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* and Environmental Assessment for Project review by the Ministry of the Environment, Conservation and Parks under the Ontario *Environmental Assessment Act*. This memorandum is a follow-up on the Bird Technical Meeting (Working Group) of February 1, 2021. The objectives of this memorandum are to:

1. Describe the breeding bird species model development process and results.
2. Present model simulations to compare multiple study designs to identify an “optimal” sample size that reduces model predictive bias and maximizes precision to the best extent possible.
3. Describe the chosen “optimal” study design’s bias and habitat representativity compared to the TISG study design (the Agency 2020).
4. Describe the chosen study design’s representativity of model covariates relative to the Local Study Area (LSA – 3 km buffer from Project centreline) and Regional Study Area (RSA – 11 km buffer from Project centreline).

As per section 8.9 of the TISG (the Agency 2020), simulations were conducted using simple models developed with existing point count data (Zoetica 2018, Golder 2019) to describe any bias introduced by using a Generalized Random Tessellation Stratified (GRTS) study design compared to the TISG (the Agency 2020) benchmark study design. The GRTS study design takes into consideration limited site accessibility combined with a Project that is expected to impact less common geologic features (i.e., eskers) and associated habitat types in greater proportion to their availability as required by the TISG (the Agency 2020). Habitat types were given unequal probabilities (i.e., weighted values) using three qualitative values (High, Medium, and Low species richness) based on their importance to breeding bird species in the region. Deciduous and mixedwood forests were classified as high species richness; coniferous, second-growth / regenerating, and burned / disturbed forests were classified as medium species richness; and swamp, bog, and fen were classified as low species richness. The TISG benchmark study design consists of multiple survey stations along transects spaced 2 km apart positioned perpendicular to the Project route (the Agency 2020).

3. Bird Species Model Development

3.1 Methods

Generalized Linear Models with a Zero Inflated Poisson distribution (GLM-ZIP) and QPAD offsets (Sólymos 2020) were generated for species abundance of Proxy Valued Components (VC) of species in the Forest Birds VC and Bog / Fen Birds and Other Wetland Birds VC (**Table 3-1**). Common Yellowthroat (*Geothlypis trichas*) was modelled as a fen species due to insufficient observations of fen specialists. Attempts were made to generate models for two Species at Risk (SAR), Canada Warbler and Olive-sided Flycatcher.

Table 3-1: Bird Valued Components for Preliminary Modelling

Bird Valued Component	Proxy Valued Component		Federal Status	Provincial Status
	Common Name	Scientific Name		
Forest Birds	Red-eyed Vireo (deciduous forest)	*Vireo olivaceus*	-	-
	Ovenbird (mixedwood forest)	*Seiurus aurocapilla*	-	-
	Dark-eyed Junco (coniferous forest and disturbed [forestry or fire] forest)	*Junco hyemalis*	-	-
Bog / Fen Birds and Other Wetland Birds	Palm Warbler (bog)	*Setophaga palmarum*	-	-
	Common Yellowthroat (fen)	*Geothlypis trichas*	-	-
	Northern Waterthrush (swamp)	*Parkesia noveboracensis*	-	-
Species at Risk	Canada Warbler	*Cardellina candensis*	Threatened	Special Concern
	Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Special Concern

Bird abundance data was compiled from 273 site visits at 171 survey stations (Zoetica 2018, Golder 2019). **Table 3-2** summarizes bird counts relative to each land cover.

Table 3-2: Total Bird Counts from Existing Datasets Summarized by Land Cover

Land Cover	Total Bird Count							
	Red-eyed Vireo	Ovenbird	Dark-eyed Junco	Palm Warbler	Common Yellowthroat	Northern Waterthrush	Canada Warbler	Olive-sided Flycatcher
Coniferous Treed	3	5	14	6	2	5	1	11
Coniferous/ Thicket Swamp	2	2	12	9	14	12	1	4
Deciduous Treed	4	0	4	1	3	4	1	1
Disturbance - Non and Sparse Woody	5	3	17	11	9	6	2	5
Disturbance - Treed and/or Shrub/Sparse Treed	7	7	5	2	2	7	1	3
Mixed Treed	13	3	6	0	1	6	2	1
Treed/Open Bog	0	2	18	19	1	2	2	6
Treed/Open Fen	3	2	13	5	9	5	0	4
Total	**37**	**24**	**89**	**53**	**41**	**47**	**10**	**35**

The GLM-ZIP models utilized a subset of biotic and abiotic variables proposed in **Section 9.4.1** of the *Birds* – Study *Plan*. Biotic variables focused on the proportion of land cover (i.e., coverage class) within a 100 m radius of breeding bird survey points. Land cover was based on the Ministry of Natural Resources and Forestry (MNRF) Far North Landcover (FNLC) database (MNRF 2014) modified to describe fire disturbed habitats using Ontario's Provincial Satellite Derived Disturbance Mapping digital resource (**Table 3-3**). Another indirect biotic variable is year of disturbance, as detected from changes in satellite datasets (CCFM 2020). Biotic variables also included aboveground biomass and the dynamic habitat index which is a data product largely based on vegetation indices (CCFM 2020).

Abiotic variables for breeding bird survey points included elevation (m) based on the Provincial Digital Elevation Model (DEM) (MNRF 2020) with calculations made for surface roughness (**Table 3-4**). Surface roughness is a degree of surface irregularity and is calculated by the largest inter-cell difference of a central pixel and its surrounding cell. The QGIS Roughness module was used to calculate surface roughness (QGIS Project 2021).

Statistical offsets were applied to GLM-ZIP models based on sampling area (100 m radius from survey station), sampling time (0-3 minutes, 3-5 minutes, 5-10 minutes), and distance of observation (0-49 m, 50-100 m). Time since local sunrise (TSSR) and Julian day were used as covariates to model duration probability (i.e., sampling time). Year showed little to no utility as an effect in the current set of models that were developed with two years of data. Year will be tested and included as a potential random effect after the upcoming field season.

Table 3-3: Predictor Variables

Dependent Variables	Independent Variables	
	Biotic	Abiotic
Abundance	**Land Cover[1] Within 100 m Radius:** ■ coniferous treed ■ coniferous/thicket swamp ■ deciduous treed ■ disturbance – non and sparse woody ■ disturbance – treed and/or shrub/sparse treed ■ mixed treed ■ treed and open bog ■ treed and open fen **Year of Disturbance[2]** **Aboveground Biomass[2]** **Dynamic Habitat Index[2]**	**Digital Elevation Model (m)[3]** ■ elevation ■ surface roughness **Time** ■ time since sunrise (TSSR) ■ survey date (Julian day) ■ year

Notes: 1 MNRF 2014 / 2 CCFM 2020 / 3 MNRF 2020

Akaike's Information Criterion (AIC) was used as a guide for model fit and selection by comparing candidate models using metrics that represent model accuracy and penalizing models with a greater number of covariates (Akaike 1978). The initial best candidate models were selected using a step-wise model selection. Covariate adjustments were made to the initial candidate models to maximize the amount of variance explained by the model, minimize the mean model bias, and minimize AIC. Leave-one-out cross-validation was used to examine within-sample model bias relative to each covariate. Leave-one-out cross-validation includes withholding one point and re-fitting the model on the rest of the observations and repeating this process for each available observation (Allen 1974). By comparing the residuals (observed - predicted) of each of these model predictions from the leave-one-out cross-validation to each covariate, one may get a sense of the bias each covariate may be contributing to any model biases. Other diagnostics, such as deviance squared, Spearman Rho between observed and predicted counts, and Chi-square test using deviance statistics were recorded for each model.

The variance inflation factor (VIF) of models were examined to quantify the multi-collinearity of all predictor variables (Longnecker and Ott 2004).

3.2 Results and Discussion

Models were developed for the six proxy VCs and two SAR (**Table 3-4**). GLM-ZIP models will be refined as additional breeding bird data is collected and will include more explanatory variables as described in section **9.4.1** of the *Birds Study Plan* (AECOM 2021). The maximum VIF of models did not exceed five, suggesting that no further action was required to reduce the multi-collinearity of predictor variables.

The bird count summary in **Table 3-2** indicates that there are generally no clearcut associations between proxy VCs and their expected habitats. Only the abundance models for Dark-eyed Junco (*Junco hyemalis*) and Palm Warbler (*Setophaga palmarum*) show positive relationships between their expected habitats and abundance. Similarly, the zero-inflated model for Common Yellowthroat showed higher probability of presence in treed and open fens.

Table 3-4: Bird Abundance Models and Diagnostics

Species Model	Model Type	Covariates (Abundance model)	Covariates (Zero-inflated model)	Model Diagnostics			
				Spearman rho	Deviance^2	Chi-square p value	Max VIF
Red-eyed Vireo (deciduous forest)	GLM-ZIP	-Intercept - DNSWdy + Elevation + AGBiomass - CTSw - MT + DynamicHabitat - TOFen	-Intercept - DNSWdy - CTSw - Roughness + DynamicHabitat - TOFen	0.62	0.34	1	2.4
Ovenbird (mixedwood forest)	GLM-ZIP	-Intercept - DNSWdy - AGBiomass + DTSST + DynamicHabitat - TOBog - TOFen	-Intercept - DNSWdy - AGBiomass - CT - MT + DynamicHabitat - TOBog - TOFen	0.47	0.24	1	3.0
Dark-eyed Junco (coniferous forest and disturbed forest)	GLM-ZIP	Intercept + DNSWdy + CT + DT + TOBog + Roughness	-Intercept + CTSw + Roughness + TOBog + TOFen - DynamicHabitat	0.43	0.16	0.96	1.4
Palm Warbler (bog)	GLM-ZIP	-Intercept + Elevation + Roughness + DynamicHabitat + TOBog	-Intercept + CTSw + Roughness + CT + MT - TOBog + DynamicHabitat	0.53	0.28	1	1.7
Common Yellowthroat (fen)	GLM-ZIP	-Intercept - AGBiomass - CT - DTSST - TOFen	-Intercept + CT + MT + TOFen + TOBog	0.39	0.22	1	1.2
Northern Waterthrush (swamp)	GLM-ZIP	Intercept - Elevation - CTSw - CT - MT - ChangeYear - TOBog	-Intercept + Roughness + CT + TOFen - CTSw - DTSST - DynamicHabitat	0.43	0.21	1	1.5
Canada Warbler (SAR)	GLM-ZIP	Intercept + DNSWdy- Elevation + CT + DTSST + TOFen	Intercept -Elevation + CT + DTSST + DNSWdy + TOFen - ChangeYear + log(AGBiomass+10)	0.36	0.46	1	3.7

Species Model	Model Type	Covariates (Abundance model)	Covariates (Zero-inflated model)	Model Diagnostics			
				Spearman rho	Deviance[2]	Chi-square p value	Max VIF
Olive-sided Flycatcher (SAR)	GLM-ZIP	-Intercept - Elevation - DynamicHabitat - Roughness - MT	-Intercept - Elevation - DynamicHabitat -MT - Roughness + DTSST	0.28	0.12	0.98	1.7

Notes: AGBiomass: Aboveground biomass; CT: Coniferous Treed; CTsw: Coniferous Tree Swamp; DNSWdy: Disturbed – Non and Sparse Woody; DTSST: Disturbed – Treed and or Shrub/Sparse Treed; DT: Deciduous Treed; MT: Mixed Treed; TO Bog: Treed to Open Bog; TO Fen: Treed to Open Fen

4. Model Simulations to Determine "Optimal" Sample Size and Study Design to Fill Data Gaps

4.1 Methods

Model simulations were conducted to compare multiple study designs to identify an "optimal" sample size that reduces model predictive bias and maximizes precision to the best extent possible. The following four study designs were compared using simulations of the previous bird models:

1. The existing GRTS study design (273 sample visits at 171 survey stations)
2. Using the existing GRTS study design (273 sample visits at 171 survey stations) with additional sampling selected using the existing GRTS study design (60% of survey stations from existing sites and 40% new survey stations).
3. A simple random study design.
4. The TISG (the Agency 2020) benchmark study design.

Model simulations (n = 50) were conducted where potential site visits from each study design were randomly selected for an incremental range of sample sizes. A series of sample sizes (e.g., increments of 50 until 2,300 for the TISG (the Agency 2020) benchmark study design; increments of 50 until 500 for others) were simulated, assuming that each survey station was visited twice (i.e., sample size of 100 = 50 survey stations). Time-associated covariates that are used to calculate QPAD offsets were simulated with a simple Monte Carlo sampling routine, where mean and standard deviation parameters were derived from TSSR and Julian Day data in the existing dataset.

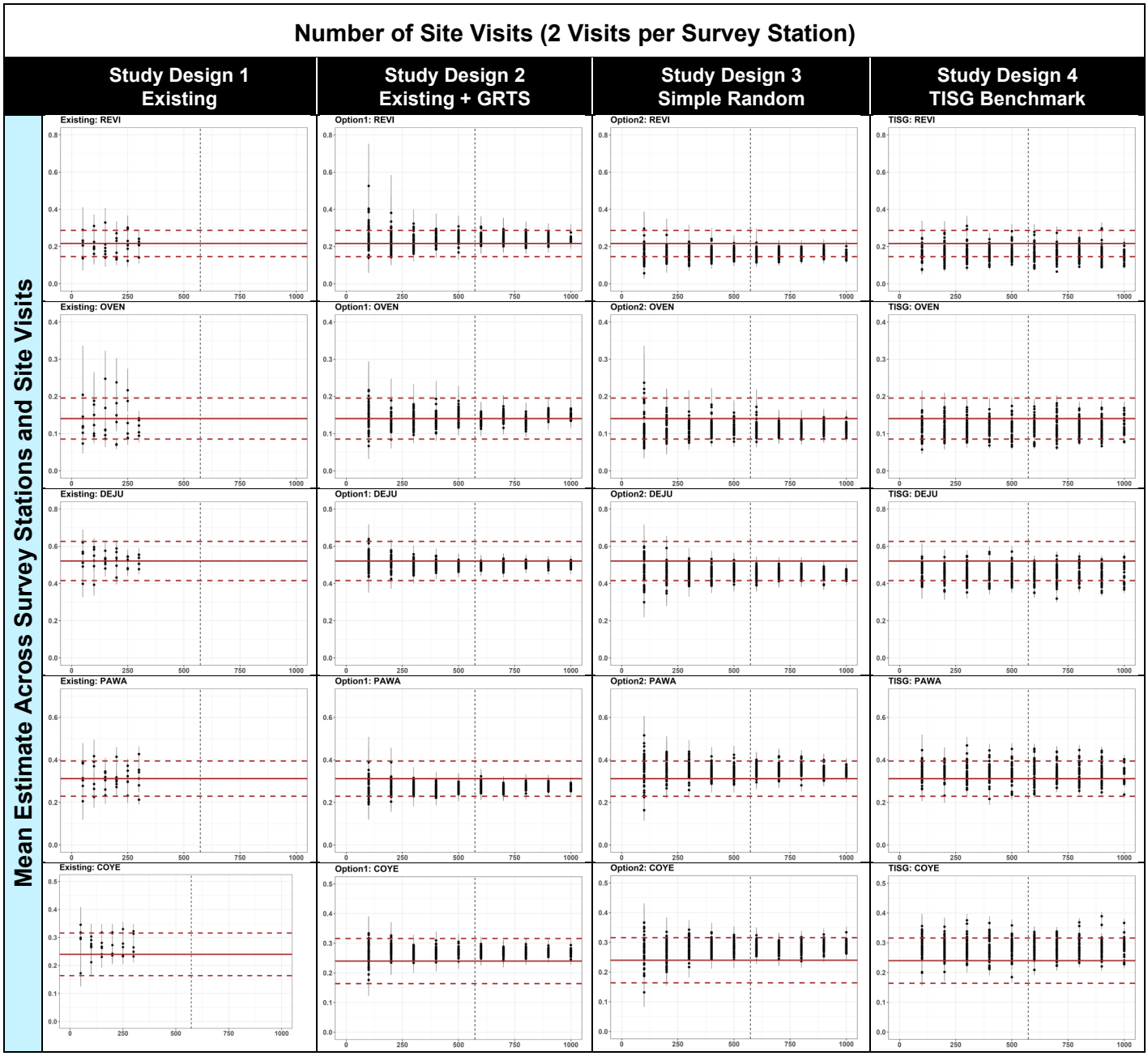
The precision and average bias of abundance estimates from each bird species model was examined across each sample size increment by calculating the mean and the variance (95% confidence interval around the mean) for each study design. With 50 model simulations, an ideal sample size would have 50 mean abundance estimates relatively close to the observed mean (low average bias) with small or comparable confidence intervals relative to the observed confidence interval (high precision).

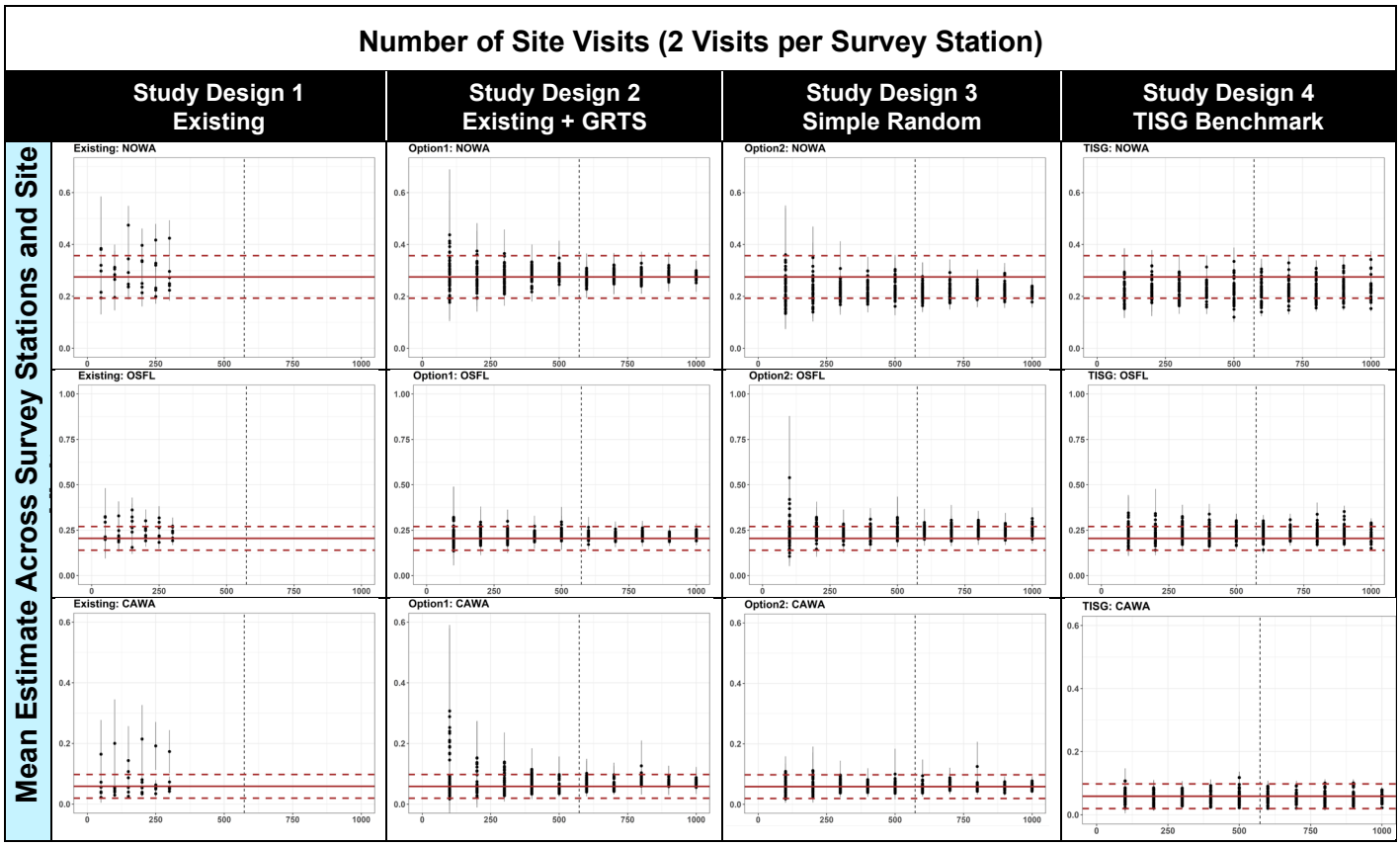
4.2 Results and Discussion

The variance of bird species models for the existing 273 site visits selected with the GRTS study design shows initial signs of decreasing (**Figure 4-1**). In contrast, the mean and variance of estimates from each bird species model is stable at a fairly low number of site visits with the TISG (the Agency 2020) benchmark study design (**Figure 4-1**). The mean and variance from each bird species model for study designs 2 to 4 stabilize by 573 site visits (**Figure 4-1**). This would indicate that 300 additional site visits (two site visits at 150 survey stations) on top of the 273 site visits already completed (Zoetica 2018, Golder 2019) is a reasonable "optimal" sample size.

The variance in the study designs 2 and 3 show a substantial decline before stabilizing after 500 visits for each species (**Figure 4-1**). Study design 2 (GRTS study design) is the preferred option for selecting additional sites based on the lower variance and mean bias by 573 site visits for Olive-sided Flycatcher (**Figure 4-1**), relative to other study designs. Study design 2 has similar variance and bias around its mean model estimates as study designs 3 and 4 for Canada Warbler.

Figure 4-1: Mean Estimate and Variance (95% confidence interval) by Number of Site Visits (2 visits per survey station) for Each Bird Species Model using Study Design 1 (existing GRTS Study Design), Study Design 2 (existing GRTS study design and additional survey stations selected using the GRTS study design), Study Design 3 (simple random study design), and Study Design 4 (TISG (the Agency 2020) **benchmark study design).**





Notes: REVI = Red-eyed Vireo
PAWA = Palm Warbler
OSFL= Olive-sided Flycatcher
OVEN – Ovenbird
COYE = Common Yellowthroat
CAWA = Canada Warbler
DEJU = Dark-eyed Junco
NOWA = Northern Waterthrush

5. Habitat Representativity of Additional Points

5.1 Methods

Land cover within a 100 m radius of survey stations was calculated for 300 site visits (two visits to 150 survey stations) with each study design based on 50 simulations and compared to the land cover in the LSA (3 km buffer from centreline) and RSA (11 km buffer from centreline). The LSA and RSA were selected using an ecosystem-centred approach recommended in section 7.4.1 of the TISG (the Agency 2020). As such, the proportion in each land cover represented by the LSA is similar to the RSA.

5.2 Results and Discussion

The land cover for study design 3 (simple random sampling) and study design 4 (TISG benchmark study design) are comparable to the LSA and RSA (**Table 5-1**). Compared to study design 4, the preferred study design 2 (GRTS study design) oversampled in deciduous and mixedwood forest and undersampled in treed to open fen, treed to open bog, and coniferous swamps (**Table 5-1**). This is an acceptable representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous and mixedwood forest. Coniferous treed is also consistently oversampled by the additional 150 survey stations from study design 2, which is beneficial given the higher counts of Olive-sided Flycatcher in this land cover (**Table 3-2**).

Table 5-1: Land Cover Within 100 m of 150 Survey Stations Selected Through Four Study Designs Compared to Land Cover in the Local Study Area (LSA) and Regional Study Area (RSA)

Land Cover	Proportion					
	Study Design 1: Existing 171 Survey Stations (273 site visits) using GRTS Study Design	Study Design 2: Additional 150 Survey Stations using GRTS Points (mean [SD])*	Study Design 3: Additional 150 Survey Stations using Simple Random Sampling (mean [SD])*	Study Design 4: Additional 150 Survey Stations using TISG Benchmark Study Design (mean [SD])*	LSA	RSA
Coniferous Treed	0.18	0.18 (0.01)	0.12 (0.03)	0.11 (0.04)	0.11	0.11
Coniferous/Thicket Swamp	0.18	0.16 (0.02)	0.28 (0.03)	0.30 (0.07)	0.26	0.27
Deciduous Treed	0.04	0.06 (0.01)	0.02 (0.01)	0.02 (0.01)	0.02	0.02
Disturbance – Non and Sparse Woody	0.14	0.11 (0.02)	0.08 (0.02)	0.09 (0.04)	0.08	0.08
Disturbance – Treed and/or Shrub/Sparse Treed	0.09	0.09 (0.01)	0.08 (0.02)	0.07 (0.04)	0.07	0.06
Mixed Treed	0.09	0.15 (0.01)	0.04 (0.01)	0.05 (0.04)	0.04	0.04
Treed/Open Bog	0.14	0.11 (0.01)	0.19 (0.03)	0.17 (0.06)	0.18	0.19
Treed/Open Fen	0.15	0.13 (0.02)	0.19 (0.03)	0.19 (0.05)	0.18	0.18

**Note: summary statistics representative of 50 simulations with 150 survey stations*

6. Covariate Representativity of Additional Points

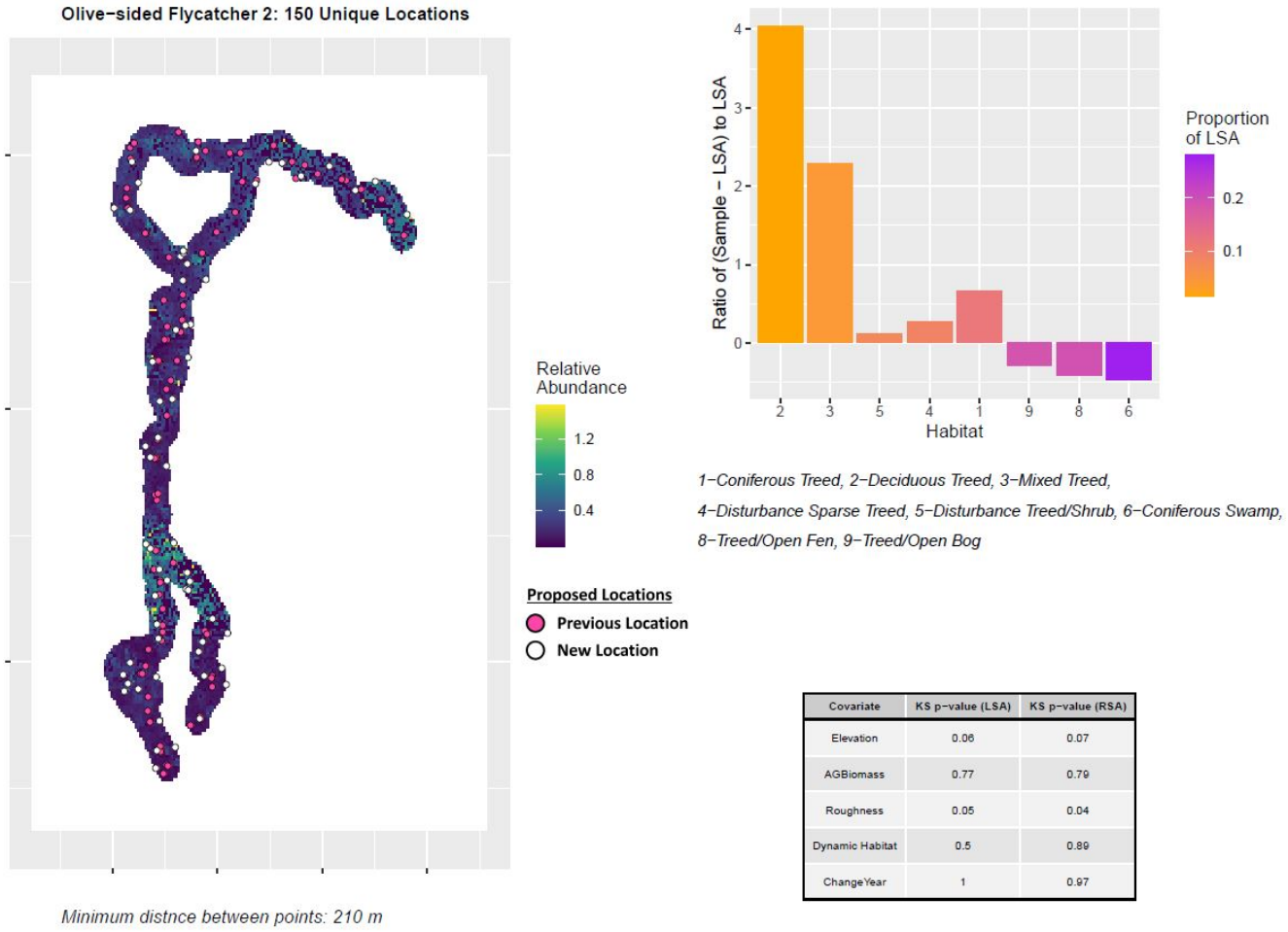
6.1 Methods

To examine the covariate representativity of the preferred study design 2 (GRTS study design), we analyzed the similarity of model covariate distributions across 150 additional survey stations generated by study design 2 with respect to distributions of model covariates across the entire LSA and RSA. A non-parametric multiple comparisons test (Kolmogorov-Smirnov test; Conover 1971) was used to assess whether distributions of all model covariates from survey stations generated by study design 2 are statistically significantly similar (reject H_o at $p < 0.05$; H_o = distributions are not different) to covariate distributions across the LSA and RSA. This was conducted for 50 model simulations using study design 2's approach for each bird model.

6.2 Results

A total of 20 of 50 simulations selected 150 survey stations where elevation, aboveground biomass, change year, and dynamic habitat that were similar to both the LSA and RSA. Surface roughness is highly skewed and difficult to represent completely with 150 survey stations, although one simulation (Simulation 2) did provide a relatively similar distribution for the LSA (**Figure 4-1**). **Figure 4-1** is an example of a simulation showing an adequate distribution's Kolmogorov-Smirnov results for each covariate, the predicted relative abundance map across the LSA for Olive-sided flycatcher, and graphically displays the relative over/under-sampling representativity of the additional 150 survey stations.

Figure 6-2: Spatial Distribution of 150 additional Study Design 2 Survey Stations, modelled relative abundance for Olive-sided flycatcher, Kolmogorov-Smirnov test p-values for important continuous variables used in the models, and the relative over/under sampling of each land cover class relative to the LSA.



Covariate	KS p−value (LSA)	KS p−value (RSA)
Elevation	0.06	0.07
AGBiomass	0.77	0.79
Roughness	0.05	0.04
Dynamic Habitat	0.5	0.89
ChangeYear	1	0.97

All 50 simulations produced high oversampling of deciduous and mixedwood forest, slight oversampling of disturbed forest types and coniferous forest, and slight undersampling of treed to open bog, treed to open fen, and coniferous swamps. This is an acceptable representativity given that the TISG (the Agency 2020) recommends oversampling of land cover types associated with eskers such as deciduous and mixedwood forest.

7 Conclusion

Bird model simulations indicate that a total of 573 sites visits is the “optimal” sample size that reduces model predictive bias and maximizes precision to the best extent possible. Given that 273 site visits to 171 survey stations has already been completed (Zoetica 2018, Golder 2019), an additional 150 survey stations (two site visits per survey station) selected using the GRTS study design provides acceptable habitat representativity based on the TISG requirement to emphasize habitats associated with eskers such as deciduous and mixedwood forests. Furthermore, covariate representativity was adequately achieved for 20 of 50 model simulations with a sample size of 150 survey stations selected with the GRTS study design.

We hope this memorandum meets your expectations for future discussion. If you have any further questions, please do not hesitate to contact the undersigned.

Sincerely,

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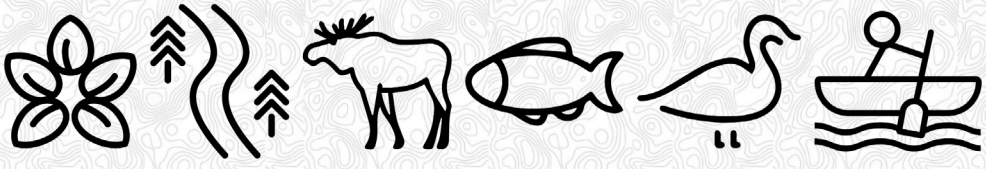
Phone: 1-800-764-9114 **Email:** info@martenfallsaccessroad.ca **Web:** http://www.martenfallsaccessroad.ca



Birds Study Plan

Agency Comments on Study Plan

Study Plan Version	Commentor	Comment # / Ref #	Study Plan Section Reference (PDF Page #)	TISG Section	Agency Response (2022)	Required Action	Proponent Response 2022
Final	The Agency	BI-01	**Section 6.1 Temporal Boundaries Project Phases** "Project phases, which are temporal boundaries, are developed to establish the timeframes within which potential effects of the Project will be considered in the IS / EA Report. The Project is planned to occur in two phases, which are briefly described below and shown in Figure 6-1. … There are currently no plans to decommission the CAR as there is no expected / known end date for its need. Therefore, future suspension, decommissioning and eventual abandonment of the CAR will not be considered in the IS / EA Report. It will be considered if and when a decommissioning or abandonment application is made for the road. In determining the temporal boundaries, in particular the long operations and maintenance phase, consideration was given to the long-term effects on the well-being of present and future generations (Sustainability Principle #28). The final temporal boundaries to be used in the IS / EA Report will be based on regulatory agency guidance, professional judgement and input received through the Project consultation process."	**Section 7.4.2 Temporal boundaries** "For valued components related to wetlands, eskers, birds, wildlife, and Species at Risk, define temporal boundaries in a manner that enables detection of all species that use the project study area, local study area, and regional study area throughout the year and between years, and to estimate their temporal pattern of use (e.g., breeding, or migrants stopping on northward and/or southward migration). Baseline data collection for all biophysical valued components is to be provided for a minimum of two years, unless specified otherwise. Temporal boundaries spanning more than one year will enable accounting for variation due to irregular events (e.g., masting events, storms on migration, late snowfalls)."	Incorrect conclusions about baseline conditions and predicted impacts may result if biologically relevant temporal boundaries are not defined. Temporal scales need to be defined to capture Bird VC use of the study areas per the description in Section 7.4.2 of the Guidelines.	Define in a workplan the temporal boundaries for Bird VCs in biologically relevant ways (i.e. to enable detection of all bird species that use the PSA, LSA & RSA), as per Section 7.4.2 of the Guidelines.	Temporal boundaries for the effects assessment were defined in the Study Plan. Timing for field surveys were also provided in the Study Plan. A schedule will be provided in the Work Plan. Multiple years of bird survey data collection for the project will be compiled and analyzed to account for annual variation. Bird field studies are proposed throughout the year in order to estimate annual temporal patterns of use (e.g. breeding, migration, winter use)
Final	The Agency	BI-02	**Section 6.2.1 Spatial Boundaries** "The specific location of Project components, including the roadway, quarries, pits and temporary infrastructure, are not yet known and will be included in the IS / EA Report. While most of the Project components are expected to be located within the preliminary 5 km wide study area, benefits (e.g., reduced environmental disturbance, avoidance of sensitive features, technical considerations, concerns received through consultation) for locating Project components on lands outside of the 5 km wide study area may become known during the IA / EA process. If the need to locate Project components outside the 5 km wide study area is determined to be required or of benefit to the Project, the study area would be adjusted."	**Section 7.4.1 Spatial boundaries** "The size, nature and location of past, present and foreseeable future projects and activities are factors that should be included in the definition of spatial boundaries."	The absence of baseline surveys at locations that may be used for aggregates sources, lay down yards, worker camps, etc., risks incorrect assessment of bird occurrence, abundance and project impacts on migratory birds.	Include spatial boundaries that are defined with respect to all foreseeable project activities, as per Section 7.4.1 of the Guidelines. Use a Project Study Area that includes all project components, such as areas of quarries and aggregate sources. These could be identifiable using	The specific locations of Project components, including quarries and aggregate sources, are currently under review, but are expected to occur within the PDA and will be provided in the IS/EA Report. In the event Project components will be located outside of the currently-defined PDA, the PDA will be updated and additional studies may be required to describe existing conditions and assess the Project impacts
Final	The Agency	BI-03	**Section 6.2.2 Bird Study Area**	**Section 7.4.1 Spatial boundaries** "Delineate spatial boundaries (i.e., regional study area, local study area, and project study area) to meet the following objectives: a. range of land cover types should be representative of the defined spatial extent; b. the spatial pattern of the land cover types should be well distributed across the defined spatial extent (e.g., revise if one or more land cover types is concentrated in one sub-area and uncommon in other parts of the area); and c. low to moderate rate of change in the prevalence of one or more land cover types with increasing distance from the (i.e., to use land cover patterns to constrain the distances within which comparisons should be made)."	Maps and figures are a clear way of displaying information. The inclusion of more figures to help illustrate the study areas would be beneficial.	The Proponent is encouraged to provide figures showing all survey locations for all bird species, in all study areas (Project, Local and Regional).	Maps will be provided in work plans, submitted separately from the Study Plan.
Final	The Agency	BI-04	**Section 7.2 Study Methods** **Table 7-1: Bird Valued Components:** - "Forest Birds (proxy VC of Red-eyed Vireo [Vireo olivaceous] for deciduous forest, Ovenbird [Seirus aurocapilla] for mixedwood forest, Dark-eyed Junco [Junco hyemalis] for coniferous forest and disturbed forest - Raptors (proxy VC of Osprey [Pandion haliaetus] for diurnal raptors and Boreal Owl [Aegolius funereus] for nocturnal raptors - Shorebirds (proxy VC of Wilson's Snipe [Gallingo delicata]) - Waterfowl (proxy VC of Mallard [Anas platyrhynchos]) - Bog / Fen Birds and Other Wetland Birds (proxy VC of Palm Warbler [Setophaga palmarum] for bogs, Common Yellowthroat [Geothlypis trichas] for fens; and Northern Waterthrush [Parkesia noveboracensis] for swamps). " **Section 9.4.1 Bird Habitat Models** "Bird habitat models will be developed for proxy VCs in the Forest Birds, Raptors, Bog / Fen and Other Wetland Birds, Waterfowl, and Shorebirds VCs including SAR (Table 7-1) when there are sufficient survey data. Ontario's Provincial Satellite Derived Disturbance Mapping digital resource will be utilized to describe fire disturbed land cover for potentially affected habitats of the Forest Birds VC and Bog / Fen Birds and Other Wetland Birds VC."	**Section 8.9 Birds, migratory birds and their habitat** "The Impact Statement must:… - at minimum, the combined information from existing data and field surveys needs to be detailed enough to describe the distribution and abundance of all bird species in relation to the study areas; … – provide documentation and digital files for all results and analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);… - species communities should not be collapsed into diversity metrics or the focus narrowed to indicator species. Species identity, distribution, abundance and where possible estimates of breeding status should be the primary targets of quantification. **Section 7.3 Consideration and methodology in selecting valued components** "In selecting a valued component to be included, the following factors should be considered:…. - Whether the potential effects of the Project on the valued component can be measured and/or monitored or would be better ascertained through the analysis of a proxy valued component." **Section 7.4.2 Temporal boundaries** "For valued components related to wetlands, eskers, birds, wildlife, and Species at Risk, define temporal boundaries in a manner that enables detection of all species that use the project study area, local study area, and regional study	Regarding proxy VCs, Section 7.3 of the Guidelines supports the use of proxy indicator species in situations where a VC cannot be easily measured directly and use of a proxy would provide a better resolution. This is not the case for Bird VCs. Collapsing assessments into proxy species is likely to lead to inaccurate estimates of project impacts since the Project is expected to impact many bird species. Use of proxy (equivalent to focal or indicator) species is likely to lead to unreliable conclusions since the assumption of equal impacts to all species within groups is usually unfounded. Extrapolating from indicator species is generally not supported by the current scientific literature, as it often will fail to estimate impacts to individual species. This can lead to over- or under-estimation of expected impacts to other species in the group, and for a misrepresentation of the group as a whole. Section 7.4.2 of the Guidelines requires	Include in the Impact Statement the data and analysis for all bird species, as per Sections 7.4.2 and 8.9 of the Guidelines. Develop and run models for all species, and for species where models fail, identify the causes (e.g. point to the species frequency of occurrence and/or abundance in the summary of sampling results). Analyze all detected bird species, assess the analysis results and provide the documentation and digital files as parts of the Impact Statement.	The data collected from the various bird field programs will all be analyzed and assessed as baseline conditions for all species (abundance). Initial data modeling analysis was done on birds that are rare or less abundant to ensure that the sampling design had the best chance of detecting all birds present in the LSA. Where differential effects is predicted (where this information is available to assess or identify differential effects), this information will be provided in the EA/IA.

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Final	The Agency	BI-05	**7.2.1 Field Surveys** **Figure 7-1 Breeding Bird Survey Locations (2018-2019)** **9.4.2 Predicted Effects of the Project** "Models will be used to extrapolate abundance (i.e., mean across years or density when possible) and distribution (i.e., mean across sites) at the PDA, LSA and RSA scale."	**Section 8.9 Birds, migratory birds and their habitat** "survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: … o sampling effort per unit area - field survey effort should be most intensive within the project study area. The level of effort per unit area may be similar or somewhat less within the remainder of the local study area, but should be scaled to the likelihood that project effects will impact birds within that zone. Efforts outside the project study area should be carefully designed to ensure that estimates comparing within and across the project study area, local study area and regional study area are unbiased and as precise as possible;… o simulation modelling should be used to assess bias and precision between project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks."	The study plan does not indicate that sampling will occur within the regional study area (RSA), which will result in an inability to estimate potential impacts at the regional scale and will impair evaluations of potential impacts at the project study area (PSA) and local study area (LSA) scales. As noted in Section 8.9 of the Guidelines, there are few existing sources of data to describe regional bird populations. Therefore, sampling within the RSA is necessary to serve as a comparison with the LSA and PSA. Extrapolations to the RSA based exclusively on data from the LSA are unlikely to be reliable. An important part of the impact assessment process is data from the RSA. Failing to sample within the RSA will make a direct comparison with the LSA and PSA bird populations impossible and will increase the risk of unreliable conclusions. Predicting abundances/densities in the RSA from models parameterized using LSA data alone will not lead to reliable comparisons across scales. In addition, if the RSA is not sampled there will be no comparable data from an unaffected but similar area to evaluate project effects within the PSA and LSA. It	Include data and analysis based on sampling within the RSA in the Impact Statement as per Section 8.9 of the Guidelines	The approach used to define the LSA was intended to lead to a LSA that represents land covers found within the PDA. The RSA was defined such that it represents the land cover within both the PDA and LSA (especially rarer habitats), represents the rapid land cover change that occurs along the edges of these features, and represents a portion of the broader landscape matrix. Thus the data collected within the LSA will be used to represent the conditions in the RSA upon which the assessment of project effects in the RSA will be based. Confirmation (QA/QC) of habitat types in the LSA vs the RSA will be conducted as part of the vegetation program and will be considered, where applicable in the final description of baseline conditions.
Final	The Agency	BI-06	**Section 7.2.1.1.1 Study Design** "Breeding bird point counts were conducted from June 5 to June 14, 2018 and June 28 to July 7, 2018 at 101 survey stations within the LSA (Zoetica 2018a). Breeding bird point counts were conducted at 70 survey stations from June 13 to June 17, 2019 to fill data gaps and minor realignments (Golder 2019). The allocation of breeding bird survey stations within each land cover type (riparian habitats excluded in the table) are shown in Table 7-2. Due to safety concerns from helicopter pilots or limited time, 101 of the 171 survey stations were visited at least twice as per CWS (2008) guidelines for a total of 273 site visits. Breeding bird survey stations are spatially distributed across the full extent of the current LSA with the exception of a 20.7-km route option added in August 2020…"	**Section 8.9 Birds, migratory birds and their habitat** "The Impact Statement must::... - Collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): o design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modeling techniques based on current and recent scientific literature; … o provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results …	There is a strong risk of incorrect conclusions if variations in data collection methods are not clearly explained, understood and accounted for, in the analysis. It is not possible to understand if designs described in section 7.2.1.1.1 of the study plan will affect the use of data collected from these sites. As currently written, section 7.2.1.1.1 does not sufficiently describe the 2019 sampling (e.g. to make it clear that GRTS was not used in 2019 site selection and that an ad hoc visual gap filling was performed). As a further example, it is not clear if point count/ARU locations are clustered and how specific locations within clusters were chosen.	As per Section 8.9 of the Guidelines, include documentation in the Impact Statement to demonstrate clearly the methods and survey design elements, and make explicit how the analysis of data successfully accommodated differing designs while minimizing bias. This includes a detailed description of all survey designs and gap evaluation procedures, as well as an evaluation of impacts on the data from the varied survey designs. Include detailed descriptions of each design and process for selecting sample locations in the Impact Statement.	The IS / EA Report will provide a detailed description of methods and describe the simulation results as suggested.
Final	The Agency	BI-07	**Section 7.2.1.1.1 Study Design** "Three additional constraints were applied to the point count selection procedures: 1) minimum of 200 m between points to avoid double counting birds; …" **Section 7.2.1.1.3 Survey Protocol** "Breeding bird point count surveys will be conducted at each station, separated by a minimum distance of 200 m where possible, twice during the breeding bird season (June 1 through July 10 in the Northern Ontario Ecozone; June 1 through July 17 in Hudson Bay Lowlands Ecozone), and 10 days apart."	**Section 8.9 Birds, migratory birds and their habitat** "The Impact Statement must:… □ design suggestions for Project Study Area and Local Study Area scales: Use a standardized design approach during survey planning. The resulting design details will serve as the basis to develop alternative designs, evaluate options for particular design details, and to identify potential efficiencies. The approaches and tools suggested elsewhere in this document (e.g., land cover analysis, data simulations) should be considered during the planning phase. The following should be considered as inputs to design planning and evaluation; … □ transects and sites: … o survey sites along transect should be located as follows: 1 site on centreline of route, sites spaced every 250 metres up to 1 kilometre, then spaced every 500 metres to end of transect. A 5-kilometre transect should have 15 survey	Survey sites spaced less than 250 m apart can result in double-counting of individual birds among sites. This can lead to incorrect analysis results. Both Forest Bird Monitoring Program and the Breeding Bird Atlas also recommend minimum 250 m.	As per Section 8.9 of the Guidelines, increase spacing to a minimum of 250m for bird data collection. For any historic sampling locations, ensure between-point spacing is included in the analysis, to account for potential double-counting of individuals.	For all future breeding bird point counts, spacing will be a minimum of 250 m apart. All historic sampling locations were a minimum of 250 m apart.

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Final	The Agency	BI-08	**7.2.1.1.1 Study Design** "Breeding bird survey stations are spatially distributed across the full extent of the current LSA with the exception of a 20.7-km route option added in August 2020 (Figure 7-1)."	**Section 7.4.2 Temporal boundaries** "…Baseline data collection for all biophysical valued components is to be provided for a minimum of two years, unless specified otherwise…" **Section 8.9 Birds, migratory birds and their habitat** "…The Impact statement must: -collect field data over at least two years. The goal of collecting data over multiple years is to improve the understanding of natural variability in populations. Two years of sampling is suggested as a minimum. As the number of sampling years increases so does the understanding of natural variability;…"	The Study Plan does not address how the lack of a year of sampling on this "20.7-km route option added in August 2020" will be addressed in future fieldwork. More detail is needed.	Ensure that the analysis on impacts to birds in the Impact Statement is based on two years of data collection along the preferred route as required by Section 8.9 of the Guidelines. Provide details on when and how an additional year of detail data collection on the route option added in August 2020 will occur.	The IS / EA Report will include detailed descriptions of each design and process for selecting sample locations. Analysis on the impact to birds will be based on two years of data within the LSA as a whole study area.
Final	The Agency	BI-09	**Section 7.2.1.1.2 Study Design Bias and Representativity,** p28 "The bird species models for the existing 273 site visits selected with the GRTS study design shows initial signs of decreasing variance (Appendix C). The mean and variance in the TISG benchmark study design is stable at a fairly low number of site visits (**Appendix C**). The variance in the other study design options stabilize by 573 site visits (**Appendix C**). This indicates that 300 additional site visits (two site visits at 150 survey stations) on top of the 273 site visits already completed (Zoetica 2018b, Golder 2019), is a reasonable "optimal" sample size that stabilizes the precision of model estimates and minimizes bias relative to the TISG benchmark study design. The GRTS study design is the preferable option for selecting additional survey stations based on the lower variance and mean bias by 573 site visits for SAR such as Canada Warbler and Olive-sided Flycatcher (**Appendix C**)" **Appendix C MFFN Bird Study Design and Modelling Memo** **Section 6.2 Results** "A total of 20 of 50 simulations selected 150 survey stations where elevation, aboveground biomass, change year, and dynamic habitat that were similar to both the LSA and RSA. Surface roughness is highly skewed and difficult to represent completely with 150 survey stations, although one simulation (Simulation 2) did provide a relatively similar distribution for the LSA (**Figure 4-1**). **Figure 4-1** is an example of a simulation showing an adequate distribution's Kolmogorov-Smirnov results for each covariate, the predicted relative abundance map across the LSA for Olive-sided flycatcher, and graphically displays the relative over/under-sampling representativity of the additional 150 survey stations." **Section 6.3 Discussion** "…Although the GRTS study design is the preferable option for selecting additional survey stations based on the lower variance and mean bias by 573 site visits for SAR such as Canada Warbler and Olive-sided Flycatcher (**Appendix C**)"	**Section 8.9 Birds, migratory birds and their habitat** "survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: … simulation modelling should be used to assess bias and precision between project study area, local study area, and regional study area to ensure the estimates are useful for comparison. Field surveys should occur within the regional study area since there are few existing sources of data that effectively describe regional bird populations in areas, including this area, that are distant from road networks.… provide documentation and digital files for all results of analyses that allow for a clear understanding of the methods and a replication of the results (raw scripts or workflows are preferred in place of descriptive documentation);"	Appendix C demonstrates a good direction and encouraging efforts to align with the Guidelines. Similar types of quantitative work is strongly encouraged. As described in the Guidelines, it will be important to show clearly in the Impact Statement how conclusions were reached. The work behind Appendix C is helpful and on the correct path, but adjustments will be required. As is, Appendix C does not yet provide sufficient support for the choice of 573 site-visits as being optimal.	As per Section 8.9 of the Guidelines, include the documentation and digital files in the Impact Statement that allow for a clear understanding of the methods used and allow a replication of the results. Describe clearly the simulation results by showing in the Impact Statement: parameter estimates and error estimates separately, the topics of bias and precision evaluated separately, and repeat visits clearly and distinguished from visits of new sites in sample size calculations.	The IS / EA report will provide a detailed description of methods and describe the simulation results as suggested.

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Final	The Agency	BI-10	**Section 7.2.1.2.2 Survey Protocol** "ARUs will be the sole source of data collection for bird SAR (Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail) requiring species-specific surveys at dusk or during the evening due to safety concerns. ARUs will be deployed in suitable habitat for each of these species as identified during the desktop review with the sample size per species to be provided in the work plan. Golder (2019) deployed eight ARUs targeting Eastern Whip-poor-will in suitable habitat within a 2.5 km buffer LSA (Figure 7-2). ARU deployment in future programs will target the same locations and will identify additional locations in the expanded 3.0 km buffer LSA based on a desktop review. For bird SAR where ARUs are the sole source of data collection, survey windows and survey timing will be species-specific and located in suitable habitat as described in Section 7.2.1.5." **Section 7.2.1.4.1 Desktop Review** "Potential nesting habitat for Bank Swallow (i.e.., vertical riverbanks and bluffs), Barn Swallow (i.e. man-made structures), Chimney Swift (i.e.., hollow trees, tree cavities, caves) and Peregrine Falcon (i.e.., cliffs close to large bodies of water) will be identified through interpretation of aerial imagery where possible." **Section 7.2.1.4.2 Field Surveys** "Potential nesting habitat identified through desktop review as well as locations where Bank Swallow, Barn Swallow, Chimney Swift and Peregrine Falcon were will be searched for within the PDA and LSA in conjunction with vegetation and bat habitat identification surveys as described in the VC-Vegetation Study Plan and VC-Wildlife Study Plan. Golder (2019) identified no suitable nesting habitat for Barn Swallow or Bank Swallow within a 2.5-km buffer LSA based on a desktop review and aerial / ground reconnaissance. Future desktop review and aerial / ground reconnaissance in will expand the search area to the additional 20.7 km route option (including the 3 km buffer LSA)."	**Section 8.9 Birds, migratory birds and their habitat** □ "survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: … o rare species require more survey effort to detect than common species, and species rarity should be accounted for in survey design by increasing the number and duration of surveys; ... □ generate measures of abundance and distribution using spatially balanced, randomly selected sample locations. Sampling should include edges and transitions between habitat types and should not be focused exclusively within homogeneous patches of a given habitat type: … o use simulation modelling prior to sampling to ensure coverage is broad enough to estimate and account for detection error as well as provide unbiased estimates of abundance and distributions;" **Section 8.11 Species at Risk** "The Impact Statement must: … □ account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys:"	The study plan does not contain sufficient details to show that the Impact Statement will have sufficient samples and an appropriate survey design to reliably model the abundance and density of the bird species targeted by these surveys. As described in the Guidelines, it is important to show how all survey designs will produce data that are representative of the study areas and that sampling was sufficient and aligned with the requirements of the Guidelines. The absence of a clear and detailed survey design for these targeted surveys will impair evaluations of the Impact Statement with respect to the risks of incorrect conclusions (due to imprecision and/or bias in the data). The approach described the risks of under sampling, which will impair decision-making by producing highly variable estimates of baseline conditions. There is also a risk of incorrect decisions based on biased estimates of baseline conditions and a high uncertainty of impact estimates due to insufficient sample sizes. Imprecise estimates can prevent the	As per Section 8.9 of the Guidelines, base analysis on data collected according to the described survey design principles and practices. This also applies to targeted surveys. Demonstrate that a desktop review and the sampling undertaken will be sufficient for the target species and for assessing data sufficiency.	The IS / EA Report will include detailed descriptions of each design and process for selecting sample locations.
Final	The Agency	BI-11	Section 7.2.1.2.3 ARU Data Collection " Survey sampling effort for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be based on a binomial expansion (Correia 2015) of published detection probabilities that provide at least a 95% certainty of estimating their population sizes: $1-(1-p)^k$ Where: p = probability of detection k = sampling replicates ARU data for Common Nighthawk, Eastern Whip-poor-will, Short-eared Owl, and Yellow Rail will be analyzed from species-specific time periods with the highest detection probability based on published literature. Detection of these species outside of specified time periods and during other analyses will be classified as incidental observations. ... For Yellow Rail, ARU data collection will be partially based on the Marsh Monitoring Program (BSC 2000). ARUs will be placed near suitable Yellow Rail habitat in the LSA including graminoid fens, the herbaceous vegetation of bogs, and floodplains of rivers and streams (COSEWIC 2001). The number and location of survey stations will be provided at a later date. ARU data segments will be randomly selected from the breeding season between May 20 and July 5. Data segments will have no precipitation and wind speeds below 20 km/h (as per BSC 2000). Unlike the Marsh Monitoring Program, a one-minute ARU data segment will be randomly selected at 2:00 AM where a detection probability of 0.630 for Yellow Rail was reported in Northern Alberta (Hedley et al. 2020). Binomial expansion applied to the detection probability of 0.630 indicates that analyzing three data segments provides a 95.2% certainty of estimating the Yellow Rail population size (**Table 7-4**). "	**Section 8.11 Species at Risk** "The Impact Statement must: … □ account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys:"	The Guidelines states that the number of interpreted segments should be higher for rare species and those that vocalize infrequently. A narrow focus on results from a single study in northern Alberta is not satisfactory; time periods need to be expanded beyond 2AM. An insufficient number of recording segments can result in biased and incorrect conclusions about species presence. The Correia 2015 reference, upon which the estimates of sampling sufficiency were based in the Study Plan, is in the online journal "e-Journal for Non-destructive Testing" that is not focused on the relevant fields of biology, ecology or survey design. The formula described does not in fact lead to "a 95% certainty of estimating their population sizes" and the formula is not relevant to estimations of population size. Therefore a different reference should be used.	As per Section 8.11 of the Guidelines, more sampling for rare species is required. The analysis for rare species in the Impact Statement should be based on higher numbers of sample. Consider a first pass of automated processing targeting yellow rail, then validate with acoustic interpretation of segments selected from sites where the first pass suggested occupancy.	Acknowledged.

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Final	The Agency	BI-12	**7.2.1.2.3 ARU Data Collection** "For Common Nighthawk…The number and location of survey stations will be provided at a later date" "For Yellow Rail…The number and location of survey stations will be provided at a later date.	**Section 8.9 Birds, migratory birds and their habitat** "- survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: … o sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey locations per land cover or habitat class, without requiring aggregation of habitat classes post-hoc;" **Section 8.11 Species at Risk** "- account for the fact that rare species will require more survey effort to detect, which should be reflected in survey design by increasing the number and duration of surveys:… o design of surveys will need to consider multiple number of survey locations in order to represent the habitat heterogeneity of the regional study area, and to plan the number of survey locations per land cover or habitat class so that aggregation of habitat classes post-hoc is not required;"	The study plan indicates that locations of survey stations for Common Nighthawk and Yellow Rail, will be provided 'at a later date'. The lack of specific information on the location of survey stations limits the advice that the Federal Review Team can provide at this stage in terms of the suitability of the number of survey stations, and their spatial distribution within the study area, in order to confirm their acceptability with the Guidelines.	Include in the Impact Statement maps with all the locations of survey stations for every bird species surveyed. Provide in the Impact Statement a clear description of the timing and frequencies of data collection for every bird species surveyed, and how the survey protocols followed the requirements of the Guidelines.	Acknowledged.
Final	The Agency	BI-13	**Section 7.2.1.5 Aerial Surveys** **Table 7-5: Sampling Effort for Aerial Bird Surveys** **Section 7.2.1.5.2 Survey Protocol** "Aerial surveys will be conducted in the LSA on two occasions during spring and fall to capture early to late migration of waterfowl and shorebirds and on two occasions during the breeding season for waterfowl and raptors. Potential stopover / staging areas will be examined by circling areas of suitable open habitats and counting the number of individual waterfowl and shorebirds, identified to lowest taxonomic level possible. Aerial surveys conducted during the breeding season will focus on identifying breeding pairs / broods and incubating adults of conspicuous waterfowl species (Table 7-5). Zoetica (2018b) conducted aerial surveys to identify inactive stick nests during the late winter of 2018 with confirmation of nest activity during the spring and summer of 2018. All stick nests identified in 2018 and during planned spring migration aerial surveys will be verified during subsequent aerial and ground surveys to confirm breeding status. Raptor stick nests will be identified to species, where possible, based on nest and stick size if no raptors are found near the nest. The Universal Transverse Mercator (UTM) location of all waterfowl, shorebird, and raptors observations will be recorded to map their seasonal abundance and distribution by habitat type in the LSA. Aerial surveys will be conducted using helicopters if possible, as they are generally preferable to fixed-wing aircraft given the lower flight speed and better outward visibility and thereby improved ability to detect birds (Ministry of Environment, Lands and Park Resources Inventory Branch 1999). Surveys will be consistent as possible with respect to altitude, time of day, flight speed, etc. and conducted during calm weather conditions (little to no precipitation and wind speeds less than four on the Beaufort Scale)."	**Section 8.9 Birds, migratory birds and their habitat** "The Impact Statement must: … o collect bird data to adequately represent the following temporal sources of variation: o among years; o within and among seasons (e.g., spring migration, breeding, fall migration, overwintering); and o within the 24 hour daily cycle. … □ collect data in a manner that enables reliable extrapolations in space (i.e., at minimum to Project, local and regional study areas) and in time (i.e., across years): o design surveys so that they represent the spatial and temporal targets of modeling and extrapolations, and to produce scientifically defensible predictions of impacts and estimates of mitigation effectiveness. Survey designs should be sensitive enough to detect and quantify the impacts at the spatial and temporal scales identified above (i.e., project study area, local study area, and regional study area), any departures from predictions, and the effectiveness of mitigations. Justify the selection of modeling techniques based on current and recent scientific literature; o survey protocol planning should include modeling and simulations to estimate sampling requirements, and analysis to evaluate resulting design options: □ sample size must be planned to support evaluation of the project study area within the context of the local study area and regional study area. Appropriate design of surveys will need to consider multiple survey locations in order to represent the habitat heterogeneity of the regional study area, and to yield multiple survey locations per land cover or habitat class, without requiring aggregation of habitat	The study plan does not contain adequate details to show that the Impact Statement will have sufficient samples and an appropriate survey design to reliably model the abundance and density of the birds targeted by these surveys. Materials discussed with the proponent about survey designs and using simulations to assess sampling sufficiency apply to the aerial survey for birds mentioned in the study plan. Section 8.9 of the Guidelines has additional guidance on principles for designing surveys on birds. Helicopter methods are generally recognized as necessary for the species level identifications of waterfowl, shorebirds and waterbirds that are required for the -specified species level analysis outlined in the Guidelines However, imprecise estimates can prevent calculation of predicted project impacts and prevent differentiation of any differences in populations between the PSA, LSA and RSA. Additionally, designs that do not incorporate randomization and related principles can lead to bias in the data, which	As per Section 8.9 of the Guidelines, base the Impact Statement on data collection methods according to designs that align with the described survey design principles and practices. Use sampling designs that are appropriate for producing reliable and sufficient data, in order to demonstrate that correct conclusions have been drawn.	Acknowledged.
Final	The Agency	BI-14	**Section 9.2 Valued Components and Indicators** **Table 9-2 Bird Indicators** "Rationale for Selection - Cultural and social significance associated with this VC. - Functional role in the ecosystem and food web."	**Section 2.4 Regulatory framework and the role of government** "The Impact Statement must identify:… □ legislation and other regulatory approvals that are applicable to the Project at the federal, provincial, regional and municipal levels or from any body—including a co-management body—established under a land claim agreement referred to in section 5 of the Constitution Act, 1982, or from an Indigenous governing body as defined in the Impact Assessment Act (IAA) that has powers, duties or functions in relation to the environmental effects of a project, including a list of the federal, provincial or territorial GHG legislation,	The study plan does not mention the Migratory Birds Convention Act, 1994 as a rationale for the selection of any of the selected Birds VCs.	Ensure that the Impact Statement includes references to the Migratory Birds Convention Act, 1994, as a federal legislative mechanism applicable to the Project.	Acknowledged.

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Final	The Agency	BI-15	**Section 9.3 Indirect Effects** "A direct effect occurs through the direct interaction of an activity with an environmental discipline. The Project-environment interactions currently anticipated, based upon preliminary analysis, to result in direct effects to Birds have been identified in **Table 9-1**. The potential direct effects resulting from the Project-environment interactions will be confirmed during the IA / EA process and will be based on input received through the Indigenous Knowledge Program and Consultation and Engagement Program, regulatory agency guidance, and professional judgement. An indirect effect occurs when a change to one environmental discipline resulting from a Project activity causes a change to another environmental discipline (e.g., changes in groundwater could indirectly affect birds). Table 9-3 provides a preliminary identification of how changes to Birds may result in indirect effects to other environmental disciplines."	**Section 15.2 Birds, migratory birds and their habitat** "The Impact Statement must: □ describe direct, incidental and cumulative predicted positive and/or adverse effects to migratory birds and non-migratory birds, including population level effects that could be caused by all project activities… □ consult A Framework for the Scientific Assessment of Potential Project Impacts on Birds Appendix 2 and 3 for overview of potential impacts to birds from road projects57; … o non-linear, indirect and synergistic responses to the project should be explicitly explored where reasonable;"	Section 9.3 of the study plan indicates that Table 9-3 provides a preliminary identification of how changes to birds may cause indirect effects to other disciplines. However, it appears that table 9.3 does not indicate how changes to birds may result in indirect effects to other environmental disciplines, but rather whether those interactions may occur. The more relevant consideration for this study plan is whether changes to other environmental disciplines/VCs may result in indirect effects to birds.	Ensure that potential interactions that may result in indirect effects to birds are identified. Clarify that Table 9-3 indicates not how but whether indirect effects may occur.	Indirect effects to wildlife will be described in the IS / EA Report. Table 9-3 summarizes whether there is a potential for indirect effects to occur.
Final	The Agency	BI-16	**Section 9.6 Residual Effects** Definitions of: □ Negligible: Small scope of effect and slight severity of effect to Bird VCs. □ Low: Restricted scope of effect and moderate severity of effect to Bird VCs. □ Medium: Large scope of effect and serious severity of effect to Bird VCs. □ High: Large to pervasive scope and high to extreme severity of effect to Bird VCs.	**Section 13.1 Methodology** "The effects to each valued component outlined in sub-sections 14.3, 15.2, 15.3, 15.4 must be described using the following criteria: □ Scope, defined spatially as the proportion of the valued component's occurrence or population within the study areas (project study area, local study area and regional study area) that can reasonably be expected to be affected by the predicted effect within 10 years. Characterize the scope of each predicted adverse effect on each valued component as follows: o pervasive: the effect is likely to be pervasive in its scope, affecting the valued component across all or most (71-100%) of its occurrence or population within the study areas; o large: the effect is likely to be widespread in its scope, affecting the valued component across much (31-70%) of its occurrence or population within the study areas; o restricted: the effect is likely to be restricted in its scope, affecting the valued component across some (11-30%) of its occurrence or population within the study areas; and o small: the effect is likely to be very narrow in its scope, affecting the valued component across a small proportion (1-10%) of its occurrence or population within the study areas. □ Severity, defined as, within the scope, the level of damage to the valued component from the effect that can reasonably be expected; typically measured as the degree of destruction or degradation within the scope or the degree of reduction of the population within the scope. Characterize the severity of each predicted adverse effect on each valued component as follows: o extreme: within the scope, the effect is likely to destroy or eliminate the valued component or reduce its population by 71-100% within ten years or three generations; o serious: within the scope, the effect is likely to seriously degrade/reduce the valued component or reduce its population by 31-70% within ten years or three generations; o moderate: within the scope, the effect is likely to moderately degrade/reduce the valued component or reduce its population by 11-30% within ten years or three generations; and	As outlined in Section 15.2 of the Guidelines, the criteria described in Section 13.1 of the Guidelines need to be used to describe effects to valued components outlined in Section 15.2. While the proposed criteria are similar, the definitions do not accommodate the entirety of possible combinations of scope and severity. For example, how would small scope and extreme severity be classified?	Use the criteria found in Section 13.1 of the Guidelines to describe effects to birds from this project in the Impact Statement.	The criteria in Section 13.1 of the guidelines will be used when describing effects to birds and bird habitat.

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Final	The Agency	BI-17	**Section 9.7 Consideration of Meeting Canada's Environmental Obligations** "Where the Project may contribute to Canada's ability to meet these obligations, the ISA / EA Report will describe plans and commitments to help to ensure that positive contributions are met."	**Editorial**		Change occurrences of "ISA/EA Report" to "IS/EA Report".	Acknowledged.
Final	The Agency	BI-18	**Section 11 Concordance with Federal and Provincial Guidance** Row 19 of the Concordance table "For each of the valued components that will be assessed in the Impact Statement, the proponent must create a study plan and a work plan to be validated by the Agency. Upon receipt of a study plan, the Agency may request that the proponent present and discuss the study plan at technical meetings, which will be scheduled during the impact statement phase." "The Study Plan meets this requirement. A summary of the Technical discussions with agencies have been summarized in Section 3 of the Study Plan	**Editorial**	To date only a study plan, and not a workplan, was submitted to the Agency for validation.	Provide a workplan to the Agency for validation that outlines how the data will be collected, such as information on location, scheduling, sequencing (i.e., how to action the study plan).	A Birds Field Logistics Work Plan will be provided to the Agency.
Final	The Agency	BI-19	**Section 11, Table 11-1 Federal Concordance – Conformance with Requirements, ID #54** "This information will be collected as described in the Land and Resource Use Study Plan. " Study Plan Reference - Land and Resource Use Plan	**Section 8.9 Birds, migratory birds and their habitat** "…The Impact Statement must: − describe the use of (magnitude, timing) migratory and non-migratory birds as a source of country foods (traditional foods) or where use has Indigenous cultural importance (e.g., Canada Goose, Snow goose, Swans, Gyrfalcon, Loon, Peregrine Falcon, and duck species);…"	The Land and Resource Use study plan does not address this requirement from Section 8.9 of the Guidelines regarding country foods, contrary to what Table 11-1 of the study plan suggests.	Correct this omission within the Land and Resource use study plan and/or Birds study plan to ensure that this part of Section 8.9 of the Guidelines is addressed.	Relevant primary and secondary information collected through the Indigenous Knowledge Program will be shared with each relevant technical discipline team, as appropriate. The Guidance Document developed for the Project and provided to all Indigenous communities and groups identified includes questions related to birds used for subsistence or cultural purposes and IK related to bird and bird habitat. There are also opportunities for technical teams to engage with Indigenous communities to solicit perspectives and information relevant to the Project and the bird and bird habitat.

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Final	The Agency	BI-20	**Table 11-1: Study Plan Federal Concordance – Conformance with Requirements, ID #128** "This information will be collected as described in the Land and Resource Use Study Plan." Study Plan Reference - Land and Resource Use Plan	**Section 17.6 Culture** "…The Impact Statement must assess potential impacts to surrounding communities, including local Indigenous communities. The spatial and temporal boundaries for the assessment should be determined with the input from the community based on pre-contact in consideration of aspects that are relevant to the community's understanding of their culture. The Impact Statement must assess changes to: − Culturally significant plants or wildlife…"	The Land and Resource Use Plan does not address this requirement from Section 17.6 of the Guidelines regarding culturally significant plants or wildlife, contrary to what Table 11-1 of the study plan suggests.	Correct this omission within the Land and Resource use study plan and/or the Birds Study plan to ensure that this part of Section 17.6 of the Guidelines is addressed.	The Section 17.6 requirement referenced in the comment has been included in the ATRI Study Plan concordance table (Table 11-1, ID#30). The Response in the ATRI Concordance Table is as follows: "Information on burial sites, the use of Indigenous languages, traditional cultural activities, and culturally significant plants and wildlife collected through the IK and Consultation and Engagement programs will be used in the assessments on Aboriginal and Treaty Rights and Interests, and Cultural Heritage
Final	The Agency	BI-21	**Editorial - Footnote 10** "In February 2020 a regional assessment of the Ring of Fire region commenced; however, it is not sufficiently advanced at this time to inform the Project VCs. The VCs will be consulted and engaged on early in the IA/ EA process and finalized taking into consideration the input received. Therefore, only information relevant to the Project that arises from the regional assessment of the Ring of Fire within an appropriate timeline will inform the VCs for the Project."		The statement in the footnote "In February 2020 a regional assessment of the Ring of Fire region commenced; however, it is not sufficiently advanced at this time to inform the Project VCs." should be corrected to reflect the fact that the Regional Assessment in the Ring of Fire area has not yet begun.	Consider replacing the text in the footnote with "In February 2020, the Minister of Environment and Climate Change determined that a regional assessment will be conducted in an area centred on the Ring of Fire mineral deposits in northern Ontario. However, at this time, the Regional Assessment in the Ring of Fire area is not sufficiently advanced to inform the Project VCs."	Acknowledged.
Final	The Agency	BI-22	**Table 11-3: Study Plan Federal and Provincial Concordance – Requirement Deviations**		Proposed amendments and/or deviations from the Guidelines will not be reviewed or approved during		Acknowledged.

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Final	NDMNRF - NRF Arm	1.	Pg.14 Birds Table 1-2	N/A	Comment not specific to the Birds Work Plan: Provincially Significant Wetlands (PSWs) are not identified under Designated Areas in the Valued Components addressed by the Vegetation Study Plan. PSWs, Areas of Natural and Scientific Interests (ANSIs) and Significant Wildlife Habitat (SWH) are mandated natural heritage values of interest for NRF. As such, recognizing and considering these areas in the study plans and future project documentation will allow NRF to provide informed comment regarding potential impacts from the project.	Recommend PSWs (and ANSIs, and SWH) be identified as designated areas in the Valued Components for either the “Wetland and Riparian Ecosystems” section or under the “Designated Areas” section of the Vegetation Study Plan.	ANSIs are currently identified under the Designated Areas section of the Vegetation Study Plan. The form and function of SWH will be considered through field data collection for the various Wildlife and Vegetation Valued Components, and SWH will be assessed in an indirect way through characterization of habitats for the various Valued Components. There are no designated PSWs in the study area. Using OWES to evaluate wetlands in northern Ontario, especially in the project study areas of vast peatlands, is not an effective tool to characterize the value of wetlands. However, wetlands are being considered from a functional perspective (including hydrological, ecological, social and traditional values) as well as an ecological viewpoint through the Peatlands and Vegetation Study Plans. The components of what makes a PSW will be covered under the Wetland and Riparian Ecosystems Valued Component.
Final	NDMNRF - NRF Arm	2.	Pg.14 Birds Table 1-2	N/A	The Birds Study plan indicates that the Vegetation Study Plan lists Species at Risk (SAR) and conservation concern species together in one grouping. However, these are different categories with different direction in the form of policy and guidelines as well as legislative requirements.	Recommend not grouping conservation concern species with SAR but rather address them separately. Some species may fall under both categories, however many do not. It would be better to speak of them as separate groups.	Although combined under one Valued Component, SAR and SOCC will each be characterized and discussed separately in the IS / EA Report.
Final	NDMNRF - NRF Arm	3.	Pg. 14-16 Birds Table 1-2	N/A	Comment not specific to the Birds Study Plan: Table 1-2 of the Birds Study Plan does not identify that trapping is covered in any Study Plan. In which In Study Plan(s) is trapping being considered?	Please identify where consideration of trapping is included within the study plans	Potential effects to current and traditional use of lands (including trapping) will be considered and described in the IS / EA report.

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Final	NDMNRF - NRF Arm	4.	Pg.27 Birds 6.2.1 General Information	N/A	The following text was presented in the Peatland Study Plan and not in the Birds Study Plan. *"Location for Project components other than the route itself (e.g., temporary construction access roads, work areas, worker camps, and pits, quarries and associated access road) are unknown at this time; however, the PDA and LSA will be adjusted accordingly as the Project design progresses and as required."* The described approach would benefit the	Include the quoted sentences in the Birds Study Plan in the way they were presented in the Peatlands Study Plan.	Acknowledged.
Final	NDMNRF - NRF Arm	5.	Pg.28 Birds 6.2.1 General Information	N/A	The following text was presented in the Peatland Study Plan and the Birds Study Plan, but it has been shifted to different section in the Birds Study Plan.	Please place the following text in Section 6.2.1 of the Birds Study Plan to assist consistency with the other Plan (i.e. Peatlands). "*As further detailed in Section 4, the Proponent will continue to provide opportunities for neighbouring Indigenous communities and interested persons to provide input and inform the effects assessment, including the LSAs and RSAs."*	Acknowledged.
Final	NDMNRF - NRF Arm	6.	Pg.33 Birds 7.2 Study Methods	N/A	The Study Plan indicates that, "*The two fen specialists (i.e., LeConte's Sparrow and Sedge Wren) are not included at this time because preliminary data indicates that there are insufficient observations of these species to allow for future modeling*". What will happen if future information includes more fen species?	Will this decision be revisited if future field surveys indicate sufficient numbers of fen species for future modeling? What would be considered a sufficient number in this case? Alternatively, was this decision finalized based on only the first year of bird indicator data?	Depending on the data collected, we will revisit what species are modelled and consider changes.
Final	NDMNRF - NRF Arm	7.	Pg.34 Birds 7.2.1.1 Breeding Bird Point Count	N/A	Assessing consistency over time at locations during Bird Studies is helpful for determining some important ecological factors (e.g. fecundity).	It is recommended that you target a portion of the previously surveyed sites during subsequent field visits in order to determine consistency over time. Please clarify your approach in the Study Plan.	Increased sampling effort is required to determine where rare species are. In addition, a portion of previously surveyed sites will be targeted in subsequent surveys and will be identified in the IS/ EA report.
Final	NDMNRF - NRF Arm	8.	Pg.32-49 Birds 7.2 Study Methods General Comment	N/A	NRF notes that there are no ground surveys proposed within the broader RSA. Are there any habitat features that may be impacted by the project where, as a result of their disturbance, species will need to rely on similar habitat in the RSA? NRF would be particularly interested in situations where this may occur for Conservation Concern Species including Special Concern Species at Risk (e.g. Peregrine Falcon and others). In order to describe the potential for negative environmental effects of the project on Birds, it may be necessary to evaluate Significant Wildlife habitat in with in the RSA (i.e. with regard to both occurrence and carrying capacity).	Recommend assessment of habitat presence and availability for Conservation Concern Species, including Special Concern Species at Risk in the RSA where this habitat may be needed by displaced birds.	The approach used to define the LSA was intended to lead to a LSA that represents land covers found within the PDA. The RSA was defined such that it represents the land cover within both the PDA and LSA (especially rarer habitats), represents the rapid land cover change that occurs along the edges of these features, and represents a portion of the broader landscape matrix. Thus the data collected within the LSA will be used to represent the conditions in the RSA upon which the assessment of project effects in the RSA will be based. Confirmation (QA/QC) of habitat types in the LSA vs the RSA will be conducted as part of the vegetation program and will be considered, where applicable in the final description of baseline conditions.
Final	NDMNRF - NRF Arm	9.	Pg.40 & 42 Birds 7.2.1.2.2 ARU Survey Protocol	N/A	There is a discrepancy between deployment dates listed in the survey protocol in Section 7.2.1.2.2 versus the dates provided in Table 7-3.	Please clarify the inconsistency in sampling windows so your procedure is clear to readers (and readers can consider if sampling windows were sufficient for all species of interest to them).	Acknowledged.

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Final	NDMNRF - NRF Arm	10.	Pg.43 & 44 Birds 7.2.1.2.3 ARU Data Collection	N/A	This section covers some species of interest to the NRF (e.g. Short-eared Owl and Yellow Rail which are both species of Special Concern) but it also indicates that the number and location of survey stations will be provided in an upcoming work plan. It is NRF's understanding that the work plans will not be made available for agency review	It is recommended that the number and methodology of survey location selection be included so that NRF may provide guidance regarding if the proposed approach is sufficient to inform our understanding of the potential impacts of this project.	A Birds Field Logistics Work Plan will be provided to the Agency and Government Review Team.
Final	NDMNRF - NRF Arm	11.	Pg.48 Birds 7.2.1.5.2 Survey Protocol	N/A	It is unclear from the description provided if a second stick nest survey be carried out in the late winter, or if the full area was surveyed in 2018?	It is recommended that this section be clarified with regard to the area covered by surveys as well as regarding the timing of surveys.	A Birds Field Logistics Work Plan will be provided to the Agency and Government Review Team.
Final	NDMNRF - NRF Arm	12.	Pg. 48 Birds 7.2.1.5.2 Survey Protocol	N/A	The nests of specially protected raptors or specially protected birds may be found during road alignment requiring tree removal. Removal of such nests requires approval under the Fish and Wildlife Conservation Act 1997 (FWCA) (e.g. see O. Reg. 669/98: Wildlife Schedules). Project delay could occur if nests are not identified prior to tree clearing along the ROW, or otherwise where FWCA authorizations to destroy specific nests are required. In this study plan, stick nest surveys appear to only	A FWCA authorization to remove the nest (tree) of specially protected raptors or specially protected birds could be required during tree clearing of the selected route and associated work areas. Nest removal would be authorized only for times outside of the critical breeding period. As such, forest nesting raptors and herons should be included in the stick nest surveys design. For ease of locating nests, these surveys should be flown during winter when accumulated snow in nest bowls make nests more obvious.	Acknowledged.
Final	NDMNRF - NRF Arm	13.	Pg.51 Birds 8.1 Species at Risk	N/A	It is unclear from this section how distribution and abundance data will be extrapolated to the RSA scale, especially given our understanding that no field bird surveys are proposed within the RSA.	It is recommended that a description of how distribution and abundance data will be extrapolated to the RSA scale be provided. NRF will need to understand the approach utilized when considering the strength of conclusions provided during the environmental assessment.	Acknowledged.
Final	NDMNRF - NRF Arm	14.	Pg.53 Birds 9.2 Valued Components and Indicators	N/A	The footnote on this page indicates that information from the Regional Assessment(s) may be used inform and finalize the VCs for the Project where the information is relevant, and where it becomes available within a timeline that allows for its incorporation. NRF supports the consideration of any additional, relevant	Provide in the EA a sufficiently detailed description of all information sources used to inform and finalize the VCs to enable NRF to evaluate the appropriateness of the final VCs as related to NRF's interests in birds and bird habitat.	The requested information will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	15.	Pg.54 Birds Table 9-2: Bird Indicators	N/A	Table 9-2 lacks a row dedicated specifically to Conservation Concern Species (subnational ranking S1-S3). Understanding the proposed approach to assessment for these species is important for NRF to comment regarding potential influences of the project on these species.	Recommend including a separate VC for Conservation Concern s Species (subnational ranking S1-S3) in addition to what is already listed in this table.	Although combined under one Valued Component, SAR and SOCC will each be characterized and discussed separately in the IS / EA Report.
Final	NDMNRF - NRF Arm	16.	Pg.56 Birds Table 9-3: Potential Discipline Interactions	N/A	Table 9-3 lacks specific mention of Conservation Concern s Species.	Include Conservation Concern Species in the Discipline and Associated VCs.	Although combined under one Valued Component, SAR and SOCC will each be characterized and discussed separately in the IS / EA Report.
Final	NDMNRF - NRF Arm	17.	Pg.57 Birds 9.4.1 Birds Habitat Model Development	N/A	The Study Plan does not discuss how model outputs will be field verified?	NRF recommends field verifying a certain percentage of the habitat model outputs to gauge consistency and accuracy of predictions with occurrences on the ground.	Acknowledged.
Final	NDMNRF - NRF Arm	18.	Pg.59/60 Birds 9.4.1.2 Predictor Variables 9.4.1.3 Model Fit and Selection	N/A	This Study Plan provides information regarding the proposed approach to modeling of bird presence/absence on the landscape based on both biotic and abiotic features.	NRF may provide further comment regarding the approach to modelling of bird presence/absence later in the environmental assessment process.	Acknowledged.
Final	NDMNRF - NRF Arm	19.	Pg.61 Birds 9.4.2 Predicted Effects of the Project	N/A	It is unclear how permanent changes to habitat (e.g. the road ROW) will be identified and assessed in contrast to temporary changes (e.g. such as changes to allow for laydown areas, temporary aggregate pits, work camps). How will the resulting decision be determined in response (e.g. avoidance, vs minimization of impacts, vs mitigation of	Recommend a method to differentiate potential impacts from temporary versus from permanent changes in this section of the Study Plan.	Acknowledged.

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Final	NDMNRF - NRF Arm	20.	Pg.62 Birds 9.5 Mitigation and Enhancement Measures	N/A	This portion of the report indicates that only technically and economically feasible avoidance and mitigation measures will be assessed. How the technical and economic feasibility will be determined is unclear from the Study Plan. For instance, will the relative importance of potentially disturbed features be considered when determining the feasibility of options to avoid them? Will the technical or	Please provide transparency regarding how the technical and economic feasibility of avoidance and mitigation options will be determined.	The requested information will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	21.	Pg.63 Birds 9.5.1 TISG Section 20 Requirements	N/A	This section concentrates on the need to address Federal requirements for the project. It should be noted in the Study Plan that additional considerations may be necessary to meet provincial mandated interests (e.g. provincially mandated timing windows are expected to apply to some of the work associated with the project)	Update the Study Plan to reflect that additional considerations may be required to address provincially mandated interests. The approach suggested in comment #23 below would help address this concern.	The IA / EA process will follow provincial requirements and mandated interests, where applicable.
Final	NDMNRF - NRF Arm	22.	Pg.65 Birds Table 9-5: Birds Magnitude Definition	N/A	There is substantial detail provided in this table regarding what potential impact levels will be considered negligible, low, medium and high. This approach is, however, general in nature. There may be a much larger level of concern if for instance 10% of the habitat or population of a Special Concern species will be impacted as opposed to the same level of impact to a more common species. What	It is recommended that a description be provided to explain how the magnitudes in the level of impact table were determined. What standards and guidelines where utilized and does this approach apply regardless of the rarity of a species or habitat?	The IS / EA Report will include an explanation of how the magnitudes in Table 9-5 were determined. This will include the standards and guidelines that were considered and specification of whether they apply regardless of the rarity of a species or habitat.
Final	NDMNRF - NRF Arm	23.	Pg.66 Birds 9.7 Consideration of Meeting Canada's Environmental Obligations	N/A	It would be very beneficial to have a similar section for "Consideration of Meeting Ontario's Environmental Obligations	Add a section to address the steps necessary to meet Provincial requirements and mandated interests.	The IA / EA process will follow provincial requirements and mandated interests, as applicable.
Final	NDMNRF - NRF Arm	24.	Pg.67 Birds 9.8 Consideration of Sustainability Principles	N/A	Sustainability is a concept considered also by provincial agencies such as NRF. As such it is recommended that provincial interests also be described in this section of the Study Plan.	To reflect that additional considerations related to sustainability may be necessary to address provincial interests, consider adding to this section by indicating that additional considerations may be necessary to meet provincial interests. Also, "and agencies" should be added to the first sentence in the last paragraph (i.e. identified by Indigenous communities, interested persons, **and agencies).**	Acknowledged.
Final	NDMNRF - NRF Arm	25.	Pg.68 Birds 9.10 Follow-up Programs	N/A	This paragraph seems to concentrate only on Federal requirements. NRF may also an interest in follow-up programs which verify the accuracy of effects assessment and mitigation measures.	Recommend including a commitment to consider and address provincial interests in follow-up programs which assess the effectiveness of mitigation measures, and the verify the accuracy of predictions regarding environmental impacts of the project.	The IS / EA Report will include a commitment to consider and address provincial interests in follow-up programs, as applicable.

Birds Study Plan

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Final	NDMNRF - NRF Arm	26.	Pg.71 Birds Table 11-1: TISG ID #2, 3 & 4 Also Pg.80 Birds Table 11-1: TISG ID #55	N/A	From a NRFs standpoint, the following are some of our mandated interests that need to be considered (many in relation to bird studies): - mapped streams - Significant Wildlife Habitat - Conservation concern species and plant communities - Provincially Significant Wetlands - Trapline Areas and Bait Harvest Areas - Fish and Fish Habitat - Wildlife Activity Sites and Areas - Winter Concentration Areas - Fish Activity Areas - Significant Ecological Areas - Wild Rice Stands - Caribou Range Boundary - Aquatic Resource Area Survey Points and Water Segments - Provincially Tracked Data Layers - Lake Trout Lakes - Brook Trout fisheries - ANSIs - Crown Land Use Policy Atlas - Species Observations Local	It is recommended that the listed topics be considered and discussed where they may relate to birds in the Birds Study Plan, and/or in the IS/EA Report.	The requested information will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	27.	Pg.72 Birds Table 11-1: TISG ID #8	N/A	No RSA field work is proposed in the second round of surveying. The avoidance of field verification in the RSA may hinder confidence in conclusions of the environmental assessment for this project as this relates to bird studies.	The RSA should be included in field verification efforts related to the proposed modelling/habitat classification assumptions (i.e. for results predicted at the RSA scale). If use of surrogate data is the preferred option, greater demonstration of how the data is representative of site conditions is necessary.	The approach used to define the LSA was intended to lead to a LSA that represents land covers found within the PDA. The RSA was defined such that it represents the land cover within both the PDA and LSA (especially rarer habitats), represents the rapid land cover change that occurs along the edges of these features, and represents a portion of the broader landscape matrix. Thus the data collected within the LSA will be used to represent the conditions in the RSA upon which the assessment of project effects in the RSA will be based. Confirmation (QA/QC) of habitat types in the LSA vs the RSA will be conducted as part of the vegetation program and will be considered, where applicable in the final description of baseline conditions.
Final	NDMNRF - NRF Arm	28.	Pg.72 Birds Table 11-1: TISG ID #10	N/A	More qualitative and quantitative descriptions of proposed data collection, sampling, survey and research protocols and methods would better inform commenting agencies regarding the applicability of proposed sampling and analysis approaches.	Currently, it appears the list of specific data sources is incomplete given the wealth of information regarding environmentally sensitive features/observations available that are not currently referenced in the Appendix. A more thorough list is welcomed. Alternatively, provision of why additional sources were considered inappropriate to inform this project would assist NRF understanding of why they are not being utilized (e.g. reference current comments rows 34-43).	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	29.	Pg.72 Birds Table 11-1: TISG ID #12	N/A	With the material provided to date, it is unclear what proportion of the baseline data collection will inform the extrapolations and predictions, and what, if any, future field surveys will be carried out to determine the accuracy of the model and analysis outputs.	Additional discussion within the Study Plan is requested to explain how accuracy and bias of model and analysis outputs will be assessed.	The IS / EA Report will include detailed descriptions of each design and process for selecting sample locations, and describe the simulation results as suggested.
Final	NDMNRF - NRF Arm	30.	Pg.73 Birds Table 11-1: TISG ID #13	N/A	Although data sources are provided in the Study Plan, it is unclear which sources have been reviewed versus what has been selected for use, and how these decisions have been determined.	Clarification is required. Of the wealth of data layers available, very few are listed within the Appendix. It is unclear if sources were not considered or, considered and rejected as useful to inform the current project.	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.

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Final	NDMNRF - NRF Arm	31.	Pg.73 Birds Table 11-1: TISG ID #14	N/A	It is unclear whether the modeling and simulations will be completed in advance of the second round of field surveys yet understanding the approach utilised in this portion of survey design is important for understanding the strength of conclusions generated.	Will the second round of field surveys be used to build the baseline condition models and simulations? Will these be used to verify the accuracy of the model and simulation assumptions and outputs? Please clarify the approach to be taken in the Study Plan.	The modelling approach in the provided memorandum: M*arten Falls First Nation Community Access Road Breeding Bird Study Design Bias and Representativity* has informed the study design for the bird field program. There will not be additional modelling to inform further field sampling.
Final	NDMNRF - NRF Arm	32.	Pg.74 Birds Table 11-1: TISG ID #17	N/A	Contact with the Ministry of Environment, Conservation and Parks is indicated in this response, but it is important that NRF be	It is recommended that NRF be engaged regarding the list of valued ecosystem components that relate to birds.	Acknowledged.
Final	NDMNRF - NRF Arm	33.	Pg.76 Birds Table 11-1: TISG ID #28	N/A	Federal wetland function assessment requirements are described, however there is no indication regarding provincial wetland assessment requirements.	NRF recommends that wetland function assessment methodology also align with the Ontario Wetland Evaluation System.	Using OWES to evaluate wetlands in northern Ontario, especially in the project study areas of vast peatlands, is not an effective tool to characterize the value of wetlands. However, wetlands are being considered from a functional perspective (including hydrological, ecological, social and traditional values) as well as an ecological viewpoint through the Peatlands and Vegetation Study Plans. The components of what makes a PSW will be converged under the Wetland and Riparian Ecosystems Valued Component. There are no designated PSWs in the study area. Using OWES to evaluate wetlands in northern Ontario, especially in the project study areas of vast peatlands, is not an effective tool to characterize the value of wetlands. However, wetlands are being considered from a functional perspective (including hydrological, ecological, social and traditional values) as well as an ecological viewpoint through the Peatlands and Vegetation Study Plans. The components of what makes a PSW will be converged under the Wetland and Riparian Ecosystems Valued Component.
Final	NDMNRF - NRF Arm	34.	Pg.77 Birds Table 11-1: TISG ID #40	N/A	It is unclear from the response provided if an increased survey effort will be implemented for rare species.	Please clarify if an increased survey effort will be implemented for rare species. NRF recommends that increased surveys for rare species be implemented instead of strictly addressing rarity of species only through consideration of relative rarity during statistical analysis.	See the memorandum: Marten Falls First Nation Community Access Road Breeding Bird Study Design Bias and Representativity Section 7.4 Sampling effort for select species at risk.
Final	NDMNRF - NRF Arm	35.	Pg.78 Birds Table 11-1: TISG ID #49 And Pg.81 Birds Table 11-1: TISG ID #83	N/A	These comments discuss a need to consider the relative rarity of habitats for nesting birds in relation to the character of the wider landscape. Also indicated is that baseline data should provide evidence that there is enough equivalent habitat available to accommodate displaced nesting birds.	NRF recommends that baseline data from multiple years be utilized in order to assess annual variability, especially for rare species. Additionally, when equivalent habitat is being considered, provision of sufficient evidence demonstrating enough carrying capacity for both the local and displaced populations within the equivalent habitat, is necessary. If sufficient carrying capacity cannot not be demonstrated, then any adverse effects need to be captured in the effect assessment. The occurrence of “equivalent habitat” does not guarantee the existing population in that habitat is below carrying capacity.	The IS / EA Report will include detailed descriptions of each design and process for selecting sample locations, and describe the simulation results as suggested.

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Final	NDMNRF - NRF Arm	36.	Pg.80 Birds Table 11-1: TISG ID #56	N/A	A commitment that all criteria used to choose plot locations in the Impact Statement will be provided in the IS/EA Report is provided. However, once field work is complete, and the EA Report is developed, it will be challenging to address any inadequacies in field evaluations if plot locations chosen were inappropriate.	It is recommended that the criteria used to choose plot locations be provided, or at minimum summarized, in the Study Plans. This approach would assist NRF with providing guidance to the Project Team that may assist in development of the most effective approach to field surveys and data assessment.	The memorandum: *Marten Falls First Nation Community Access Road Breeding Bird Study Design Bias and Representativity* details the development of the study design for sampling bird populations.
Final	NDMNRF - NRF Arm	37.	Pg.80 Birds Table 11-1: TISG ID #57	N/A	There is potential for year-round adverse effects on non-migratory bird species as a result of this project.	Migratory and non-migratory bird species need to be considered if the potential for negative environmental impacts on the bird population is to be fully assessed during this environmental assessment process.	Bird surveys are planned for all seasons for both migratory and non-migratory species.
Final	NDMNRF - NRF Arm	38.	Pg.81 Birds Table 11-1: TISG ID #61	N/A	It is important that the effects of this project on non-migratory species is adequately considered. Avian surveys will likely differ somewhat from non-migratory species as a portion of the surveying will need to consider year-round occupancy and habitat use.	It is recommended that a description of survey efforts designed to describe the potential effects of this project on non-migratory birds, specifically, be provided.	Bird surveys are planned for all seasons for both migratory and non-migratory species.
Final	NDMNRF - NRF Arm	39.	Pg.81 Birds Table 11-1: TISG ID #82	N/A	This section commits to provision of a list of all species at risk listed under federal Schedule 1 Species at Risk Act which may be directly, or indirectly, impacted by the project.	It is recommended that a similar list of Provincially Listed species be provided in addition to the list of Federally regulated species.	Acknowledged.
Final	NDMNRF - NRF Arm	40.	Pg.83 Birds Table 11-1: TISG ID #93	N/A	Although this section indicates that a summary of any modifications to standardized sampling protocols, as well as rationale for such changes and a description of whom was consulted when these determinations were made will be provided in the IS/EA Report, waiting until this late stage to share such information carries with it a risk that the	It is recommended that a summary of any such changes to standard protocols, and the rationale for them be provided earlier (e.g. in the Study Plans) in order to allow for review of protocols and methods prior to field surveys.	Every attempt will be made to communicate with agencies and receive approvals in advance of and/or notify of changes to field programs at the earliest opportunity practicable.
Final	NDMNRF - NRF Arm	41.	Pg.84 Birds Table 11-1: TISG ID #105	N/A	Here migratory bird species are considered when assessing changes in mortality risk.	Changes to mortality risk for non-migratory bird species should also be considered.	Acknowledged.
Final	NDMNRF - NRF Arm	42.	Pg.86 Birds Table 11-1: TISG ID #130 & 131	N/A	Mitigation measures will be informed by best management practices, applicable resource management and/or recovery plan, Indigenous input, and industry standards.	NRF should be engaged regarding mitigation measures for birds as well where proposed actions may impact NRF's mandate.	NRF will be engaged regarding mitigation measures for birds within NRFs mandate. Applicable guidance will be included in the IS / EA Report
Final	NDMNRF - NRF Arm	43.	Pg.88 Birds Table 11-2: MECP ID #11	N/A	It remains unclear to NRF regarding when the work plan for Birds will be provided for comment, and how the related comment timeline will correspond with field assessments (will this information only be provided after field assessments are complete or will comments on the work plan be expected to inform field visits).	It is recommended that consultation with NRF regarding sampling assessment approaches be completed before field evaluation is initiated. Consultation with NRF requires sharing of proposed approaches in sufficient detail, and with sufficient time to allow for evaluation and comment by our ministry so the resulting guidance can inform field assessments practices, and data evaluation approaches.	A Birds Field Logistics Work Plan will be provided to the Agency and Government Review Team. Additional surveys are planned in 2022 and are described in the Work Plan.
Final	NDMNRF - NRF Arm	44.	Pg.94 Birds Table 11-1: MNRF ID# 32	N/A	NRF indicated in earlier comments that criteria and indicators should be expanded upon through development of quantitative descriptions (e.g. number of water crossings required, number of kms of wetlands to be	Recommend that quantifiable criteria and indicators be developed.	Acknowledged, the bird criteria and indicators do include quantifiable measurements.
Final	NDMNRF - NRF Arm	45.	Birds General	N/A	It is unclear from the Birds Study Plan how items such as the Ecoregional Criteria Schedules, and the Significant Wildlife Habitat Technical Guide and the Natural Heritage Reference Manual will be utilised during assessments to identify the significance of features, or to determine study locations	Recommend that a section be included in the Birds Study Plan which describes how appropriate provincial direction will be utilized to inform assessment approaches, and conclusions.	The IS / EA report will include a discussion on how provincial guidance/manuals are utilized to inform assessment approaches, and conclusions, where applicable.

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Final	NDMNRF - NRF Arm	46.	Birds General	N/A	Currently, large increases in species observation reports are recorded every 6 months to NHIC. This results in changes to lists on a frequent basis.	In order to consider updated information available at NHIC during this project, it is recommended that data cuts be updated for future work plans and EA work.	New and updated data will be included in the IS / EA report as applicable.
Final	NDMNRF - NRF Arm	47.	Birds 12. References	N/A	NHIC Conservation Concern Species list should be listed in the References section as well.	List NHIC Conservation Concern Species. They can be found on NHIC's website: https://www.ontario.ca/page/get-natural-heritage- information	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	48.	Pg.98+ Birds 12. References	N/A	Some of the references likely will have changed with SAR going to MECP.	It is recommended that document references should be confirmed to ensure any changes that have occurred as a result of the switch of responsibility from MNRF (now NRF) to MECP for SAR are accurately reflected.	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	49.	Pg. 101 Birds 12. References	N/A	It is noted the Canadian classification system and the Alberta wetland policy are referenced. Given that this project is proposed in Ontario it is recommend that Ontario's guidance be referenced and utilised.	List Ontario's guidance for wetlands of this project. Ontario Wetland Evaluation System, Northern Manual should be referenced in relation to wetland habitat considerations being made for bird species. https://www.ontario.ca/page/wetlands-evaluation	Ontario Wetland Evaluation System, Northern Manual, will be referenced in the IS / EA Report, where applicable.
Final	NDMNRF - NRF Arm	50.	Pg.104 Birds 12. References	N/A	Indicates Ontario GeoHub reference will be used for watercourses.	Ontario GeoHub should be used for more than just watercourses (ex. Ontario Flow Assessment Tool, Land Inventory Ontario information, Forest Resource Inventory etc.).	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	51.	Pg.110 Birds Appendix A	N/A	GeoHub should be listed as a publicly available data source. See original request listed in Table 11-1 MNRF ID#31 (Pg.93). GeoHub provides all open data digital layer files in addition to web applications.	Include reference to Ontario's GeoHub in data source list: https://geohub.lio.gov.on.ca/	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	52.	Pg.110 Birds Appendix A	N/A	NHIC tracked data layers are different than the NHIC Make a Map website because the latter is updated only every six months, and it may restrict more sensitive postings.	Include NHIC tracked data layers independently of the NHIC Make a Map website. The Data layers should be the primary source of information.	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	53.	Pg.110 Birds Appendix A	N/A	This section includes only the ANSI layer of Land Information Ontario (LIO), but there is much additional information available in LIO that is relevant to this project.	Include LIO independently here (i.e. additional layers beyond the ANSI layer will be of use in modeling and for the effects assessment).	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	54.	Pg.110 Birds Appendix A	N/A	The Significant Wildlife Habitat (SWH) Criteria Schedules are referenced here but not the Ontario SWH Technical Guide.	Update this section to indicate that SWH Ecoregional Criteria Schedules will be applied in tandem with Ontario's SWH Technical Guide.	The IS / EA Report will reference the Ontario's SWH Technical Guide, where applicable.

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Final	NDMNRF - NRF Arm	55.	Pg.110 Birds Appendix A	N/A	Enhanced Forest Resource Inventory data is available and should be considered.	Enhanced Forest Resource Inventory imagery is a Land Inventory Ontario (LIO) by-product and will need to be specifically requested, otherwise forestry related spatial information can be found in the GeoHub under Forest Resources Inventory	Enhanced Forest resource Inventory data will be considered and included n the IS/EA report as applicable.
Final	NDMNRF - NRF Arm	56.	Pg.110 Birds Appendix A	N/A	Part of this project is situated in the section of Ontario where active commercial forestry is ongoing.	Include consideration of applicable current Forest Management Plans and Annual Work Schedules in the reference list.	Forest Management Plans and Annual Work Schedules will be considered in the IS / EA Report, where applicable.
Final	NDMNRF - NRF Arm	57.	Pg.110 Birds Appendix A	N/A	Early Detection and Distribution Mapping System (EDDMaps Ontario) should be considered as well for invasive species observation information.	Include this reference source in this list available at: https://www.eddmaps.org/ontario/	A full list of references used or considered in the baseline descriptions and effects assessment will be provided in the IS/EA Report.
Final	NDMNRF - NRF Arm	58.	Pg.111 Birds Appendix A	N/A	"Important Habitats to include" should also list Significant Wildlife Habitat, candidate and approved ANSIs and Provincially Significant Wetlands.	Include the following in the "Important Habitats to include" list: - Significant Wildlife Habitat - Candidate and approved ANSIs - Provincially Significant Wetlands	Acknowledged. These will be included in the IS/EA Report, as applicable.
Final	NDMNRF - NRF Arm	59.	Pg. 111 Birds Appendix A	N/A	The Significant Wildlife Habitat Mitigation Tool includes excellent descriptions of potential impacts on wildlife (including bird) habitat.	Consider adding the Significant Wildlife Habitat Mitigation Tool as a reference to this Study Plan. This document can be obtained at: https://www.ontario.ca/document/significant-wildlife-habitat-mitigation-support-tool	Comment has be considered and will be addressed in the IS / EA Report as applicable.
Final	NDMNRF - NRF Arm	60.	Pg.111 Birds Appendix A	N/A	This list makes no mention of identified Far North Land Use Planning Designations, yet these are important considerations when planning projects in the Far North.	Include consideration of Identified Far North Land Use Planning Designations.	Far North Land Use Planning Designation will be considered in the IS / EA Report, as applicable.

MARTEN FALLS FIRST NATION
ALL SEASON COMMUNITY ACCESS ROAD

FINAL

Birds Field Logistics Work Plan

November 2021



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Revision History

Rev #	Date	Revision Description

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- represents Golder's judgement in light of the Limitations and the Standard of Care applicable for the preparation of similar reports;
- may be based on information provided to Golder which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context;
- was prepared for the specific purposes described in the Report and the Agreement; and
- in the case of subsurface, environmental or geotechnical conditions, may be based on limited testing and on the assumption that such conditions are uniform and not variable either geographically or over time.

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

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Acronyms

Agency, the ... Impact Assessment Agency of Canada
ARU ..... Autonomous Recording Unit
CAR ..... Community Access Road
EA ..... Environmental Assessment
HaSEP ..... Health and Safety and Environmental Protection Plan
IA ..... Impact Assessment
IAA ..... *Impact Assessment Act*
IAAC ..... Impact Assessment Agency of Canada
JSEA ..... Job Safety and Environmental Analysis
MECP ..... Ontario Ministry of the Environment, Conservation and Parks
MFFN ..... Marten Falls First Nation
SAR ..... Species at Risk
TISG ..... Tailored Impact Statement Guidelines
ToR ..... Terms of Reference
VC ..... Valued Component

1. Introduction

The Proponent of the Community Access Road (CAR or the Project) is Marten Falls First Nation (MFFN), a remote First Nation community in northern Ontario located at the junction of the Albany and Ogoki rivers, approximately 430 kilometres from Thunder Bay, Ontario. The MFFN community is proposing an all-season CAR that will connect the MFFN community to Ontario's provincial highway network (Highway 643) to the south via the existing Painter Lake Road. MFFN, as the Proponent of the Project, has formed a MFFN CAR Project Team that includes MFFN CAR Community Member Advisors and MFFN CAR Project Consultants who act with input, guidance, and direction from the MFFN Chief and Council.

This document outlines the work plan to implement the field studies for the valued component (VC) forest birds, raptors, shorebirds, waterfowl, bog/fen and other wetland birds, and species at risk (SAR) birds, recognizing that the results of these studies will be used to support a coordinated Impact Assessment (IA) required for Project review by the Impact Assessment Agency of Canada (the Agency) under the federal *Impact Assessment Act* (IAA), and an Environmental Assessment (EA) required for Project review by the Ontario Ministry of the Environment, Conservation and Parks (MECP) under the Ontario *Environmental Assessment Act*.

The Birds Work Plan describes the proposed methods and schedule to complete the field program and considers both the Agency's Tailored Impact Statement Guidelines for the Marten Falls Community Access Road Project (TISG) (IAAC 2020) and the comments received on the Draft Terms of Reference (ToR) (AECOM 2020).

2. Overview and Approach

The approach and associated study areas for the birds field program are defined in the Birds Study Plan (MFFN CAR 2021). These considerations were developed based on guidance from and discussions with both federal and provincial regulators. A brief description of the proposed methodology and staffing plan to complete the birds field program are described below, with the understanding that the technical content is limited to supplementary information (not previously included in the Birds Study Plan).

2.1 Methodology

The proposed methodology for the birds field program is described in **Table 2-1**, and the corresponding survey locations are shown in **Figure 2-1**, **Figure 2-2** and **Figure 2-3**. The proposed methodology described below is in line with what was initially detailed in the Birds Study Plan. No deviations are anticipated at this time.

Table 2-1: Methodology for Bird Field Study

Breeding Bird Point Counts	
Permits To Conduct Field Studies	■ MECP Letter of Authorization to Conduct Research in a Provincial Park or Conservation Reserve; valid from June 01, 2021 to December 31, 2022.
Field Study Methods	■ Pre-selected stations in Figure 2-1 will be used wherever possible, however many of these were selected during desktop review, and changes may be necessary pending conditions encountered in the field. ■ Breeding bird point counts and audio recordings on a handheld device will be completed at each station.
Lab Analysis Methods	■ No lab analysis is required for breeding bird point counts.
Autonomous Recording Unit (ARU)	
Permits To Conduct Field Studies	■ MECP Letter of Authorization to Conduct Research in a Provincial Park or Conservation Reserve; valid from June 01, 2021 to December 31, 2022.
Field Study Methods	■ Autonomous Recording Units (ARUs) will be set up at a subset of Breeding Bird Point Count Stations shown in **Figure 2-1** as described in the Birds Study Plan to record during the spring migration, breeding season, fall migration, and winter. However additional ARU locations may be added to capture targeted migration habitat that does not overlap with current station locations, pending conditions encountered in the field. ■ Targeted ARUs for eastern whip-poor-will and common night hawk will be set up at existing stations shown in **Figure 2-2** as described in the Birds Study

Autonomous Recording Unit (ARU)	
	Plan. An additional six stations have been added via desktop, but habitat suitability will be confirmed in the field. New stations may be moved, and additional stations may be added, pending conditions encountered in the field. ■ Targeted ARUs for yellow rail, and short-eared owl will be at existing ARU stations wherever possible, pending confirmation of habitat in the field. Additional stations may be added, pending conditions encountered in the field.
Lab Analysis Methods	■ No lab analysis is required for ARUs.
Marsh Bird Call Playback Surveys	
Permits To Conduct Field Studies	■ MECP Letter of Authorization to Conduct Research in a Provincial Park or Conservation Reserve; valid from June 01, 2021 to December 31, 2022.
Field Study Methods	■ These surveys will be conducted at existing stations shown in **Figure 2-2**, as well as at an additional five stations added via desktop, as described in the Birds Study Plan, but habitat suitability will be confirmed in the field. New stations may be moved, and additional stations may be added, pending conditions encountered in the field.
Lab Analysis Methods	■ No lab analysis is required for marsh bird call playback surveys.
Species Specific Surveys	
Permits To Conduct Field Studies	■ MECP Letter of Authorization to Conduct Research in a Provincial Park or Conservation Reserve; valid from June 01, 2021 to December 31, 2022.
Field Study Methods	■ Surveys for chimney swift, bank swallow, barn swallow, and peregrine falcon will be conducted at additional areas within the Local Study Area than those mentioned above, in conjunction with vegetation and bat habitat identification surveys, as discussed in the Birds Study Plan.
Lab Analysis Methods	■ No lab analysis is required for species specific surveys.
Aerial Surveys	
Permits To Conduct Field Studies	■ N/A
Field Study Methods	■ Aerial surveys will follow spacing, and methods described within the Birds Study Plan and shown in **Figure 2-3**, however the precise layout of transects will be adapted as needed, pending confirmation of habitat, bird behaviour, and weather conditions encountered in the field.
Lab Analysis Methods	■ No lab analysis is required for aerial surveys.

Figure 2-1: Bird Point Count Survey and ARUS Locations

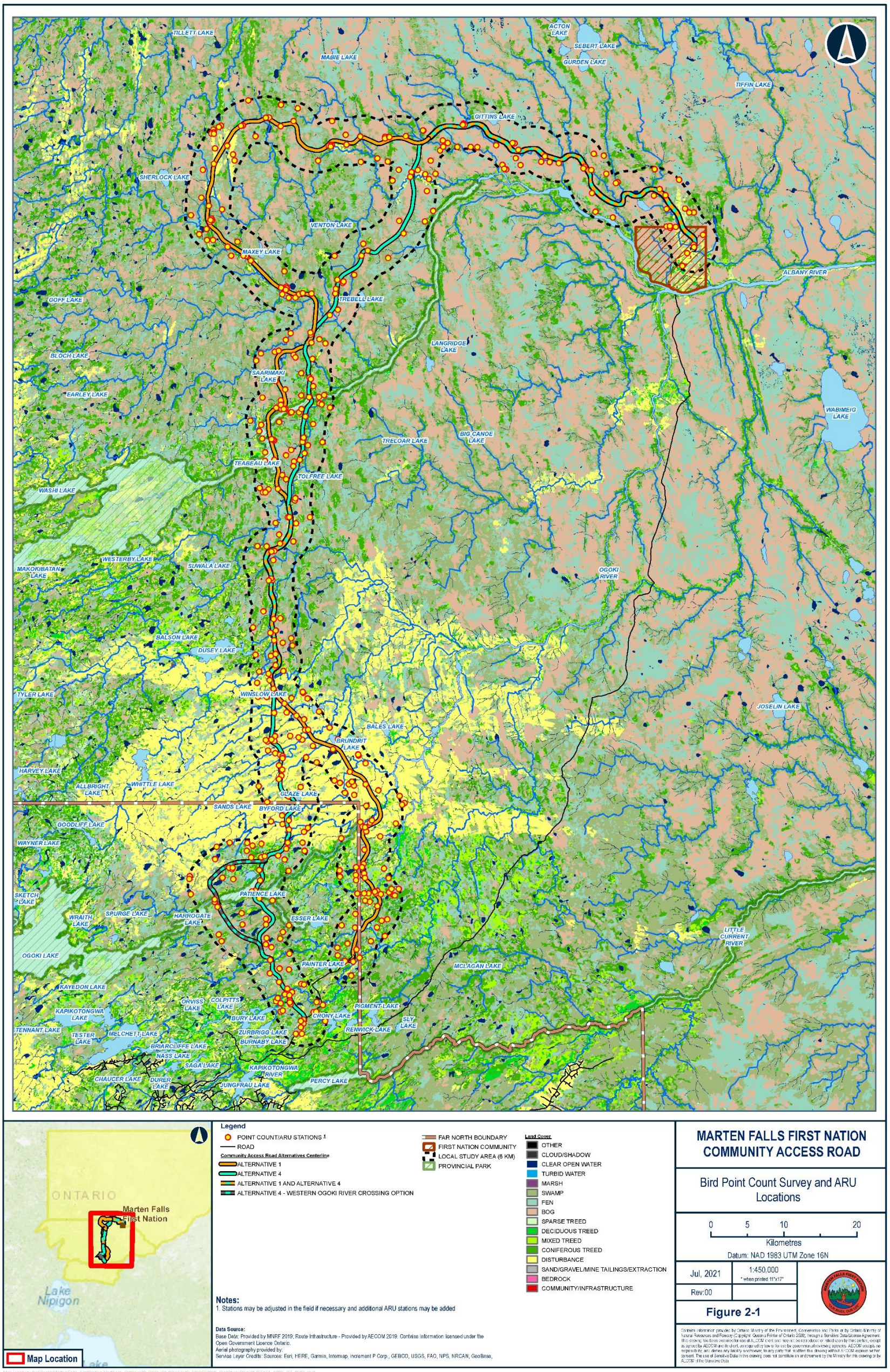


Figure 2-2: Marsh Bird Playback and Eastern Whip-poor-will Survey Locations

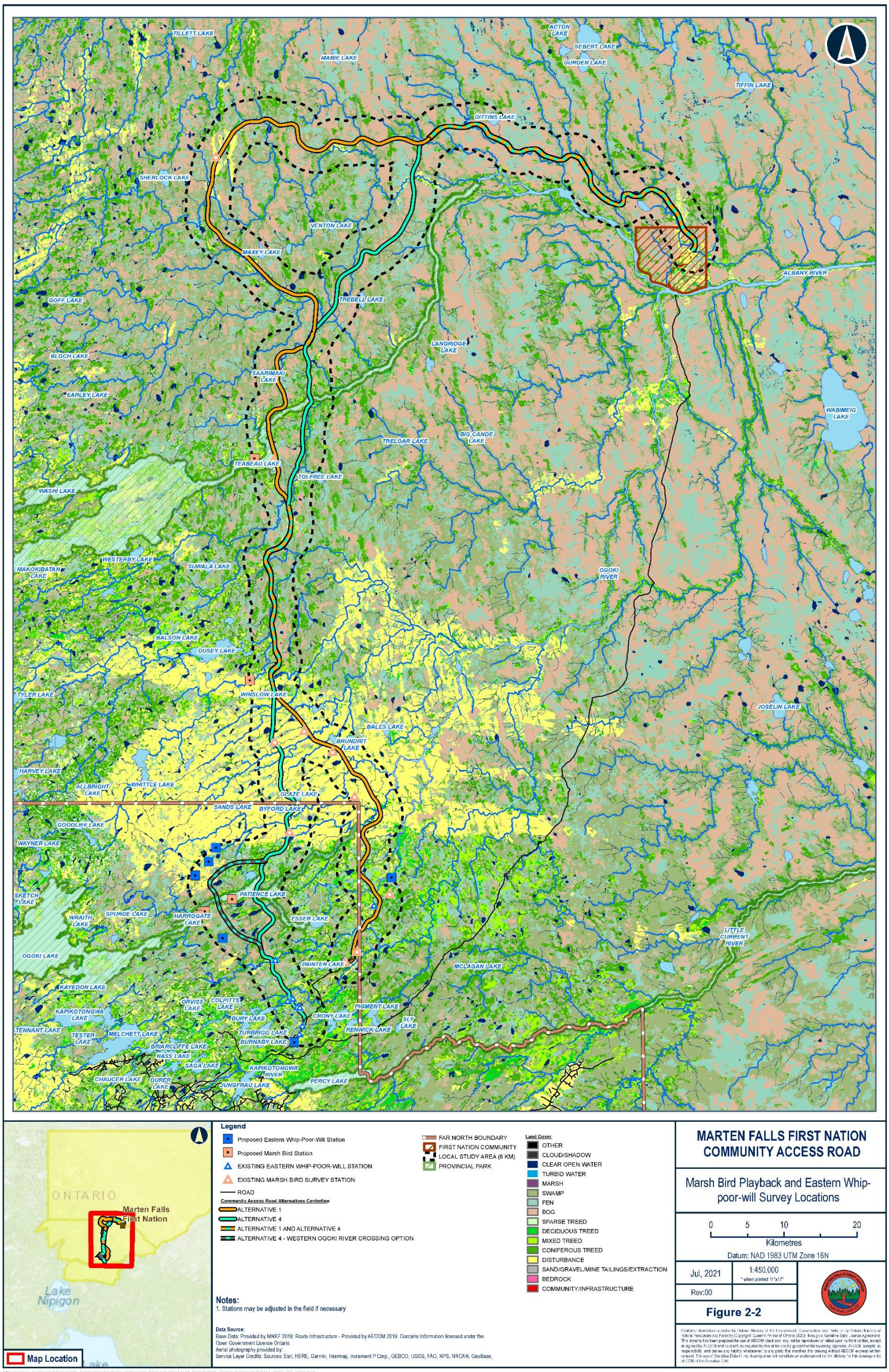
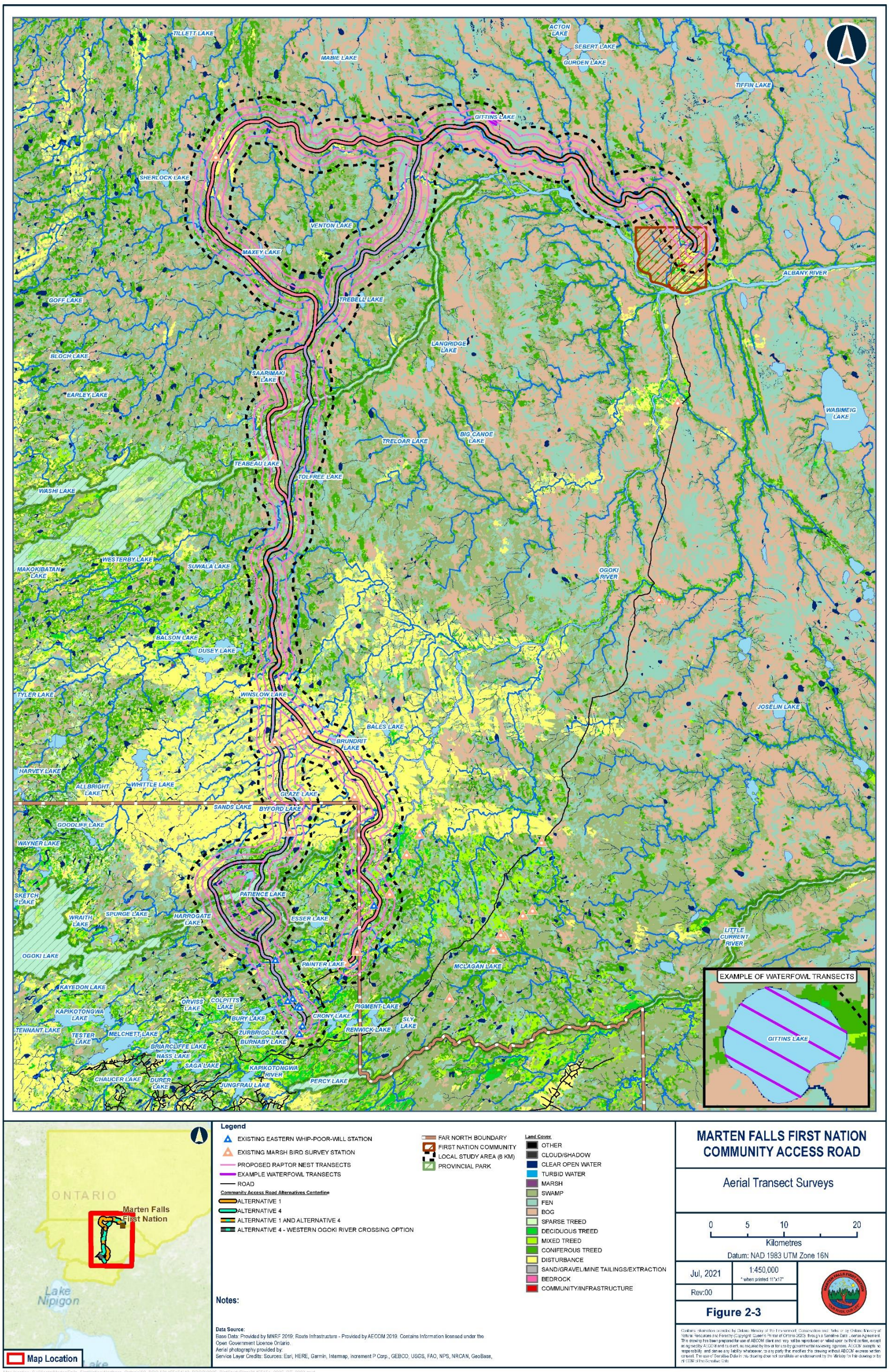


Figure 2-3: Bird Aerial Transect Surveys



2.2 Program Staffing

The proposed staff participating in the birds field program are outlined in **Table 2-2**.

Table 2-2: Personnel Qualifications

Name	Title	Project Role	Credentials	Years of Experience*
Fergus Nicoll	Terrestrial and Wetland Specialist	Bird Component Lead, Field Lead/Author	Dip.T.	22
Connor Charchuck	Terrestrial Biologist	Statistical Lead	M.Sc.	8
Erin Greenaway	Senior Ecologist	Natural Sciences Lead, Senior Adviser, Senior Reviewer	B.Sc.	23
Luke Owens	Wildlife Biologist	Field Lead	B.A.	15
Jamie Weir	Fish and Wildlife Technologist	Field Lead	Dip.T.	16

*Note: * Experience as of March 2021*

Please note that the staffing for the birds field program may also rely on additional members from the MFFN CAR Project Consultant Team and / or members from local Indigenous communities.

3. Discipline Specific-Schedule

The proposed schedule for the birds field program is presented below in **Table 3-1**. This schedule is subject to change based on evolving climactic conditions in the Project Area, including forest fires.

Table 3-1: Program Schedule

Task / Program	Start Date (MM/YR)	Approximate Duration	Targeted VC Interaction
■ Breeding Bird Point Counts	■ June 1, 2022	■ Two trips of up to 14 days in length during the time period of June 1 through July 17 2022	■ Forest Birds, Wetland Birds
■ ARU program (winter, spring migration, breeding, fall migration)	■ February 2022	■ February 2022 to November 2022	■ Forest Birds, Wetland Birds, Raptors, SAR Birds
■ Marsh Bird Playback Surveys	■ May 2022	■ May through July 2022	■ Wetland Birds, SAR Birds
■ Species Specific Surveys	■ May 2022	■ May through July 2022	■ SAR Birds
■ Aerial Surveys	■ September 2021	■ Six trips of up to 3 days between September 2021 and July 2022	■ Raptors, Shorebirds, Waterfowl

Prior to field programs commencing, the following groups from the Project Contact List will be notified:

- Indigenous Community Key Contacts
- Tribal Councils, Provincial Territorial Organizations and Métis Nation of Ontario
- Other Indigenous Persons Identified for Consultation (including MFFN community members)
- Businesses
- Tourism Operators
- Community and Interest Groups and Non-Governmental Organizations
- Interested Parties / Potential Stakeholders – Unaffiliated
- Government Review Team
- Non-Government Review Team agency representatives
- Forest Management Companies
- Mining Claim Holders
- Emergency Medical Services and Law Enforcement
- Neighbouring Projects and their Contacts
- Other Agency Representatives (elected Members of Parliament and Provincial Parliament of Ontario)

4. Health and Safety

4.1 General

Golder is committed to the health and safety of employees, clients, contractors and the public, with the understanding that all work performed by Golder is subject to strict health and safety policies and applicable federal, provincial, and municipal acts and regulations. Golder has internal Work Safe Practices for aerial work, remote work, cold weather work, and working around water. All field crew members will be expected to review these protocols prior to commencing surveys. In addition, the Golder survey teams will develop a project specific Health and Safety and Environmental Protection Plan (HaSEP) prior to conducting field work. The Project's HaSEP will be reviewed and discussed with all field crew members (including pilot and Indigenous crew members) prior to the survey's commencement.

The aerial / helicopter support for the Project will be designed and scheduled according to Golder's and the client's health and safety policies, procedures, and training. Restrictions on aircraft type and pilot proficiency will apply. Prior to daily take-off, the pilot will provide an aircraft orientation and safety briefing to all members of the survey team. The briefing will include identifying hazards, emergency response plans and procedures, and general helicopter protocol (including how to exit and enter an aircraft). As part of these briefings, hazards specific to the day's task will also be identified, discussed, and documented on a job safety and environmental analysis (JSEA) form, with a plan for all crew members to sign the JSEA. Field surveys will only occur when weather conditions allow safe aircraft operations, recognizing that (1) field crew members have the right to refuse substandard actions or conditions if the worker feels that these actions / conditions are imminently dangerous to their safety or to the safety of others and (2) field crew members should rely on pilot judgement as well as their own experienced and comfort level to determine if flights should occur or be prematurely terminated.

As part of each field day, field crew members will pack extra food, water, and clothing in case of aircraft mechanical trouble and unexpected delays. In addition, each field crews will carry a survival and first aid kit for emergency situations (supplementary to the aircraft emergency survival kit). Daily check-in times with a designated contact will be pre-determined as part of the HaSEP, noting that satellite phones or satellite communication devices (e.g., Garmin inReach) will be used in areas where cell phone coverage is not reliable.

4.2 COVID-19

All COVID-19 related risk mitigation and recovery measures have been established in line with government protocols and AECOM corporate measures. Field crews will employ preventative COVID-19 actions including daily screening questionnaires and the use of Personal Protective Equipment such as gloves, masks, regular disinfection and social distancing.

Members of the field crews are not to attend site, or must remove themselves from site, if they fit any of the following criteria:

- They have symptoms associated with COVID-19 (e.g., fever, cough, sore throat, shortness of breath, sneezing / running nose or loss of sense of smell);
- They have been confirmed for COVID-19 or are awaiting the results from being tested for COVID-19;
- They have been in close-contact with a known or suspected case of COVID-19 in the past 14 days; and / or
- They have returned, or been in contact with someone who has returned, from overseas in the past 14 days.

When working in the community, field crews will strictly adhere to the COVID-19 preventative measures as described above. Where community access is required to facilitate a field survey, entry will be discussed with the community in advance. As needed, a negative COVID-19 test will be presented prior to entering Indigenous communities.

Field crews will have access to an adequate supply of sanitizer, and, as part of this, the crew members will regularly sanitize their hands. Further to this: field crews will minimize use of shared tools and equipment, as practical (including the use of hand tools, electronic devices, pens, clipboards, and notepads); all work surfaces and equipment used in the course of work will be adequately cleaned and disinfected at the end of the work shift or more frequently when visibly soiled or used repeatedly; and cloth or surgical masks (as a minimum) will be worn by field crews at all times during the course of work and in transit to the work site in line with government direction.

For all workers, regardless of specific exposure risks, it is always a good practice to:

- Frequently wash your hands with soap and water for at least 20 seconds, noting that, when soap and running water are unavailable, use of an alcohol-based hand rub with at least 60% alcohol is suggested.
- Avoid touching your eyes, nose, or mouth with unwashed hands.
- Avoid close contact with people who are sick.
- Cover your mouth and nose with your bent elbow or tissue when you cough or sneeze, and immediately dispose of the used tissue.
- Stay home if you are sick.

5. References

AECOM Canada Ltd. (AECOM), 2020:

Marten Falls First Nation Proposed Terms of Reference Marten Falls Community Access Road – Environmental Assessment

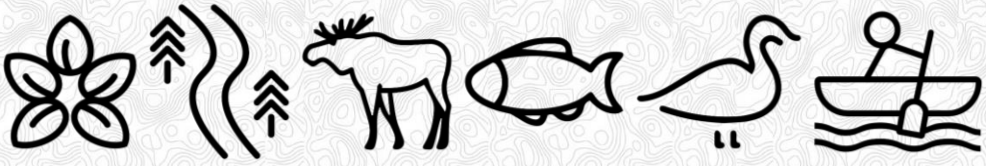
Impact Assessment Agency of Canada (IAAC), 2020:

Tailored Impact Statement Guidelines for the Marten Falls Community Access Road Project. https://iaac-aeic.gc.ca/050/documents/p80184/133937E.pdf

Marten Falls First Nation Community Access Road Project (MFFN CAR), 2021:

Birds Study Plan

Phone: 1-800-764-9114 **Email:** info@martenfallsaccessroad.ca **Web:** http://www.martenfallsaccessroad.ca



Attachment B – Birds Technical Support Document

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Attachment B: Birds Technical Support Document

February 2026

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Design recommendations given in this report are applicable only to the project and areas as described in the text and then only if constructed in accordance with the details stated in this report. The comments made in this report on potential construction issues and possible methods are intended only for the guidance of the designer. The number of testing and / or sampling locations may not be sufficient to determine all the factors that may affect construction methods and costs. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

This limitations statement is considered an integral part of this report.

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List of Annexes

Annex A: Bird Species List

1. Introduction

Marten Falls First Nation is a remote First Nation community in northern Ontario, approximately 430 kilometres (km) from Thunder Bay, Ontario, located at the junction of the Albany and Ogoki rivers. The Marten Falls First Nation community is proposing a Community Access Road (the Project) that will connect the Marten Falls First Nation community to the Ontario provincial highway network.

This report documents and summarizes baseline conditions for Birds obtained during field programs completed from 2018 through 2023.

2. Study Objectives

Bird baseline data were collected to support the Project and are outlined in greater detail in the *Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2026). The bird baseline data were used to support the Environmental Assessment / Impact Assessment for the Project. Forest birds, raptors, shorebirds, waterfowl and waterbirds, bog / fen birds and other wetland birds, other land birds, and species at risk were selected as the Valued Component groups for the birds discipline. For each bird Valued Component group, at least one representative species was selected as a proxy Valued Component based on habitat association and expected abundance or behaviour (i.e., diurnal or nocturnal). The species at risk Valued Component includes the key habitats associated with each species at risk, and its critical habitat as appropriate.

The proxy Valued Components were selected as focal species that would be representative of the broader Valued Component groups and would occur in sufficient numbers within the Project study areas to support habitat model validation.

The objectives of the birds baseline study were to:

- Characterize the existing environment that supports birds in the Project study areas;
- Gather information required to inform environmental effects using the indicators selected for each Valued Component group;
- Develop studies that meet all federal and provincial regulatory requirements for effects assessments;
- Inventory bird populations and identify key habitat associations in the study areas;
- Capture information from community engagements, Indigenous Knowledge and stakeholder considerations;
- Establish the current state of bird resources in the study areas with which to compare future environmental effects monitoring results; and
- Support the development of Project-specific mitigation strategies.

This report documents and summarizes baseline conditions for birds obtained during field programs completed from May 2018 to January 2023.

3. Study Areas

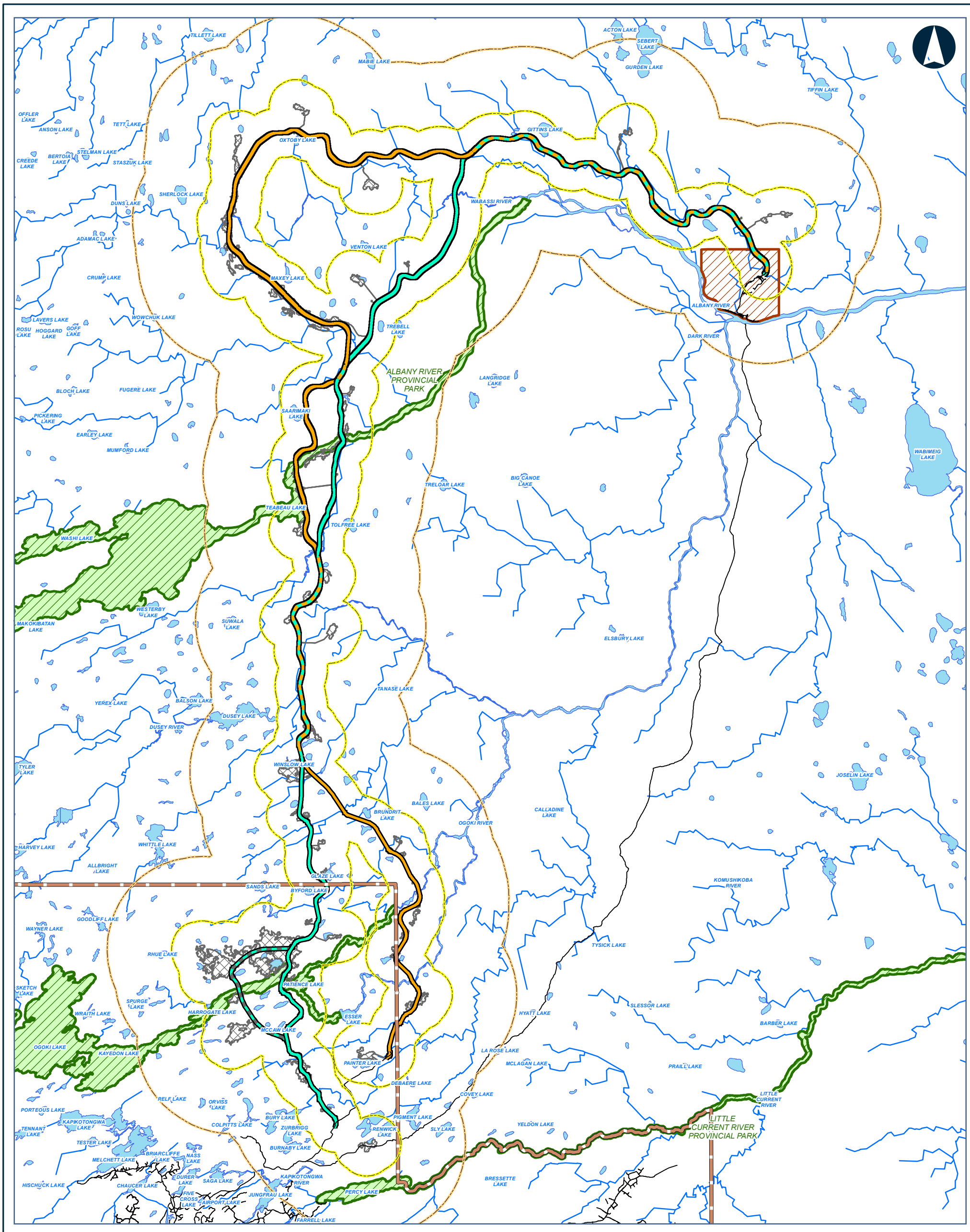
Study areas identify the geographic extents within which potential effects of the Project are likely to occur and are considered in the Environmental Assessment / Impact Assessment. The existing conditions and potential effects are documented for three study areas selected for the Project:

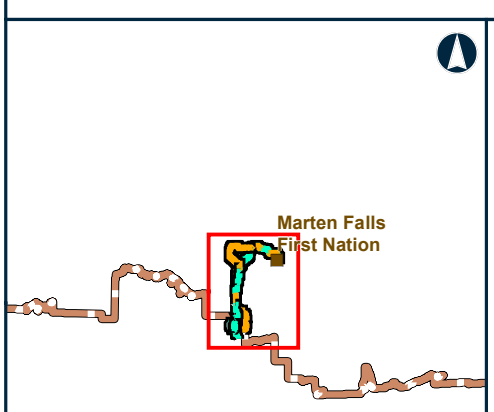
1) Construction Disturbance Area: the area of direct disturbance by Project footprint (Project footprint is defined as the physical disturbance associated with Project construction and operation);

2) Local Study Area: the area where direct and indirect effects of the Project (e.g., sensory disturbance) are likely to occur; and

3) Regional Study Area: the area where incremental and cumulative effects of the Project and other developments are likely to occur on birds Valued Components.

The Local Study Area and Regional Study Area boundaries for bird Valued Components are shown in **Figure 3-1.** Additional information related to the Project study areas are outlined in greater detail in the *Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2026).





Legend

- ROAD
- WATERBODY
- WATERCOURSE

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

BIRDS STUDY AREAS

0 5 10 20
Kilometres
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Figure 3-1

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4. Methods for Collection of Data

4.1 Desktop Review and Information Sources

Prior to planning and implementing field investigations, a desktop review of existing information sources for birds was completed using available sources, including reports provided by AECOM Canada Ltd., publicly available databases, and published reports. Additional information related to the desktop review and information sources are outlined in greater detail in the *Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2026).

4.1.1 Ecosite and Habitat Review

During plot selection and study design, results of the vegetation study were not yet available, so ecosite information and classification were based on desktop review of the Far North Land Cover dataset (MNRF, 2014a). During data analysis, updated ecosite data from the vegetation study were used. Through the vegetation desktop ecosite mapping and field verification, ecosite types were identified within the Local Study Area (*Vegetation Technical Support: Existing Conditions & Effects Assessment – Section 6.4*). For breeding bird point count survey plots that were outside of the Local Study Area, the Far North Land Cover dataset (MNRF, 2014a) and Provincial Land Cover 2000 were used to acquire a broad description of habitat type. Given the scale of the Project and the limitations identified in the desktop mapping exercise, for mapping and analyses purposes, ecosites were then rolled into vegetation community groupings. Additional information related to the ecosite and habitat review are outlined in greater detail in the *Draft Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2024).

4.2 Field Investigations

4.2.1 Study Design

The study design for bird field investigations was informed by the requirements of the *Tailored Impact Statement Guidelines* as well as from engagement with regulators (**Section 4.2.2**), provincial guidance documents and peer-reviewed literature about approved methodology for scientific studies. The study design was intended to meet the overarching objectives of the requirements in the *Tailored Impact Statement Guidelines*. Additional information related to the Project study design are outlined in greater detail in the *Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2026).

4.2.2 Breeding Bird Point Count Surveys

4.2.2.1 Objectives

The objective of the breeding bird point count surveys was to determine the presence, distribution, abundance, and density of breeding birds within the Regional Study Area with more focus on sampling within the Local Study Area. Breeding bird point count surveys primarily targeted bird Valued Components in the forest birds and bog / fen and other wetland birds groups due to the abundance of forest and wetland habitats in the Local Study Area.

4.2.2.2 Methods

4.2.2.2.1 Survey Effort and Plot Placement

Breeding bird point counts were first completed in 2018 at 160 survey plots within the Local Study Area and Regional Study Area by Zoetica Environmental Consulting Services (Zoetica, 2018a; **Table 4-1**). Additional point count surveys conducted by WSP Canada Inc. (formerly Golder Associates Ltd.) focused primarily on sampling within the Local Study Area and occurred in 2019 and 2022. A total of 41 point count survey plots were sampled in 2019 (Golder, 2019) and 89 plots were surveyed in 2022; of the 89 plots surveyed in 2022, 19 were placed in locations that were surveyed in 2018 (n=9) or 2019 (n=10) (**Table 4-1**). Breeding bird survey plots were spatially distributed across the Local Study Area to maximize spatial coverage (**Figure 4-1**). Among all sample years, a total of 31 unique bird point count plots were established in the Project Development Area, 210 unique bird point count plots were established in the Local Study Area, and an additional 30 point count plots were established in the Regional Study Area, outside of the Local Study Area boundaries (**Table 4-1; Figure 4-2**).

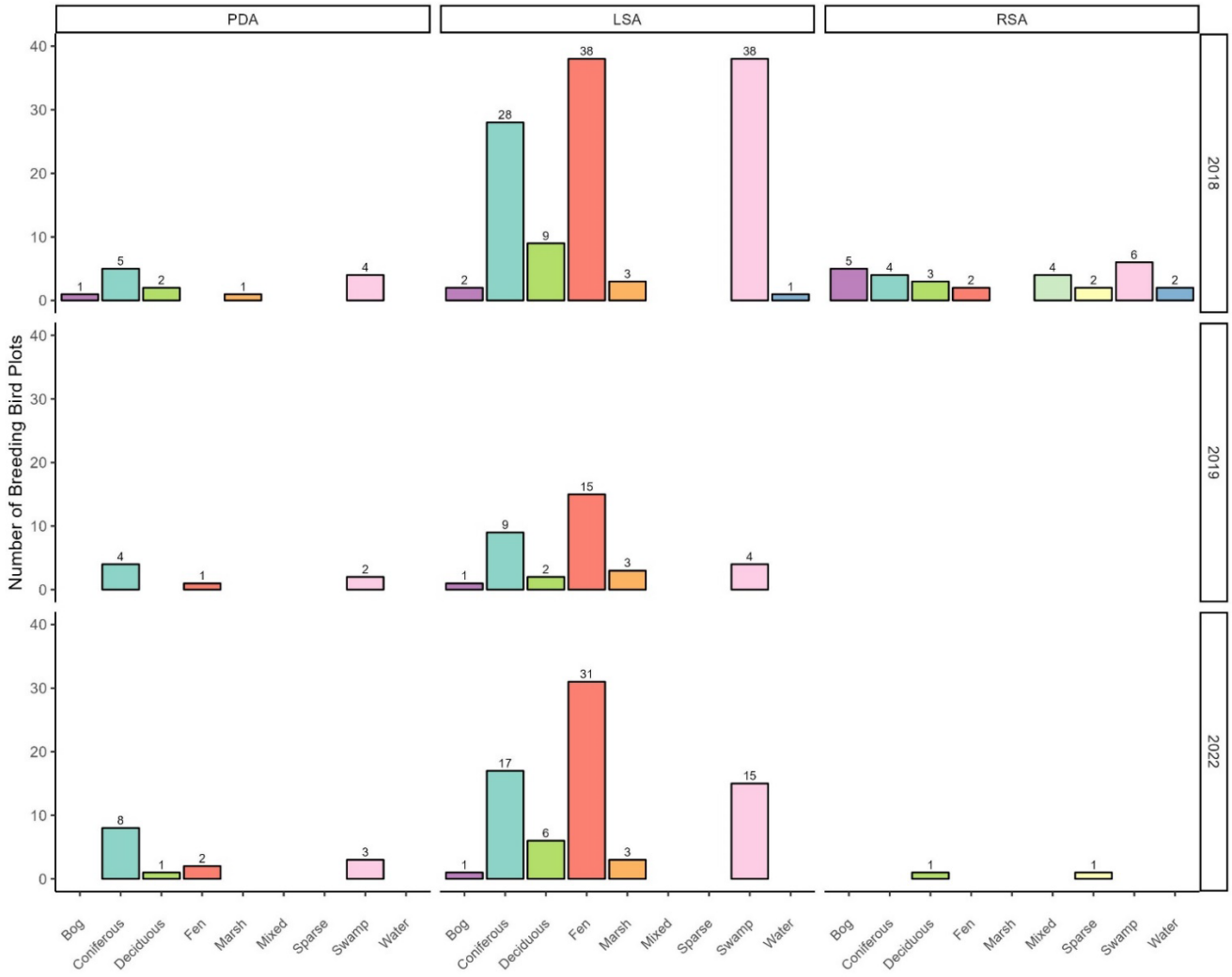
Data from all survey years (2018, 2019, and 2022) were included in the data analysis to allow for sampling over multiple years and inter-annual variation. There were some minor differences in methods used during surveys in 2022 compared to those used in 2018 to 2019; these differences are outlined in **Table 4-1**.

Table 4-1: Point Count Survey Effort by Habitat Category in the Project Development, Local, and Regional Study Areas, 2018, 2019, and 2022

Habitat Category	2018			2019			2022			All Survey Years[a]		
	CDA	LSA[a]	RSA[b]	CDA	LSA[a]	RSA[b]	CDA	LSA[a]	RSA[b]	CDA	LSA[a]	RSA[b]
Bog	1	2	5	0	1	0	0	1	0	1	3	5
Coniferous Forest	5	28	4	4	9	0	8	17	0	16	49	4
Deciduous Forest	2	9	3	0	2	0	1	6	1	3	17	4
Fen	0	38	2	1	15	0	2	31	0	3	77	2
Marsh	1	3	0	0	3	0	0	3	0	1	9	0
Mixed Forest	0	0	4	0	0	0	0	0	0	0	0	4
Early Successional Sparse Treed	0	0	2	0	0	0	0	0	1	0	0	3
Swamp	4	38	6	2	4	0	3	15	0	7	54	6
Water	0	1	2	0	0	0	0	0	0	0	1	2
All Habitat Types	**13**	**119**	**28**	**7**	**34**	**0**	**14**	**73**	**2**	**31[c]**	**210[c]**	**30**

Notes:
(a) Plots that are within the Local Study Area but outside of the Project Development Area boundaries.
(b) Plots that are within the Regional Study Area but outside of the Local Study Area boundaries.
(c) Some plots were placed at the same locations among survey years; therefore, the sum of plots per survey year may not equal the total across all survey years.
CDA = Construction Disturbance Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 4-1: Breeding Bird Survey Point Count Plots Completed in the Project Study Area, 2018 to 2022



HARROGATE LAKE
MCCAW LAKE
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
OGOKI RIVER
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
ORVISS LAKE
COLPITTS LAKE
BURY LAKE
ZURBRIGG LAKE
BURNABY LAKE
CRONY LAKE
RENWICK LAKE
PIGMENT LAKE
SAGA LAKE
KAPIKOTONGWA RIVER
LITTLE CURRENT RIVER PROVINCIAL PARK
PERCY LAKE
LITTLE CURRENT RIVER
JUNGFRAU LAKE
LITTLE JUNGFRAU LAKE
FARRELL LAKE
LITTLE CURRENT RIVER PROVINCIAL PARK
MURIEL RIVER
RUNWAY LAKE

Marten Falls First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

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Figure 4-2.1

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DUSEY LAKE
WINSLOW LAKE
BALES LAKE
BRUNDRIT LAKE
GLAZE LAKE
SANDS LAKE
BYFORD LAKE
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
PATIENCE LAKE
OGOKI RIVER

Marten Falls First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

0 2.25 4.5
Kilometres

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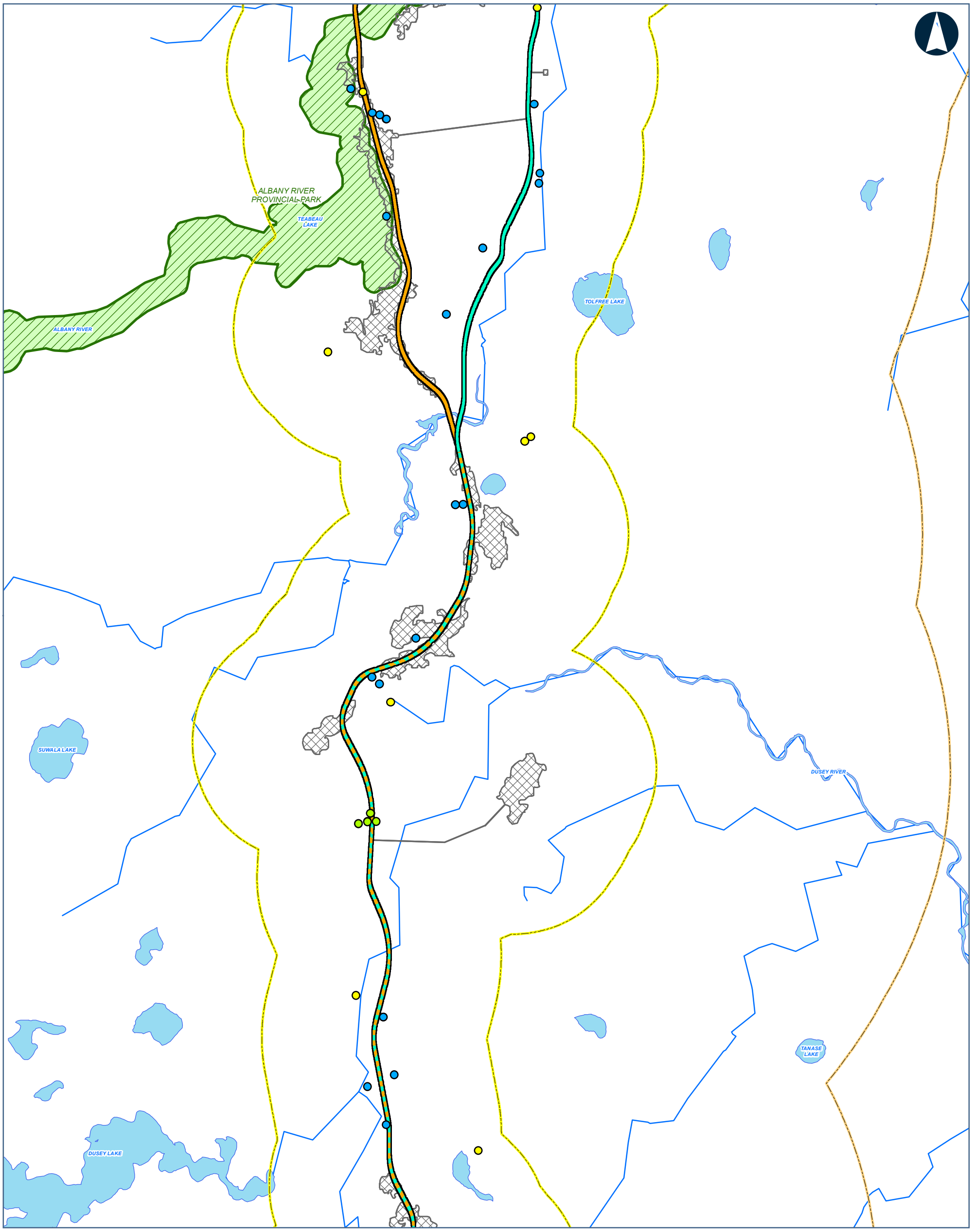

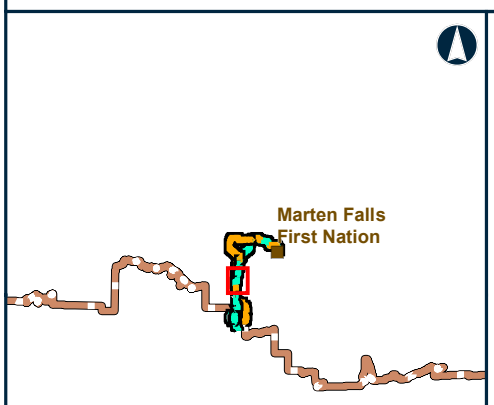

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

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WABASSI RIVER
VENTON LAKE
MAXEY LAKE
TREBELL LAKE
ALBANY RIVER
SAARIMAKI LAKE
ALBANY RIVER PROVINCIAL PARK

Marten Falls First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

0 — 2.25 — 4.5
Kilometres

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Figure 4-2.4

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GARVEY LAKE

SLADE LAKE

MABIE LAKE

OXTOBY LAKE

Marten Falls First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- WATERBODY
- WATERCOURSE
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-2.5

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GURDEN LAKE

GITTINS LAKE

WABASSI RIVER

ALBANY RIVER

ALBANY RIVER
PROVINCIAL PARK

Marten Falls
First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-2.6

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SEBERT LAKE

GURDEN LAKE

TIFFIN LAKE

ALBANY RIVER

Marten Falls First Nation

Map Location

Legend

BREEDING BIRD COUNT LOCATION
- 2018 (ZOETICA)
- 2019 (GOLDER)
- 2022 (GOLDER)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1 AND ALTERNATIVE 4

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Breeding Bird Point Count Survey Plots Sampled in the Project Study Areas, 2018 to 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-2.7

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Constraints applied to the point count selection procedures for all years of data are as described in the Birds Study Plan.

Survey plots in 2018 were randomly placed within the Local Study Area to maximize spatial coverage and to sample habitat types in proportion to their availability in the study area, in collaboration with Environment and Climate Change Canada (Zoetica, 2018a). Survey plots established in 2019 were placed within the Local Study Area to fill "gaps" in survey effort from 2018 surveys. The study design took into consideration limited site accessibility combined with the expectation that less common geologic features (i.e., eskers) and associated land cover types would be affected in greater proportion to their availability. Target breeding bird point count plots were selected using a Generalized Random Tessellation Stratified study design.

As part of the Generalized Random Tessellation Stratified study design, survey plot placement was based on the proportions of each habitat type within the Local Study Area. First, the land cover within the Local Study Area was characterized using land cover categories of the Far North Land Cover dataset (MNRF, 2014a) as well as recently burned areas from the Fire Disturbance Area dataset. Land cover categories with similar characteristics were combined if a land cover type comprised less than 1% of the total Local Study Area. Target survey plots were then mapped across habitat type categories according to the availability of habitat categories in the Local Study Area and the biodiversity rank assigned to each habitat category (i.e., habitat categories classified as having higher value in supporting songbird species richness were more likely to be sampled than habitat categories with lower value). Following Section 8.9 of *the Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), the Generalized Random Tessellation Stratified study design allocated 60% of survey plots (90) to point count surveys and 40% of survey plots (60) to autonomous recording units. Due to timing and access constraints a total of 89 point counts were surveyed in 2022. The allocation of survey plots between point count and autonomous recording units was completed randomly allowing for spatial coverage of both, with the exception that a subset of autonomous recording unit plots were selected based on their presence in potential migration corridors or stopovers (e.g., along larger rivers). More details on migration survey methodology are provided in **Section 4.2.6.2**.

The proposed distribution of survey plots among habitat categories within the Local Study Area was reviewed by Environment and Climate Change Canada prior to any 2022 field work. Survey plots were adjusted dynamically in the field if pre-selected plots were inaccessible. The Birds Study Plan provides full details on how target survey plot locations were selected for 2022 sampling.

4.2.2.2.2 Point Count Survey Protocol

Breeding bird point count surveys were conducted at each plot, separated by a minimum distance of 200 m where possible, twice during the breeding bird season (June 1 through

July 10 in the Northern Ontario Ecozone; June 1 through July 17 in Hudson Bay Lowlands Ecozone), and ten days apart. Expert observers skilled in Northern Ontario bird identification by sight and sound were used for breeding bird point counts to minimize bias in skill level and hearing ability.

Point counts were modified from standard breeding bird programs such as the Forest Bird Monitoring Program Survey Instructions (Canadian Wildlife Service, 2008) and the Atlas of the Breeding Birds of Ontario (Cadman et al., 2007). Point count surveys began as soon as possible after sunrise (due to safety issues with flying helicopters in low light conditions, manned pre-dawn surveys were not possible) and ended no later than 11 a.m.

Data included all species observed through both call and songs. Each observation was recorded during a standardized 10-minute point count, recording each individual bird in the first minute interval that it was detected. Estimated distances to each bird was recorded as: 0 to 50 m, 50 to 100 m, and beyond 100 m. Birds flying over or through the plot were categorized as incidental observations. Surveys were only completed with little or no precipitation and when wind was calm or less than four on the Beaufort Scale.

4.2.2.2.3 Data Analysis

Bird vocalizations during point counts were recorded using a high-quality portable recording device (Zoom H2n digital handheld recorder or equivalent) mounted on a tripod. Paired autonomous recording unit and breeding bird surveys were not completed for the Project. An attempt was made to determine correction factors using unpaired breeding bird and autonomous recording unit data following methods in Van Wilgenburg et al. (2017). The only Valued Component that met the availability assumption was dark-eyed junco (Oji-Cree translation, *binechiinch gaanitaanigamoch*) (*Junco hyemalis*). Therefore, the decision was made to use breeding bird survey and autonomous recording unit data for habitat models separately (**Attachment C – Birds Modelling Report**). For passerines, breeding bird survey data were used to develop habitat models. For boreal owl (Oji-Cree translation, *kookookoo*) (*Aegolius funereus*), common nighthawk (Oji-Cree translation, *dibiki binechii*) (*Chordeiles minor)*, and Wilson's snipe (Oji-Cree translation, *nibiikaang gaa'ayaach binechiinch) (Gallinago delicata)*, more detections were made from autonomous recording units than breeding bird surveys. Therefore, models were developed using autonomous recording unit data (**Attachment C – Birds Modelling Report**).

Due to an unbalanced numbers of visits per plot (one to four visits per plot), the maximum count of each proxy Valued Component was determined and used during data analysis for each breeding bird survey plots.

Differences in 2018 and 2019 Methods Compared to 2022 Methods

Point counts conducted in 2018 (Zoetica, 2018a) and 2019 (Golder, 2019) generally followed the same protocols as surveys conducted in 2022, with the following exceptions:

- Digital handheld recorders (e.g., Zoom H2n), were not used during 2018 and 2019 surveys;
- Observations were not recorded in the first minute they were detected in 2018 and 2019; and
- Point counts in 2019 were five minutes in length.

4.2.3 Bird Autonomous Recording Unit Surveys

Autonomous recording units were used to survey birds during the breeding season (**Section 4.2.3.1**), the spring and fall migration periods (**Section 4.2.3.2**), and the winter season (**Section 4.2.3.3**).

4.2.3.1 Breeding Season

4.2.3.1.1 Objectives

The objective of the breeding bird autonomous recording unit surveys was to determine the presence, distribution, and abundance of breeding birds in the forest bird, raptors, and bog / fen and other wetland birds Valued Component groups. Density was not determined because autonomous recording units are unlimited distance point counts, which make it problematic to estimate density (Yip et al., 2017).

Autonomous recording units were deployed in 2022 to collect avian data to complement other surveys. Autonomous recording units complemented traditional point counts by providing more frequent data collection, which is potentially valuable in detecting rare species, if they occur in the area.

4.2.3.1.2 Methods

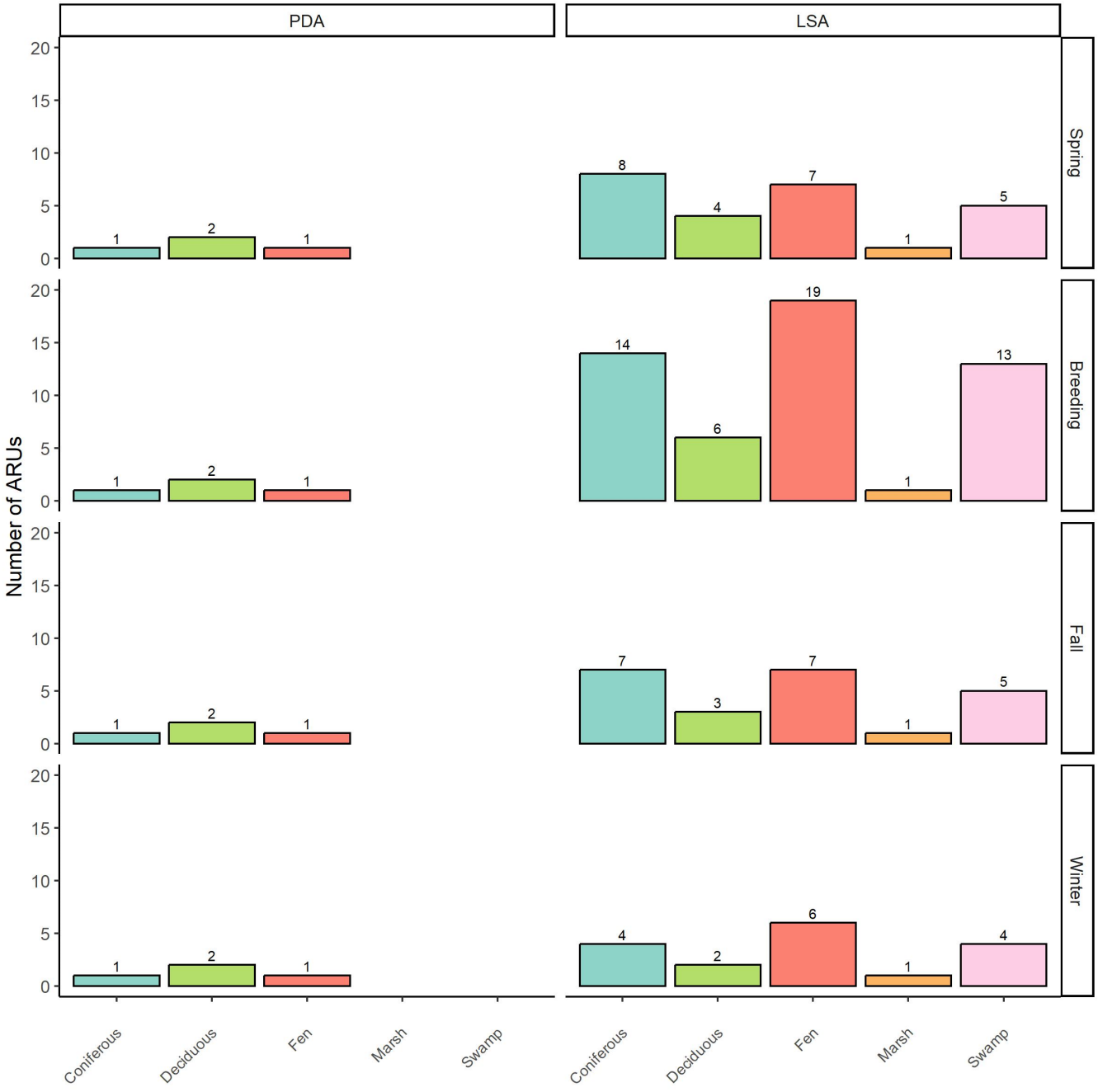
Study Design

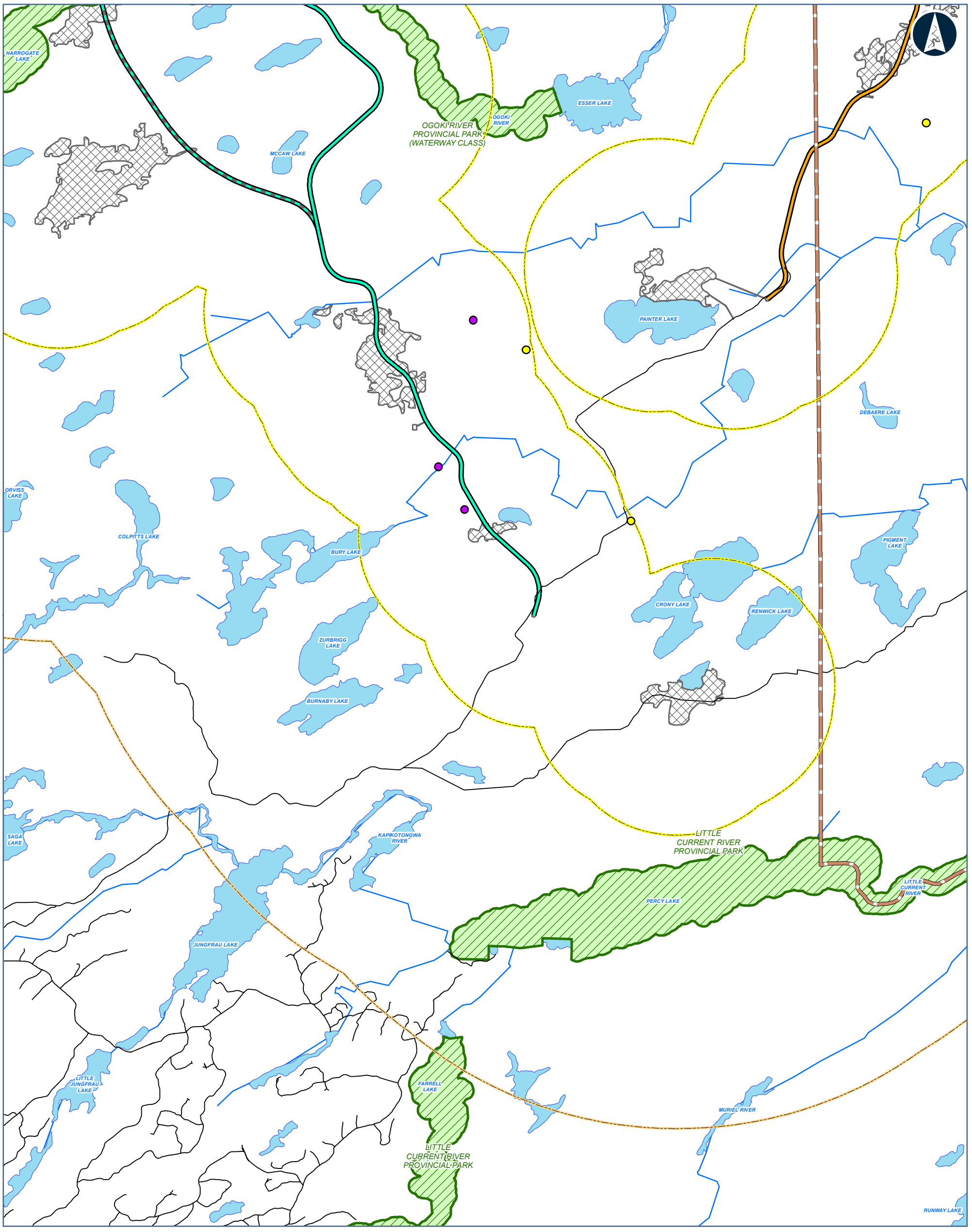
Autonomous recording unit survey plot selection followed the study design described for breeding bird point count surveys in **Section 4.2.2.2.** Based on Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), autonomous recording units were deployed at approximately 40% of the proposed 150 breeding bird survey plots during the breeding season (i.e., 60 plots). The autonomous recording unit data sampling effort followed Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020) or was based on existing data when the sampling effort was greater, as described in the Birds Study Plan. The allocation of survey plots between point count and autonomous recording units was done randomly allowing for spatial coverage of both, with the exception that a subset of autonomous recording unit

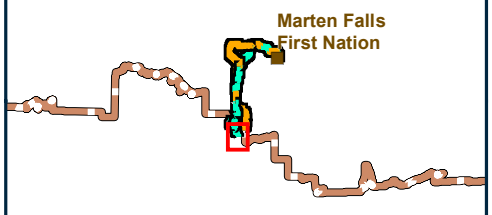
plots was selected based on their presence in potential migration corridors or stopovers (e.g., along larger rivers). More details on migration survey methodology are provided in **Section 4.2.3.2.2**. When accessing a specific plot during the morning point count period was not feasible, it was allocated as an autonomous recording unit plot. Due to equipment failure, reliable data were collected at 57 of the originally selected 60 plots (**Figure 4-3**).

Autonomous recording units were spaced at least 800 m apart to avoid double counting based on the detection distances recorded for a suite of 24 bird species (Yip et al., 2017). **Figure 4-4** illustrates where autonomous recording unit survey plots were established in the Local Study Area.

Figure 4-3: All Bird Species Autonomous Recording Unit Plots Established in the Project Study Areas, 2022







Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

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Figure 4-4.1

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DUSEY LAKE
WINSLOW LAKE
BALES LAKE
BRUNDRIT LAKE
GLAZE LAKE
SANDS LAKE
BYFORD LAKE
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
PATIENCE LAKE
OGOKI RIVER

Marten Falls First Nation

Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

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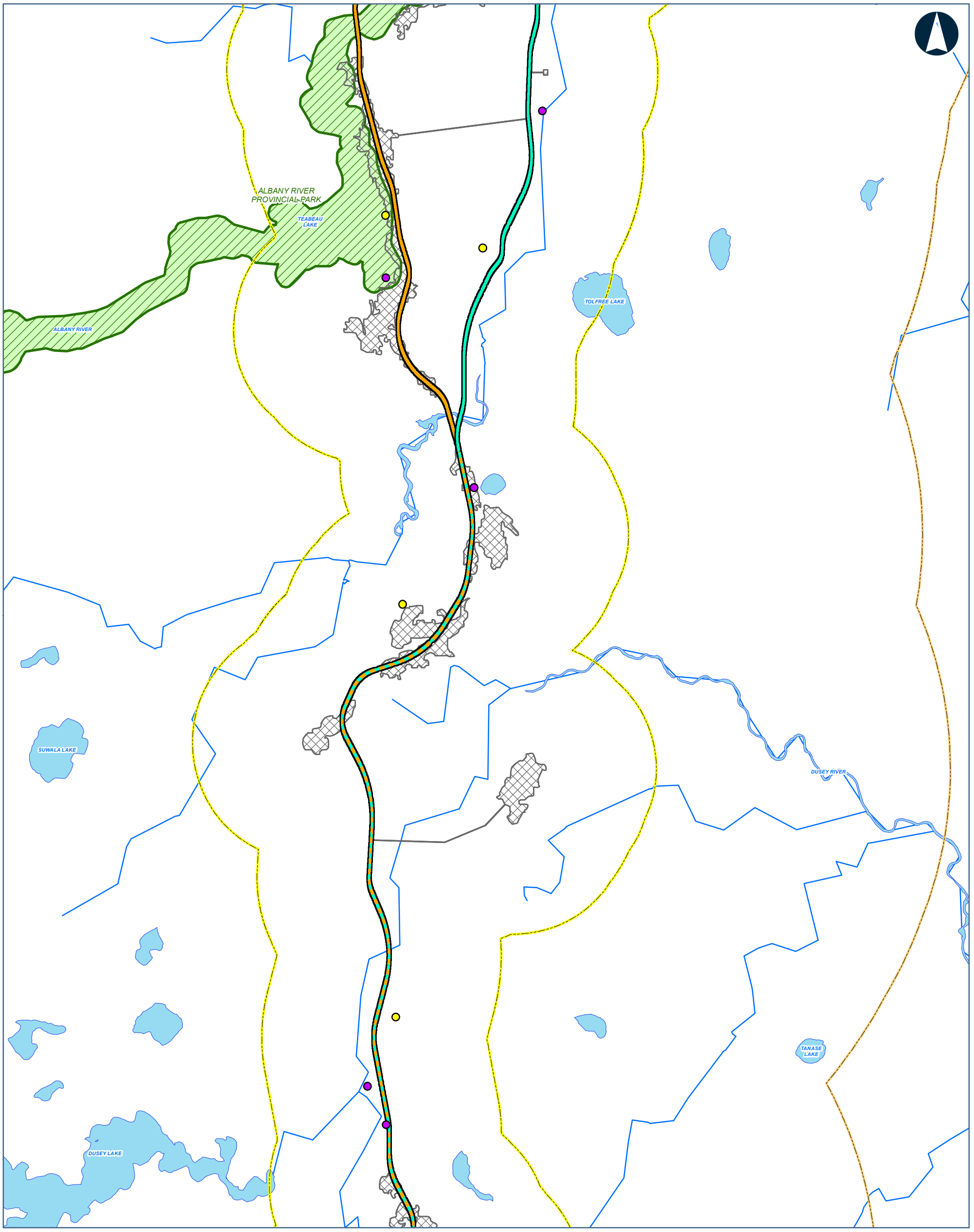

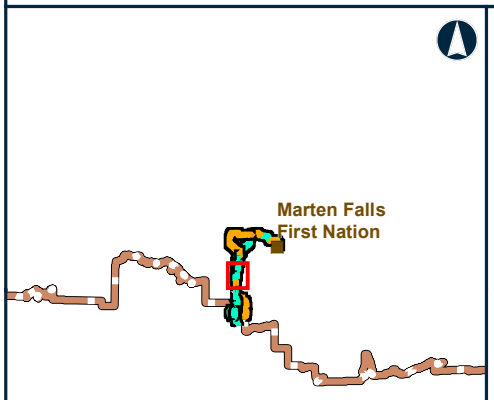

Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

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Figure 4-4.3

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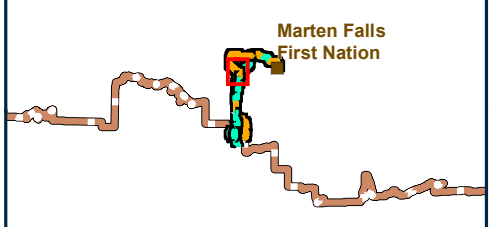
WABASSI RIVER
VENTON LAKE
MAXEY LAKE
TREBELL LAKE
ALBANY RIVER
SAARIMAKI LAKE
ALBANY RIVER PROVINCIAL PARK



Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

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Figure 4-4.4

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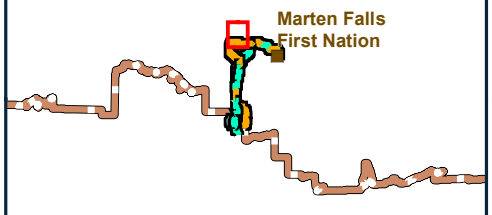
GARVEY LAKE

SLADE LAKE

MABIE LAKE

OXTOBY LAKE



Map Location

Legend

- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- WATERBODY
- WATERCOURSE
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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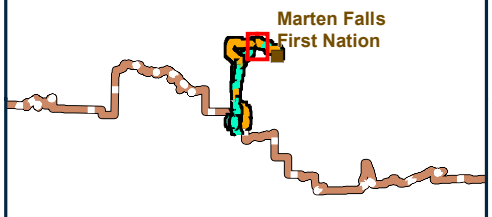
GURDEN LAKE

GITTINS LAKE

WABASSI RIVER

ALBANY RIVER

ALBANY RIVER
PROVINCIAL PARK



Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-4.6

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SEBERT LAKE

GURDEN LAKE

TIFFIN LAKE

ALBANY RIVER

Marten Falls First Nation

Map Location

Legend

- ALL-SEASON
- BREEDING

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1 AND ALTERNATIVE 4
- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Autonomous Recording Unit Plots Sampled in the Local Study Area, 2022

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-4.7

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Data Collection

Data were collected with autonomous recording units during the breeding bird season for most birds present in the Local Study Area from June 1 through July 10 (Northern Ontario Ecozone) or June 1 through July 17 (Hudson Bay Lowlands Ecozone). Autonomous recording units collected data each day during two periods (i.e., morning period and dusk / night period). To extend battery life and data storage space, rather than recording continuously, autonomous recording units were set to collect data every hour for three minutes during each period as described below.

- The morning period was from 30 minutes before local sunrise to 5 hours after sunrise (for diurnal species); and
- The dusk / night period was from 30 minutes before local sunset until 1 hour before sunrise (for crepuscular and nocturnal species).

A three-minute data segment was selected instead of a standardized ten-minute point count because shorter data segments allow new species to be detected more rapidly for the equivalent sampling effort (Bayne et al., 2017).

Acoustic files collected by autonomous recording units were randomly selected at each autonomous recording unit plot to acquire a total of 30 segments per plot spread out over the entire breeding period (15 in the morning period, and 15 in the dusk / night period). These 30 segments were analyzed at each of the 57 autonomous recording unit plots, for a total of 1,710 segments during the breeding season. Randomly selected acoustic files collected by autonomous recording units were analyzed by skilled interpreters familiar with bird communities in the region. For Quality Control / Quality Assurance purposes, interpreters listened to each track as many times as needed until they were confident in their identifications of each sound (i.e., calls, songs, non-vocal sounds such as woodpecker [Oji-Cree translation, *papaseh*] [*Picus*] species' drumming). When interpreters were uncertain about the identification of an individual sound, the segment was flagged and re-interpreted by another skilled observer. If a sound still could not be identified with confidence, it was noted as "unidentified", with an attempt to use the lowest taxonomical classification possible (e.g., unidentified warbler, unidentified bird). Acoustic files containing substantial environmental or other noise (e.g., wind, rain, anthropogenic noise) were excluded from the analysis.

Paired autonomous recording unit and breeding bird surveys were not completed for the Project. An attempt was made to determine correction factors using unpaired breeding bird surveys and autonomous recording unit data following methods in Van Wilgenburg et al. (2017). The only Valued Component that met the availability assumption was dark-eyed junco. Therefore, the decision was made to use breeding bird surveys and autonomous recording unit data for habitat models (**Attachment C – Birds Modelling Report**). For passerines, breeding bird survey data were used to determine habitat models. For boreal

owl, common nighthawk, and Wilson's snipe, more detections were made from autonomous recording units than breeding bird surveys. Therefore, models were determined using autonomous recording unit data (**Attachment C – Birds Modelling Report**).

4.2.3.2 Spring and Fall Migration

4.2.3.2.1 Objectives

The objective of autonomous recording unit surveys during spring and fall migration was to determine the presence, distribution, and abundance of birds, where possible, in the forest bird, raptors, and bog / fen and other wetlands birds Valued Component groups during the migration periods (spring and fall). Density was not determined because autonomous recording units are unlimited distance point counts, which make it problematic to estimate density (Yip et al., 2017).

4.2.3.2.2 Methods

Autonomous recording unit survey plot selection followed the study design described for breeding bird point count surveys in **Section 4.2.2.2**. Based on Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), autonomous recording units were deployed at approximately 40% of the proposed 150 breeding bird survey plots during the breeding season (i.e., 60 plots). A subset of these plots (approximately 50% or 30 plots) was selected to record during the spring and fall migration periods (**Figure 4-3**). Plots were selected based on spatial coverage as well as to emphasize potential migration corridors along watercourses and ridges (including eskers). Due to equipment failure, reliable data were only collected at 29 of the originally selected 30 plots during spring migration and 27 of the originally selected 30 plots during fall migration.

Autonomous recording units were programmed to record data one hour before local sunrise, until five hours after sunrise, during spring migration from April 15 through May 31 and fall migration from August 1 through September 30.

Acoustic files collected by autonomous recording units were randomly selected at each autonomous recording unit plot to get a total of 35 segments per plot spread out over the spring migration period (15 in the morning period, and 20 in the dusk / night period). These 35 segments were analyzed at each of the 29 autonomous recording unit plots operational during the spring, for a total of 1,015 segments during the spring migration period. A total of 20 segments per plot (all during the morning period) were randomly selected over the fall migration period. These 20 segments were analyzed at each of the 27 autonomous recording unit plots operational during the fall, for a total of 540 segments during the fall migration period.

Randomly selected acoustic files collected by autonomous recording units were analyzed by skilled interpreters and followed the Quality Control / Quality Assurance as described in **Section 4.2.3.1.2**.

4.2.3.3 Winter

4.2.3.3.1 Objectives

The objective of the autonomous recording unit surveys was to determine the presence, distribution, and abundance of birds in the forest bird, raptors, and bog / fen and other wetlands birds Valued Components groups by season and among years. Density was not determined because autonomous recording units are unlimited distance point counts which make it problematic to estimate density (Yip et al., 2017).

4.2.3.3.2 Methods

Autonomous recording unit survey plot selection followed the study design described for breeding bird point count surveys in **Section 4.2.2.2**. Based on Section 8.9 of the *Tailored Impact Statement Guidelines* (Impact Assessment Agency of Canada, 2020), autonomous recording units were deployed at approximately 40% of the proposed 150 breeding bird survey plots during the breeding season (i.e., 60 plots). A subset of these plots (approximately 50% or 30 plots) were selected to record during the early winter period (**Figure 4-3**). The same plots were selected for winter surveys as were selected during spring and fall migration.

Autonomous recording units were programmed to record data one hour before local sunrise, until five hours after sunrise, from December 1, 2022, until January 10, 2023 (i.e., early 2023 or “winter”). Winter sampling was limited due to autonomous recording unit constraints related to temperature extremes and due to logistics, including access and snow conditions. Due to equipment failure, reliable data were only collected at 21 of the originally selected 30 plots.

Acoustic files collected by autonomous recording units were randomly selected at each autonomous recording unit plot, to get a total of 15 segments per plot spread out over the winter period (all in the morning period). These 15 segments were analyzed at each of the 21 autonomous recording unit plots, for a total of 315 segments during the winter season. Randomly selected acoustic files collected by autonomous recording units were analyzed by skilled interpreters and followed the Quality Control / Quality Assurance as described in **Section 4.2.3.1.2**.

4.2.4 Species at Risk Autonomous Recording Unit Surveys

4.2.4.1 Objectives

Although the larger bird autonomous recording unit program (**Section 4.2.3**) was used to collect data for most of the bird Valued Components, additional targeted plots were established to monitor for four specific species at risk: common nighthawk, eastern whip-poor-will (Oji-Cree translation, *gaamajaachimoch binechinch*) (*Caprimulgus vociferous*), short-eared owl (Oji-Cree translation, *gaayaagaachitawaagech kookookohoo*) (*Asio flammeus*), and yellow rail (Oji-Cree translation, *egaawiikaa gaanagosich binechiinch*) (*Coturnicops noveboracensis*). These species are crepuscular and / or nocturnal, requiring surveys at dusk or during the night, so in-person surveys were not completed due to access and safety concerns.

4.2.4.2 Methods

Additional autonomous recording unit survey locations for targeted species at risk were determined based on a screening of habitat suitability in the Local Study Area. Habitat suitability was determined based on a desktop review, helicopter reconnaissance, and WSP Canada Inc.'s experience in the Local Study Area. Additional autonomous recording units were installed in areas where suitable habitat was identified that was not already sampled by the existing autonomous recording unit program. A total of 13 autonomous recording units were deployed for targeted species at risk (**Figure 4-5; Table 4-2**).

Data collection was partially based on the following protocols:

- *Eastern Whip-poor-will and Common Nighthawk (Chordeiles minor) Survey Protocol* (MNRF, 2013);
- *Draft Survey Protocol for Eastern Whip-poor-will (Caprimulgus vociferous) in Ontario* (MNRF, 2014b);
- Nocturnal owl surveys in northern Ontario (Bird Studies Canada, 2002); and
- Marsh Monitoring Program (Birds Canada, 2023b).

The survey effort for each species was determined following detection probability calculations as described in the Birds Study Plan. Autonomous recording unit data were analyzed from species-specific time periods with the highest detection probability based on published literature. Sampling effort per autonomous recording unit for the selected species at risk is found in **Table 4-2**.

Table 4-2: Sampling Effort per Autonomous Recording Unit for Select Species at Risk

Species	Survey Window	Number of Autonomous Recording Unit Sampling Plots	Number of Data Segments per Plot	Segment Length (minutes)	Total Minutes of Sampling Effort	Time of Survey
Common nighthawk	May 23 – July 7	8	10	3	240	Sunset to one hour after sunset
Eastern whip-poor-will	May 23 – July 7	8	8	3	192	Sunset to one hour after sunset
Short-eared owl	May 15 – July 15	1	15	3	45	One hour before sunset to one hour after sunset
Yellow rail	May 20 – July 5	5	5	3	75	Midnight to 4 a.m.

a.m. = before noon.

Common Nighthawk

Eight autonomous recording units were placed in suitable common nighthawk habitat (i.e., open woodlands or openings in forests) (**Figure 4-5**); locations were the same as those sampled in 2019 (Golder, 2019). Autonomous recording unit data segments (three minutes) to be reviewed were randomly selected from the last week of May to the first week of July for a total of ten segments per plot (**Table 4-2**). Data segments were selected with no audible precipitation, and calm or light winds.

Eastern Whip-poor-will

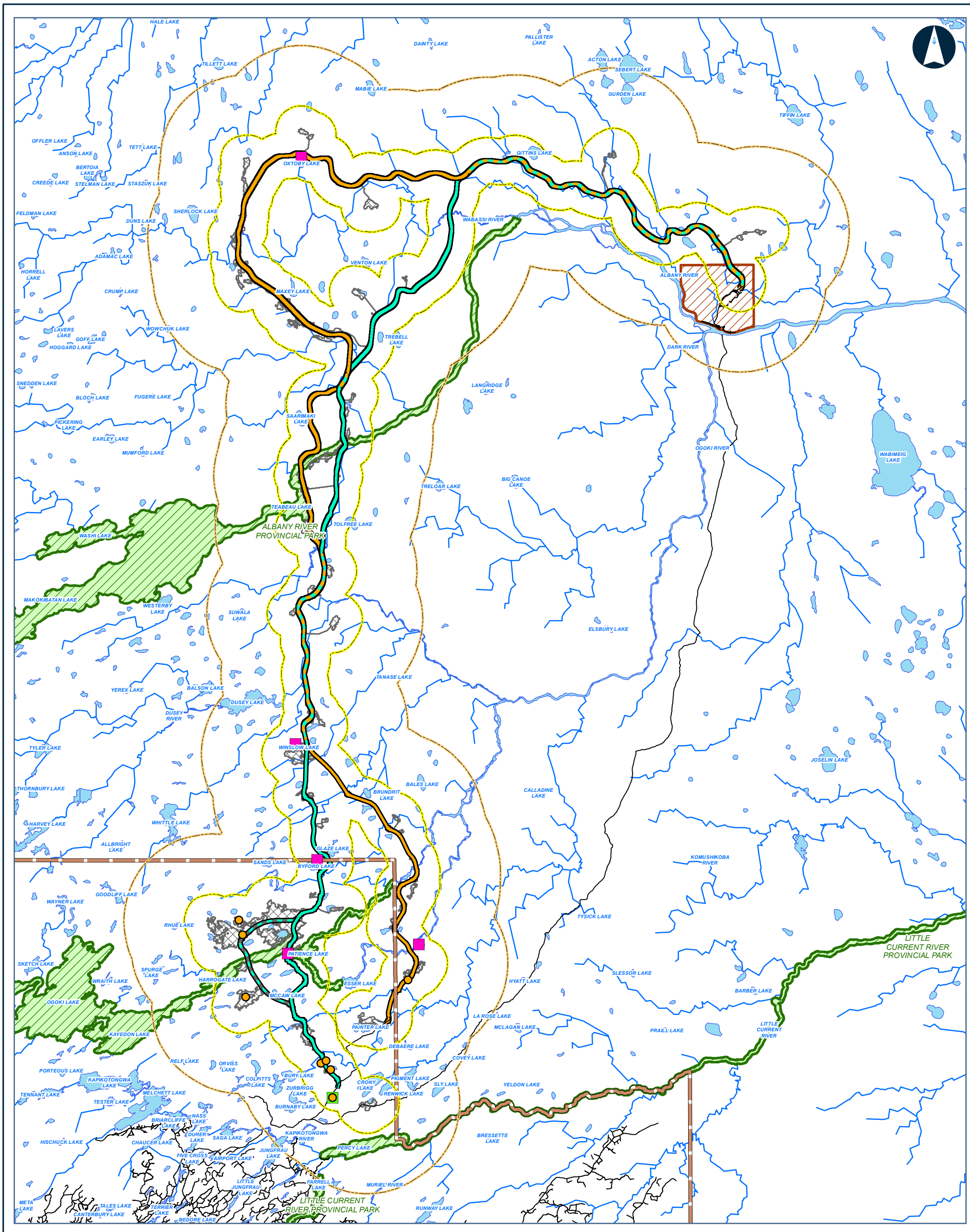
Eight autonomous recording units were placed in suitable eastern whip-poor-will habitat (i.e., open woodlands or openings in forests) (**Figure 4-5**); locations were the same as those sampled in 2019 (Golder, 2019). Efforts were made to randomly select data segments from the last week of May to the first week of July when the moon (greater than 50% illuminated) was above the horizon and the sky was clear or partly cloudy to maximize chances of detecting calling individuals (Cink et al., 2017). Eight, 3-minute segments per plot were reviewed for this species (**Table 4-2**). Data segments were pre-selected with no audible precipitation, and calm or light winds.

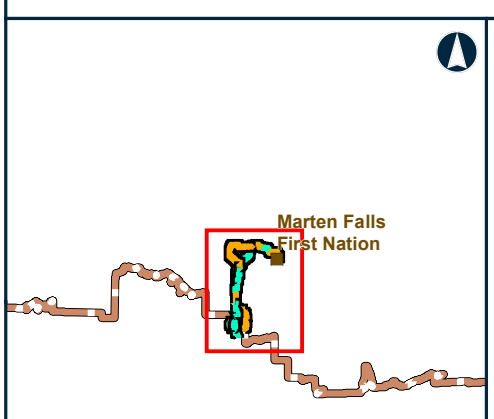
Short-eared Owl

One targeted autonomous recording units was placed in an open area in the Local Study Area where short-eared owls were likely to vocalize or produce “wing-claps” during courtship displays over the nest territory (Holt, 1992). (**Figure 4-5**; **Table 4-2**). Autonomous recording unit data segments were randomly selected from one hour before sunset to 30 minutes after sunset from May 15 to June 15 (10 weeks) with no audible precipitation and calm to light winds. Fifteen, 3-minute segments per plot were selected for this species.

Yellow Rail

Five autonomous recording units were placed in suitable yellow rail habitat such as graminoid fens, herbaceous bogs, and river and stream floodplains (COSEWIC, 2009) (**Figure 4-5**). Autonomous recording unit data segments were randomly selected from the breeding season from May 20 to July 5 with no audible precipitation and calm to light winds. Five, 3-minute segments were randomly selected from midnight to 4 a.m. (**Table 4-2**).





Legend

- COMMON NIGHTHAWK / EASTERN WHIP-POOR-WILL
- SHORT-EARED OWL
- YELLOW RAIL

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Targeted Species at Risk Autonomous Recording Unit Plots Established in the Local Study Area, 2022

0 5 10 20
Kilometres

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Figure 4-5

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4.2.5 Marshbird Call Playback Surveys

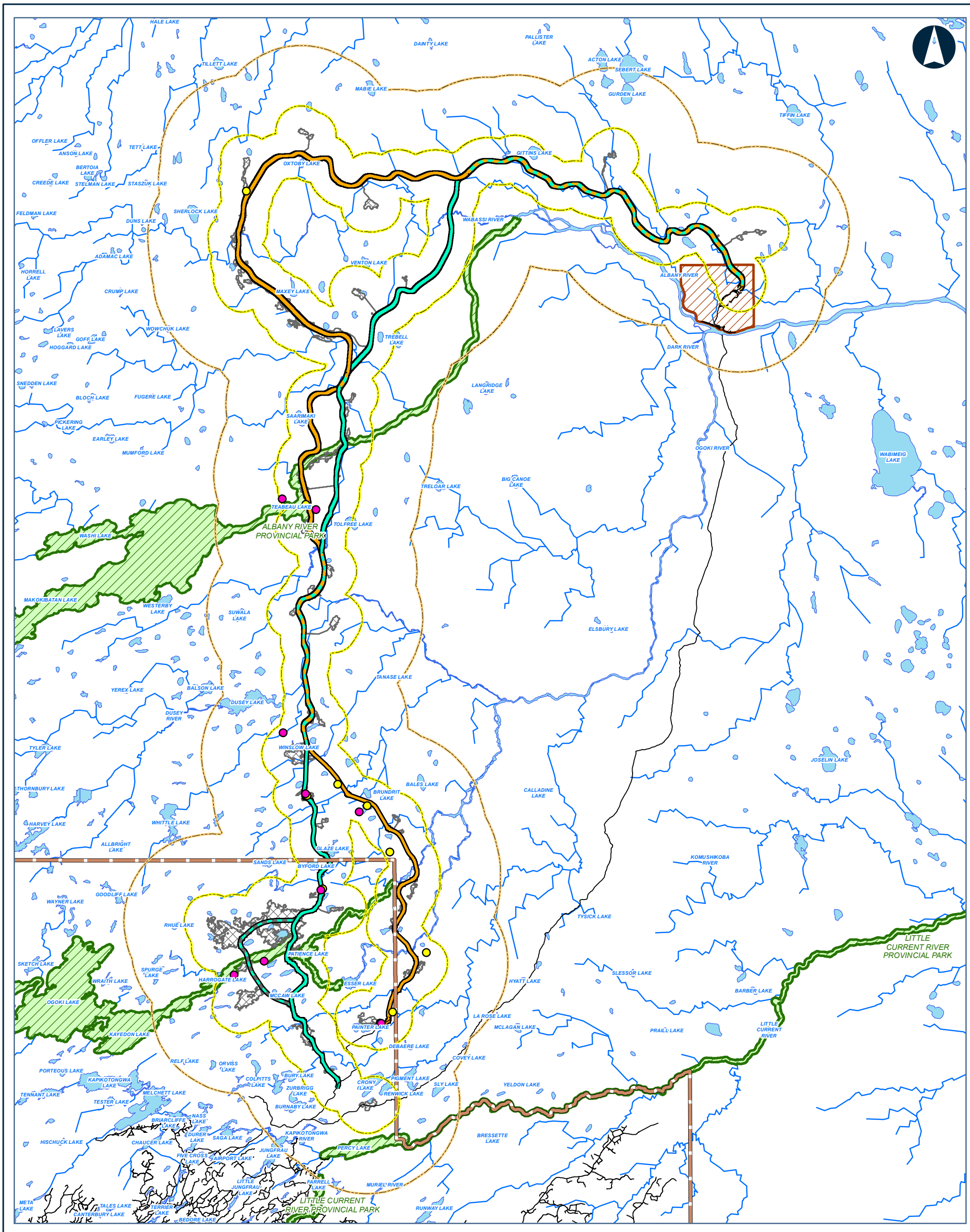
4.2.5.1 Objectives

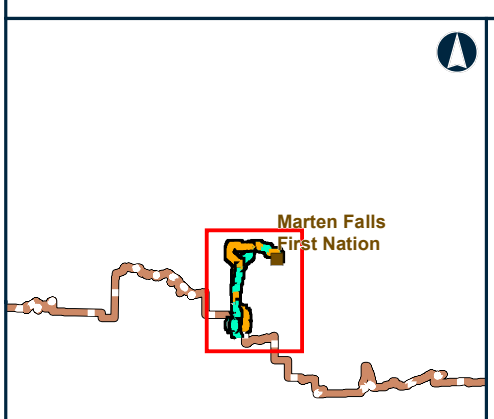
Playback surveys primarily targeting marshbird Valued Components in the bog / fen and other wetland birds group were conducted in 2018 and 2022. The objective of playback surveys was to determine the presence, distribution, abundance, and density of breeding marshbirds.

4.2.5.2 Methods

Marsh ecosites comprise 2.0% of the Local Study Area, which represents 2.9% of wetland ecosystems. A total of ten marshbird call playback survey plots sampled by Zoetica (2018a) were within the Local Study Area (**Figure 4-6**). In 2022, additional survey plots were established at marshes identified through a desktop review in the Local Study Area, for an addition of nine plots (**Figure 4-6**). Of the plots surveyed in 2018 and 2022, three were located within 1 km of each other ranging in distance from 160 to 320 m apart.

Surveys were conducted during the breeding season (May 20 – July 5; Bird Studies Canada, 2000). In 2018, surveys were completed between June 8 and July 3. A single survey plot was visited twice. In 2022, surveys were conducted once during the breeding season between June 8 and 14. Surveys were conducted at each identified plot in accordance with the Marsh Monitoring Program (Bird Studies Canada, 2003). Each survey included a 5-minute sequence alternating between 30 seconds of broadcasted call and 30 seconds of silence for each of the targeted species (i.e., yellow rail, sora [*Porzana Carolina*], Virginia rail [*Rallus limicola*], American bittern [*Botaurus lentiginosus*] and pied-billed grebe [*Podilymbus podiceps*]) to elicit calls from these typically elusive marshbird species (Bird Studies Canada, 2000). Surveys were completed with little or no precipitation and during calm winds or wind less than 28 km per hour. In addition to marshbird call playback surveys, incidental breeding bird point count data, and autonomous recording unit breeding data were screened for secretive marshbirds when within or near suitable habitat.





Legend

- MARSH BIRD CALL PLAYBACK (2018)
- MARSH BIRD CALL PLAYBACK (2022)

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Marsh Bird Call Playback Surveys Completed in the Project Study Area, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-6

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4.2.6 Aerial Surveys

4.2.6.1 Waterfowl, Waterbird, and Shorebird Breeding

4.2.6.1.1 Objectives

Aerial surveys were conducted by helicopter to target waterfowl, waterbirds, shorebirds, and some wetland birds in the Local Study Area. Waterfowl are ducks, geese (*Branta* species, Nikah), and swans. Waterbirds include species that require open water habitat for nesting such as loons, grebes, coots (*Fulica* species), herons, and gulls (*Larus* species). Shorebirds include species that forage in shoreline areas such as sandpipers and plovers. The objective of the breeding aerial surveys was to estimate breeding distribution, abundance, and density of waterfowl, waterbirds, and shorebirds, where possible.

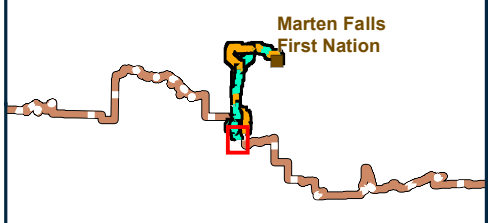
4.2.6.1.2 Methods

Prior to field work, a desktop review of aerial imagery was used to identify areas of suitable open habitats (e.g., wetlands and lakes) where waterfowl, waterbirds, and shorebirds could establish breeding sites. These areas of suitable habitat were targeted during surveys; however, given the extensive wetland and waterbody features in the Local Study Area, surveys were flown across the entire Local Study Area to sample all potentially suitable habitat present.

Breeding aerial surveys were conducted in the Local Study Area over two survey rounds in 2022 (June 12, and June 23 to 28). The Local Study Area was divided into flight paths and each path was offset from the centreline of the Project Development Area, taking care not to overlap with other flight paths, where possible. When larger waterbodies were encountered, such as lakes and large open areas of the Albany and Ogoki rivers, the shoreline perimeter of the watercourse or waterbody was surveyed (**Figure 4-7**).

The surveys focused on identifying breeding pairs / broods and incubating adults of conspicuous waterfowl species such as geese; however, an attempt was made to fly at a low enough altitude to allow for identification of waterbirds and shorebirds, when possible. Survey paths were flown as consistently as possible with respect to altitude, time of day, and flight speed and were all completed during suitable weather conditions (i.e., little to no precipitation and wind speeds less than four on the Beaufort Scale). Flight altitude was as low as safely possible, ranging on average, between 30 and 60 m above ground level, allowing for better visibility of waterfowl, waterbirds, and shorebirds. All waterfowl, waterbirds, shorebirds, and other birds encountered were identified, where possible, and enumerated. Any broods encountered were also enumerated. Conspicuous waterfowl nests, if encountered, were identified, if possible, and a waypoint was recorded with a GPS.

HARROGATE LAKE
MCCAW LAKE
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
OGOKI RIVER
ESSER LAKE
PAINTER LAKE
DEBAERE LAKE
ORVISS LAKE
COLPITTS LAKE
BURY LAKE
PIGMENT LAKE
CRONY LAKE
RENWICK LAKE
ZURBRIGG LAKE
BURNABY LAKE
SAGA LAKE
KAPIKOTONGWA RIVER
LITTLE CURRENT RIVER PROVINCIAL PARK
PERCY LAKE
LITTLE CURRENT RIVER
JUNGFRAU LAKE
LITTLE JUNGFRAU LAKE
FARRELL LAKE
LITTLE CURRENT RIVER PROVINCIAL PARK
MURIEL RIVER
RUNWAY LAKE



Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION

- ROAD
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 2.25 4.5
Kilometres

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Figure 4-7.1

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DUSEY LAKE
WINSLOW LAKE
BALES LAKE
BRUNDRIT LAKE
GLAZE LAKE
SANDS LAKE
BYFORD LAKE
OGOKI RIVER PROVINCIAL PARK (WATERWAY CLASS)
PATIENCE LAKE
OGOKI RIVER

Marten Falls First Nation

Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- WATERBODY
- WATERCOURSE
- FAR NORTH BOUNDARY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-7.2

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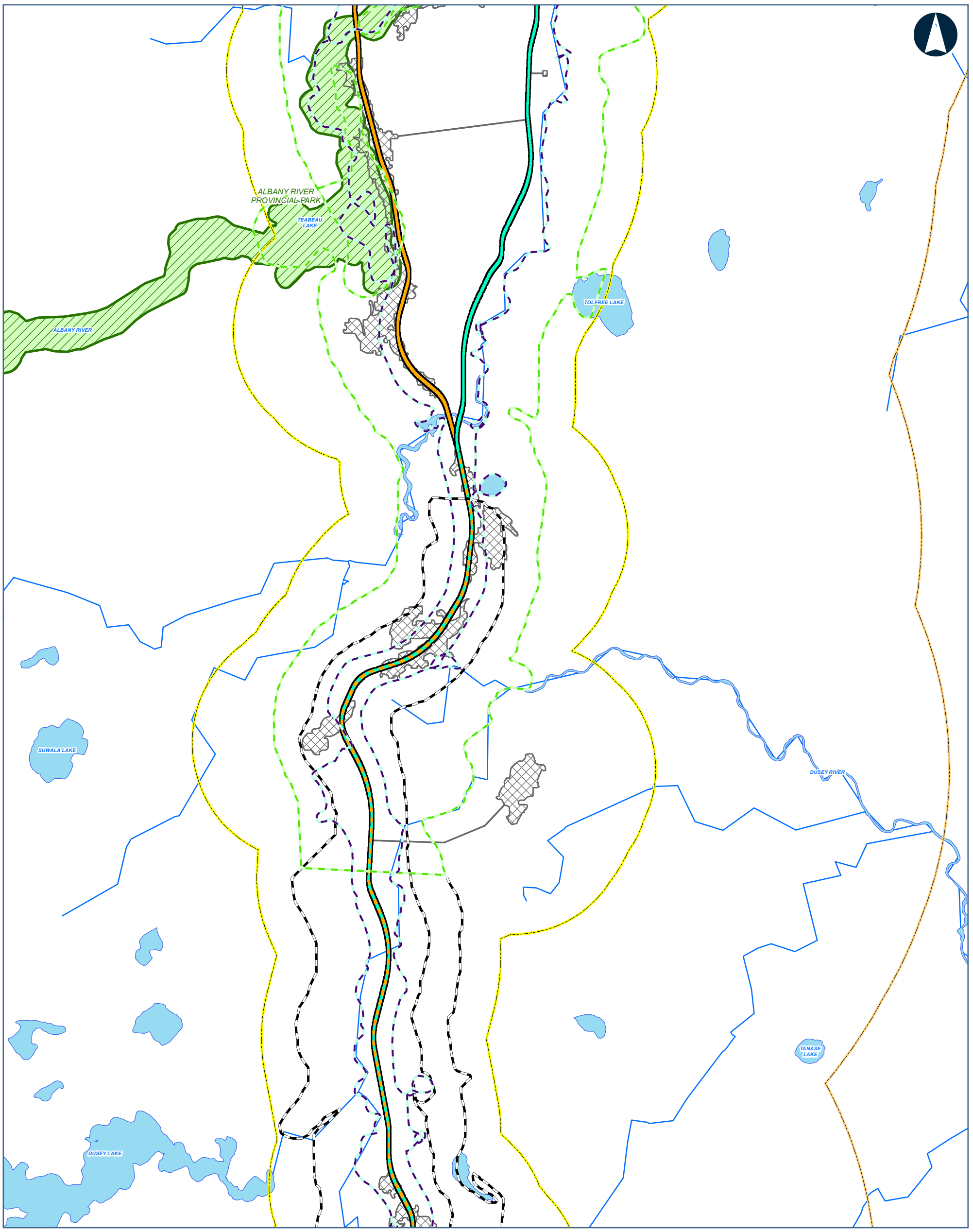

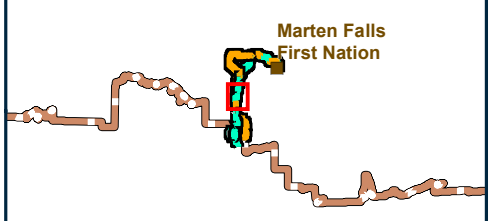

Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-7.3

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WABASSI RIVER

VENTON LAKE

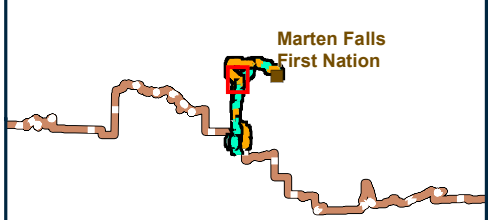
MAXEY LAKE

TREBELL LAKE

ALBANY RIVER

SAARIMAKI LAKE

ALBANY RIVER PROVINCIAL PARK



Map Location

Legend

BROOD SURVEY FLIGHT PATHS

- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 — 2.25 — 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-7.4

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GARVEY LAKE

SLADE LAKE

MABIE LAKE

OXTOBY LAKE

Marten Falls First Nation

Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- WATERBODY
- WATERCOURSE
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-7.5

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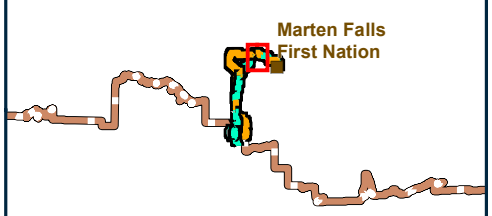
GURDEN LAKE

GITTINS LAKE

WABASSI RIVER

ALBANY RIVER

ALBANY RIVER
PROVINCIAL PARK



Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- WATERBODY
- WATERCOURSE
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

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Kilometres

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Figure 4-7.6

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SEBERT LAKE

GURDEN LAKE

TIFFIN LAKE

ALBANY RIVER

Marten Falls First Nation

Map Location

Legend

BROOD SURVEY FLIGHT PATHS
- JUNE 11, 2022
- JUNE 12, 2022
- JUNE 23, 2022
- JUNE 24, 2022
- JUNE 27, 2022
- JUNE 28, 2022

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1 AND ALTERNATIVE 4

- ROAD
- WATERBODY
- WATERCOURSE
- FIRST NATION COMMUNITY
- PROPOSED DEVELOPMENT AREA - 100M
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl Breeding Aerial Surveys Completed in the Local Study Area, 2022

0 2.25 4.5
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-7.7

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4.2.6.2 Waterfowl, Waterbird, and Shorebird Spring and Fall Migration

4.2.6.2.1 Objectives

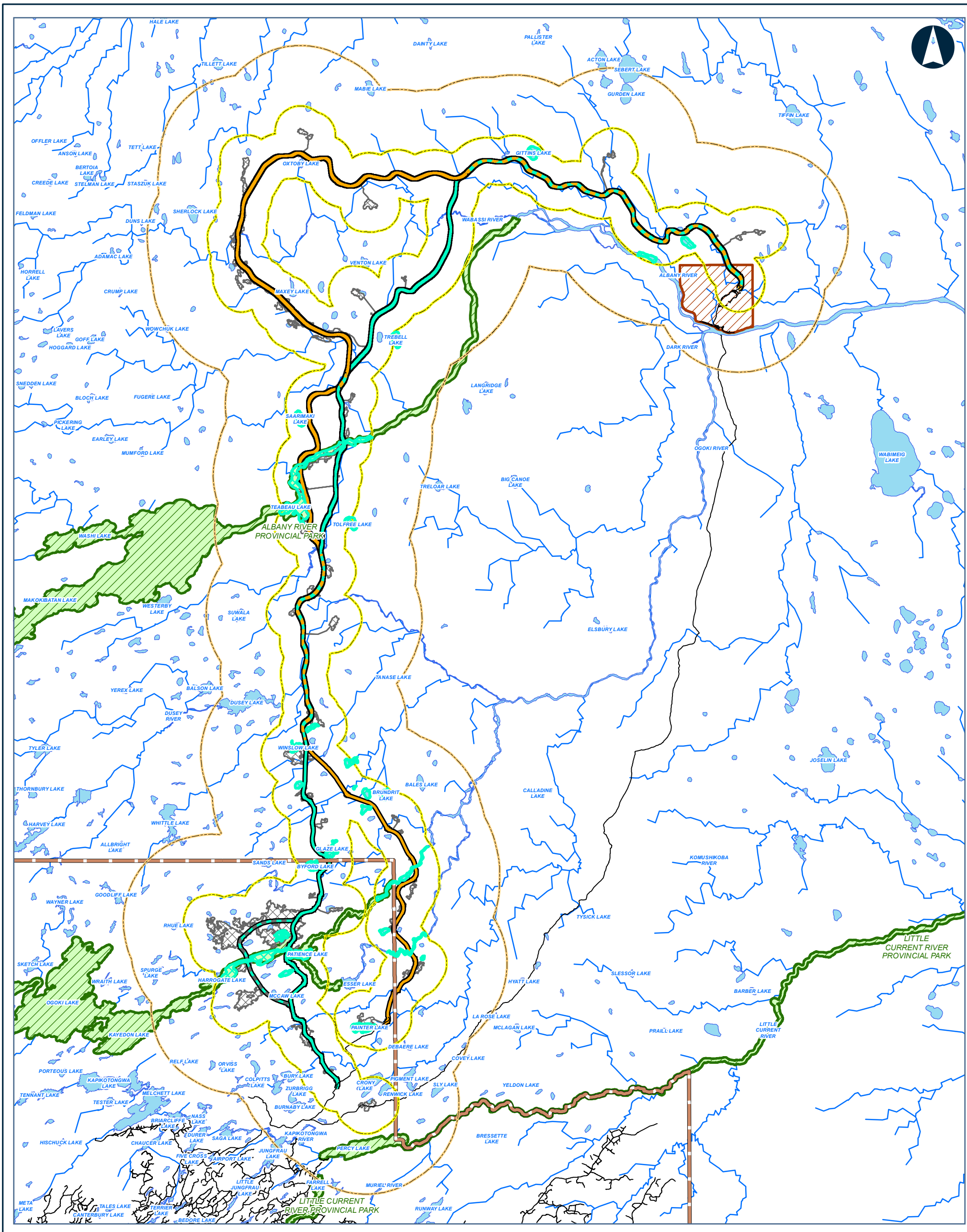
Aerial surveys were conducted in the Local Study Area to determine the presence, distribution, and abundance of waterfowl, waterbirds, and shorebirds, where possible, during the spring and fall migration periods. These data were used to identify potential stopover features for waterfowl, waterbirds, and shorebirds in the Local Study Area.

4.2.6.2.2 Methods

A desktop review of aerial imagery, as well as information from past helicopter reconnaissance flights, identified areas of suitable open habitats where waterfowl, waterbirds, and shorebirds may occur during migration, with a focus on larger lakes and wider reaches of the Albany and Ogoki rivers.

Aerial surveys using helicopters were conducted in the Local Study Area during one visit in May 2022 and two visits in September 2022. An additional survey was planned for early May 2022; however, it could not be completed due to late ice-out conditions. **Figure 4-8** illustrates where migratory aerial surveys were completed in 2022.

Targeted waterbodies were examined by circling the perimeter, counting the number of individual waterfowl, waterbirds, and shorebirds, identified to lowest taxonomic level possible. Surveys were as consistent as possible with respect to altitude, time of day, flight speed, and other flight parameters, and conducted during calm weather conditions (little to no precipitation and wind speeds less than four on the Beaufort Scale). Flight altitude was as low as safely possible, ranging on average, between 30 and 60 m above ground level, allowing for better visibility of waterfowl, waterbirds, and shorebirds. All waterfowl, shorebirds, waterbirds, and other birds encountered were identified, where possible, and enumerated.



MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl, Waterbird, and Shorebird Migration Stopover Aerial Surveys Completed in the Project Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 4-8

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4.2.6.3 Raptor Stick Nest

4.2.6.3.1 Objectives

The objective of raptor surveys was to estimate breeding distribution, abundance, and density of raptors, where possible, and to identify any conspicuous active stick nests.

4.2.6.3.2 Methods

Zoetica conducted aerial surveys to identify stick nests during the late winter of 2018 with confirmation of nest activity during the spring and summer of 2018 (Zoetica, 2018b). Effort was made to identify raptor stick nests during all WSP Canada Inc. wildlife field programs completed in the winter of 2021 / 2022 and spring of 2022 that had a helicopter component (i.e., waterfowl aerial migration surveys, wolverine [Oji-Cree translation, *wishkobish* (*Gulo gulo*)] hair snagging surveys and rebaits, ungulate aerial surveys, and wildlife camera set up / take down). In 2022, stick nest activity status (active or inactive) was noted and waypoints were taken to allow for a revisit of nests.

All stick nests identified in 2018, and inactive nests identified in winter 2021 / 2022 and spring 2022 were revisited and verified during breeding waterfowl aerial surveys in June 2022. Only inactive nests identified in the winter 2021 / 2022 or spring 2022 were revisited in June 2022 to minimize disturbance to nest occupants at active nests. Information on bird species, tree species where the nest was located, ecosite and adjacent habitat, presence of eggs or young, and behaviour of adults was collected at all active nests. Photographs were taken if possible without excessive harassment of the occupants. If stick nests were already occupied / active during spring aerial waterfowl migration surveys in May 2022, then they were not visited again in June to minimize disturbance.

Raptor species observed incidentally during other bird surveys were recorded along with their spatial coordinates and habitat associations.

4.2.7 Other Species at Risk Surveys

4.2.7.1 Objectives

Species-specific surveys were conducted for breeding bird species at risk not always well captured by the other methods applied in this study. The objective of species-specific surveys was to determine the presence, distribution, abundance, and density of breeding bird species at risk, and their habitats, where possible.

4.2.7.2 Methods

Surveys were conducted for barn swallow (Oji-Cree translation, *gaanawachwebamaach manichooshan binechiinch*) (*Hirundo rustica*), bank swallow (Oji-Cree translation, *gaa'osaaw bebeshi aakiganech binechiinchechench*) (*Riparia riparia*), chimney swift (Oji-Cree translation, *gondaaganaabikoong gaadashiiyayaach binechiinch*) (*Chaetura pelagica*), and peregrine falcon habitat during all aerial surveys in the Local Study Area. Initially, potential nesting habitat was screened through desktop review of aerial imagery and Lidar, and during helicopter reconnaissance. Any habitat identified as having the potential to support species at risk nests, were surveyed during waterfowl, waterbird, and shorebird breeding, and spring migration aerial surveys in the Local Study Area in May and June 2022. Habitats searched for included vertical riverbanks and bluffs (bank swallow), buildings and other anthropogenic structures (barn swallow), cliffs (peregrine falcon), and large hollow trees and tree cavities (chimney swift).

After reviewing all potential habitat locations, it was determined that suitable nesting habitat for bank swallow, barn swallow, and peregrine falcon did not occur in the Local Study Area. Although some potentially suitable cavity trees for chimney swift occur in some portions of the Local Study Area (e.g., areas of larger trees along rivers and lakes), it was determined through desktop review that this species is well outside its range within the Local Study Area and Regional Study Area. Results from all diurnal breeding bird surveys in the Local Study Area, including some targeted chimney swift surveys for the drilling program, supported this conclusion. Therefore, follow up surveys for these four species, were not completed.

4.2.8 Incidental Observations

Incidental observations of all birds, particularly raptors and species at risk, were recorded during all wildlife field programs. Incidental observations include records of birds flying over or flying through breeding bird point count plots and detections of bird species at risk that were made on autonomous recording units outside of the applicable timing windows for these species (**Table 4-2**).

4.3 Data Management and Analysis

Data management, including quality assurance and quality control was employed for all field investigations to minimize potential for data entry and analysis errors, prepare datasets for analysis, and limit sensitive data distribution in accordance with established agreements.

4.4 Deviations from Study Plan

Indigenous Knowledge and information on Indigenous land and resource use and cultural values were not available at the time the bird field programs were designed and implemented. Indigenous Knowledge and Indigenous land and resource use that has since become available is being considered in combination with the data collected from the baseline field investigations in the *Birds Technical Support Document: Existing Conditions & Effects Assessment Report* (WSP, 2026), as part of the *Environmental Assessment / Impact Statement Report*. A comprehensive overview of deviations from the study plan are provided in the *Birds Technical Support Document: Existing Conditions & Effects Assessment* (WSP, 2026).

5. Results

Results of the desktop review and field surveys are presented below. Results are organized by Valued Component, as defined in **Section 2 – Study Objectives**. Each section presents information on the Valued Component group: specific information on the proxy Valued Components identified for each of the broader Valued Component categories are found in **Section 6 – Summary of Proxy Valued Component Observations**.

5.1 Forest Birds

5.1.1 Desktop Review

There is potential for 65 forest bird species to occur in the study areas (**Annex A – Bird Species List**). The Project Regional Study Area overlaps two Bird Conservation Regions: Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield. Each Bird Conservation Region has a Conservation Plan that lists priority bird species (Environment Canada, 2013, 2014). A combined 32 species of forest birds that are identified as priority species in Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield could occur in the Project study areas (**Annex A**); of these, 26 species are songbirds, 3 species are woodpeckers and allies, 2 species are grouse, and 1 species is a corvid (Environment Canada, 2013, 2014). Five forest bird species that are listed under Schedule 1 of the *Species at Risk Act* have the potential to occur in the birds Regional Study Area: Canada warbler (Oji-Cree translation, *gaamakatew bebeshisich binechiinch*) (*Cardellina canadensis*), eastern wood-pewee (Oji-Cree translation, *gaagigiweshkitwech binechiinch*) (*Contopus virens*), evening grosbeak (Oji-Cree translation, *gaa'onaagoshi nigamoch binechiinch*) (*Coccothraustus vespertinus*), olive-sided flycatcher (Oji-Cree translation, *gaagweshkoshiich binechiinch*) (*Contopus cooperi*), and wood thrush (*Hylocichla mustelina*) (Government of Canada, 2023a). All five of these species are also listed under Ontario's *Endangered Species Act* (Government of Ontario, 2023a).

Two Ontario Breeding Bird Atlas survey blocks that overlap with or are close to the birds Regional Study Area (Blocks 16EB and Block 16EC) were surveyed during the first or second Ontario Breeding Bird Atlases (1981-1985 and 2001-2005, respectively) (Federation of Ontario Naturalists, 1987; Bird Studies Canada, 2007). There were 49 forest bird species detected during the Ontario Breeding Bird Atlas surveys; this includes 5 Bird Conservation Region priority species (Birds Canada, 2023a). The forest bird species recorded at the highest relative abundance during Ontario Breeding Bird Atlas surveys were ruby-crowned kinglet (*Corthylio calendula*), white-throated sparrow (*Zonotrichia albicollis*), Swainson's thrush (*Catharus ustulatus*), and yellow-rumped warbler (*Setophaga coronata*), though several species were recorded with no associated

abundance value (Birds Canada, 2023a). Olive-sided flycatcher was the only forest bird species at risk detected during Ontario Breeding Bird Atlas surveys; this species was detected in Block 16EB and in Block 16EC (Birds Canada, 2023a).

A review of the eBird observation database indicated that both Canada warbler and olive-sided flycatcher have been historically observed in the Regional Study Area; however, no records of evening grosbeak, wood thrush, or eastern wood-pewee have been recorded (eBird, 2023). Additional desktop resources (see **Section 4.1** for comprehensive list) were reviewed for bird observations within the Regional Study Area; however, these other databases contained no survey plots that overlapped with the Regional Study Area or the surrounding area.

5.1.2 Field Survey Results

Across all field surveys completed from 2018 to 2022 (**Figure 5-1**), there were 64 species of forest birds observed (**Annex A**). The 64 forest bird species included 52 songbird species, 2 grouse species, 7 species of woodpeckers and allies, 1 hummingbird species, and 2 corvid species. The total number of forest bird species observed by survey method are provided below:

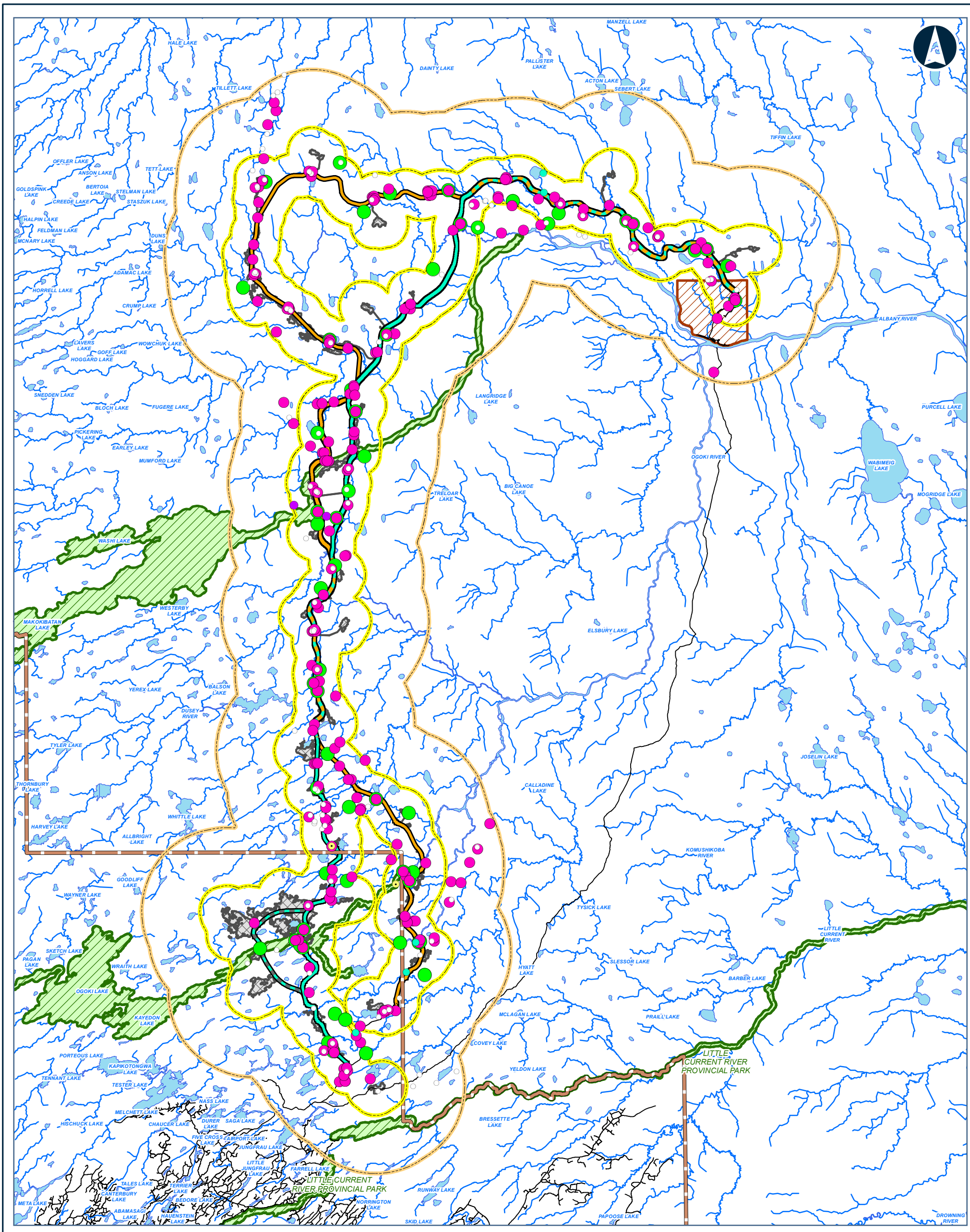
- Breeding Bird Point Count Surveys: 59 species;
- Bird Autonomous Recording Unit Surveys: 61 species;
- Targeted Autonomous Recording Unit Surveys for Species at Risk: 0 species; and
- Incidental Observations: 39 species.

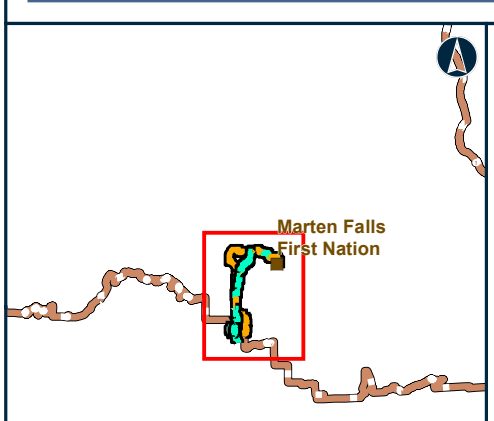
Out of the 64 forest bird species observed across all survey types, 6 species were observed only in the Local Study Area: bohemian waxwing (*Bombycilla garrulus*), black-throated green warbler (*Setophaga virens*), eastern kingbird (*Tyrannus tyrannus*), rose-breasted grosbeak (*Pheucticus ludovicianus*), ruby-throated hummingbird (*Archilochus colubris*), and wood thrush; an unidentified woodpecker (black-backed woodpecker [*Picoides arcticus*] or American three-toed woodpecker [*Picoides tridactylus*]) was also detected only in the Local Study Area. Red crossbill (*Loxia curvirostra*) was observed exclusively in the Project Development Area. No species were detected exclusively in the Regional Study Area.

Four forest bird species at risk were observed during field surveys: Canada warbler, eastern wood-pewee, olive-sided flycatcher, and wood thrush (**Annex A**). A total of 31 Bird Conservation Region priority forest bird species were identified as part of field surveys in the Project study areas from 2018 to 2022 (**Annex A**).

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Forest Birds During Field Surveys in the Project Study Areas, 2018 to 2022





Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT
- FOREST BIRD PRESENT
- FOREST BIRD

BREEDING BIRD POINT COUNT
- FOREST BIRD PRESENT
- FOREST BIRD

MARSH MONITORING PROGRAM
- FOREST BIRD PRESENT

INCIDENTAL
- FOREST BIRD PRESENT

COMMUNITY ACCESS ROAD ALTERNATIVES
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- BIRDS RSA

Notes:
None

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0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-1

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_1_GIS_ForestBirds_Observations_2018to2022.mxd
Date Saved: 11/25/2024 7:37:34 AM User Name: gld_rduval

5.1.2.1 Breeding Bird Point Count Surveys

A total of 59 forest bird species were recorded during point count surveys across all survey years and seasons (**Table 5-1**). Out of the 59 total forest birds detected during point counts, 3 species are classified as species at risk: Canada warbler, eastern wood-peewee, and olive-sided flycatcher. All species detected during point count surveys were also detected during bird autonomous recording unit surveys. Point count observers detected 45 species at plots established within the Project Development Area, 58 species at plots within the Local Study Area, and 35 species in the Regional Study Area (**Table 5-1**).

The forest bird species with the highest total observations recorded during point count surveys from 2018 to 2022 were white-throated sparrow (338 total observations), ruby-crowned kinglet (284 total observations), and hermit thrush (*Catharus guttatus*) (224 total observations). A total of 24 forest bird species had 10 or less than 10 detections during breeding bird point count surveys, including eastern wood-pewee (4 detections) and pileated woodpecker (*Dryocopus pileatus*) (3 detections).

Table 5-1: Forest Bird Observations During Breeding Bird Point Count Surveys, 2018, 2019 and 2022

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
American redstart	*Setophaga ruticilla*	4	15	3	22
American robin	*Turdus migratorius*	3	21	0	24
American three-toed woodpecker	*Picoides dorsalis*	0	2	0	2
Bay-breasted warbler	*Setophaga castanea*	3	3	1	7
Black-and-white warbler	*Mniotilta varia*	4	24	3	31
Blackburnian warbler	*Setophaga fusca*	0	13	0	13
Black-backed woodpecker	*Picoides arcticus*	2	1	0	3
Black-capped chickadee	*Poecile atricapillus*	1	4	1	6
Blackpoll warbler	*Setophaga striata*	1	2	0	3
Black-throated green warbler	*Setophaga virens*	0	1	0	1
Blue-headed vireo	*Vireo solitarius*	5	23	1	29
Blue jay	*Cyanocitta cristata*	1	1	0	2
Bohemian waxwing	*Bombycilla garrulus*	0	2	0	2
Boreal chickadee	*Poecile hudsonicus*	0	16	3	19
Brown creeper	*Certhia americana*	1	3	0	4
Canada jay	*Perisoreus canadensis*	6	38	1	45
Canada warbler	*Cardellina canadensis*	0	14	3	17
Cape May warbler	*Setophaga tigrina*	1	1	0	2

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
Cedar waxwing	*Bombycilla cedrorum*	3	14	0	17
Chestnut-sided warbler	*Setophaga pensylvanica*	3	11	1	15
Chipping sparrow	*Spizella passerina*	4	19	4	27
Common grackle	*Quiscalus quiscula*	0	2	0	2
Connecticut warbler	*Oporornis agilis*	3	74	6	83
Dark-eyed junco	*Junco hyemalis*	16	159	7	182
Downy woodpecker	*Dryobates pubescens*	0	2	0	2
Eastern kingbird	*Tyrannus tyrannus*	0	1	0	1
Eastern wood-pewee	*Contopus virens*	1	0	3	4
Fox sparrow	*Passerella iliaca*	4	21	4	29
Golden-crowned kinglet	*Regulus satrapa*	12	27	1	40
Hairy woodpecker	*Dryobates villosus*	4	5	1	10
Hermit thrush	*Catharus guttatus*	20	183	21	224
Least flycatcher	*Empidonax minimus*	7	28	8	43
Magnolia warbler	*Setophaga magnolia*	24	111	14	149
Mourning warbler	*Geothlypis philadelphia*	3	3	0	6
Nashville warbler	*Leiothlypis ruficapilla*	16	84	4	104
Northern flicker	*Colaptes auratus*	3	14	0	17
Northern parula	*Setophaga americana*	1	1	0	2
Olive-sided flycatcher	*Contopus cooperi*	9	55	8	72
Orange-crowned warbler	*Leiothlypis celata*	2	31	6	39
Ovenbird	*Seiurus aurocapilla*	5	35	11	51
Philadelphia vireo	*Vireo philadelphicus*	13	17	3	33
Pine grosbeak	*Pinicola enucleator*	0	1	0	1
Pine siskin	*Spinus pinus*	0	1	0	1
Pileated woodpecker	*Dryocopus pileatus*	1	2	0	3
Purple finch	*Haemorhous purpureus*	2	4	0	6
Red-breasted nuthatch	*Sitta canadensis*	7	20	4	31
Red-eyed vireo	*Vireo olivaceus*	9	52	14	75
Ruby-crowned kinglet	*Corthylio calendula*	36	214	34	284
Ruffed grouse	*Bonasa umbellus*	0	6	0	6
Spruce grouse	*Canachites canadensis*	0	1	1	2
Swainson’s thrush	*Catharus ustulatus*	12	85	14	111
Tennessee warbler	*Leiothlypis peregrina*	7	50	10	67

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
Veery	*Catharus fuscescens*	0	4	0	4
Winter wren	*Troglodytes hiemalis*	13	59	7	79
White-throated sparrow	*Zonotrichia albicollis*	36	272	30	338
White-winged crossbill	*Loxia leucoptera*	2	17	0	19
Yellow-bellied flycatcher	*Empidonax flaviventris*	10	100	5	115
Yellow-bellied sapsucker	*Sphyrapicus varius*	2	13	1	16
Yellow-rumped warbler	*Setophaga coronata*	24	119	10	153
Number of Species Detected		**45**	**58**	**35**	**59**

PDA = Project development area; LSA = Local Study Area; RSA = Regional Study Area.

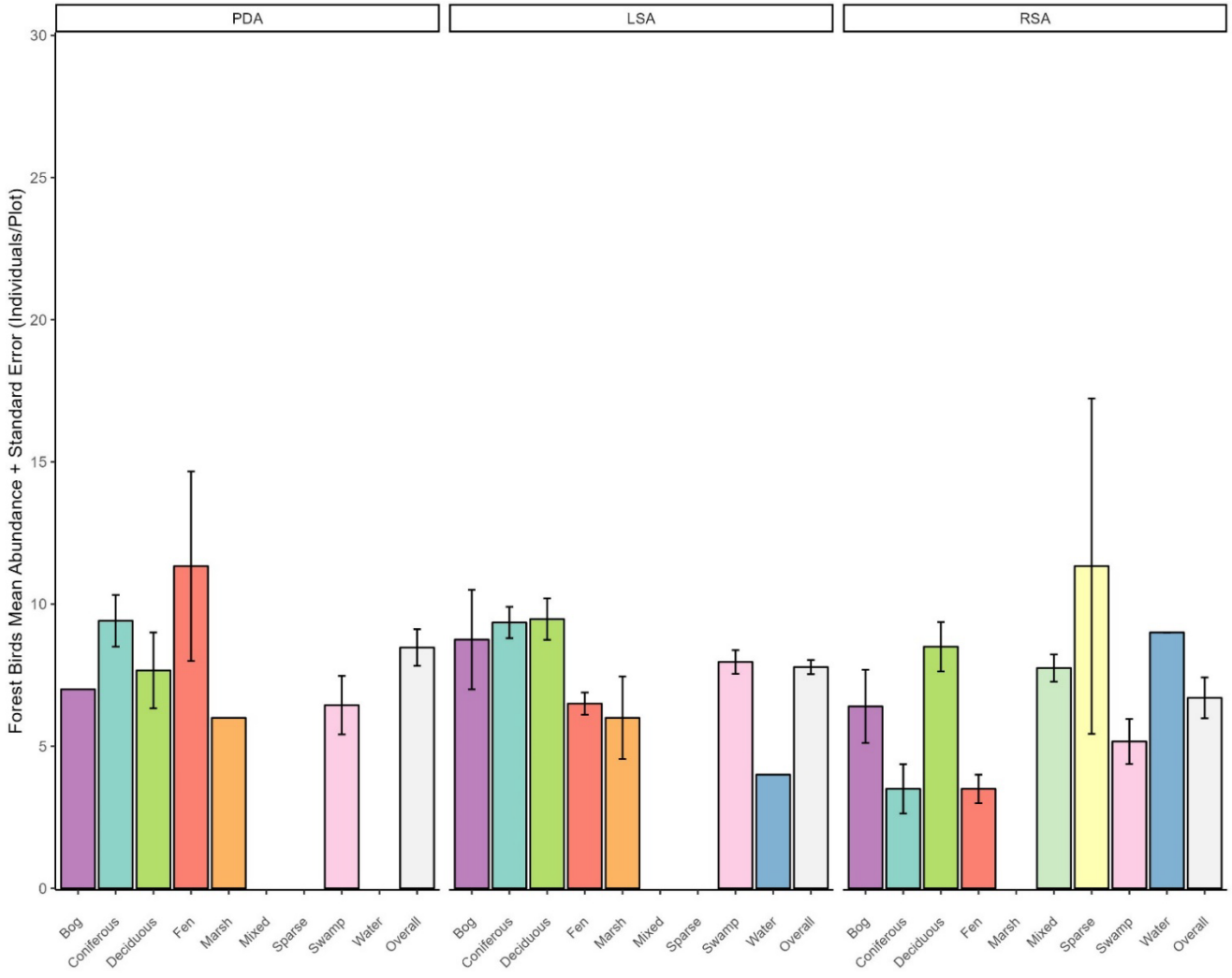
Figure 5-2 and **Figure 5-3** provide a visual summary of forest bird relative abundance and species richness recorded at point count plots during 2018 to 2022 field surveys. Results are presented across the three study areas sampled from 2018 to 2022 and mean observations are summarized by habitat type sampled. All data were collected during the breeding season in 2018 to 2022 when these species are most likely to occur in the study areas and are also most likely to be spontaneously calling or singing from territories.

Patterns of relative abundance by habitat type in the Regional Study Area differed from those in the Project Development Area and Local Study Area; however, sample size in the Regional Study Area (n = 30 plots) was relatively low compared to the Project Development Area (n = 226 plots) and Local Study Area (n = 34 plots) (**Figure 5-2**). Within the Project Development Area, mean relative abundance of forest birds was highest in the fen (11.3 ± 3.3 [1 standard error (SE)] individuals per plot visit), coniferous forest (9.4 ± 0.9 individuals per plot visit), and deciduous forest (7.7 ± 1.3 individuals per plot visit) habitat types (**Figure 5-2**). In the Local Study Area, forest bird relative abundance was highest in the deciduous forest (9.5 ± 0.7 individuals per plot visit), coniferous forest (9.4 ± 0.6 individuals per plot visit), and bog (8.8 ± 1.8 individuals per plot visit) habitat types (**Figure 5-2**). In general, relative abundance of forest birds was similar at plots in the Local Study Area compared to those within the Project Development Area. The Regional Study Area had the lowest mean relative abundance (6.7 ± 0.7 individuals per plot visit) when habitat types were pooled.

Species richness values recorded for forest birds reflected patterns observed for relative abundance; the highest mean species richness values recorded in the Project Development Area were made in the deciduous forest, coniferous forest, and fen habitat types (**Figure 5-3**). In the Local Study Area, the highest mean species richness values were recorded in the coniferous forest, deciduous forest, and swamp habitat types (**Figure 5-3**).

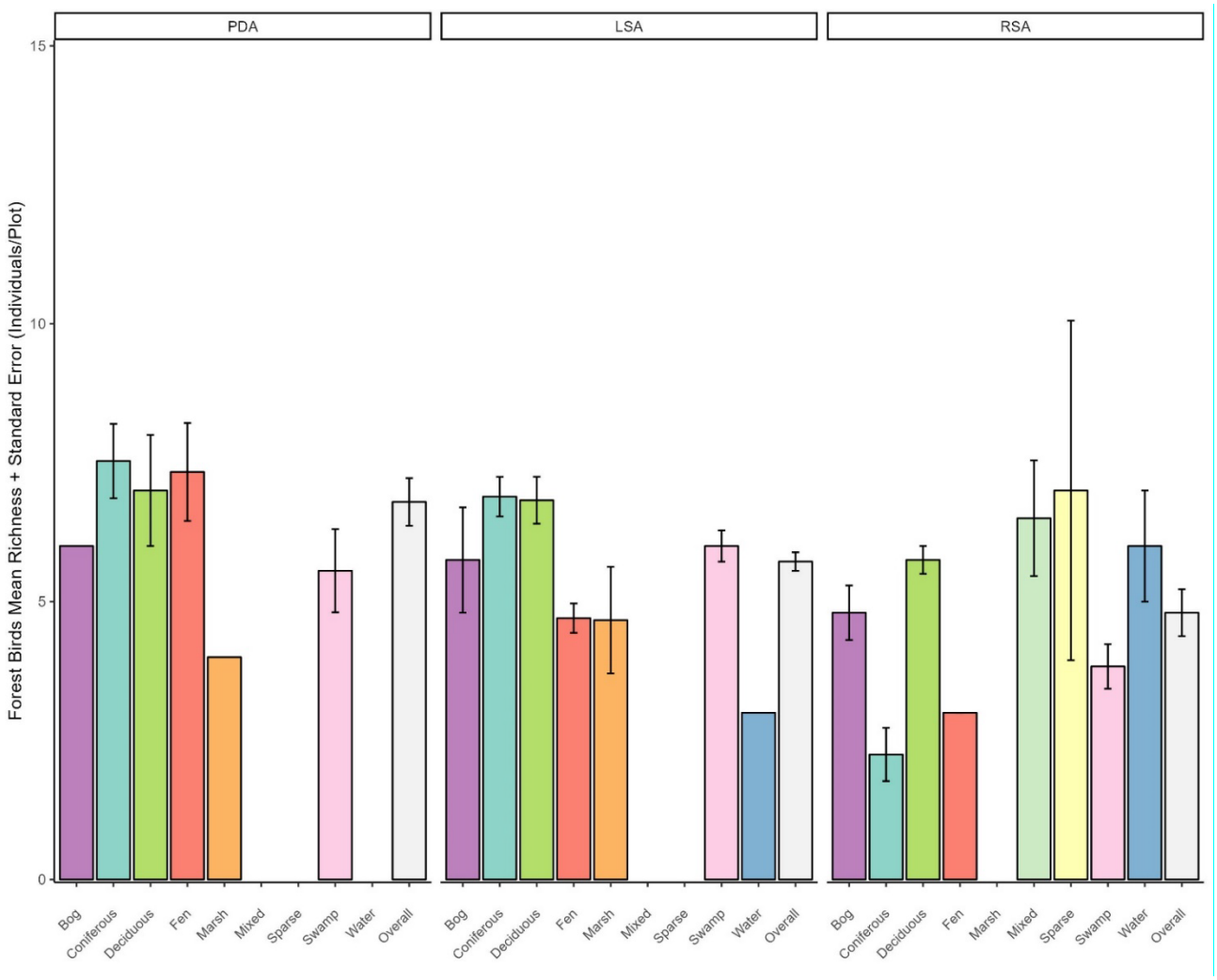
The lowest mean species richness of forest birds in the Project Development Area was recorded in the marsh habitat type (four species [SE not available due to low sample size]) and the highest in the coniferous forest habitat type (7.5 ± 0.7 species). Within the Local Study Area, the lowest mean species richness of forest birds was detected in the water habitat type (three species [SE not available due to low sample size]) and the highest in the coniferous forest habitat type (6.9 ± 0.4 species). The mean species richness of forest birds in the Regional Study Area was lowest in the coniferous forest habitat type (2.3 ± 0.5 species) and highest in the sparse forest habitat type (7.0 ± 3.1 species). Across pooled habitat types, point count plots in the Project Development Area had a higher mean species richness of forest birds (6.8 ± 0.4 species) than the Local Study Area (5.7 ± 0.2 species) and Regional Study Area (4.8 ± 0.4 species) (**Figure 5-3**).

Figure 5-2: Forest Bird Mean Relative Abundance Across Habitat Type Recorded During Point Count Surveys, 2018 to 2022



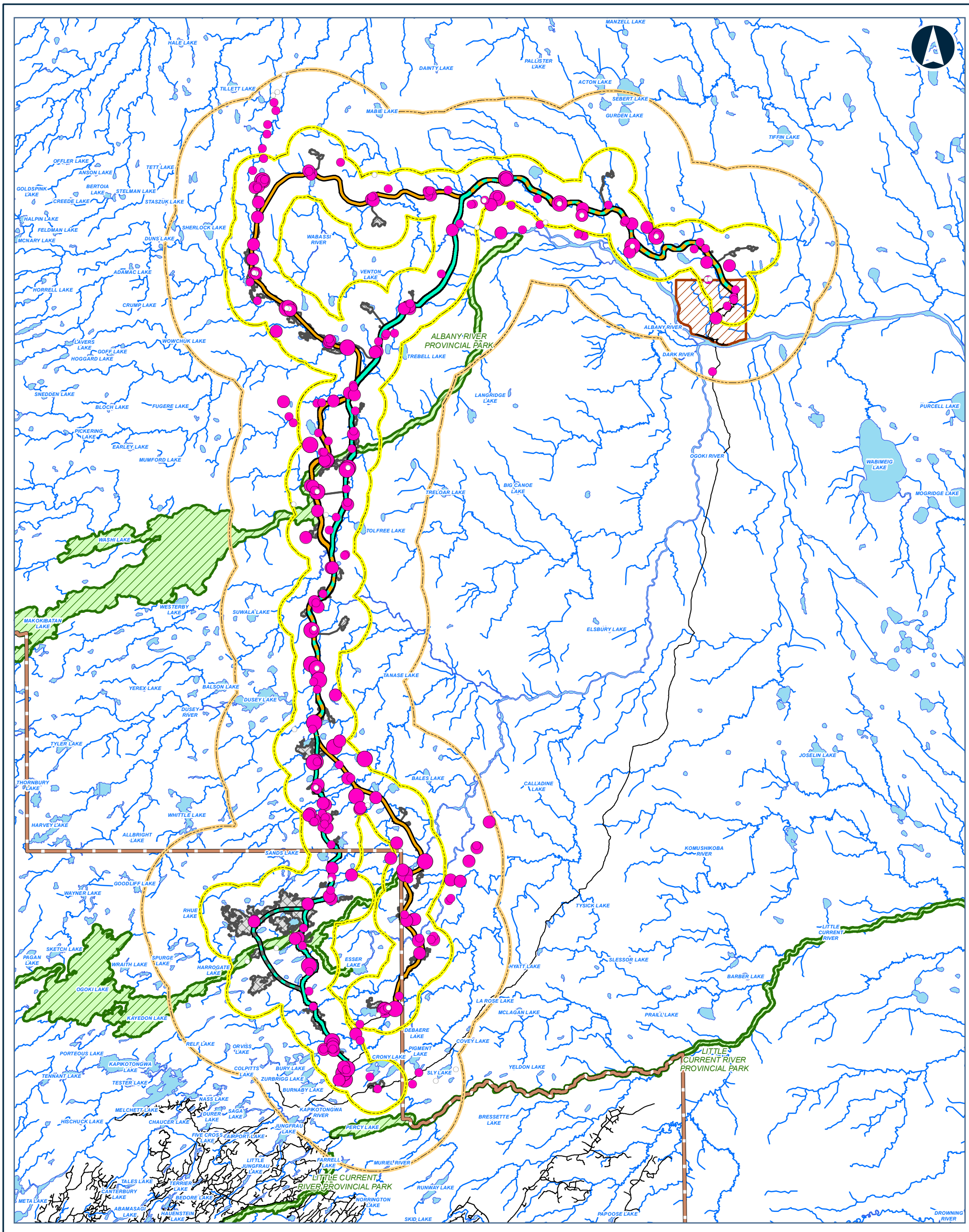
Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

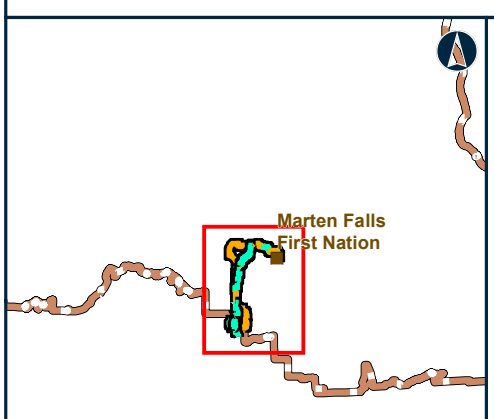
Figure 5-3: Forest Bird Mean Richness Across Habitat Type Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-4 displays abundance values recorded at point count plots sampled during the breeding season to demonstrate where songbird breeding “hotspots” occur within the Project study areas. Forest bird abundance at autonomous recording unit plots was relatively consistent across the Local Study Area (**Figure 5-4**).





Map Location

Legend

ABUNDANCE OF FOREST BIRDS AT BREEDING SEASON POINT COUNT SURVEY LOCATIONS

- 14 - 28
- 8 - 13
- 1 - 7
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- WildlifeModelling_Birds_RSA

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Forest Bird Abundance Recorded During Breeding Season Point Count Surveys in the Local Study Area, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-4

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_4_GIS_Abundance_ForestBirds_BBS_2018to2022.mxd
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5.1.2.2 Bird Autonomous Recording Unit Surveys

A total of 61 forest bird species were recorded on bird autonomous recording units across all seasons (**Table 5-2**). Out of the 61 total forest birds detected on all-season autonomous recording units, four are species at risk under Schedule 1 of the *Species at Risk Act* (Government of Canada, 2023a) and under Ontario's *Endangered Species Act* (Government of Ontario, 2023a): Canada warbler, eastern wood-pewee, olive-sided flycatcher, and wood thrush. Autonomous recording units detected 51 species at plots established within the Project Development Area and an additional 10 species at plots within the Local Study Area (excluding the Project Development Area) (**Table 5-2**). The total number of forest birds detected at all autonomous recording unit plots varied by season as follows (**Table 5-2**):

- Spring: 55 species;
- Breeding: 58 species;
- Fall: 43 species; and
- Winter: 6 species.

The forest bird species with the greatest total detections recorded on all-season autonomous recording units were white-throated sparrow (1,690 detections), ruby-crowned kinglet (984 detections), Swainson's thrush (831 detections), and hermit thrush (772 detections) (**Table 5-2**). Three species were only detected on autonomous recording units and were not detected during breeding bird point count surveys: rose-breasted grosbeak, ruby-throated hummingbird, and wood thrush.

Table 5-2: Forest Bird Detections During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
American goldfinch	*Spinus tristis*	1	0	0	0	0	1	**1**
American redstart	*Setophaga ruticilla*	13	144	7	0	4	160	**164**
American robin	*Turdus migratorius*	44	118	24	0	10	176	**186**
American three-toed woodpecker	*Picoides dorsalis*	10	1	0	0	2	9	**11**
Bay-breasted warbler	*Setophaga castanea*	6	19	1	0	2	24	**26**
Black-and-white warbler	*Mniotilta varia*	37	107	5	0	31	118	**149**

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Black-backed woodpecker	*Picoides arcticus*	5	8	9	3	3	22	**25**
Blackburnian warbler	*Setophaga fusca*	3	9	0	0	5	7	**12**
Black-capped chickadee	*Poecile atricapillus*	15	12	48	3	21	57	**78**
Blackpoll warbler	*Setophaga striata*	0	1	1	0	0	2	**2**
Blue jay	*Cyanocitta cristata*	0	3	5	0	0	8	**8**
Blue-headed vireo	*Vireo solitarius*	43	58	6	0	9	98	**107**
Boreal chickadee	*Poecile hudsonicus*	19	13	37	7	7	69	**76**
Brown creeper	*Certhia americana*	23	34	6	0	7	56	**63**
Canada jay	*Perisoreus canadensis*	32	96	167	15	26	284	**310**
Canada warbler	*Cardellina canadensis*	6	33	0	0	9	30	**39**
Cape May warbler	*Setophaga tigrina*	10	18	0	0	0	28	**28**
Cedar waxwing	*Bombycilla cedrorum*	2	99	41	0	23	119	**142**
Chestnut-sided warbler	*Setophaga pensylvanica*	3	31	0	0	1	33	**34**
Chipping sparrow	*Spizella passerina*	4	91	0	0	1	94	**95**
Common grackle	*Quiscalus quiscula*	2	8	2	0	1	11	**12**
Connecticut warbler	*Oporornis agilis*	18	200	0	0	29	189	**218**
Dark-eyed junco	*Junco hyemalis*	167	342	182	0	71	620	**691**
Downy woodpecker	*Dryobates pubescens*	1	2	4	0	2	5	**7**
Eastern kingbird	*Tyrannus tyrannus*	0	2	0	0	0	2	**2**
Eastern wood-pewee	*Contopus virens*	0	2	0	0	0	2	**2**
Fox sparrow	*Passerella iliaca*	43	50	18	0	19	92	**111**
Golden-crowned kinglet	*Regulus satrapa*	134	161	223	2	88	432	**520**
Hairy woodpecker	*Dryobates villosus*	9	15	20	1	4	41	**45**
Hermit thrush	*Catharus guttatus*	116	609	47	0	62	710	**772**
Least flycatcher	*Empidonax minimus*	13	180	0	0	11	182	**193**
Magnolia warbler	*Setophaga magnolia*	112	418	22	0	78	474	**552**
Mourning warbler	*Geothlypis philadelphia*	0	12	0	0	2	10	**12**
Nashville warbler	*Leiothlypis ruficapilla*	41	155	10	0	23	183	**206**
Northern flicker	*Colaptes auratus*	59	48	28	0	21	114	**135**
Northern parula	*Setophaga americana*	4	5	0	0	0	9	**9**
Olive-sided flycatcher	*Contopus cooperi*	11	171	16	0	2	196	**198**

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Orange-crowned warbler	*Leiothlypis celata*	12	47	0	0	4	55	**59**
Ovenbird	*Seiurus aurocapilla*	45	118	1	0	11	153	**164**
Philadelphia vireo	*Vireo philadelphicus*	4	35	1	0	9	31	**40**
Pileated woodpecker	*Dryocopus pileatus*	36	15	17	0	12	56	**68**
Pine grosbeak	*Pinicola enucleator*	7	1	1	0	2	7	**9**
Pine siskin	*Spinus pinus*	6	6	2	0	2	12	**14**
Purple finch	*Haemorhous purpureus*	16	15	5	0	5	31	**36**
Red-breasted nuthatch	*Sitta canadensis*	17	10	30	0	6	51	**57**
Red-eyed vireo	*Vireo olivaceus*	4	274	6	0	47	237	**284**
Rose-breasted grosbeak	*Pheucticus ludovicianus*	1	0	0	0	0	1	**1**
Ruby-crowned kinglet	*Corthylio calendula*	372	488	124	0	139	845	**984**
Ruby-throated hummingbird	*Archilochus colubris*	1	3	0	0	0	4	**4**
Ruffed grouse	*Bonasa umbellus*	73	53	2	0	31	97	**128**
Spruce grouse	*Canachites canadensis*	11	8	1	0	1	19	**20**
Swainson's thrush	*Catharus ustulatus*	51	747	33	0	86	745	**831**
Tennessee warbler	*Leiothlypis peregrina*	6	144	0	0	16	134	**150**
Veery	*Catharus fuscescens*	0	29	6	0	1	34	**35**
White-throated sparrow	*Zonotrichia albicollis*	349	1156	185	0	207	1483	**1690**
White-winged crossbill	*Loxia leucoptera*	32	73	18	0	12	111	**123**
Winter wren	*Troglodytes hiemalis*	142	326	27	0	41	454	**495**
Wood thrush	*Hylocichla mustelina*	1	0	0	0	0	1	**1**
Yellow-bellied flycatcher	*Empidonax flaviventris*	11	194	6	0	29	182	**211**
Yellow-bellied sapsucker	*Sphyrapicus varius*	120	42	8	0	19	151	**170**
Yellow-rumped warbler	*Setophaga coronata*	130	243	156	0	81	448	**529**
Number of Species Detected		**55**	**58**	**43**	**6**	**61**	**51**	**61**

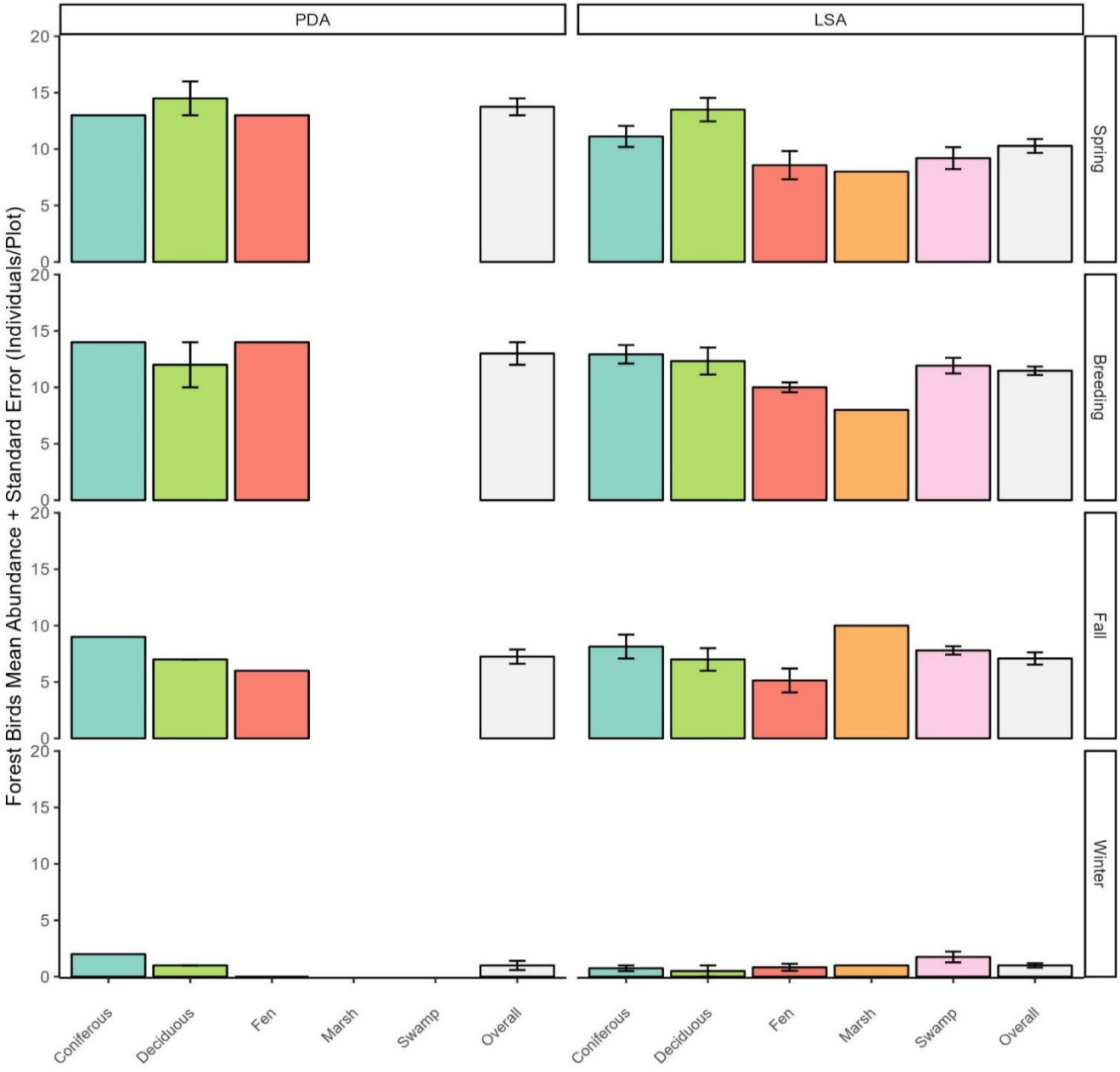
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-5 and **Figure 5-6** provide a visual summary of forest bird relative abundance and species richness recorded on autonomous recording units during the 2022 field surveys. Results are presented by habitat type and by season to illustrate how detection trends changed throughout the year (2022 to early 2023 [January or "winter"]) and across the various habitats sampled. Note that no autonomous recording units were established within the Regional Study Area outside of the Local Study Area boundaries (**Section 4.2.3**). The following information provides a summary of forest bird observations made on autonomous recording units across seasons with a focus on the breeding season when these species are most likely to occur in the study areas and are also most likely to be calling or singing from breeding territories.

Mean relative abundance for all forest bird species was highest during the breeding season and spring migration. The highest relative abundance values recorded in the Project Development Area were made in the deciduous forest, coniferous forest, and fen habitat types (**Figure 5-5**). In the Local Study Area, the highest relative abundance values were recorded in the deciduous forest, coniferous forest, and swamp habitat types (**Figure 5-5**). In general, relative abundance of forest birds was similar at plots in the Project Development Area compared to those within the Local Study Area during the breeding season; however, when data were pooled across habitat types during the breeding season, forest bird abundance recorded on autonomous recording units was slightly higher in the Project Development Area (13.0 ± 1.0 individuals per plot visit) than in the Local Study Area (11.5 ± 0.4 individuals per plot visit) (**Figure 5-5**).

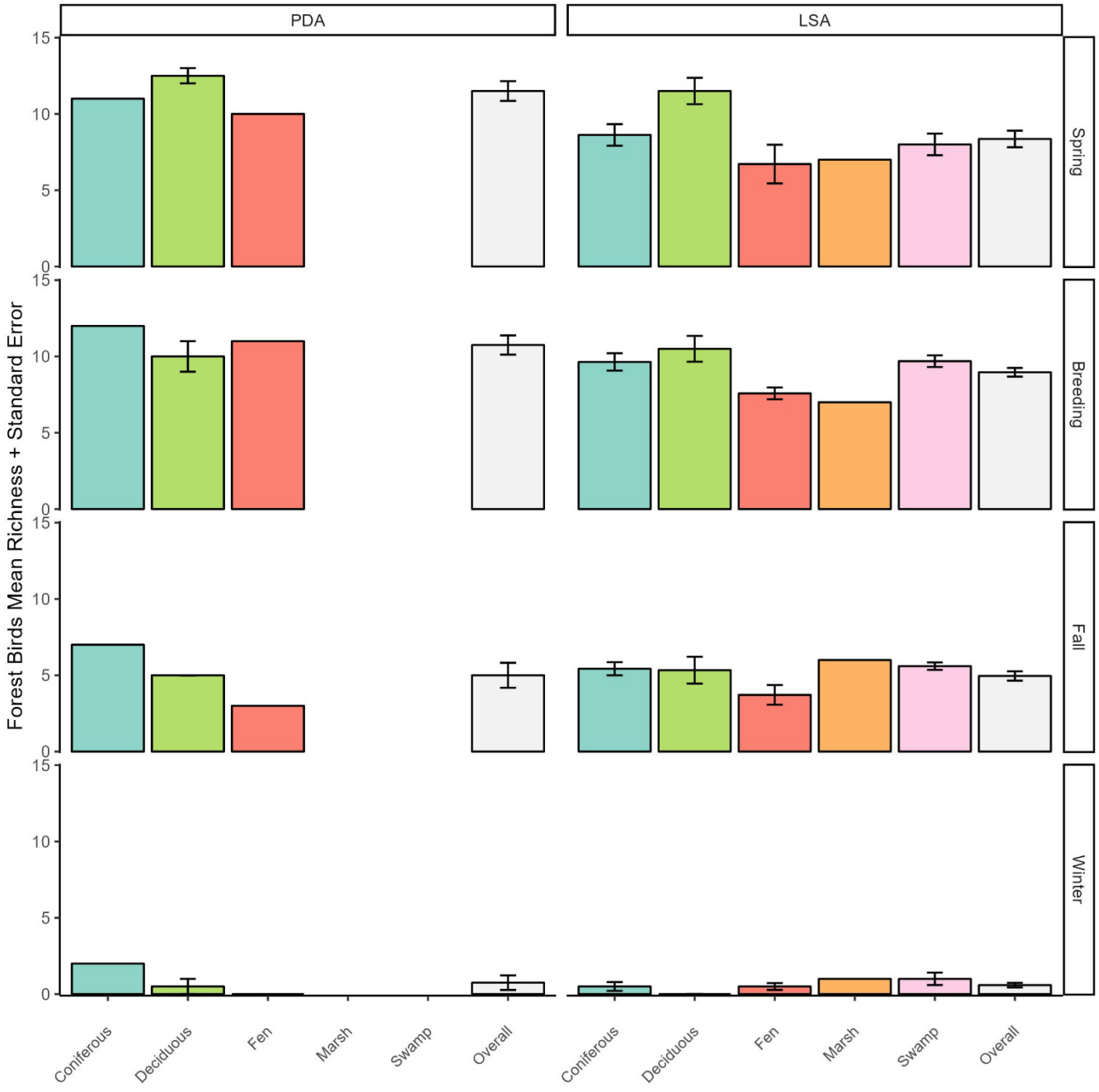
Species richness values recorded for forest birds reflected patterns observed for relative abundance; the highest mean species richness values recorded in the Project Development Area were observed in the deciduous forest, coniferous forest, and fen habitat types. In the Local Study Area, the highest mean species richness values were recorded in the deciduous forest, swamp, and coniferous forest habitat types (**Figure 5-6**). Mean species richness of forest birds recorded in the Project Development Area during the breeding season varied across habitat types and study areas and ranged from 10.0 (± 1.0) species recorded at autonomous recording unit plots in deciduous habitat to 12.0 (SE not able to be calculated due to low sample size) species detected at autonomous recording units in coniferous forest habitat (**Figure 5-6**). Within the Local Study Area during the breeding season, the lowest mean species richness was detected in the marsh habitat type (seven species [SE not able to be calculated due to low sample size]) and the highest in the deciduous forest habitat type (10.5 ± 0.8 species). Across pooled habitat types during the breeding season, autonomous recording unit plots in the Project Development Area recorded a higher mean species richness (10.8 ± 0.6 species) than autonomous recording units placed in the Local Study Area (9.0 ± 0.3 species).

Figure 5-5: Forest Birds Mean Relative Abundance Across Habitat Type and Season Recorded During Bird Autonomous Recording Unit Surveys, 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

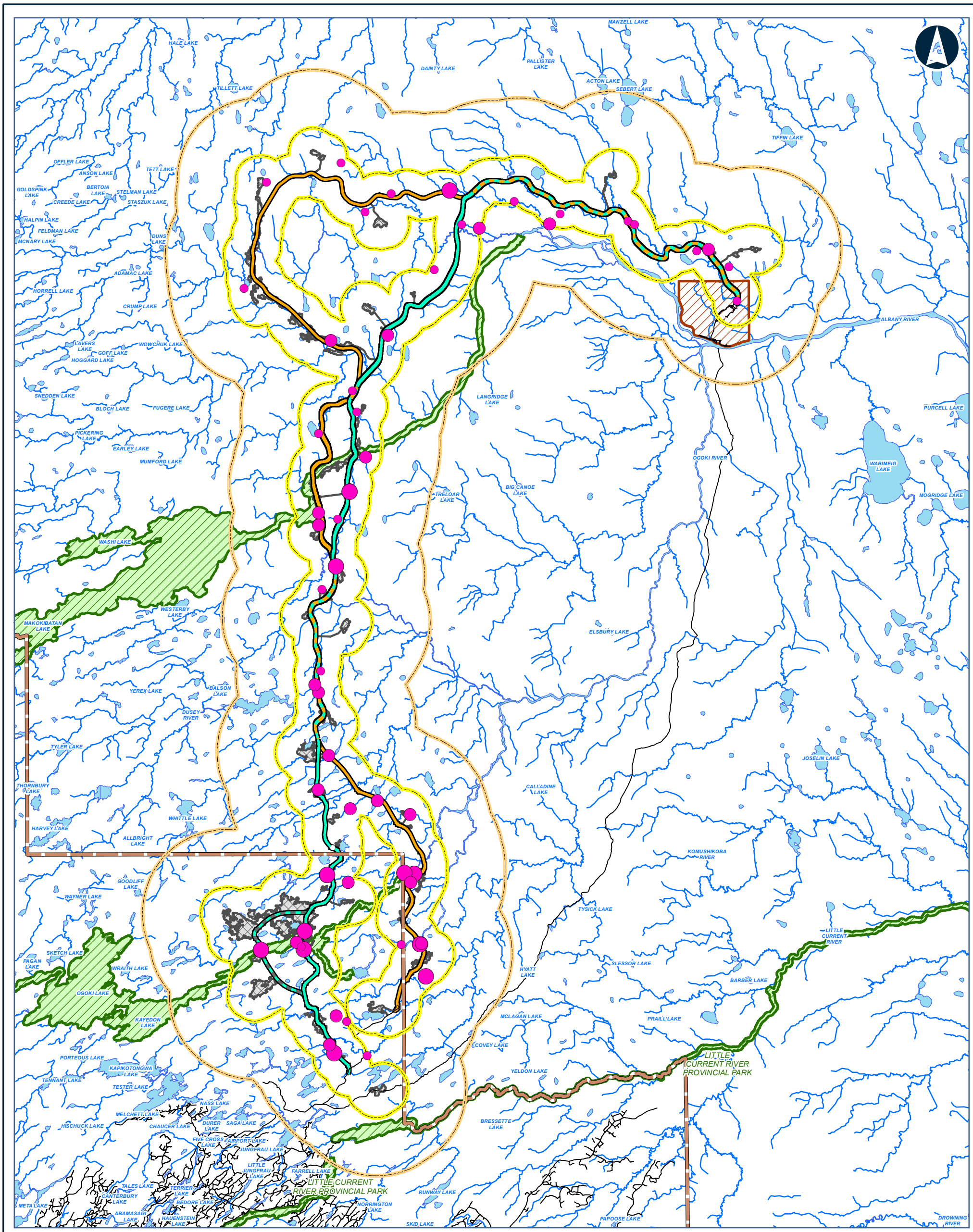
Figure 5-6: Forest Birds Mean Species Richness Across Habitat Type and Season Recorded During Bird Autonomous Recording Unit Surveys, 2022

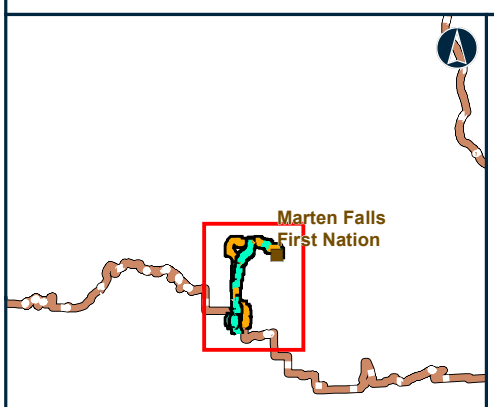


Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-7 displays pooled forest bird abundance values (i.e., all individuals classified as forest birds) recorded at autonomous recording unit plots during the breeding season to demonstrate where songbird breeding "hotspots" occurred within the Project study areas.

Values displayed for abundance represent the maximum number of forest bird individuals detected at an autonomous recording unit plot during a single “visit” (i.e., single audio file) as recorded during the breeding season. While abundance of forest birds was relatively consistent across the Local Study Area, the greatest abundances were detected in the south portion of the Local Study Area (**Figure 5-7**).





Map Location

Legend

ABUNDANCE OF FOREST BIRDS AT AUTONOMOUS RECORDING UNIT SURVEY LOCATIONS

- 4 - 5
- 3
- 1 - 2
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Forest Bird Abundance Recorded During Autonomous Recording Unit Breeding Season Surveys in the Local Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-7

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_7_GIS_Abundance_ForestBirds_ARU_2022.mxd
Date Saved: 11/24/2024 8:29:03 PM User Name: gld_rduval

5.1.2.3 Incidental Observations

A total of 26 forest bird species were detected incidentally during field surveys from 2018 to 2022. Of these, olive-sided flycatcher is listed as Special Concern under Schedule 1 of the *Species at Risk Act* (Government of Canada, 2023a) *and* under Ontario's *Endangered Species Act* (Government of Ontario, 2023a).

5.2 Raptors

5.2.1 Desktop Review

There is potential for 18 raptor species to occur in the study areas (**Annex A**). Within Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield there are eight raptor species that are classified as priority species (Environment Canada 2013, 2014): bald eagle (, Oji-Cree translation, *mikisi*) (*Haliaeetus leucocephalus*), boreal owl, golden eagle (*Aquila chrysaetos*), northern goshawk (*Accipiter gentilis*), northern hawk owl (*Surnia ulula*), peregrine falcon, sharp-shinned hawk (*Accipiter striatus*), and short-eared owl. Short-eared owl is also listed on Schedule 1 of the *Species at Risk Act* (Government of Canada, 2023a), while bald eagle, golden eagle, peregrine falcon, and short-eared owl are listed under Ontario's *Endangered Species Act* (Government of Ontario, 2023a) (**Annex A**).

There were ten raptor species detected during Ontario Breeding Bird Atlas surveys in the broader region, including five Bird Conservation Region priority species: bald eagle, golden eagle, northern goshawk, northern hawk owl, and sharp-shinned hawk. Other raptor species identified during Ontario Breeding Bird Atlas surveys were American kestrel (*Falco sparverius*), broad-winged hawk (*Buteo platypterus*), merlin (*Falco columbarius*), osprey (Oji-Cree translation, *saagwadamo*) (*Pandion haliaetus*), and red-tailed hawk (*Buteo jamaicensis*) (Birds Canada, 2023a).

There were no observations of raptor species at risk in the eBird observation database that were within the Regional Study Area. The nearest short-eared owl observations recorded through eBird were made near Fort Hope, approximately 80 km west of the Project. Additional publicly accessible datasets that monitor for raptors (e.g., Ontario Nocturnal Owls Survey; see **Section 4.1** for comprehensive list of reviewed resources) were reviewed as part of the desktop summary; however, no available data were collected within or near the Regional Study Area boundaries.

A review of the Ontario GeoHub Wildlife Values Sites database indicated that several raptor nests have historically been identified within the birds Regional Study Area (Government of Ontario, 2023b). Most of the nest locations occurred near the southern extent of the Regional Study Area, near the southern terminus of Alternative 4. A total of 61 raptor nests were recorded within the Wildlife Values Site database, accounting for 5 species.

5.2.2 Field Survey Results

Across all field survey types completed in the Regional Study Area from 2018 to 2022 (**Figure 5-8**) there were 15 species of raptors observed (**Annex A**), which included six owl, two hawk, and two eagle species. Observations of raptors included sightings of individuals, active stick nests with adults or chicks present, and auditory observations of raptors calling. The total number of raptor species observed by survey method are provided below:

- Point Count Surveys: three species;
- Bird Autonomous Recording Unit Surveys: ten species;
- Targeted Autonomous Recording Unit Surveys for Species at Risk: two species;
- Aerial Surveys: five species; and
- Incidental Observations: eight species.

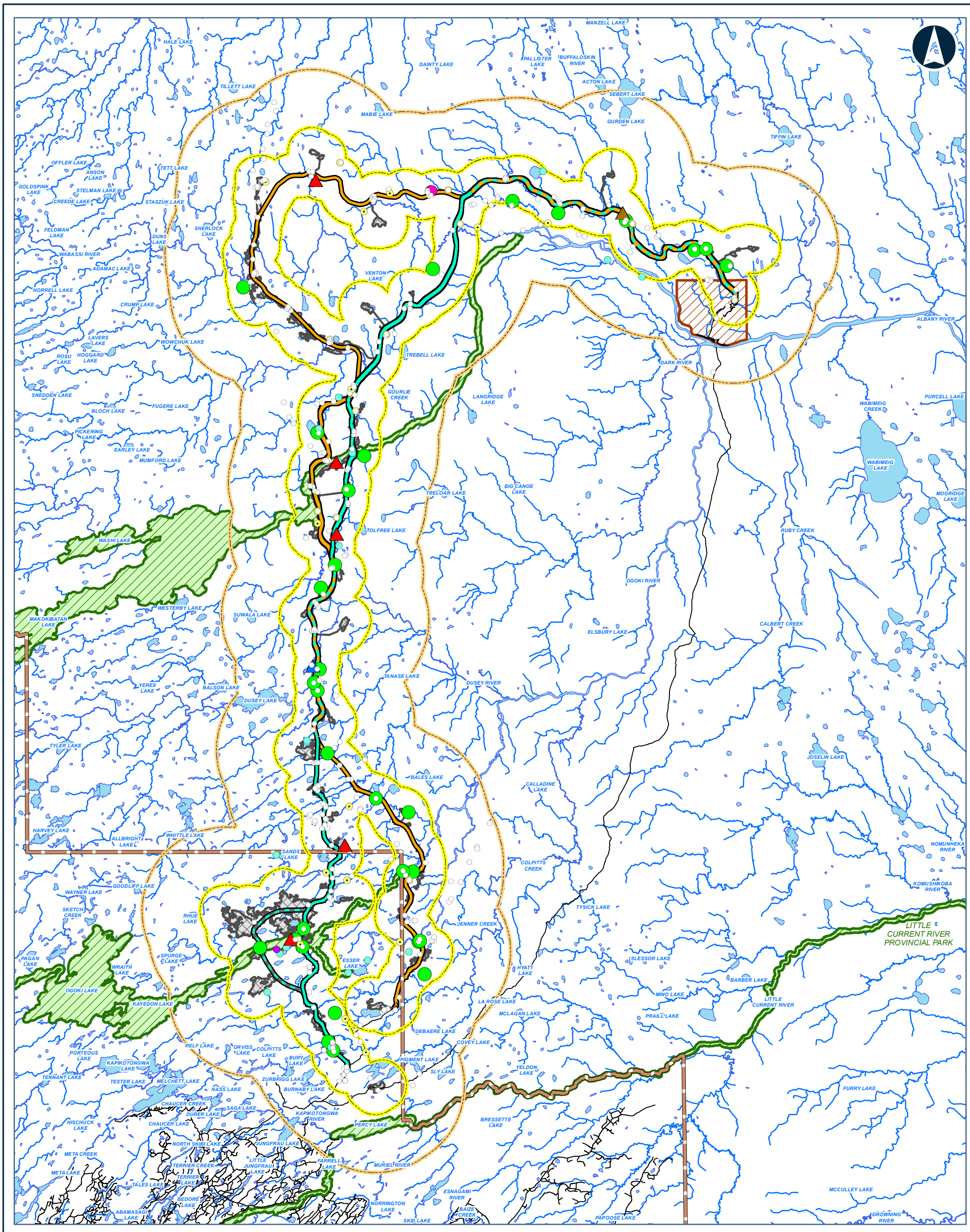
Of the 13 raptor species observed across all survey types (not including incidentally observed raptors), 7 species were identified within the Project Development Area and 13 were identified within the Local Study Area boundaries. There were no raptor species that were observed exclusively in the Project Development Area. Four raptor species were only exclusively detected in the Local Study Area (i.e., outside the Project Development Area): great horned owl, osprey, sharp-shinned hawk, and turkey vulture (Oji-Cree translation, *gitchi papakwan*) (*Cathartes aura*). No species were identified exclusively in the Regional Study Area.

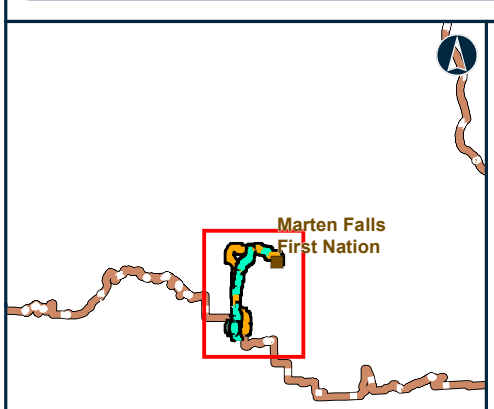
Table 5-3: Raptor Observations During 2018 to 2022 Field Surveys

Common Name	Scientific Name	Number of Observations[(a)]			Total Number of Observations[(a)]
		PDA	LSA	RSA	
Bald eagle	*Haliaeetus leucocephalus*	11	48	11	70
Boreal owl	*Aegolius funereus*	37	190	0	227
Great gray owl	*Strix nebulosa*	0	12	0	12
Great horned owl	*Bubo virginianus*	0	1	0	1
Long-eared owl	*Asio otus*	1	6	0	7
Merlin	*Falco columbarius*	2	11	0	13
Northern hawk owl	*Surnia ulula*	1	5	0	6
Northern harrier	*Circus hudsonius*	0	3	0	3
Northern saw-whet owl	*Aegolius acadicus*	1	3	0	4
Osprey	*Pandion haliaetus*	0	9	0	9
Red-tailed hawk	*Buteo jamaicensis*	1	2	1	4
Sharp-shinned hawk	*Accipiter striatus*	0	2	0	2
Turkey vulture	*Cathartes aura*	0	2	0	2
Number of Species Detected		**7**	**13**	**2**	**13**

Notes:
(a) Excluding incidentally observed raptor species.
PDA = Project development area; LSA = Local Study Area; RSA = Regional Study Area.

Two raptor species at risk were observed during field surveys: bald eagle and golden eagle. Bald eagle is listed as Special Concern and golden eagle is listed as Endangered under Ontario's *Endangered Species Act* (Government of Ontario, 2023a) (**Annex A**).





Map Location

Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT
- RAPTOR PRESENT
- RAPTOR ABSENT

BREEDING BIRD POINT COUNT SURVEY
- RAPTOR PRESENT
- RAPTOR ABSENT

MARSH MONITORING PROGRAM
- RAPTOR PRESENT

INCIDENTAL OBSERVATION
- RAPTOR PRESENT

ACTIVE RAPTOR NEST OBSERVED, 2022
- BALD EAGLE
- OSPREY
- RED-TAILED HAWK

COMMUNITY ACCESS ROAD ALTERNATIVES
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRD LSA
- BIRD RSA

Notes:
None

Data Source:
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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Raptors During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
Rev:0	

Figure 5-8

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5.2.2.1 Bird Autonomous Recording Unit Surveys

As described in **Section 4.2.3**, the bird autonomous recording unit monitoring program occurred during the calling period for several raptor species in the boreal region (i.e., spring and breeding period of 2022). Audio files collected by bird autonomous recording units during the dawn / day period overlaps with the time of day when diurnal raptor species may be active and calling. Audio files collected by autonomous recording units during the dusk / night period overlaps with the time of day when nocturnal owl species are likely to be calling. Targeted autonomous recording unit monitoring for species at risk was completed when nocturnally active owls may be vocalizing (**Section 4.2.4.2**).

Across all bird autonomous recording unit monitoring plots in the Local Study Area during 2022, ten species of raptors were detected (**Table 5-4**). During spring 2022, at least one raptor species was detected in each of the five habitat types sampled, with the greatest abundance of raptors observed in the deciduous forest habitat type. During the summer, the greatest abundance of raptors was observed in the coniferous forest habitat type. Relative abundance values for raptors were generally lower overall during the breeding season, relative to the spring, and lower during the fall relative to the breeding season (**Table 5-4**). No observations of raptors were made through autonomous recording unit monitoring in the winter season (**Table 5-4**).

Boreal owl was the most abundant raptor species recorded in the Local Study Area during the 2022 bird autonomous recording unit monitoring. The species was detected at 31 autonomous recording unit plots (54.4% of all autonomous recording units deployed in 2022). Other commonly detected raptor species included great gray owl (detected on eight units [14.0%]) and northern hawk owl (detected on six units [12.2%]).

Table 5-4: Relative Abundance of Raptors in the Local Study Area Recorded During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Relative Abundance (individuals per plot visit ± standard error)		
		Spring	Breeding	Fall
Bald eagle	*Haliaeetus leucocephalus*	0.00 ± 0.00	0.00 ± 0.00	0.04 ± 0.04
Boreal owl	*Aegolius funereus*	1.28 ± 0.17	0.30 ± 0.07	0.04 ± 0.04
Great gray owl	*Strix nebulosa*	0.28 ± 0.09	0.02 ± 0.02	0.04 ± 0.04
Great horned owl	*Bubo virginianus*	0.00 ± 0.00	0.02 ± 0.02	0.00 ± 0.00
Long-eared owl	*Asio otus*	0.04 ± 0.04	0.06 ± 0.03	0.00 ± 0.00
Merlin	*Falco columbarius*	0.16 ± 0.09	0.02 ± 0.02	0.04 ± 0.04
Northern hawk owl	*Surnia ulula*	0.16 ± 0.07	0.02 ± 0.02	0.04 ± 0.04
Northern saw-whet owl	*Aegolius acadicus*	0.04 ± 0.04	0.00 ± 0.00	0.00 ± 0.00
Osprey	*Pandion haliaetus*	0.00 ± 0.00	0.04 ± 0.03	0.00 ± 0.00
Sharp-shinned hawk	*Accipiter striatus*	0.08 ± 0.06	0.00 ± 0.00	0.00 ± 0.00

5.2.2.2 Targeted Species at Risk Autonomous Recording Unit Surveys

Two raptor species were detected on autonomous recording units that were deployed for targeted species at risk. Boreal owl and northern saw-whet owl were each observed on two autonomous recording units.

5.2.2.3 Raptor Stick Nest Aerial Surveys

Zoetica (2018b) identified five raptor stick nests in 2018. In 2022, WSP Canada Inc. revisited two of the nests found in 2018. An additional 12 stick nests were identified by WSP Canada Inc. in 2022. Of the total 17 stick nests found in 2018 and 2022, 3 nests recorded by Zoetica in 2018 were not rechecked in 2022, 7 nests were confirmed active in spring or summer 2022, and 7 nests were considered inactive in summer 2022.

Of the seven active stick nests identified in 2022, one active bald eagle nest occurred in the Project Development Area (**Figure 5-8**). Species composition of the six other active nests in the Local Study Area is as follows:

- Bald eagle: 4 nests;
- Red-tailed hawk: 1 nest; and
- Osprey: 1 nest.

Of the seven active raptor nests identified in 2022, one bald eagle nest had eggs present within the nest at the time of observation; the remaining nests had adults present and no young-of-the-year were confirmed. Active raptor stick nests identified during field surveys in 2022 were distributed relatively evenly across the Local Study Area (**Figure 5-8**). Bald eagle was the most common species detected and accounted for 70.4% of all raptor observations (57 of 81 total observations).

5.2.2.4 Other Species-Specific Species at Risk Surveys

After desktop and aerial reconnaissance surveys, it was determined that suitable nesting habitat for peregrine falcon does not occur in the Local Study Area. Therefore, follow up surveys for this species were not completed. Results from all diurnal breeding bird surveys in the Local Study Area did not record observations of this species in the study areas. A review of the Natural Heritage Information Centre Database, Ontario Breeding Bird Atlas, and eBird data that occurred within the Regional Study Area indicated that no historical observations of peregrine falcon have been made in the Regional Study Area.

No short-eared owls were detected during targeted species at risk autonomous recording unit (n = 1) surveys completed in 2022 and no incidental observations of this species were made during field surveys from 2018 to 2022.

5.2.2.5 Incidental Observations

Incidental observations detected two species that were not detected during targeted bird surveys were observed incidentally: broad-winged hawk and golden eagle.

One golden eagle individual was detected during the wolverine denning survey program on March 20, 2023. Broad-winged hawk were observed at two wolverine hair snag remote camera plot locations, one between March and April 2022, and one between May and June 2022.

5.3 Shorebirds

5.3.1 Desktop Review

There is potential for 22 shorebird species to occur in the study areas; most of these species (16) have potential to occur in the study areas only at stopover sites used during migration (**Annex A**). Within Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield there are 16 shorebird species that are classified as priority species that could occur in the study areas (**Annex A**) (Environment Canada, 2013, 2014). Red knot, *rufus* subspecies (*Calidris canutus rufa*) and red-necked phalarope (*Phalaropus lobatus*) are listed under Schedule 1 of the *Species at Risk Act* and Ontario's *Endangered Species Act* (Government of Canada, 2023a; Government of Ontario, 2023a). Lesser yellowlegs (Oji-Cree translation, *gaa'osaaw gaatech binechiinch*) (*Tringa flavipes*) is listed as Threatened under the

Endangered Species Act and is under consideration for listing under Schedule 1 of the *Species at Risk Act* (as Threatened) (Government of Ontario, 2023a; Government of Canada, 2023a).

There were six shorebird species detected during Ontario Breeding Bird Atlas surveys in the broader region, including three Bird Conservation Region priority species: greater yellowlegs (*Tringa melanoleuca*), lesser yellowlegs, and solitary sandpiper (*Tringa solitaria*) (Birds Canada, 2023a). Among the shorebird species observed during Ontario Breeding Bird Atlas surveys, greater yellowlegs was the most commonly observed species, though several species were recorded with no associated abundance value.

There were no observations of federally listed shorebird species at risk in the eBird observation database that were within the Regional Study Area (eBird, 2023).

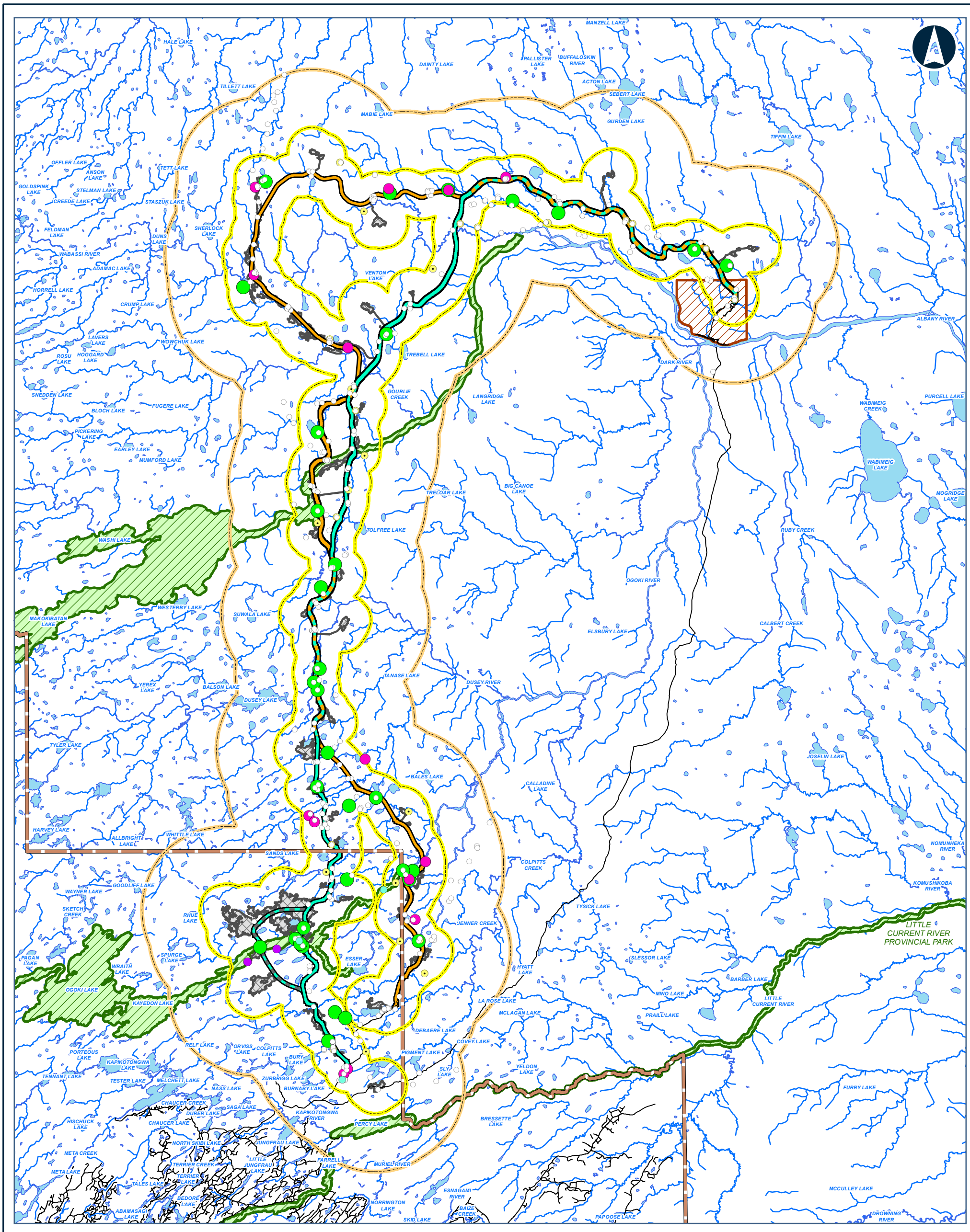
5.3.2 Field Survey Results

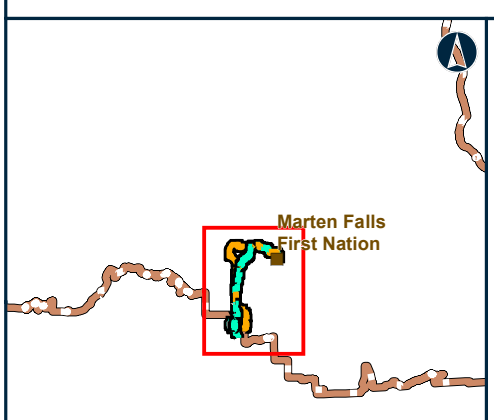
There were 11 unique species of shorebirds observed across all field survey types completed in the Regional Study Area from 2018 to 2022 (**Figure 5-9)**, including targeted aerial surveys for shorebirds, autonomous recording auditory surveys, and incidental observations made during non-targeted surveys (**Annex A**). The total number of shorebird species observed by survey method are provided below:

- Point Count Surveys: 5 species;
- Bird Autonomous Recording Unit Surveys: 11 species;
- Targeted Autonomous Recording Unit Surveys for Species at Risk: 1 species;
- Breeding Aerial Surveys: 3 species;
- Spring Migration Aerial Surveys: 2 species;
- Fall Migration Aerial Surveys: 1 species; and
- Incidental Observations: 3 species.

Lesser yellowlegs is the only federally or provincially listed shorebird that was detected during field surveys. Eight Bird Conservation Region priority species were detected during field surveys: lesser yellowlegs, black-bellied plover (*Pluvialis squatarola*), greater yellowlegs, least sandpiper (*Calidris minutilla*), semipalmated sandpiper (*Calidris pusilla*), short-billed dowitcher (*Limnodromus griseus*), solitary sandpiper, and Wilson's snipe.

Out of the 11 shorebird species observed across all survey types, 7 species were identified within the Project Development Area and 11 were identified within the Local Study Area boundaries. Four species of shorebirds were recorded exclusively in the Local Study Area: American woodcock (*Scolopax minor*), lesser yellowlegs, short-billed dowitcher, and semipalmated sandpiper. There were no shorebird species that were observed exclusively in the Project Development Area or Regional Study Area.





Map Location

Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT SURVEY
- SHOREBIRD PRESENT
- SHOREBIRD ABSENT

BREEDING BIRD POINT COUNT SURVEY
- SHOREBIRD PRESENT
- SHOREBIRD ABSENT

MARSH MONITORING PROGRAM
- SHOREBIRD PRESENT

INCIDENTAL OBSERVATION
- SHOREBIRD PRESENT

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Shorebirds Made During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres
Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-9

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Date Saved: 11/25/2024 7:42:28 AM User Name: gld_rduval

5.3.2.1 Breeding Bird Point Count Surveys

A total of five shorebird species were recorded during point count surveys across all survey years and seasons (**Table 5-5**). All species were also detected during autonomous recording unit surveys (**Section 5.3.2.2**). Point count observers detected three shorebird species at plots established within the Project Development Area, four species at plots within the Local Study Area, and one species in the Regional Study Area (**Table 5-5**). The shorebird species with the highest total observations recorded during point count surveys from 2018 to 2022 were greater yellowlegs (45 total observations) and Wilson's snipe (15 total observations). No more than one individual of each shorebird species was detected during any one point count survey.

Table 5-5: Shorebird Observations During Breeding Bird Point Count Surveys, 2018, 2019 and 2022

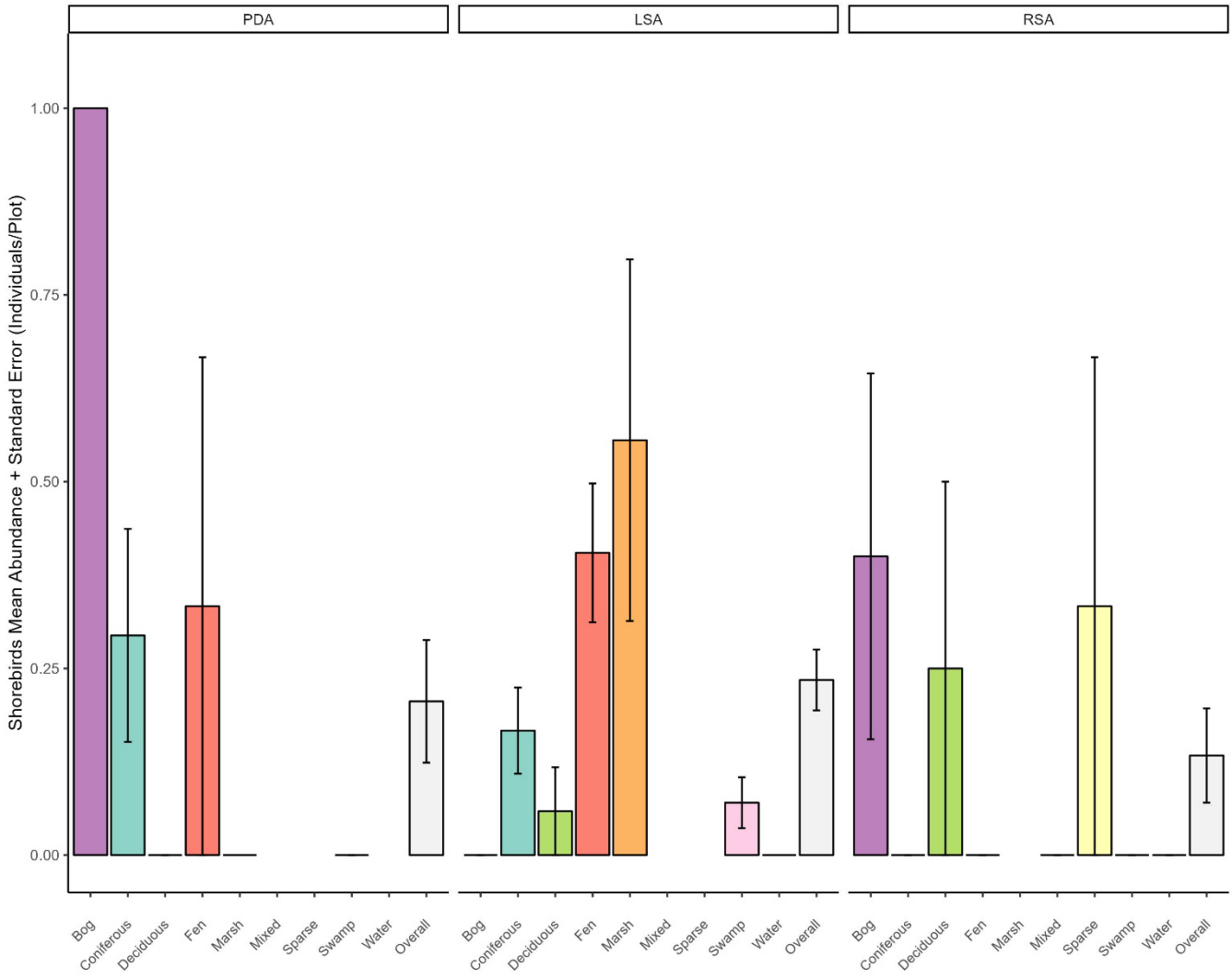
Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
Greater yellowlegs	*Tringa melanoleuca*	4	37	4	45
Killdeer	*Charadrius vociferus*	1	0	0	1
Solitary sandpiper	*Tringa solitaria*	0	1	0	1
Spotted sandpiper	*Actitis macularius*	0	1	0	1
Wilson's snipe	*Gallinago delicata*	2	13	0	15
Number of Species Detected		**3**	**4**	**1**	**5**

PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-10 and **Figure 5-11** provides a visual summary of shorebird relative abundance and species richness recorded at point count plots during 2018 to 2022 field surveys. Results are presented across the three study areas sampled from 2018 to 2022 and summarize mean observations by habitat type sampled. All data were collected during the breeding season in 2018 to 2022 when species breeding in the study area are most likely to be spontaneously calling. Shorebird relative abundance was highest in the marsh (0.6 ± 0.2 individuals per plot visit) and fen (0.4 ± 0.1 individuals per plot visit) habitat types in the Local Study Area. In the Regional Study Area, mean relative abundance of shorebirds was highest in the bog (0.4 ± 0.2 individuals per plot visit) habitat type. When data were pooled across habitat types, mean shorebird abundance was similar in the Project Development Area (0.2 ± 0.1 individuals per plot visit), the Local Study Area (0.2 ± 0.04 individuals per plot visit), and the Regional Study Area (0.1 ± 0.1 individuals per plot visit).

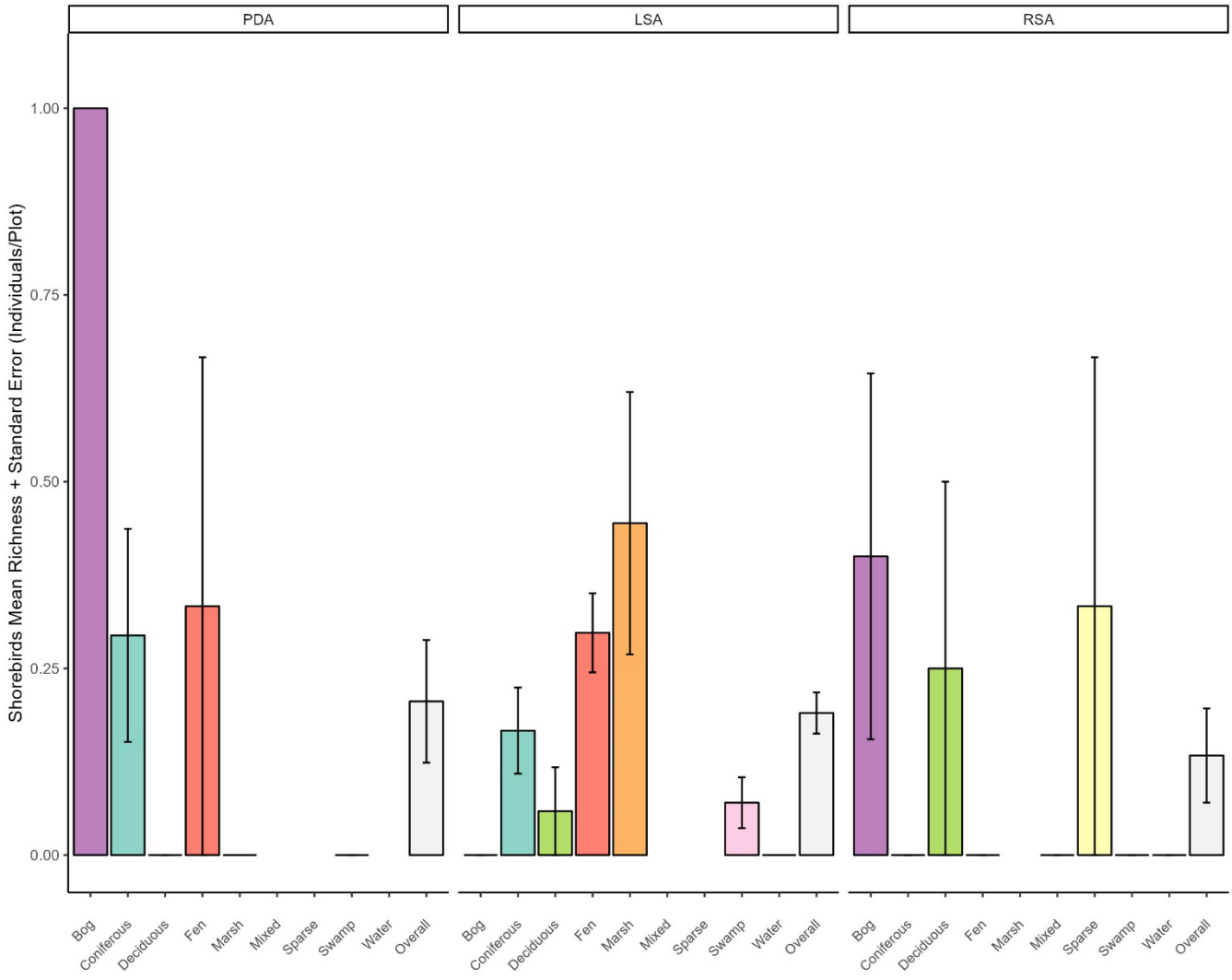
Species richness values recorded for shorebirds reflected patterns observed for relative abundance; the highest mean species richness values were recorded in the bog habitat type in the Project Development Area (1.0 species [SE not available due to low sample size]), marsh and fen habitat types in the Local Study Area (0.4 ± 0.2 species and 0.3 ± 0.1 species, respectively); and bog habitat type in the Regional Study Area (0.4 ± 0.2 [1SE] species) (**Figure 5-11**). When data were pooled across habitat types, mean shorebird species richness was similar in the Project Development Area (0.2 ± 0.1species), the Local Study Area (0.2 ± 0.03 species), and Regional Study Area (0.1 ± 0.1 species) (**Figure 5-11**).

Figure 5-10: Shorebird Mean Relative Abundance Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-11: Shorebird Mean Species Richness Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

5.3.2.2 Bird Autonomous Recording Unit Surveys

A total of 11 shorebird species were recorded on bird autonomous recording units across all seasons (**Table 5-6**). Shorebirds detected included one species at risk (lesser yellowlegs) and eight priority bird species (lesser yellowlegs, black-bellied plover, greater yellowlegs, least sandpiper, semipalmated sandpiper, short-billed dowitcher, solitary sandpiper, and Wilson's snipe). Across all seasons, autonomous recording units detected 6 species at plots established within the Project Development Area and 11 species were detected at plots within the Local Study Area (**Table 5-6**). The total number of shorebirds detected at all autonomous recording unit plots varied by season as follows (**Table 5-6**):

- Spring: eight species;
- Breeding: nine species;
- Fall: six species; and
- Winter: zero species.

The shorebird species with the greatest total detections recorded on autonomous recording units throughout all seasons were Wilson's snipe (222 detections) and greater yellowlegs (202 detections) (**Table 5-6**). The shorebird species with the maximum number of individuals detected during a single survey visit was greater yellowlegs (two individuals).

Table 5-6: Shorebird Detections During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
American woodcock	*Scolopax minor*	3	3	0	0	0	6	**6**
Black-bellied plover	*Pluvialis squatarola*	0	0	7	0	1	6	**7**
Greater yellowlegs	*Tringa melanoleuca*	47	124	31	0	9	193	**202**
Killdeer	*Charadrius vociferus*	2	3	1	0	0	6	**6**
Least sandpiper	*Calidris minutilla*	0	0	4	0	1	3	**4**
Lesser yellowlegs	*Tringa flavipes*	2	3	0	0	0	5	**5**
Semipalmated sandpiper	*Calidris pusilla*	0	1	0	0	0	1	**1**
Short-billed dowitcher	*Limnodromus griseus*	1	1	0	0	0	2	**2**
Solitary sandpiper	*Tringa solitaria*	2	5	1	0	1	7	**8**
Spotted sandpiper	*Actitis macularius*	2	25	1	0	3	25	**28**
Wilson's snipe	*Gallinago delicata*	46	176	0	0	19	203	**222**

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Number of Species Detected		8	9	6	0	6	11	11

PDA = Project development area; LSA = Local Study Area.

Figure 5-12 and **Figure 5-13** provide a visual summary of shorebird relative abundance and species richness recorded on autonomous recording units during the 2022 field surveys. Results are presented by habitat type and by season to illustrate how detection trends changed throughout the year (2022 to early 2023 [i.e., winter]) and across the various habitats sampled. Note that no autonomous recording units were established within the Regional Study Area outside of the Local Study Area boundaries (**Section 4.2.3**). The following information provides a summary of shorebird observations made on autonomous recording units in 2022 with a focus on the spring migration and breeding seasons when these species are most likely to occur in the study area and are also most likely to be spontaneously calling.

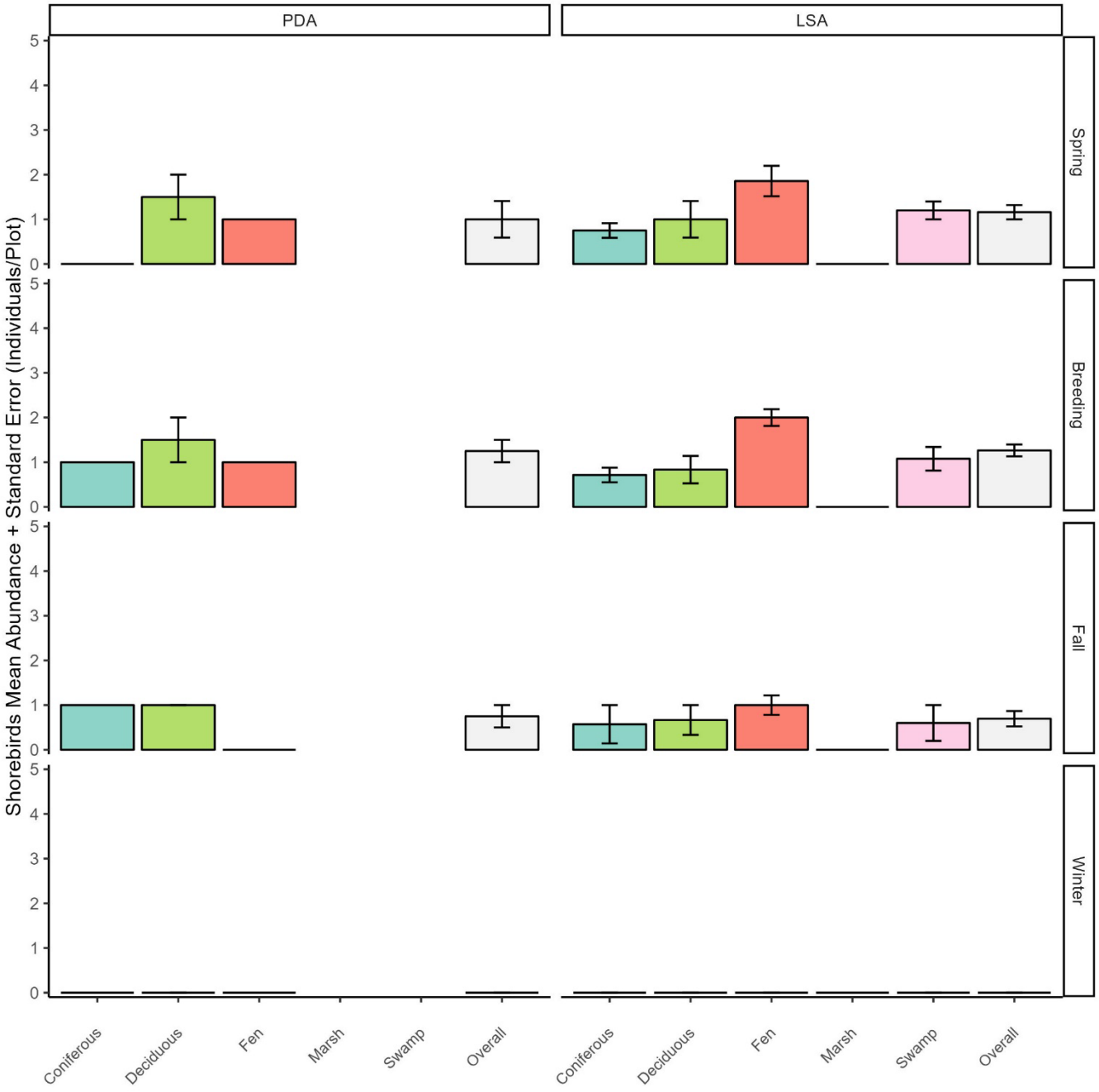
Mean relative abundance for all shorebird species was highest during the breeding season followed by spring migration. Overall, for all seasons, most shorebird observations occurred in the fen habitat type; no detections of shorebirds were made in the marsh habitat type. The highest relative abundance values recorded in the Project Development Area (all seasons combined) were made in the deciduous forest habitat type. In the Local Study Area, the highest relative abundance values were recorded in the fen habitat types (**Figure 5-12**). When data were pooled across habitat types during the breeding season, shorebird abundance recorded on autonomous recording units was similar in the Project Development Area
(1.3 ± 0.3 individuals per plot visit) and Local Study Area (1.3 ± 0.1 individuals per plot visit) (**Figure 5-12**).

Species richness values recorded for shorebirds reflected patterns observed for relative abundance; the highest mean species richness values recorded in the Project Development Area were in the deciduous forest habitat type. In the Local Study Area, the highest mean species richness values were recorded in the fen habitat type (**Figure 5-13**). Mean species richness of shorebirds recorded during the breeding season varied across habitat types and study areas and ranged from 0.6 species recorded at autonomous recording unit plots in coniferous forest habitat in the Local Study Area to 1.5 species recorded at autonomous recording unit plots in deciduous forest habitat in the Project Development Area (**Figure 5-13**). Within the Local Study Area during the breeding season, the highest species richness was recorded in the fen habitat type (1.4 ± 0.1 species).

Across pooled habitat types, autonomous recording unit plots in the Project Development Area recorded a similar mean species richness (1.3 ± 0.3 species) as autonomous recording units placed in the Local Study Area (1.0 ± 0.1 species).

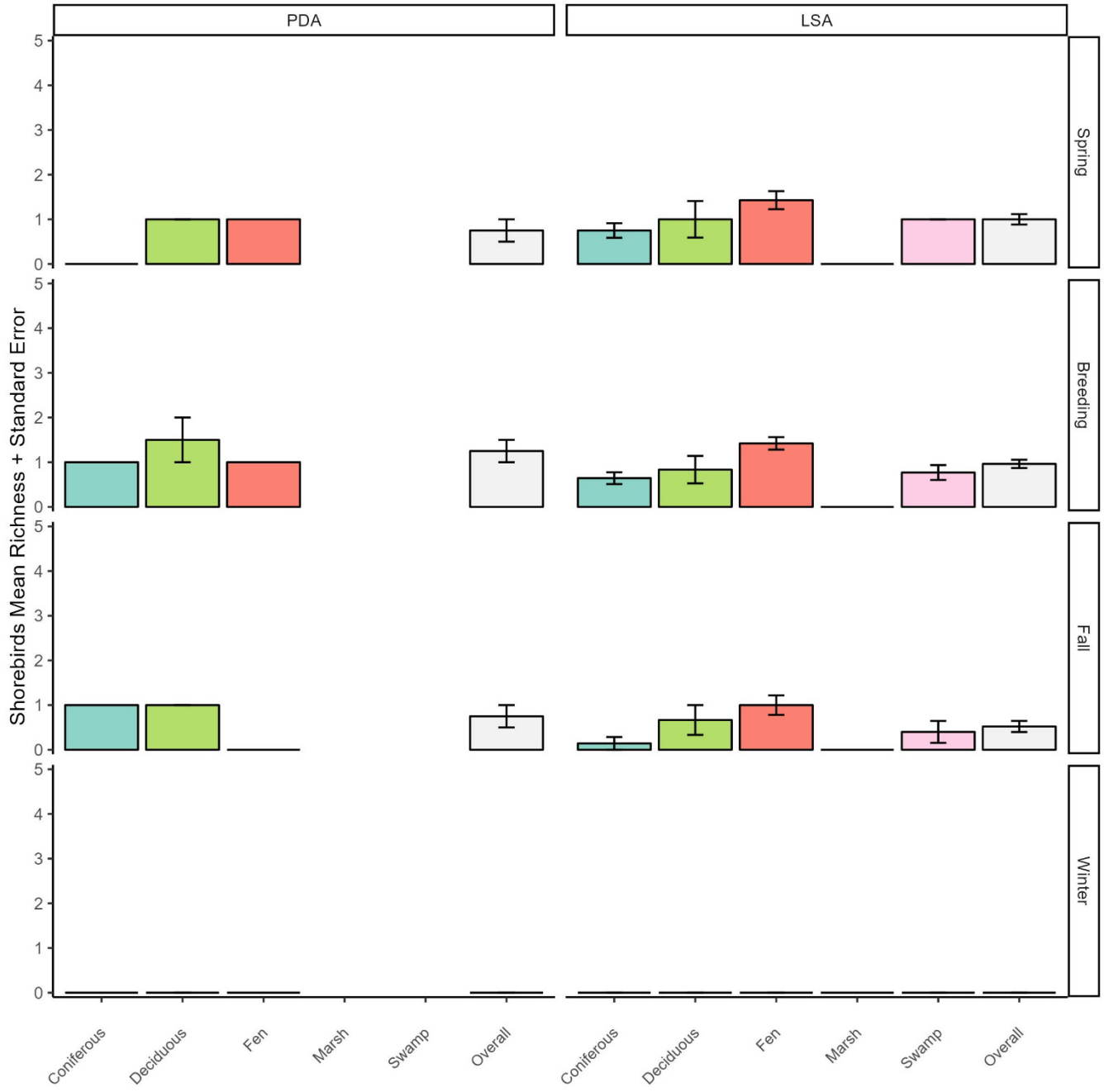
Figure 5-14 displays pooled shorebird abundance values (i.e., all individuals classified as shorebirds) recorded at autonomous recording unit plots to demonstrate where shorebirds occurred within the Project study areas. Values displayed for abundance represent the maximum number of shorebird individuals detected at an autonomous recording unit plot during a single “visit” (i.e., single audio file). Relative abundance of shorebirds was relatively consistent across the Local Study Area; however, the greatest abundances were detected at a plot west of Painter Lake in the southern portion of the Local Study Area, and north of Teabeau Lake in the north-central portion of the Local Study Area (**Figure 5-14**).

Figure 5-12: Relative Abundance of Shorebirds Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022

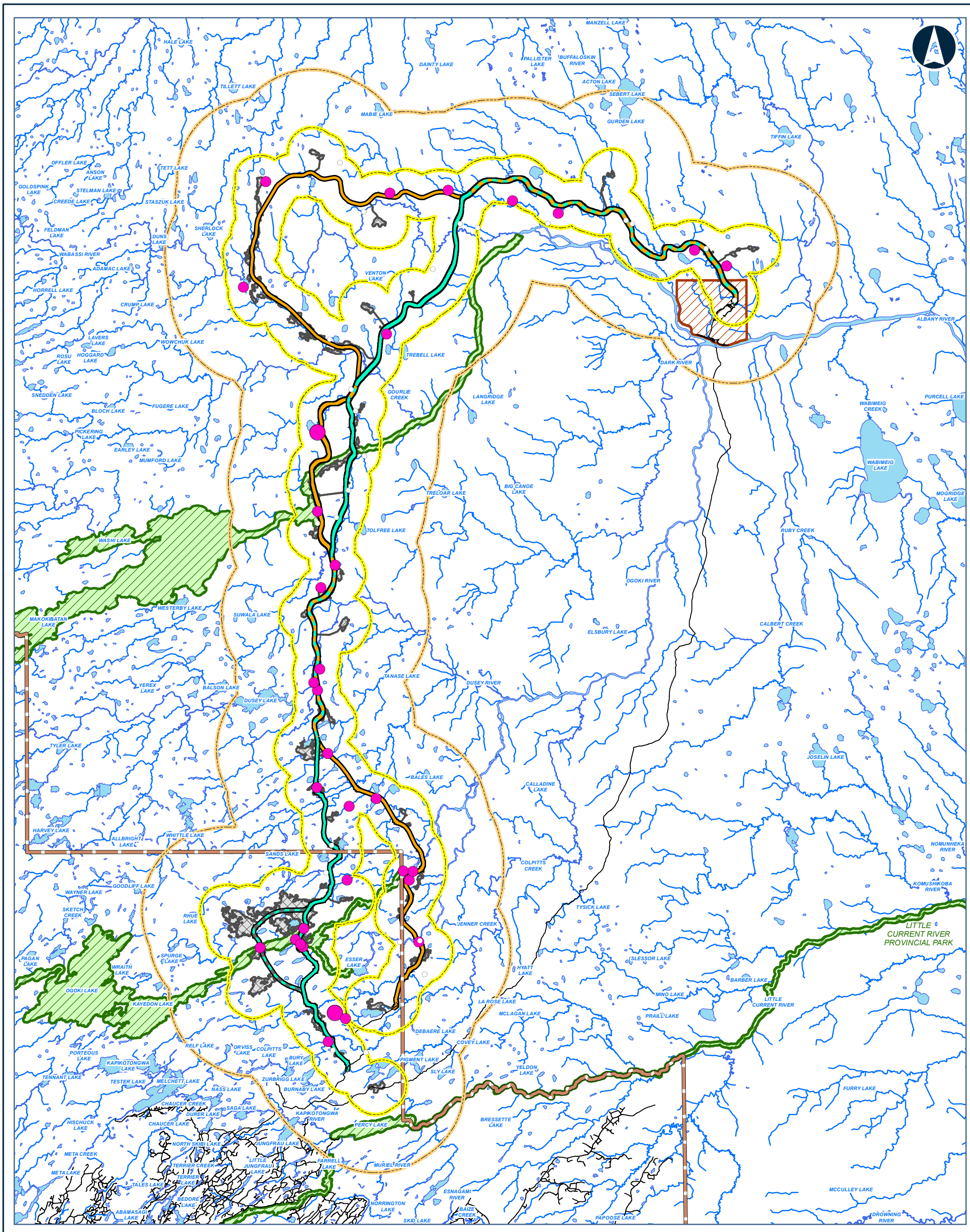


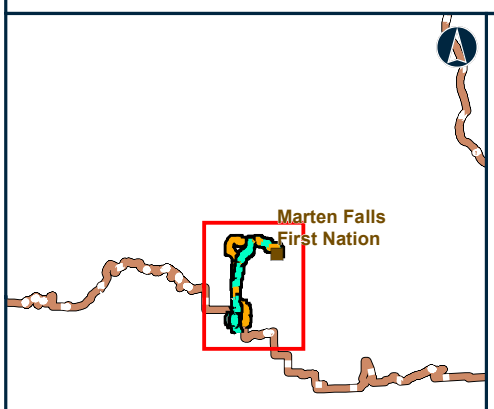
Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-13: Shorebirds Mean Species Richness Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.





Map Location

Legend

ABUNDANCE OF SHOREBIRDS AT AUTONOMOUS RECORDING UNIT SURVEY LOCATIONS

- 2
- 1
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Shorebird Abundance Recorded During Autonomous Recording Unit Breeding Season Surveys in the Local Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
Rev:0	

Figure 5-14

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_14_GIS_Abundance_Shorebirds_ARU_2022.mxd
Date Saved: 11/25/2024 7:35:56 AM User Name: gld_rduval

5.3.2.3 Targeted Species at Risk Autonomous Recording Unit Surveys

Wilson's snipe was the only shorebird detected as part of species at risk autonomous recording unit monitoring in 2022 and was recorded at two locations in the Local Study Area.

5.3.2.4 Shorebird Breeding Aerial Surveys

A total of 82 shorebird individuals, representing 3 species were identified during the breeding aerial surveys in 2022. Greater yellowlegs was the most abundant species detected with 52 adults, including 5 pairs, identified during combined survey rounds. Spotted sandpipers (*Actitis macularia*) were also commonly observed (28 adults observed, including 2 pairs), and solitary sandpiper were least observed (2 adults). No shorebird broods were observed during breeding surveys.

5.3.2.5 Shorebird Spring and Fall Migration Aerial Surveys

Shorebird detections in the study areas were highest during the spring migration aerial survey. A total of 116 individuals, representing two identified shorebird species, as well as unidentified shorebirds, were identified during the spring migration aerial survey. Spotted sandpiper was the most commonly identified species, with 86 individuals recorded during the spring survey. One semipalmated sandpiper was also identified and the remaining 29 individuals were unidentified.

The highest number of shorebirds was detected on the Ogoki River during the spring migration survey. Smaller numbers of shorebirds were also recorded on the Albany River, Brundrit Lake, Glaze Lake, Saarimaki Lake, Tolfree Lake, and Winslow Lake, as well as three unnamed lakes (Lake 2, Lake 5, and Lake 15).

Only spotted sandpiper was recorded during the fall migration aerial survey; this species was recorded at Albany Main (Albany River and Teabeau Lake).

5.3.2.6 Incidental Observations

Three shorebird species (greater yellowlegs, Wilson's snipe, and spotted sandpiper) were detected incidentally during field surveys from 2018 to 2022; all were also detected during point count, autonomous recording unit, or aerial surveys.

5.4 Waterfowl and Waterbirds

5.4.1 Desktop Review

There is potential for 30 waterfowl and waterbird species to occur in the study areas (**Annex A**). Within Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield there are 16 waterfowl and waterbird priority species that could occur in the study areas (Environment Canada, 2013, 2014) (**Annex A**). Black tern (Oji-Cree translation, *gichisaga'iiganing gaadaashiyayaach binechiinch*) (*Chlidonia niger*) is the only waterfowl or waterbird species that is listed under the *Endangered Species Act* that could occur in the Project study areas; this species is considered Special Concern in Ontario (Government of Ontario, 2023a). There are no waterfowl or waterbird species that are listed under the *Species at Risk Act* that could occur in the study areas (Government of Canada, 2023a).

There were 19 waterfowl and waterbird species detected during Ontario Breeding Bird Atlas surveys in the broader region surrounding the Regional Study Area, including 13 Bird Conservation Region priority species (Birds Canada, 2023a). The waterfowl and waterbird species recorded at the highest relative abundance during Ontario Breeding Bird Atlas surveys were common loon (Oji-Cree translation, *maang*) (*Gavia immer*), mallard (Oji-Cree translation, *ininiship*) (*Anas platyrhynchos*), common merganser (*Mergus merganser*), and herring gull (*Larus argentatus*), though several species were recorded with no associated abundance value (Birds Canada, 2023a).

There were no observations of federal species at risk in the eBird observation database that are within the Regional Study Area. A black tern observation was made along the Ogoki River outside of the Regional Study Area boundaries in 2004 (eBird, 2023).

5.4.2 Field Survey Results

There were 25 species of waterfowl and waterbirds observed across all field survey types completed in the Regional Study Area from 2018 to 2022 (**Figure 5-15; Annex A**), including 14 priority species in Bird Conservation Region 7 – Taiga Shield and Hudson Plains or Bird Conservation Region 8 – Boreal Softwood Shield (**Annex A**). Most recorded species (15) were waterfowl (i.e., ducks, geese, and swans). No waterfowl or waterbird species at risk were observed during field surveys (**Annex A**).

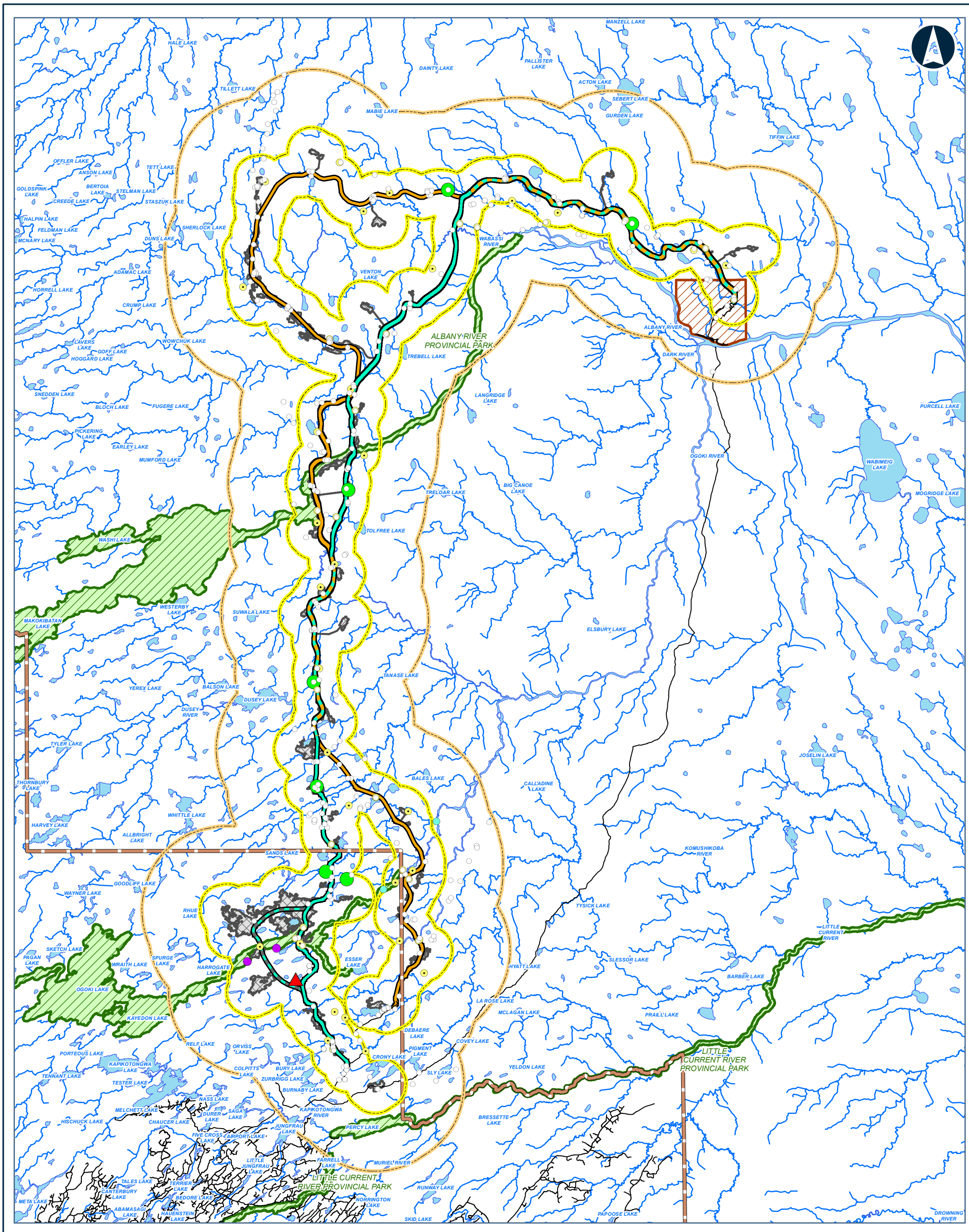
Observations of waterfowl and waterbirds included visual detections during waterfowl and waterbird breeding, spring, and fall migration aerial surveys, auditory detections made during autonomous recording unit surveys, and auditory or visual detections made during point count surveys (**Figure 5-15**). The total number of waterfowl and waterbird species observed by survey method are provided in **Table 5-7.**

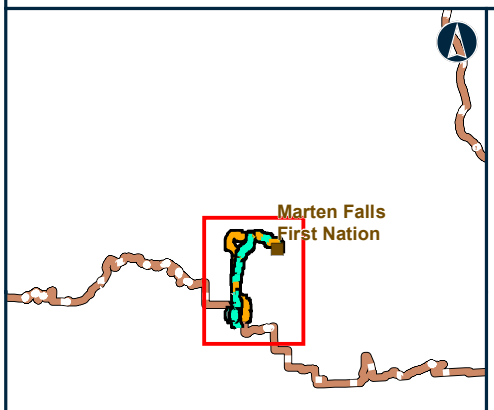
Table 5-7: Waterfowl and Waterbirds Observations by Survey Method.

Common Name	Scientific Name	Point Count Surveys	ARU Surveys	Targeted ARU Surveys	Marshbirds	Breeding Aerial	Spring Mig. Aerial	Fall Mig. Aerial	Incidental Obs.
American black duck	*Anas rubripes*		X			X	X	X	X
American coot	*Fulica americana*		X						
American wigeon	*Mareca americana*		X	X	X	X		X	X
Bonaparte's gull	*Chroicocephalus philadelphia*	X	X		X	X	X		X
Bufflehead	*Bucephala albeola*					X	X	X	
Blue-winged teal	*Spatula discors*					X	X	X	
Canada goose	*Branta canadensis*	X	X	X	X	X	X	X	X
Common goldeneye	*Bucephala clangula*	X	X		X	X	X	X	X
Common loon	*Gavia immer*	X	X	X	X	X	X	X	X
Common merganser	*Mergus merganser*	X	X			X	X	X	
Green-winged teal	*Anas carolinensis*					X	X		
Herring gull	*Larus smithsonianus*		x			X	X	X	
Hooded merganser	*Lophodytes cucullatus*					X		X	
Long-tailed duck	*Clangula hyemalis*		X						
Lesser scaup	*Aythya affinis*				X	X	X		X
Mallard	*Anas platyrhynchos*		X		X	X	X	X	X
Pied-billed grebe	*Podilymbus podiceps*								X
Ring-billed gull	*Larus delawarensis*		X						
Ring-necked duck	*Aythya collaris*		X		X	X	X	X	x
Red-necked grebe	*Podiceps grisegena*		X						
Snow goose	*Anser caerulescens*					X		X	
Trumpeter swan	*Cygnus buccinator*					X	X	X	
Tundra swan	*Cygnus columbianus*		X						
Wood duck	*Aix sponsa*		X			X			
Number of Species Detected		**5**	**16**	**3**	**8**	**18**	**14**	**14**	**10**

ARU = autonomous recording unit; SAR = Species at Risk; Mig. = migration; Obs. = observations.

Of the 25 species observed across all survey types, 19 species were identified within the Project Development Area, 23 species were identified within the Local Study Area, and 15 species were identified in the Regional Study Area. Long-tailed duck (Oji-Cree translation, *shesheeb*) (*Clangula hyemalis)* and ring-billed gull (*Larus delawarensis*) were observed exclusively in the Project Development Area, while red-necked grebe (*Podiceps grisegena*), wood duck (*Aix sponsa*), hooded merganser (*Lophodytes cuculatus*), great blue heron (Oji-Cree translation, *moskaohsih*) (*Ardea herodias*), pied-billed grebe, and green-winged teal (*Anas crecca*) were observed exclusively in the Local Study Area. No species were observed exclusively in the Regional Study Area.





Map Location

Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT SURVEY
- WATERFOWL OR WATERBIRD PRESENT
- WATERFOWL OR WATERBIRD ABSENT

BREEDING BIRD POINT COUNT SURVEY
- WATER BIRD OR WATERFOWL ABSENT

MARSH MONITORING PROGRAM
- WATERFOWL OR WATERBIRD PRESENT

INCIDENTAL OBSERVATION
- WATERFOWL OR WATERBIRD PRESENT

ACTIVE WATERFOWL OR WATERBIRD NEST OBSERVED
- TRUMPTER SWAN

COMMUNITY ACCESS ROAD ALTERNATIVES
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Waterfowl and Waterbirds During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-15

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Date Saved: 11/29/2024 11:35:12 AM User Name: gld_rduval

5.4.2.1 Breeding Bird Point Count Surveys

Five waterfowl or waterbird species were recorded during point count surveys across all survey years and seasons (**Table 5-8**). No more than one individual of each waterfowl and waterbird species was detected at any point count plot with the exception of two Canada geese observed at one plot location (excluding fly-over and fly-through detections). The highest total detection was a group of 35 Canada geese that was recorded as a fly-over (incidental observation) at one survey location.

Table 5-8: Waterfowl and Waterbirds Observations During Breeding Bird Point Count Surveys, 2018, 2019 and 2022

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
Bonaparte's gull	*Chroicocephalus philadelphia*	1	8	0	9
Canada goose	*Branta canadensis*	1	7	1	9
Common goldeneye	*Bucephala clangula*	0	2	0	2
Common loon	*Gavia immer*	0	6	1	7
Common merganser	*Mergus merganser*	0	1	0	1
Number of Species Detected		**2**	**5**	**2**	**5**

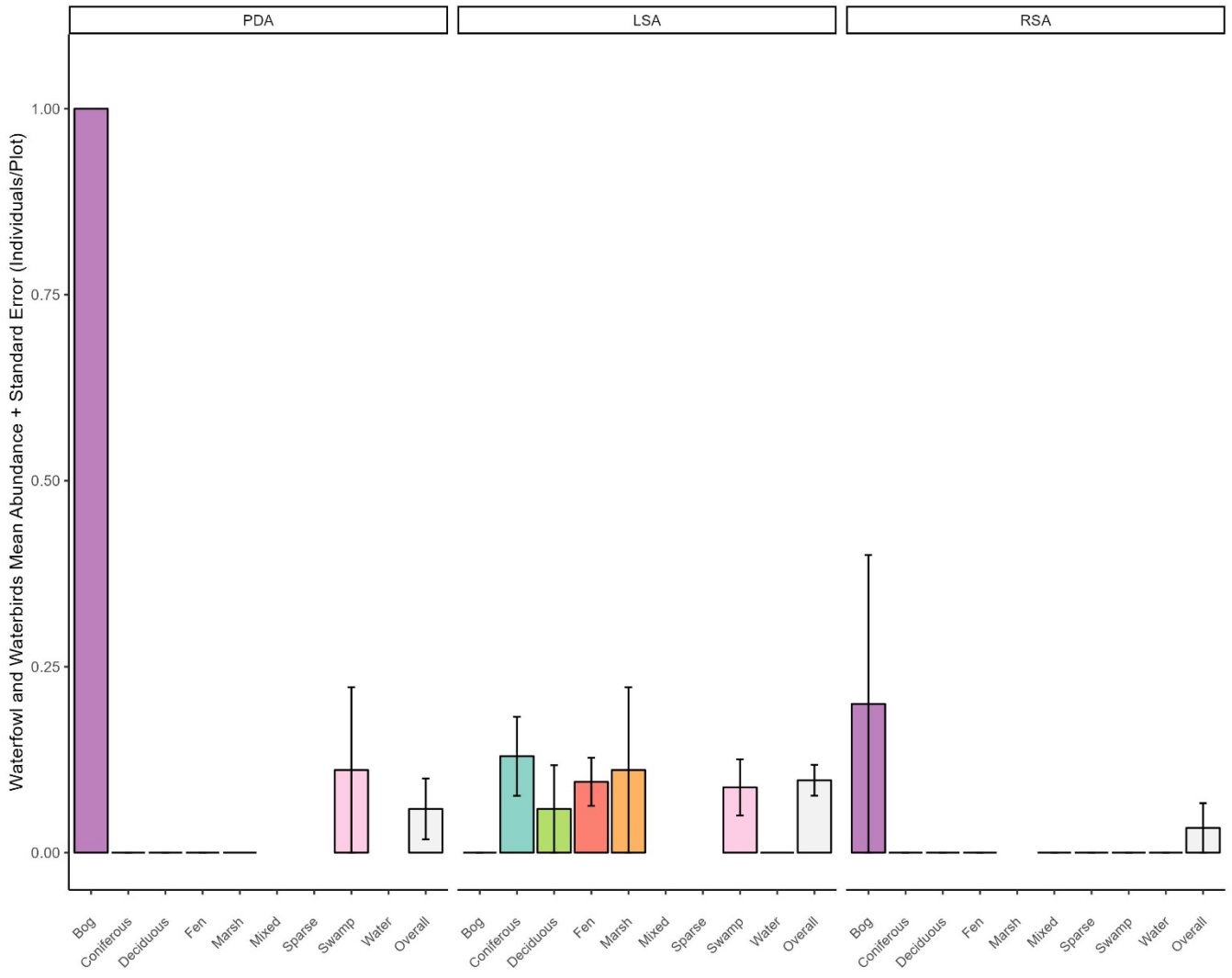
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-16 and **Figure 5-17** provide a visual summary of waterfowl and waterbird relative abundance and species richness recorded at point count plots during 2018 to 2022 field surveys. All data were collected during the breeding season in 2018 to 2022 when these species are most likely to occur in the study area and are also most likely to be spontaneously calling during breeding displays.

Patterns of mean relative abundance of waterfowl and waterbird species by habitat type differed by study area (**Figure 5-16**). Within the Project Development Area, mean relative abundance of waterfowl and waterbirds was only detected in the bog (1.0 individuals per plot visit [SE not available due to low sample size]) and swamp (0.1 ± 0.1 individuals per plot visit) habitat types (**Figure 5-16**). Waterfowl and waterbird relative abundance was highest in the coniferous forest (0.1 ± 0.1 individuals per plot visit) and marsh (0.1 ± 0.1 individuals per plot visit) habitat types in the Local Study Area (**Figure 5-16**). In the Regional Study Area, waterfowl and waterbirds were only detected in the bog habitat type (0.2 ± 0.2 individuals per plot visit) (**Figure 5-16**). When data were pooled across habitat types, mean waterfowl and waterbird abundance was similar across the Project Development Area (0.1 ± 0.04 individuals per plot visit) and Local Study Area (0.1 ± 0.02 individuals per plot visit) but slightly lower in the Regional Study Area (0.03 ± 0.03 individuals per plot visit) (**Figure 5-16**).

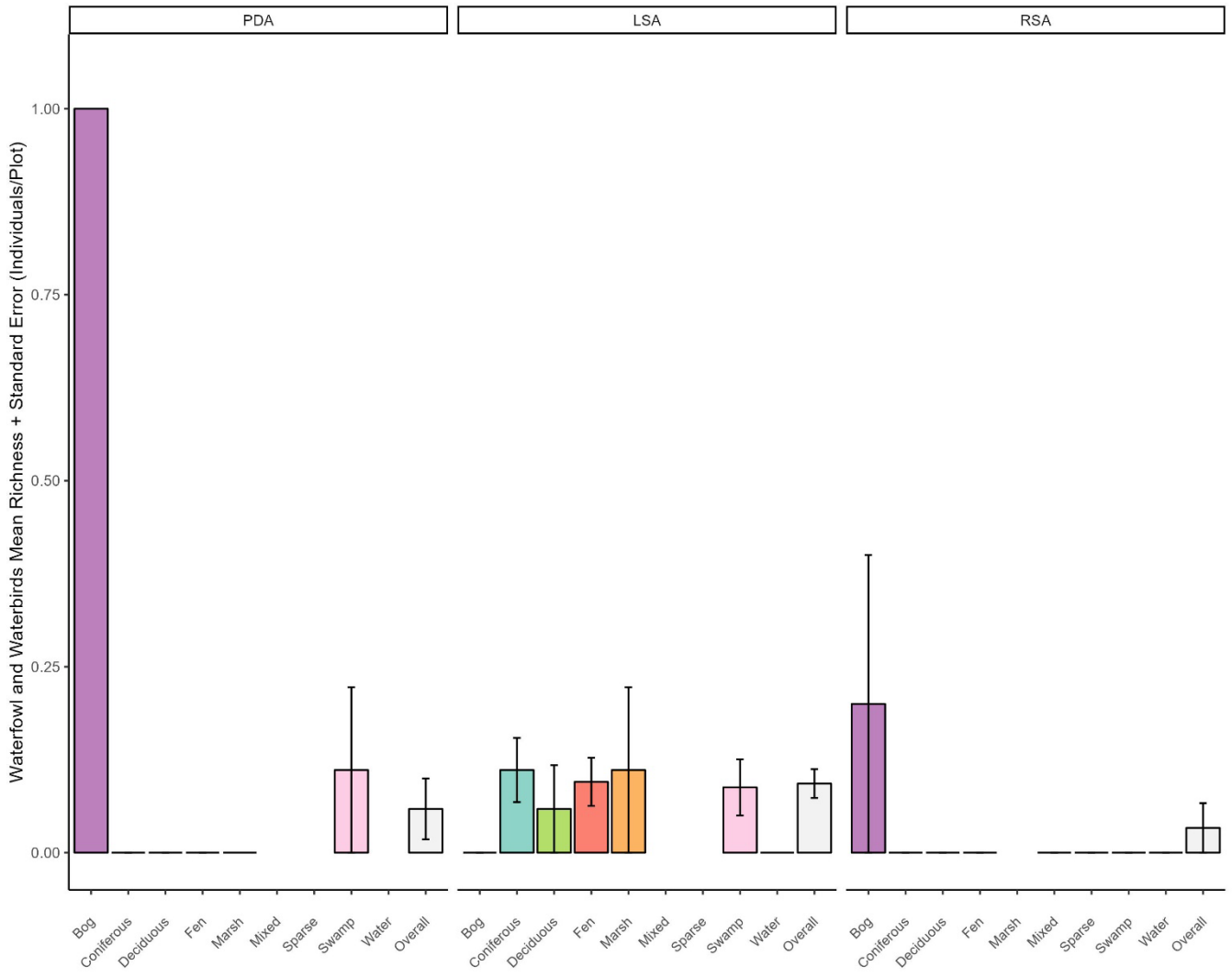
Species richness values recorded for waterfowl and waterbirds reflected patterns observed for relative abundance in the Project Development Area; the highest mean species richness values recorded in the Project Development Area were made in the bog (1.0 species [SE not available due to low sample size]) and swamp (0.1 ± 0.1 species) habitat types. However, in the Local Study Area, mean species richness was similar across coniferous forest, marsh, fen, swamp, and deciduous forest habitat types **(Figure 5-17**). Across all study areas sampled from 2018 to 2022, the Local Study Area had the highest mean species richness (0.1 ± 0.02 species) and the Regional Study Area had the lowest mean species richness (0.03 ± 0.03 species), when habitat types were pooled.

Figure 5-16: Waterfowl and Waterbirds Mean Relative Abundance Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-17: Waterfowl and Waterbirds Mean Species Richness Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

5.4.2.2 Bird Autonomous Recording Unit Surveys

A total of 17 waterfowl and waterbird species were recorded on autonomous recording units across all seasons (**Table 5-9**). Five waterfowl and waterbird species were detected during autonomous recording unit surveys that were not detected during breeding or migration aerial surveys: American coot (*Fulica americana*), long-tailed duck (*Clangula hyemalis*), ring-billed gull, ring-necked duck (*Aythya collaris*), and tundra swan (Oji-Cree translation, *waabihssi*) (*Cygnus columbianus*).

Autonomous recording units detected 8 species at plots established within the Project Development Area and 15 species at plots within the Local Study Area (excluding the Project Development Area) over all seasons (**Table 5-9**). The total number of waterfowl and waterbirds detected at all autonomous recording unit plots varied by season as follows (**Table 5-9**):

- Spring: 11 species;
- Breeding: 10 species;
- Fall: 7 species; and
- Winter: 0 species.

The waterfowl and waterbird species with the greatest total observations (i.e., the maximum number of individuals detected during a single survey visit across all monitoring season) recorded on all-season autonomous recording units were Canada goose and snow goose (*Anser caerulescens*).

Table 5-9: Waterfowl and Waterbird Detections During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
American black duck	*Anas rubripes*	0	2	0	0	0	2	2
American coot	*Fulica americana*	3	1	0	0	1	3	4
American wigeon	*Mareca americana*	2	16	0	0	0	18	18
Bonaparte's gull	*Chroicocephalus philadelphia*	6	21	0	0	9	18	27
Canada goose	*Branta canadensis*	246	75	27	0	36	312	348
Common goldeneye	*Bucephala clangula*	13	8	0	0	1	20	21
Common loon	*Gavia immer*	30	45	17	0	10	82	92
Common merganser	*Mergus merganser*	0	6	0	0	0	6	6
Herring gull	*Larus argentatus*	2	0	1	0	0	3	3

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Long-tailed duck	*Clangula hyemalis*	2	0	0	0	2	0	2
Mallard	*Anas platyrhynchos*	3	5	1	0	0	9	9
Red-necked grebe	*Podiceps grisegena*	1	0	0	0	0	1	1
Ring-billed gull	*Larus delawarensis*	1	0	0	0	1	0	1
Ring-necked duck	*Aythya collaris*	0	7	0	0	0	7	7
Snow goose	*Anser caerulescens*	0	0	5	0	0	5	5
Tundra swan	*Cygnus columbianus*	0	0	8	0	4	4	8
Wood duck	*Aix sponsa*	0	0	1	0	0	1	1
Number of Species Detected		**11**	**10**	**7**	**0**	**8**	**15**	**17**

PDA = Project Development Area; LSA = Local Study Area.

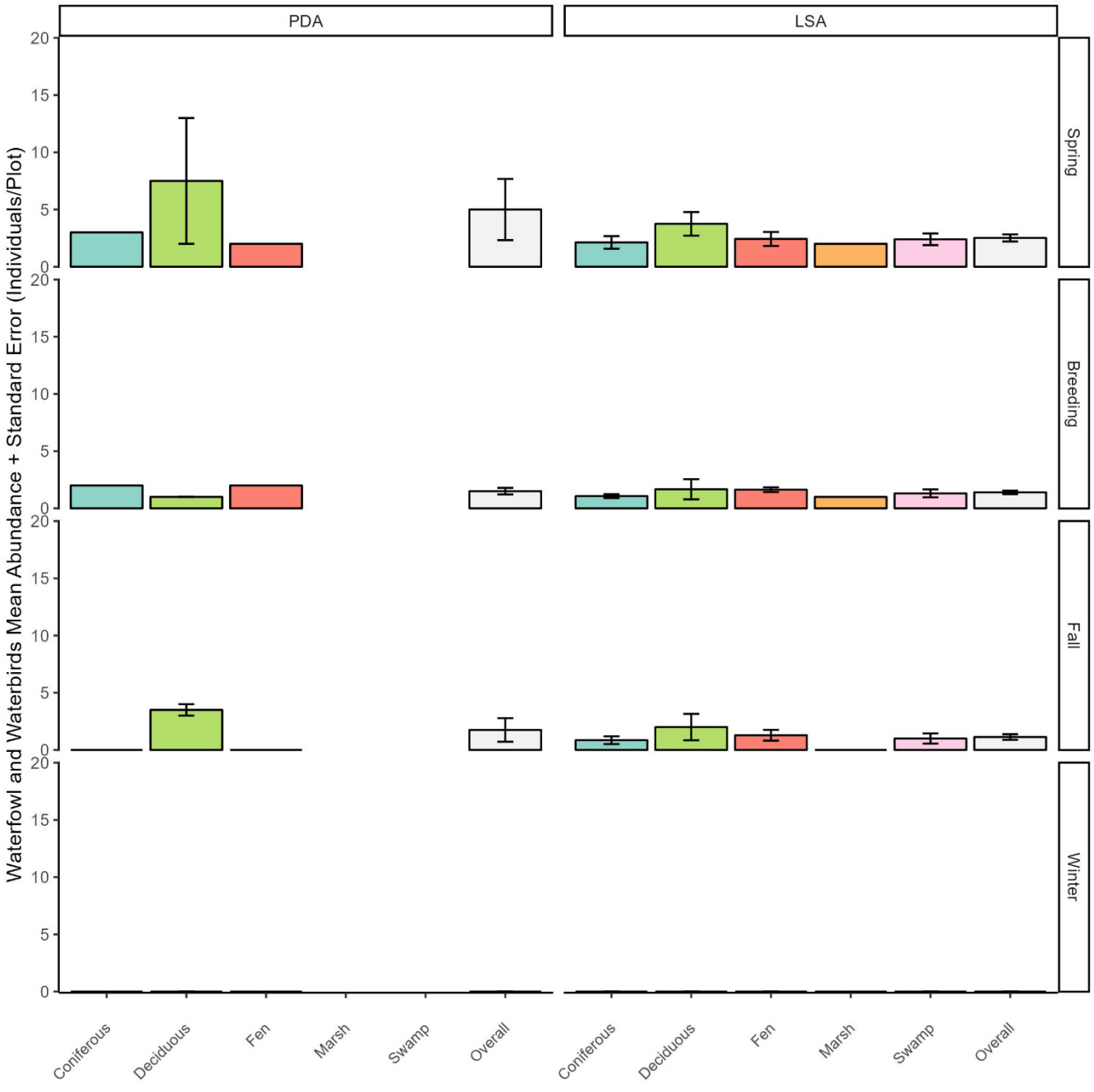
Figure 5-18 and **Figure 5-19** provide a visual summary of waterfowl and waterbird relative abundance and species richness recorded on autonomous recording units during the 2022 field surveys. Results are presented by habitat type and by season to illustrate how detection trends changed throughout the year (2022 to early 2023 [i.e., winter]) and across the various habitats sampled. Note that no autonomous recording units were established within the Regional Study Area (**Section 4.2.3**) and no detections of waterfowl or waterbirds were made in the winter. The following information provides a summary of waterfowl and waterbird observations made on autonomous recording units in 2022 with a focus on the breeding season when these species are most likely to occur in the study area and are also most likely to be spontaneously calling from breeding territories.

The highest relative abundance values recorded in the Project Development Area and Local Study Area were made during the spring in the deciduous forest habitat type. The highest relative abundance values recorded during the breeding season in the Project Development Area were in the coniferous forest and fen habitat type (2.0 individuals per plot visit, for habitat type [SE not able to be calculated due to low sample size]). In the Local Study Area, autonomous recording unit monitoring during the breeding season indicated that the relative abundance of waterfowl and waterbirds was highest in deciduous habitat type (1.7 ± 0.9 individuals per plot visit) (**Figure 5-18**). When data were pooled across habitat types during the breeding season, waterfowl and waterbird abundance recorded on autonomous recording units was similar in the Project Development Area (1.5 ± 0.3 individuals per plot visit) and the Local Study Area (1.4 ± 0.2 individuals per plot visit) (**Figure 5-18**).

Species richness values recorded for waterfowl and waterbirds reflected patterns observed for relative abundance; the highest mean species richness values recorded in the Project

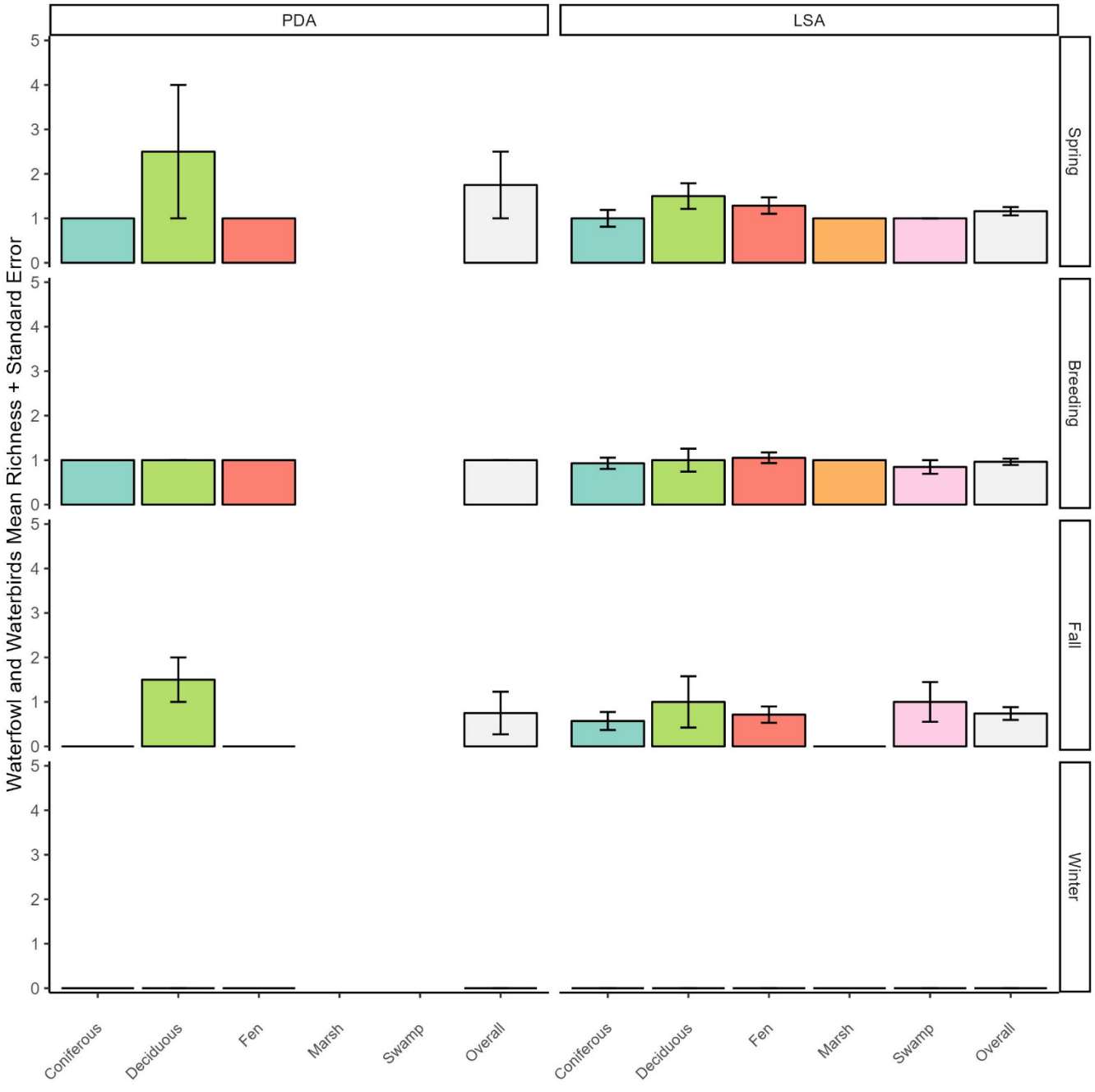
Development Area and Local Study Area were made during the spring in the deciduous forest habitat type (**Figure 5-19**). Mean species richness of waterfowl and waterbirds recorded during the breeding season varied across habitat types and study areas and ranged from 0.9 (± 0.2) species recorded at autonomous recording unit plots in swamp habitat in the Local Study Area to 1.1 (± 0.1) species recorded at autonomous recording unit plots in fen habitat in the Local Study Area (**Figure 5-19**). Across pooled habitat types, autonomous recording unit plots in the Project Development Area recorded a similar mean species richness (1.0 ± 0.0 species) as autonomous recording units placed in the Local Study Area (1.0 ± 0.1 species).

Figure 5-18: Relative Abundance of Waterfowl and Waterbirds Observed During Autonomous Recording Surveys, 2022



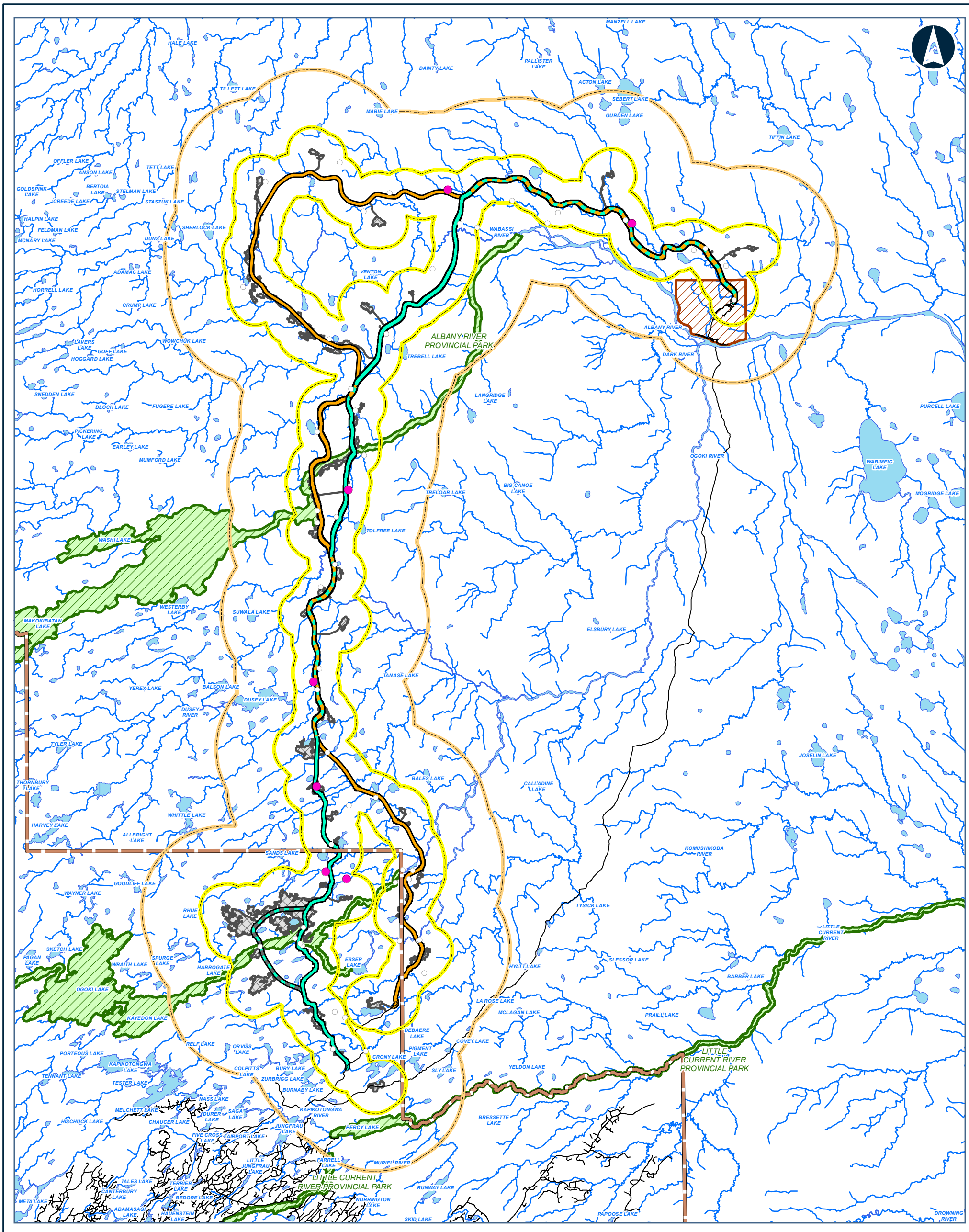
Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

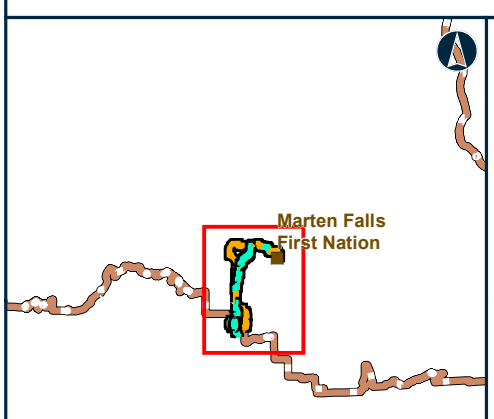
Figure 5-19: Waterfowl and Waterbirds Mean Species Richness Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-20 displays pooled waterfowl and waterbird abundance values (i.e., all individuals classified as waterfowl and waterbirds) recorded at autonomous recording unit plots to demonstrate where waterfowl and waterbirds occurred within the Project study areas. Values displayed for abundance represent the maximum number of waterfowl and waterbird individuals detected at an autonomous recording unit plot during a single “visit” (i.e., single audio file). A conservative approach was taken with all autonomous recording unit analyses to avoid double-counting, and only individuals recognized by the interpreters as multiple individuals, either through corresponding calls or overlapping individuals were recorded. While waterfowl and waterbird abundance detected across the Local Study Area was relatively low, autonomous recording unit plots in the south portion of the Local Study Area recorded the greatest abundances of waterfowl and waterbirds (**Figure 5-20**).





Legend

ABUNDANCE OF WATERFOWL AND WATERBIRDS AT AUTONOMOUS RECORDING UNIT SURVEY LOCATIONS

- 1
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Waterfowl and Waterbird Abundance Recorded During Autonomous Recording Unit Breeding Season Surveys in the Local Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-20

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_20_GIS_Abundance_WaterfowlWaterbirds_ARU_2022.mxd
Date Saved: 11/25/2024 8:16:49 AM User Name: gld_rduval

5.4.2.3 Targeted Species at Risk Autonomous Recording Unit Surveys

Three species of waterfowl and waterbirds were detected as part of species at risk autonomous recording unit monitoring in 2022: Canada goose, American wigeon (*Mareca americana*), and common loon. Each species was recorded at a single location located in the southern area of the Local Study Area.

5.4.2.4 Marshbird Call Playback Survey

No waterfowl or waterbird species targeted by marshbird call playback surveys (i.e., pied-billed grebe) were observed during the 2018 or 2022 surveys.

5.4.2.5 Waterfowl and Waterbird Breeding Aerial Surveys

A total of 18 waterfowl and waterbird species were identified as part of 2022 breeding aerial surveys (**Table 5-10**). Ring-necked duck was the most abundant species detected with 237 adults, including 55 pairs, identified during combined survey rounds (**Table 5-10**). The next most abundant species observed were Bonaparte's gull (145 adults observed, including 32 pairs) and common goldeneye (101 adults observed, including 10 pairs). Broods were recorded for three species of waterfowl and waterbirds: Canada goose (three broods containing a total of 13 young), common goldeneye (five broods containing a total of 34 young), and ring-necked duck (two broods containing a total of 10 young) (**Table 5-10**).

Table 5-10: Waterfowl and Waterbirds Observed During Breeding Aerial Surveys, 2022

Common Name	Scientific Name	Number of Observations			
		Adults	Young	Pairs	Broods
American black duck	*Anas rubripes*	23	0	5	0
American wigeon	*Mareca americana*	4	0	2	0
Bonaparte's gull	*Chroicocephalus philadelphia*	145	0	32	0
Bufflehead	*Bucephala albeola*	10	0	3	0
Blue-winged teal	*Spatula discors*	6	0	2	0
Canada goose	*Branta canadensis*	72	13	21	3
Common goldeneye	*Bucephala clangula*	101	34	10	5
Common loon	*Gavia immer*	62	0	22	0
Common merganser	*Mergus merganser*	34	0	0	0
Great blue heron	*Ardea herodias*	2	0	1	0
Green-winged teal	*Anas crecca*	6	0	2	0
Herring gull	*Larus argentatus*	8	0	1	0
Hooded merganser	*Lophodytes cucullatus*	13	0	2	0
Lesser scaup	*Aythya affinis*	2	0	1	0

Common Name	Scientific Name	Number of Observations			
		Adults	Young	Pairs	Broods
Mallard	*Anas platyrhynchos*	51	0	7	0
Ring-necked duck	*Aythya collaris*	237	10	55	2
Trumpeter swan	*Cygnus buccinator*	7	0	2	0
Wood duck	*Aix sponsa*	3	0	1	0

Only one waterfowl or waterbird nest (trumpeter swan; *Cygnus buccinator*) was identified in the study areas during breeding aerial surveys; this nest was at McCaw Lake and was observed on June 23, 2022 (**Figure 5-15**). McCaw Lake occurs between the two possible routes for Alternative 4 to cross the Ogoki River.

5.4.2.6 Waterfowl and Waterbird Spring and Fall Migration Aerial Surveys

A total of 14 waterfowl and waterbird species were identified during spring migration and 14 species were identified during fall migration aerial surveys in 2022 (**Table 5-11**). The highest waterfowl and waterbird relative abundances during the spring survey were recorded at Lake 2 (unnamed lake) and Lake 20 (unnamed lake), while Lake 11 (unnamed lake) and Ogoki Main (Ogoki River, Harrogate Lake, Patience Lake) had the highest species richness (**Table 5-11**). The highest relative abundance during the fall migration survey was recorded at Lake 18 (unnamed lake); this lake had the highest relative abundance for both migration surveys with fall migration abundance estimates that were approximately 17 times higher than the next largest abundance estimate (**Table 5-11**). During the fall migration surveys, the highest species richness was recorded at Ogoki Main and Albany Main (Albany River, Teabeau Lake).

Table 5-11: Species Richness and Relative Abundance of Waterfowl and Waterbird Species Recorded During Spring and Fall Migration Surveys, 2022

Site Name	Watercourse or Waterbody Name	Surveyed Area (ha)	Species Richness (number of species)		Relative Abundance (individuals / ha)	
			Spring 2022	Fall 2022	Spring 2022	Fall 2022
Albany Main	Albany River, Teabeau Lake	1,388.6	9	8	0.1	0.1
Albany 2	Albany River 2	122.1	4	0	0.4	0.0
Lake 1	Painter Lake	276.0	4	4	0.1	<0.1
Lake 2	unnamed lake	150.8	6	4	0.5	0.3
Lake 3	unnamed lake	141.5	7	0	0.3	0.0
Lake 4	Brundrit Lake	138.7	4	1	0.1	<0.1
Lake 5	unnamed lake	111.5	2	3	<0.1	<0.1
Lake 6	Winslow Lake	107.9	3	1	0.2	<0.1
Lake 7	Tolfree Lake	189.7	8	4	0.3	0.1
Lake 8	Trebell Lake	193.6	6	2	0.2	0.2
Lake 9	Gittins Lake	218.4	1	2	<0.1	0.1
Lake 10	Glaze Lake	146.7	5	3	0.1	0.4
Lake 11	Saarimaki Lake	185.8	13	6	0.3	0.4
Lake 12	unnamed lake	144.7	1	1	<0.1	<0.1
Lake 13	unnamed lake	64.2	3	3	0.1	0.2
Lake 14	unnamed lake	75.1	3	1	0.1	0.1
Lake 15	unnamed lake	88.1	5	1	0.3	0.1
Lake 16	unnamed lake	75.7	4	1	0.1	0.2
Lake 17	unnamed lake	67.9	1	1	<0.1	0.1
Lake 18	unnamed lake	7.5	0	3	0.0	8.4
Lake 19	unnamed lake	64.7	0	1	0.0	0.1
Lake 20	unnamed lake	18.9	5	0	0.5	0.0
Ogoki 2	Ogoki River	237.2	4	3	0.1	0.1
Ogoki 3	Ogoki River	159.4	8	0	0.2	0.0
Ogoki Main	Ogoki River, Harrogate Lake, Patience Lake	997.5	13	12	0.2	0.4
All Sites		**5,372.2**	**14**	**14**	**0.2**	**0.2**

ha = hectare; < = less than.

5.4.2.7 Incidental Observations

A total of 11 waterfowl and waterbird species were detected incidentally during field surveys from 2018 to 2022 (**Table 5-7**. One species that was not detected during targeted bird surveys was observed incidentally. Pied-billed grebe was detected incidentally (during transit between sites) during the breeding and fall migration aerial surveys.

5.5 Bog / Fen Birds and Other Wetland Birds

5.5.1 Desktop Review

There is potential for 15 bog / fen and other wetland bird species (hereafter wetland birds) to occur in the study areas (**Annex A**). Within Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield there are eight wetland bird priority species that could occur in the study areas (Environment Canada, 2013, 2014) (**Annex A**). Two wetland bird species that are listed under the *Endangered Species Act* (Government of Ontario, 2023a) and Schedule 1 of the *Species at Risk Act* (Government of Canada, 2023a) have the potential to occur in the birds Regional Study Area: yellow rail (*Coturnicops noveboracensis*) and rusty blackbird (Oji-Cree translation, *makadew binechiinch*) (*Euphagus carolinus*) (**Annex A**). Both species are classified as Special Concern federally and provincially (Government of Canada, 2023a; Government of Ontario, 2023a).

There were 11 wetland bird species detected during historical Ontario Breeding Bird Atlas surveys completed in and near the Regional Study Area, including six Bird Conservation Region priority species: alder flycatcher (*Empidonax alnorum*), Lincoln's sparrow (*Melospiza lincolnii*), palm warbler (Oji-Cree translation, *binechiinch gaanitaanigamoch*) (*Setophaga palmarum*), rusty blackbird, sandhill crane (Oji-Cree translation, *ojihjak*) (*Antigone canadensis*), and swamp sparrow (*Melospiza georgiana*) (Birds Canada, 2023a). The wetland species recorded at the highest relative abundance during Ontario Breeding Bird Atlas surveys were palm warbler and sandhill crane, although several species were recorded with no associated abundance value (Birds Canada, 2023a). Rusty blackbird was the only wetland bird species at risk that was observed in the Ontario Breeding Bird Atlas blocks sampled near the Project. No yellow rail detections have been recorded in the Regional Study Area in the Ontario Breeding Bird Atlas database. However, this is a nocturnally active species and is not likely to be detected during early morning point count surveys for the Ontario Breeding Bird Atlas.

A review of the eBird observation database indicated that rusty blackbird has been historically observed in the bird Regional Study Area (eBird, 2023). According to eBird recorded observations, rusty blackbird has been detected northwest of the Marten Falls First Nation Community and along the Albany River in the east portion of the Regional Study Area. No yellow rail detections have been recorded in the Regional Study Area in the eBird database. However, the remoteness of the area and elusive nature of this species make detecting this species difficult.

5.5.2 Field Survey Results

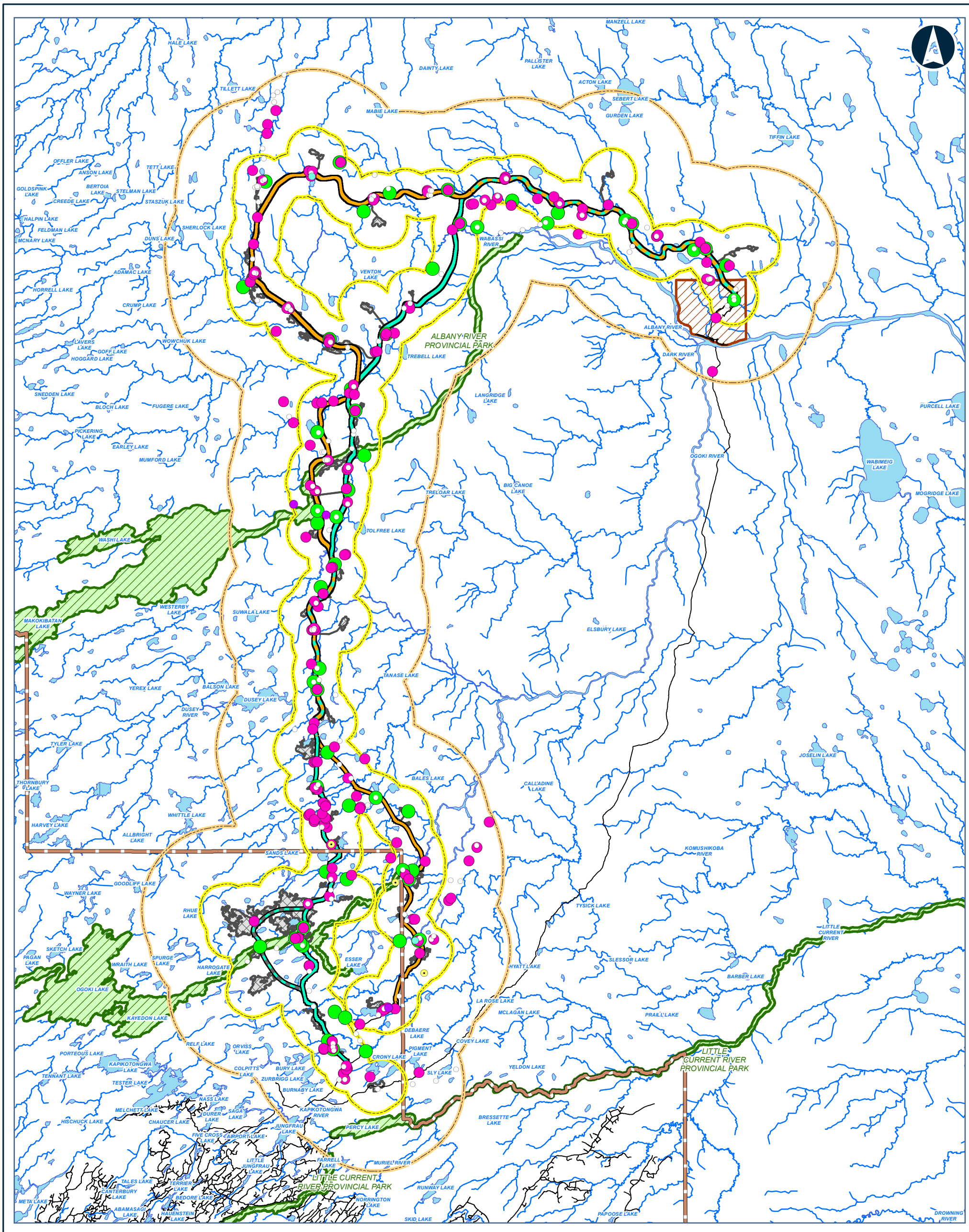
All 15 wetland bird species with potential to occur in the study areas were observed during field surveys completed from 2018 to 2022 (**Figure 5-21**; **Annex A**). This includes the federally and provincially listed yellow rail and rusty blackbird, as well as all eight priority wetland bird species in Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield. The total number of wetland bird species observed by survey method are provided in **Table 5-12**.

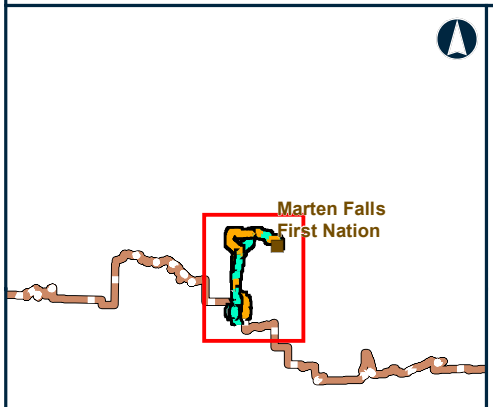
Table 5-12: Wetland Bird Species Observed by Study Method

Common Name	Scientific Name	Point Count Surveys	ARU Surveys	Targeted ARU Surveys for SAR	Marshbirds	Incidental Obs.
Alder flycatcher	*Empidonax alnorum*	X	X		X	X
American bittern	*Botaurus lentiginosus*	X	X	X		X
Clay-colored sparrow	*Spizella pallida*	X				
Common yellowthroat	*Spizella pallida*	X	X		X	X
Lincoln's sparrow	*Melospiza lincolnii*	X	X			X
Northern waterthrush	*Parkesia noveboracensis*	X	X		X	X
Palm warbler	*Setophaga palmarum*	X	X			X
Red-winged blackbird	*Agelaius phoeniceus*	X	X		X	X
Rusty blackbird	*Euphagus carolinus*	X	X			
Sandhill crane	*Grus canadensis*	X	X		X	X
Sharp-tailed grouse	*Tympanuchus phasianellus*	X	X			X
Sora	*Porzana carolina*		X	X	X	
Swamp sparrow	*Melospiza georgiana*	X	X		X	X
Virginia rail	*Rallus limicola*	X			X	
Yellow rail	*Coturnicops noveboracensis*		X		X	
Number of Species Detected		**13**	**13**	**2**	**9**	**10**

ARU = autonomous recording unit; SAR = Species at Risk; Obs. = observations.

Of the 15 wetland bird species observed across all survey types, 11 species were identified within the Project Development Area, 14 species were identified within the Local Study Area, and 10 species were recorded in the Regional Study Area. Clay-colored sparrow (*Spizella pallida*), sora, and yellow rail were recorded exclusively in the Local Study Area. No wetland species were recorded exclusively in the Project Development Area.





Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT SURVEY
- WETLAND BIRD PRESENT
- WETLAND BIRD ABSENT

BREEDING BIRD POINT COUNT SURVEY
- WETLAND BIRD PRESENT
- WETLAND BIRD ABSENT

MARSH MONITORING PROGRAM
- WETLAND BIRD PRESENT

INCIDENTAL OBSERVATION
- WETLAND BIRD PRESENT

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

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Aerial photography provided by:
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Wetland Birds During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
Rev:0	

Figure 5-21

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_21_GIS_Wetlandbirds_Observations_2018to2022.mxd
Date Saved: 11/29/2024 11:57:24 AM User Name: gld_rduval

5.5.2.1 Breeding Bird Point Count Surveys

A total of 13 wetland bird species were recorded during point count surveys across all survey years and seasons (**Table 5-13**). Rusty blackbird was detected during point count surveys. Two species were detected during breeding bird point counts that were not detected during autonomous recording unit surveys: clay-colored sparrow and Virginia rail. Point count observers detected 7 species at plots established within the Project Development Area, 11 species at plots within the Local Study Area, and 10 species in the Regional Study Area (**Table 5-13**.

The wetland bird species with the highest total observations recorded during point count surveys from 2018 to 2022 were alder flycatcher (163 total observations), palm warbler (124 total observations), and common yellowthroat (*Geothlypis trichas*, binechiinch gaanitaanigamoch) (91 total observations) (**Table 5-13**). The wetland bird with the highest number of individuals detected during a single survey visit was sandhill crane (2 individuals).

Table 5-13: Bog / Fen Birds and Other Wetland Birds Observations During Breeding Bird Point Count Surveys, 2018, 2019 and 2022

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
Alder flycatcher	*Empidonax alnorum*	14	139	10	163
American bittern	*Botaurus lentiginosus*	0	0	1	1
Clay-colored sparrow	*Spizella pallida*	0	5	0	5
Common yellowthroat	*Geothlypis trichas*	10	75	6	91
Lincoln's sparrow	*Melospiza lincolnii*	3	56	5	64
Northern waterthrush	*Parkesia noveboracensis*	9	62	13	84
Palm warbler	*Setophaga palmarum*	7	108	9	124
Red-winged blackbird	*Agelaius phoeniceus*	1	5	2	8
Rusty blackbird	*Euphagus carolinus*	0	5	0	5
Sandhill crane	*Antigone canadensis*	1	15	1	17
Sharp-tailed grouse	*Tympanuchus phasianellus*	0	2	0	2
Swamp sparrow	*Melospiza georgiana*	0	30	2	32
Virginia rail	*Rallus limicola*	0	0	1	1
Number of Species Detected		**7**	**11**	**10**	**13**

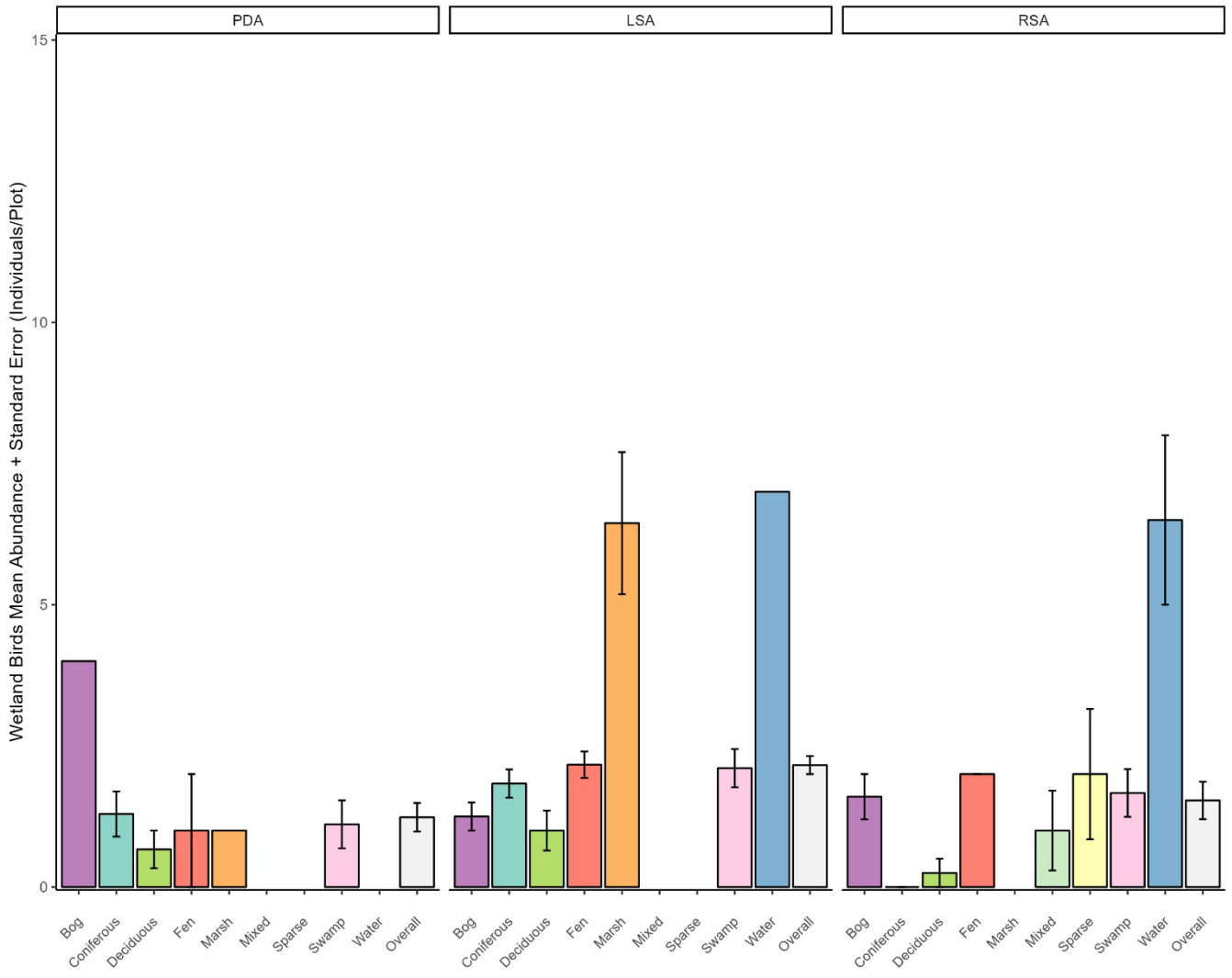
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-22 and **Figure 5-23** provide a visual summary of wetland bird relative abundance and species richness recorded at point count plots during 2018 to 2022 field surveys. Results are presented across the three study areas sampled from 2018 to 2022 and summarizes mean observations by habitat type sampled. All data were collected during the breeding season in 2018 to 2022 when these species are most likely to occur in the study area and are also most likely to be spontaneously calling or singing from territories.

Patterns of mean relative abundance of wetland bird species by habitat type differed by study area (**Figure 5-22**). Within the Project Development Area, mean relative abundance of wetland birds was highest in the bog (4.0 individuals per plot visit [SE not able to be calculated due to low sample size]), coniferous forest (1.3 ± 0.4 individuals per plot visit), and swamp (1.1 ± 0.4 individuals per plot visit) habitat types (**Figure 5-22**). Wetland bird relative abundance was highest in the water (7.0 individuals per plot visit [SE not able to be calculated due to low sample size]), marsh (6.4 ± 1.3 individuals per plot visit), and fen (2.2 ± 0.2 individuals per plot visit) habitat types in the Local Study Area (**Figure 5-22**). The habitat types with the highest mean wetland bird abundance in the Regional Study Area were water (6.5 ± 1.5 individuals per plot visit), sparse forest (2.0 ± 1.2 individuals per plot visit), and fen (2.0 ± 0.0 individuals per plot visit) habitat types (**Figure 5-22**). When data were pooled across habitat types, mean wetland bird abundance was higher in the Local Study Area (2.2 ± 0.2 individuals per plot visit) than in the Project Development Area (1.2 ± 0.3 individuals per plot visit) and Regional Study Area (1.5 ± 0.3 individuals per plot visit) (**Figure 5-22**).

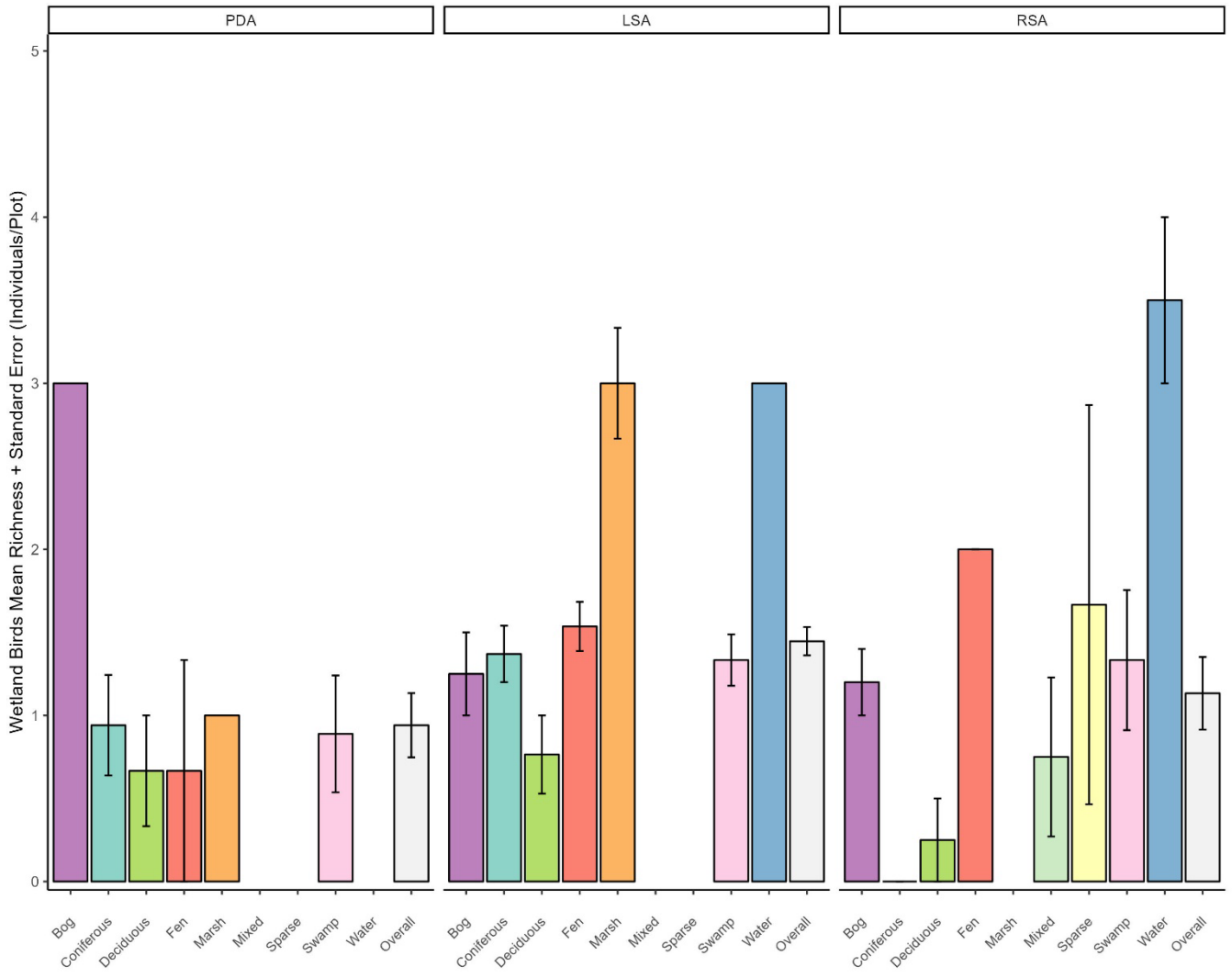
Species richness values recorded for wetland birds generally reflected patterns observed for relative abundance. The highest mean species richness value recorded in the Project Development Area (3.0 species [SE not able to be calculated due to low sample size]) was in the bog habitat type (**Figure 5-23**). In the Local Study Area, the highest mean species richness values were recorded in the water (3.0 species [SE not able to be calculated due to low sample size]) and marsh (3.0 ± 0.3 species) habitat types (**Figure 5-23**). Across pooled habitat types, point count plots in the Local Study Area had a higher mean species richness of wetland birds (1.4 ± 0.1 species) than both the Regional Study Area (1.1 ± 0.2 species) and Project Development Area (0.9 ± 0.2 species) (**Figure 5-23**).

Figure 5-22: Wetland Birds Mean Relative Abundance Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



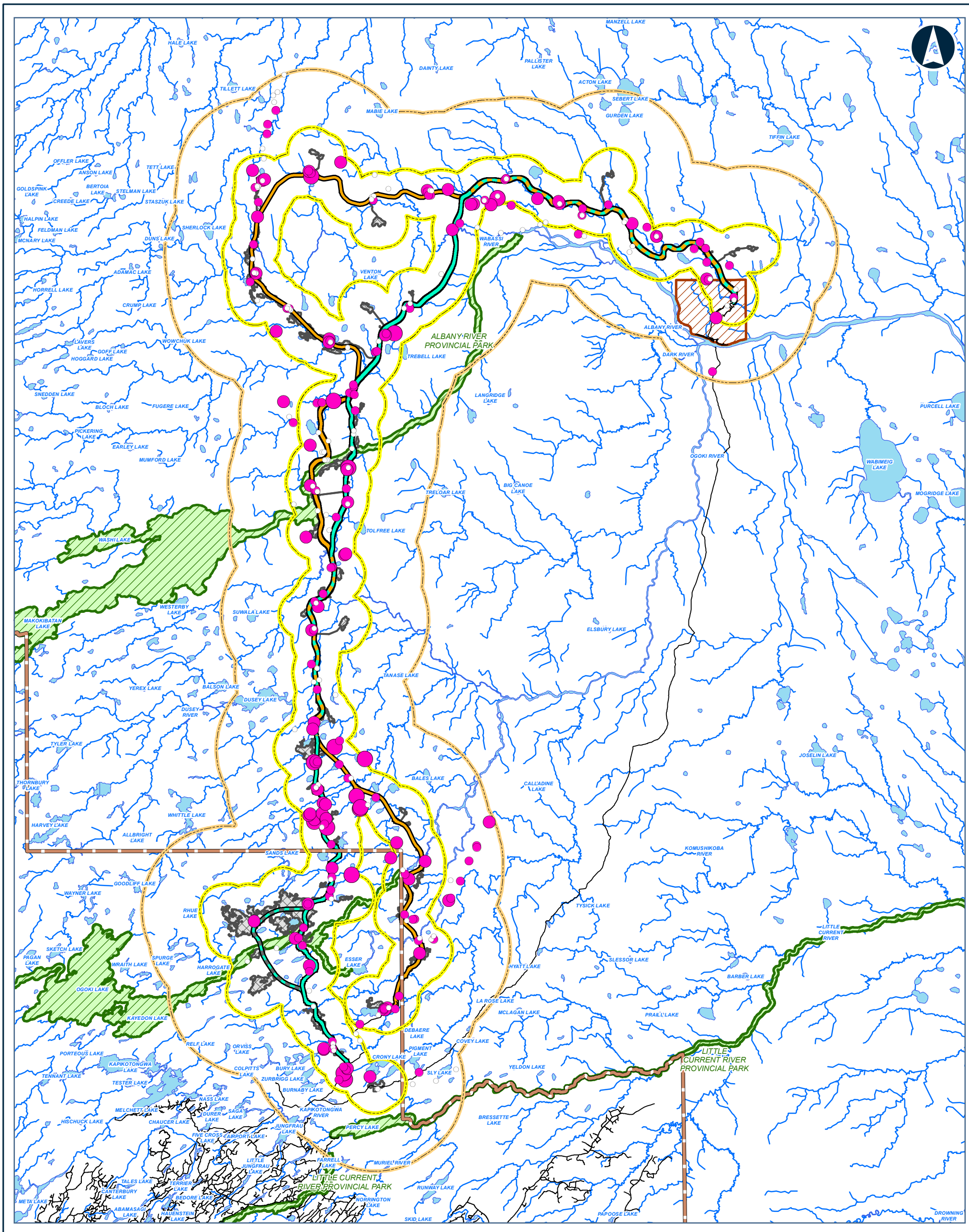
Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

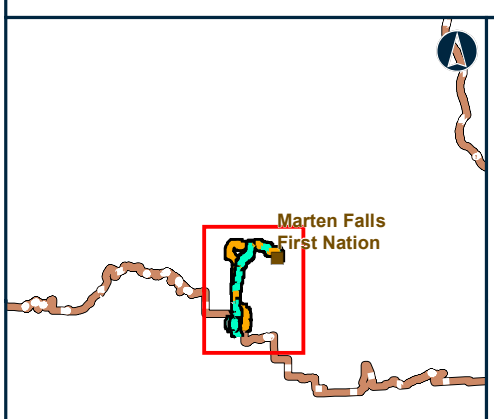
Figure 5-23: Wetland Birds Mean Species Richness Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-24 displays wetland bird abundance values recorded at point count plots sampled during the breeding season to demonstrate where songbird breeding “hotspots” occur within the Project study areas. While abundance of wetland birds was relatively consistent across the Project study areas, an increase in abundance was detected in the south portion of the Project Development Area northeast of Sands Lake (**Figure 5-24**). Results of the breeding season point count surveys showed abundance at relatively consistent levels across the Project.





Map Location

Legend

ABUNDANCE OF WETLAND BIRDS AT BREEDING SEASON POINT COUNT SURVEY LOCATIONS

- 7 - 12
- 3 - 6
- 1 - 2
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Data Source:

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Aerial photography provided by:
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Wetland Bird Abundance Recorded During Breeding Season Point Count Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-24

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_24_GIS_Abundance_WetlandBirds_BBS_2018to2022.mxd
Date Saved: 11/29/2024 11:37:31 AM User Name: gld_rduval

5.5.2.2 Bird Autonomous Recording Unit Surveys

A total of 13 wetland bird species were recorded on all-season autonomous recording units (**Table 5-14**). Of the 13 total wetland birds detected on autonomous recording units, two were classified as species at risk and both are listed as Special Concern under Schedule 1 of the *Species at Risk Act*: rusty blackbird and yellow rail (Government of Canada, 2023a). Thirteen species were observed during both autonomous recording unit and point count surveys; however, sora and yellow rail were observed during autonomous recording unit surveys only. Autonomous recording units detected 11 species at plots established within the Project Development Area and 13 species at plots within the Local Study Area (**Table 5-14**). The total number of wetland birds detected at all autonomous recording unit plots varied by season as follows (**Table 5-14**):

- Spring: 12 species;
- Breeding: 13 species;
- Fall: 10 species; and
- Winter: 1 species (sharp-tailed grouse).

The wetland species with the greatest number of detections recorded on all-season autonomous recording units were palm warbler (508 detections), alder flycatcher (415 detections), and common yellowthroat (382 detections). (**Table 5-14**). The wetland birds detected at the highest relative abundance (i.e., the maximum number of individuals detected during a single survey visit across all seasons) on autonomous recording units included: sandhill crane and swamp sparrow.

Table 5-14: Bog / Fen Birds and Other Wetland Birds Detections During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Alder flycatcher	*Empidonax alnorum*	3	400	12	0	30	385	415
American bittern	*Botaurus lentiginosus*	6	18	0	0	8	16	24
Common yellowthroat	*Geothlypis trichas*	17	346	19	0	23	359	382
Lincoln's sparrow	*Melospiza lincolnii*	68	285	23	0	27	349	376
Northern waterthrush	*Parkesia noveboracensis*	80	241	16	0	17	320	337
Palm warbler	*Setophaga palmarum*	114	381	13	0	51	457	508
Red-winged blackbird	*Agelaius phoeniceus*	7	39	3	0	1	48	49
Rusty blackbird	*Euphagus carolinus*	12	24	13	0	2	47	49
Sandhill crane	*Antigone canadensis*	130	33	61	0	12	212	224

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
Sharp-tailed grouse	*Tympanuchus phasianellus*	19	6	7	1	2	31	33
Sora	*Porzana carolina*	5	8	0	0	0	13	13
Swamp sparrow	*Melospiza georgiana*	41	134	12	0	5	182	187
Yellow rail	*Coturnicops noveboracensis*	0	1	0	0	0	1	1
Number of Species Detected		**12**	**13**	**10**	**1**	**11**	**13**	**13**

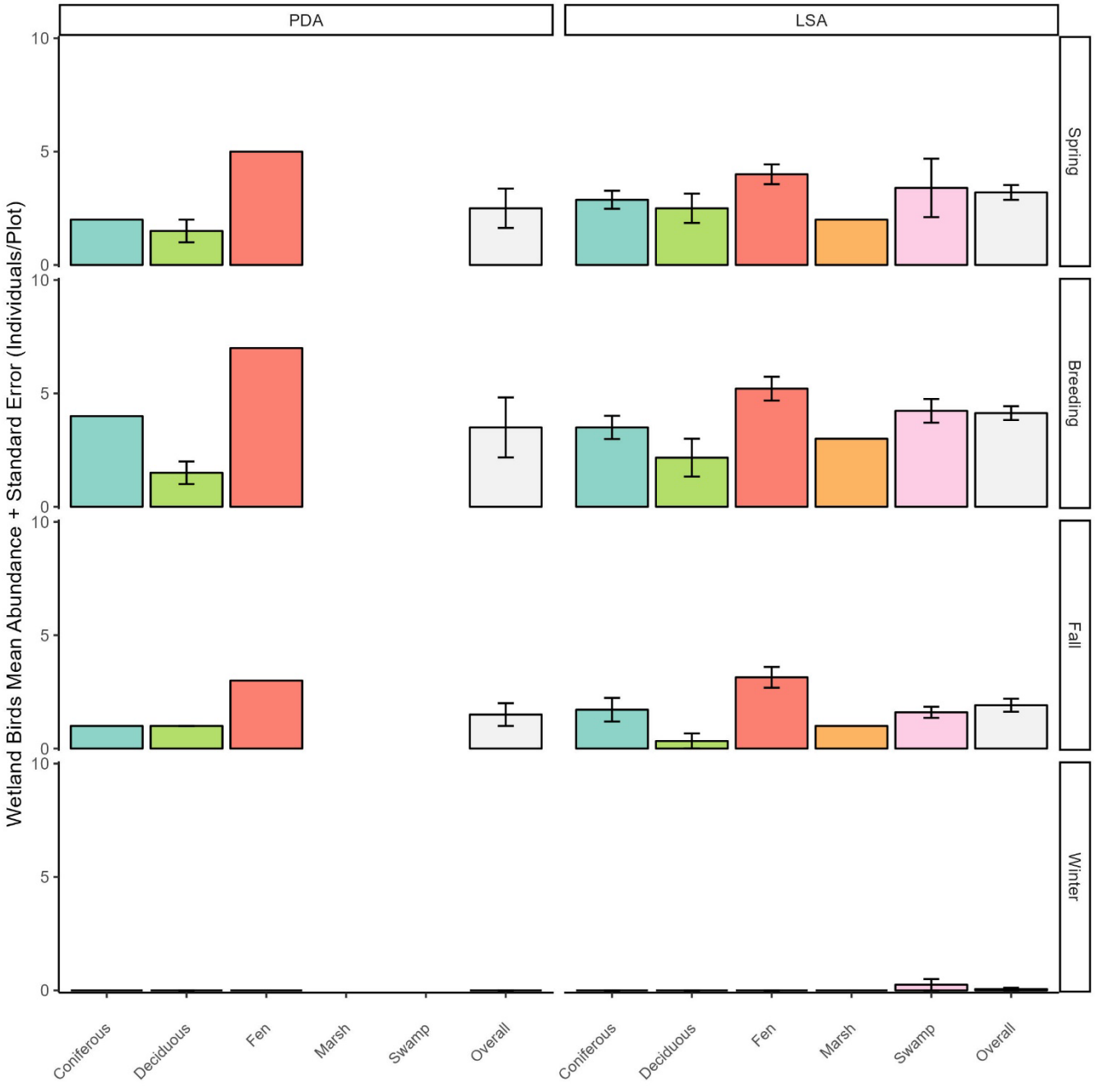
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-25 and **Figure 5-26** provide a visual summary of wetland bird relative abundance and species richness recorded on autonomous recording units during the 2022 field surveys. Results are presented by habitat type and by season to illustrate how detection trends changed throughout the year (2022 to early 2023 [i.e., winter]) and across the various habitats sampled. Note that no autonomous recording units were established within the Regional Study Area outside of the Local Study Area boundaries (**Section 4.2.3**) and no detections of wetland birds were made in the bog, mixed forest, or open water habitat types. The following information provides a summary of wetland bird observations made on autonomous recording units across seasons with a focus on the breeding season when these species are most likely to occur in the study area and also most likely to be spontaneously calling or singing from breeding territory.

Relative abundance for combined wetland birds was highest during the breeding season and spring migration, and within the fen, swamp, and coniferous forest habitat types (**Figure 5-25**). Within the Local Study Area, autonomous recording unit monitoring during the breeding season indicated that the relative abundance of wetland birds was highest in the fen (5.2 ± 0.5 individuals per plot visit), swamp (4.2 ± 0.5 individuals per plot visit), and coniferous forest (3.5 ± 0.5 individuals per plot visit) habitat types (**Figure 5-25**). In general, relative abundance of wetland birds was similar at plots in the Project Development Area compared to those that were within the Local Study Area; however, when data were pooled across habitat types during the breeding season, wetland bird abundance recorded on autonomous recording units was higher in the Local Study Area (4.1 ± 0.3 individuals per plot visit) than in the Project Development Area (3.5 ± 0.3 individuals per plot visit) (**Figure 5-25**).

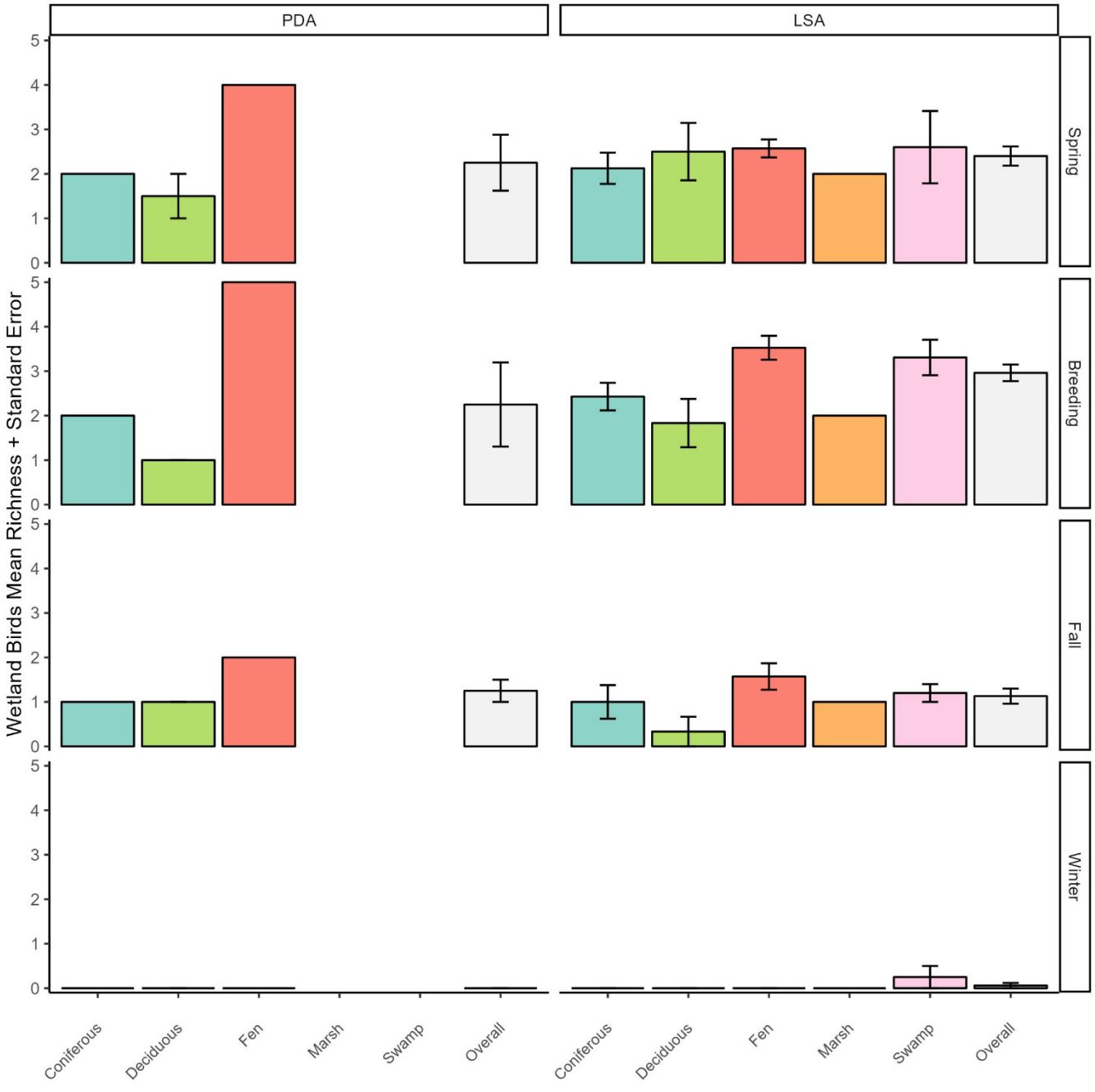
Recorded species richness values for wetland birds reflected patterns observed for relative abundance with the highest species richness observed in the fen, swamp, and coniferous forest habitat types in the Local Study Area and in the fen and coniferous forest habitat types in the Project Development Area (**Figure 5-26**). Mean species richness of wetland birds recorded during the breeding season varied across habitat types and study area and ranged from one species recorded at autonomous recording unit plots in deciduous forest in the Project Development Area to five species detected at the one autonomous recording unit placed in fen habitat within the Project Development Area (**Figure 5-26**). Within the Local Study Area, the lowest mean species richness was detected in the deciduous forest habitat type (1.8 ± 0.5 species) and the highest in the fen habitat type (3.5 ± 0.3 species).

Figure 5-25: Wetland Birds Mean Relative Abundance Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022



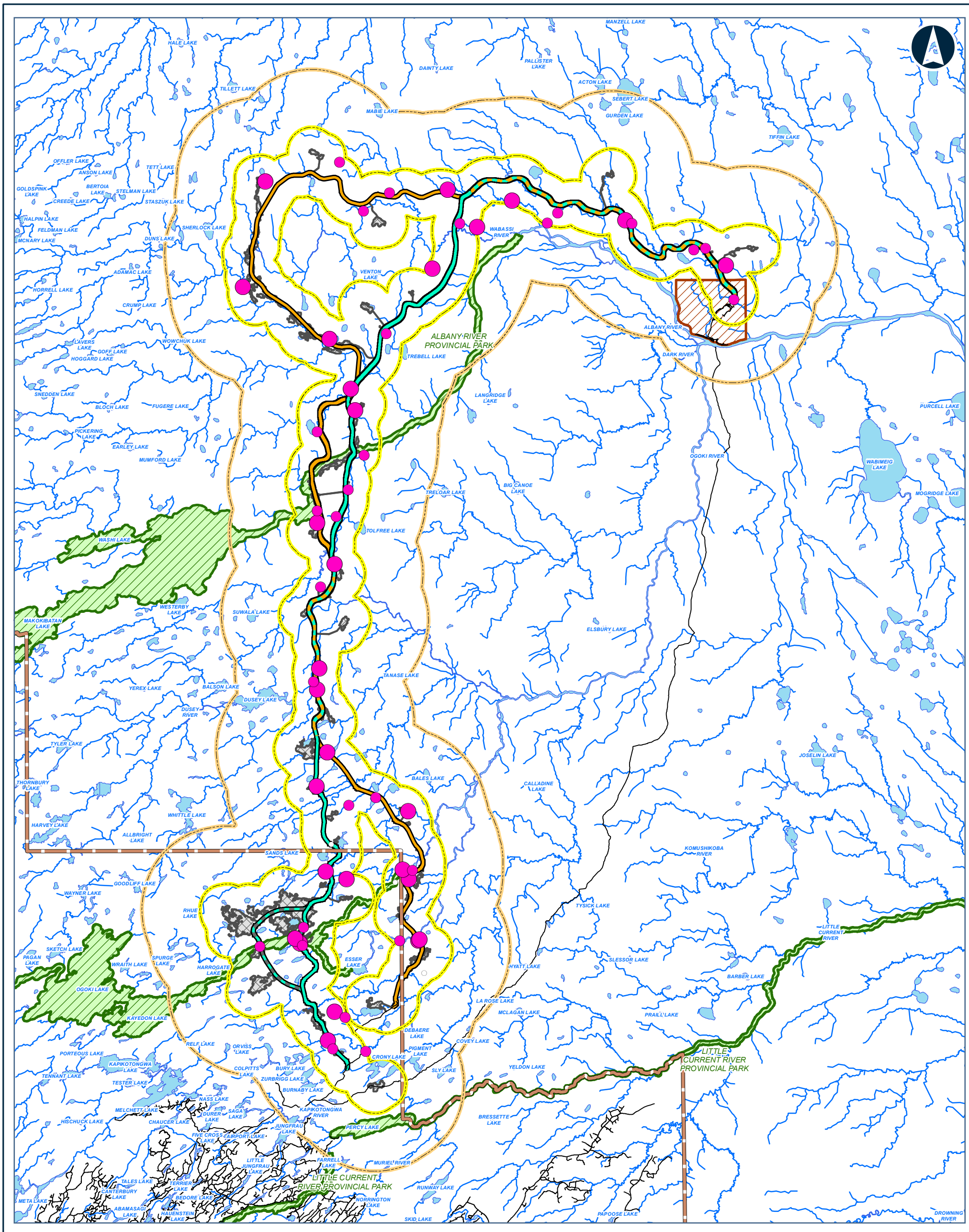
Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

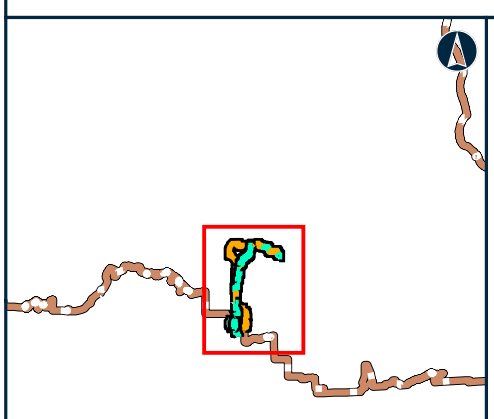
Figure 5-26: Wetland Birds Mean Species Richness Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Figure 5-27 displays abundance values recorded at all-season autonomous recording unit plots during the breeding season to demonstrate where wetland bird breeding “hotspots” occurred within the Project study areas. Wetland bird abundance was relatively consistent across the Project Development Area during the breeding season, as detected by autonomous recording units (**Figure 5-27**).





Legend

ABUNDANCE OF WETLAND BIRDS AT AUTONOMOUS RECORDING UNIT SURVEY LOCATIONS

- 3 - 6
- 1 - 2
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Wetland Bird Abundance Recorded During Autonomous Recording Unit Breeding Season Surveys in the Local Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-27

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_27_GIS_Abundance_WetlandBirds_ARU_2022.mxd
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5.5.2.3 Targeted Species at Risk Autonomous Recording Unit Surveys

Yellow rails were not detected at any of the five targeted species at risk autonomous recording unit surveys that were specific to this species. Other wetland birds detected at targeted yellow rail autonomous recording unit survey locations were sora and American bittern.

5.5.2.4 Marshbird Call Playback Survey

Three wetland bird species targeted by marshbird call playback surveys: yellow rail, sora, and Virginia rail were observed during 2018 or 2022 surveys. American bittern was not observed during 2018 or 2022 marshbird call playback surveys. Of the target species observed, Virginia rail and yellow rail were observed during 2018 surveys and not during 2022 surveys. A single yellow rail individual was observed along the shore of a lake in marsh habitat dominated by sedges (*Carex* spp.) south of Brundrit Lake. A single Virginia rail individual was observed in marsh habitat east of Painter Lake. Sora was only observed during 2022 surveys in a shore fen dominated by sedges north of Teabeau Lake.

5.5.2.5 Incidental Observations

A total of ten wetland bird species were detected incidentally during field surveys from 2018 to 2022; all were detected during point count, autonomous recording unit, or aerial surveys.

5.6 Other Land Birds

5.6.1 Desktop Review

There is potential for 21 “other” land bird species to occur in the study areas (**Annex A**). Other land birds are species that do not fit into any of the bird groups discussed in **Section 5.5**, such as birds that require site-specific habitats for nesting (e.g., bank swallow, barn swallow, and belted kingfisher [*Megaceryle alcyon*]), species that nest in open habitats (e.g., common nighthawk and eastern whip-poor-will), and habitat generalist species (e.g., common raven [*Corvus corax*]).

Within Bird Conservation Region 7 – Taiga Shield and Hudson Plains and Bird Conservation Region 8 – Boreal Softwood Shield there are six other land bird species that are classified as priority species (Environment Canada, 2013, 2014). There are five federally and provincially listed other land bird species that could occur in the study areas: bank swallow, barn swallow, chimney swift, common nighthawk, and eastern whip-poor-will. Of these, chimney swift has a low potential to occur in the study areas (based on a desktop review and aerial surveys within the Local Study Area; **Section 4.2.7.2**); however, the *Tailored Impact Statement Guidelines* for the Project identified this species as having the potential to occur in the Project study areas.

There were 12 other land bird species detected during historical Ontario Breeding Bird Atlas surveys completed in and near the Regional Study Area, including three Bird Conservation Region priority species: belted kingfisher, common nighthawk (also a species at risk), and tree swallow (*Tachycineta bicolor*) (Birds Canada, 2023a). The other land bird species recorded at the highest relative abundance during Ontario Breeding Bird Atlas surveys were common raven and savannah sparrow (*Passerculus sanwichensis*), although several species were recorded with no associated abundance value (Birds Canada, 2023a).

A review of the eBird observation database indicated that common nighthawk has been recorded in several locations in and surrounding the Regional Study Area. Observations of this species were reported at Teabeau Lake in 2019 and along the Ogoki River in 2022 (eBird, 2023). Bank swallow was recorded at the Ogoki Post Airport in 2022 (eBird, 2023). Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope (80 km west of the Project). Results of the desktop review and aerial surveys indicated that no suitable nesting habitat for bank swallows occurred in the Regional Study Area. A barn swallow observation was recorded through eBird approximately 18 km east of the Ogoki, Ontario in 2022 (eBird, 2023). Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope and Skibi Lake. No desktop sources included chimney swift or eastern whip-poor-will observations within or near the Project Regional Study Area.

5.6.2 Field Survey Results

Across all field survey types completed in the Regional Study Area from 2018 to 2022, there were 18 species of other land birds observed (**Annex A**). Of these, 13 were songbird species, 2 were corvid species, 2 were nightjar species, and 1 was a kingfisher species. Two other land bird species listed under Schedule 1 of the *Species at Risk Act* were observed during field studies: common nighthawk (Special Concern) and eastern whip-poor-will (Threatened) (Government of Canada, 2023a) (**Annex A**). Four Bird Conservation Region priority land bird species were detected during field surveys: belted kingfisher, common nighthawk, eastern whip-poor-will, and tree swallow.

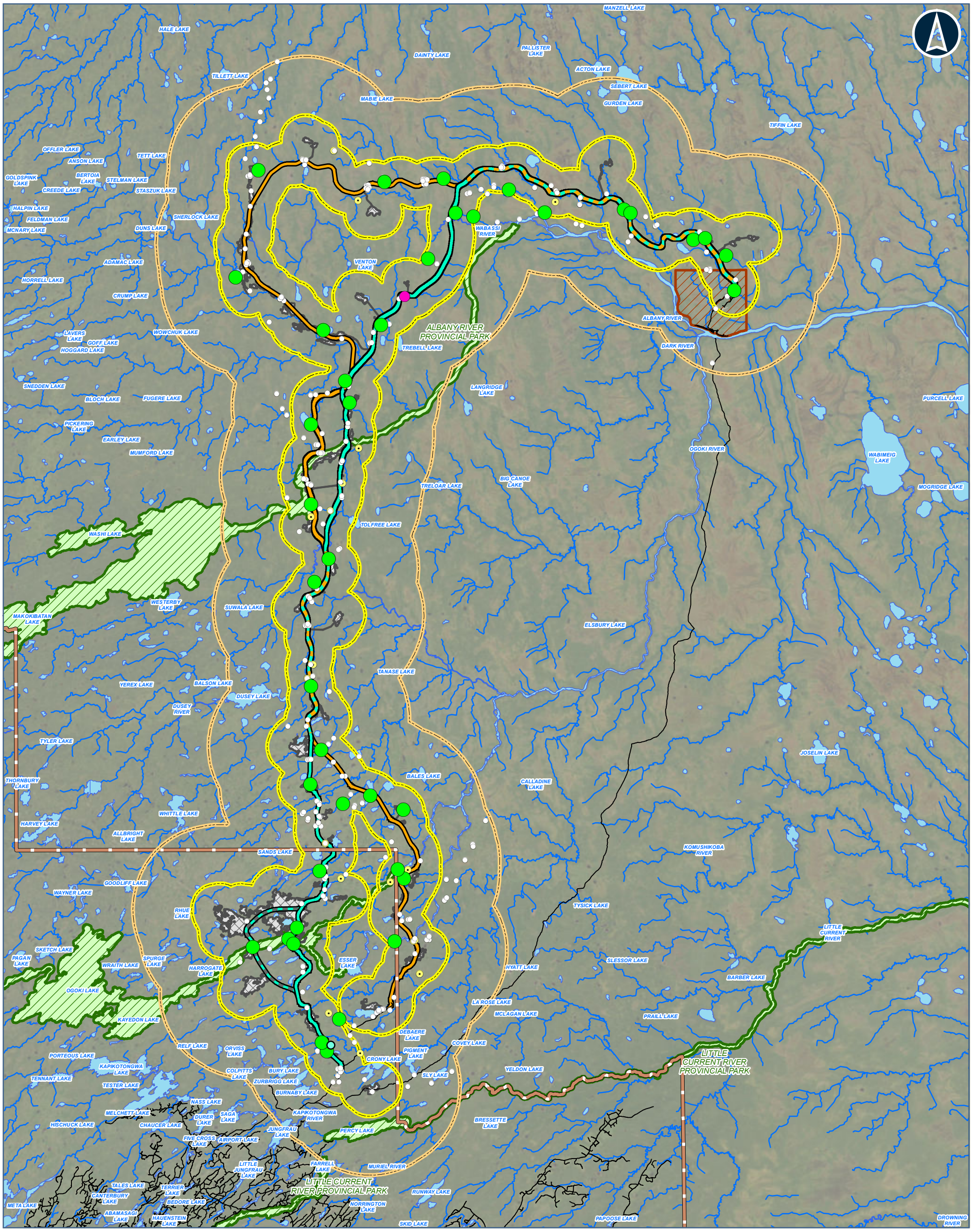
The total number of other land bird species observed by survey method, including observations made incidentally during non-targeted surveys, are provided in **Table 5-15**.

Table 5-15: Other Land Bird Species Observed by Survey Method

Common Name	Scientific Name	Point Count Surveys	ARU Surveys	Targeted ARU Surveys for SAR	Incidental Obs.
American crow	*Corvus brachyrhynchos*	X	X		
American pipit	*Anthus rubescens*		X		
Belted kingfisher	*Megaceryle alcyon*		X		X
Common nighthawk	*Chordeiles minor*	X	X	X	X
Common raven	*Corvus corax*	X	X		X
Common redpoll	*Acanthis flammea*		X		
Eastern whip-poor-will	*Antrostomus vociferus*		X	X	
European starling	*Sturnus vulgaris*		X		
Horned lark	*Eremophila alpestris*		X		
Lapland longspur	*Calcarius lapponicus*		X		
Leconte's sparrow	*Ammodramus leconteii*	X	X		
Savannah sparrow	*Passerculus sandwichensis*	X	X		
Snow bunting	*Plectrophenax nivalis*		X		
Song sparrow	*Melospiza melodia*	X	X		
Tree swallow	*Tachycineta bicolor*	X	X		X
White-crowned sparrow	*Zonotrichia leucophrys*		X		
Wilson's warbler	*Cardellina pusilla*	X	X		
Yellow warbler	*Setophaga petechia*	X	X		
Number of Species Detected		**9**	**18**	**2**	**4**

ARU = autonomous recording unit; SAR = Species at Risk; Obs. = observations.

Out of the 18 other land bird species observed across all survey types, 10 species were identified within the Project Development Area, 18 species were identified within the Local Study Area, and 4 species were identified in the Regional Study Area**.** Eight species were observed exclusively in the Local Study Area.





Legend

ALL-SEASON AUTONOMOUS RECORDING UNIT
- OTHER LAND BIRD PRESENT
- OTHER LAND BIRD

BREEDING BIRD POINT COUNT SURVEY
- OTHER LAND BIRD PRESENT
- OTHER LAND BIRD

INCIDENTAL OBSERVATION
- OTHER LAND BIRD PRESENT

COMMUNITY ACCESS ROAD ALTERNATIVES
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- BIRDS RSA

Notes:
None

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Other Land Birds During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
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Figure 5-28

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5.6.2.1 Breeding Bird Point Count Surveys

A total of nine other land birds were recorded during point count surveys across all survey years and seasons (**Table 5-16**). Out of the nine total other land birds detected during point counts, one species was classified as a species at risk: common nighthawk. Point count observers detected four species at plots established within the Project Development Area, nine species at plots within the Local Study Area, and three species in the Regional Study Area (**Table 5-16**).

The other land bird species with the highest total observations recorded during point count surveys from 2018 to 2022 included: Wilson's warbler (*Cardellina pusilla*; 63 total observations), yellow warbler (*Setophaga petechia*; 29 total observations), and common raven (10 total observations).

Table 5-16: Other Land Birds Observations During Breeding Bird Point Count Surveys, 2018, 2019 and 2022

Common Name	Scientific Name	Number of Observations			Total Number of Observations
		PDA	LSA	RSA	
American crow	*Corvus brachyrhynchos*	1	2	0	3
Common nighthawk	*Chordeiles minor*	0	1	0	1
Common raven	*Corvus corax*	1	8	1	10
Leconte's sparrow	*Ammodramus leconteii*	0	6	0	6
Savannah sparrow	*Passerculus sandwichensis*	0	9	0	9
Song sparrow	*Melospiza melodia*	0	1	0	1
Tree swallow	*Tachycineta bicolor*	0	1	0	1
Wilson's warbler	*Cardellina pusilla*	5	51	7	63
Yellow warbler	*Setophaga petechia*	4	17	8	29
Number of Species Detected		**4**	**9**	**3**	**9**

PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

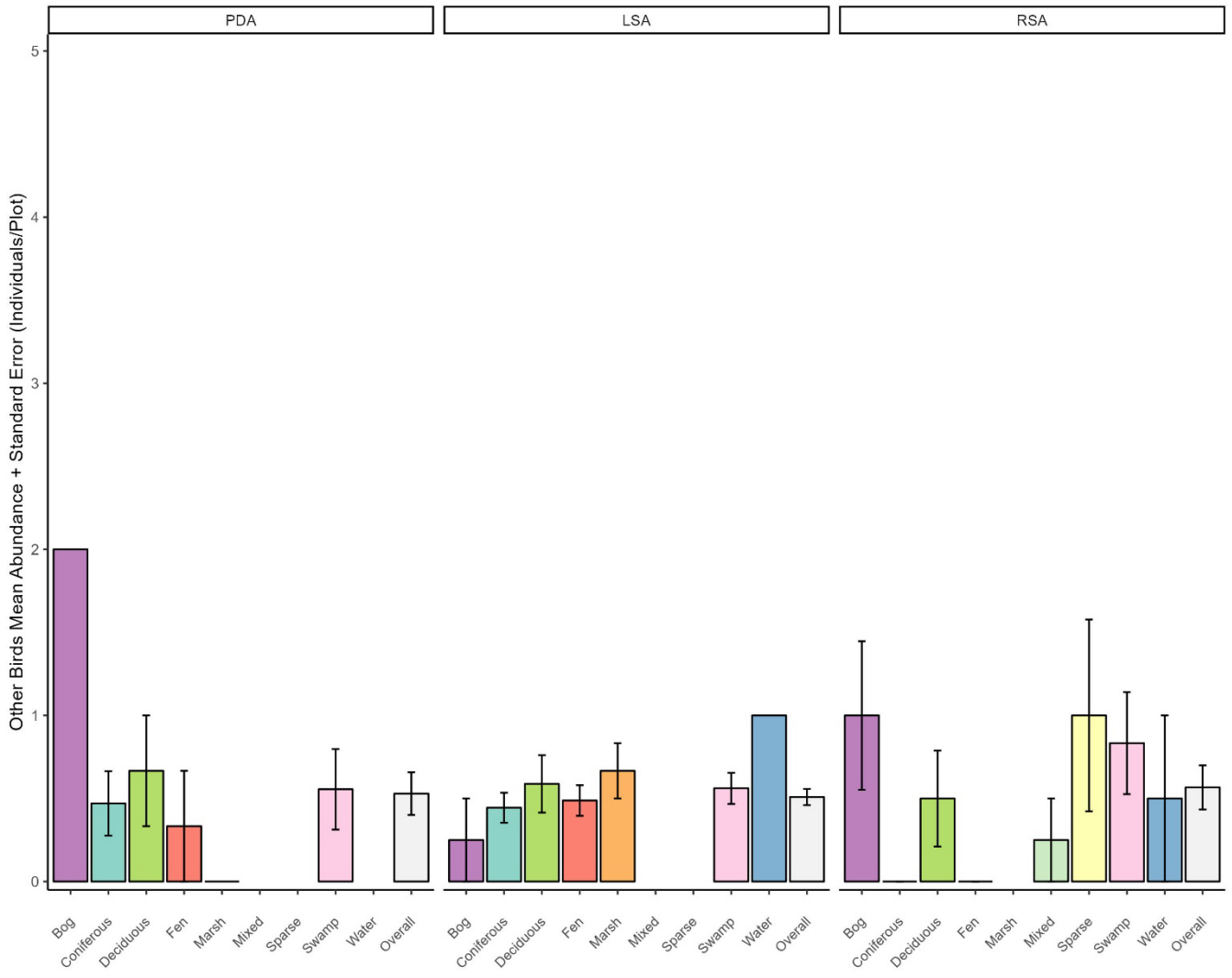
Figure 5-29 and **Figure 5-30** provide a visual summary of other land bird relative abundance and species richness recorded at point count plots during 2018 to 2022 field surveys. Results are presented across the three study areas sampled from 2018 to 2022 and summarizes mean observations by habitat type sampled. All data were collected during the breeding season in 2018 to 2022 when these species are most likely to occur in the study area and are also most likely to be spontaneously calling or singing from territories.

Within the Project Development Area, mean relative abundance of other land birds was highest in the bog (2.0 [SE not able to be calculated due to low sample size] individuals per plot visit), deciduous forest (0.7 ± 0.3 individuals per plot visit), and swamp (0.6 ± 0.2 individuals per plot visit) habitat types (**Figure 5-29**). In the Local Study Area, other land birds relative abundance was highest in the water (1.0 [SE not able to be calculated due to low sample size] individuals per plot visit), marsh (0.7 ± 0.2 individuals per plot visit), and deciduous forest (0.6 ± 0.2 individuals per plot visit) habitat types (**Figure 5-29**). In general, relative abundance of forest birds was similar at plots in the Regional Study Area, Local Study Area and Project Development Area; however, when data were pooled across habitat types, mean forest bird abundance was slightly higher in the Project Development Area (0.5 ± 0.1 individuals per plot visit) than in the Local Study Area (0.5 ± 0.05 individuals per plot visit) and in the Regional Study Area (0.6 ± 0.1 individuals per plot visit) than in the Project Development Area and Local Study Area (**Figure 5-29**).

In the Project Development Area, the highest mean species richness values recorded were made in the bog, swamp, and fen habitat types (**Figure 5-30**). In the Local Study Area, the highest mean species richness values were recorded in the water, marsh, and deciduous forest habitat types (**Figure 5-30**).

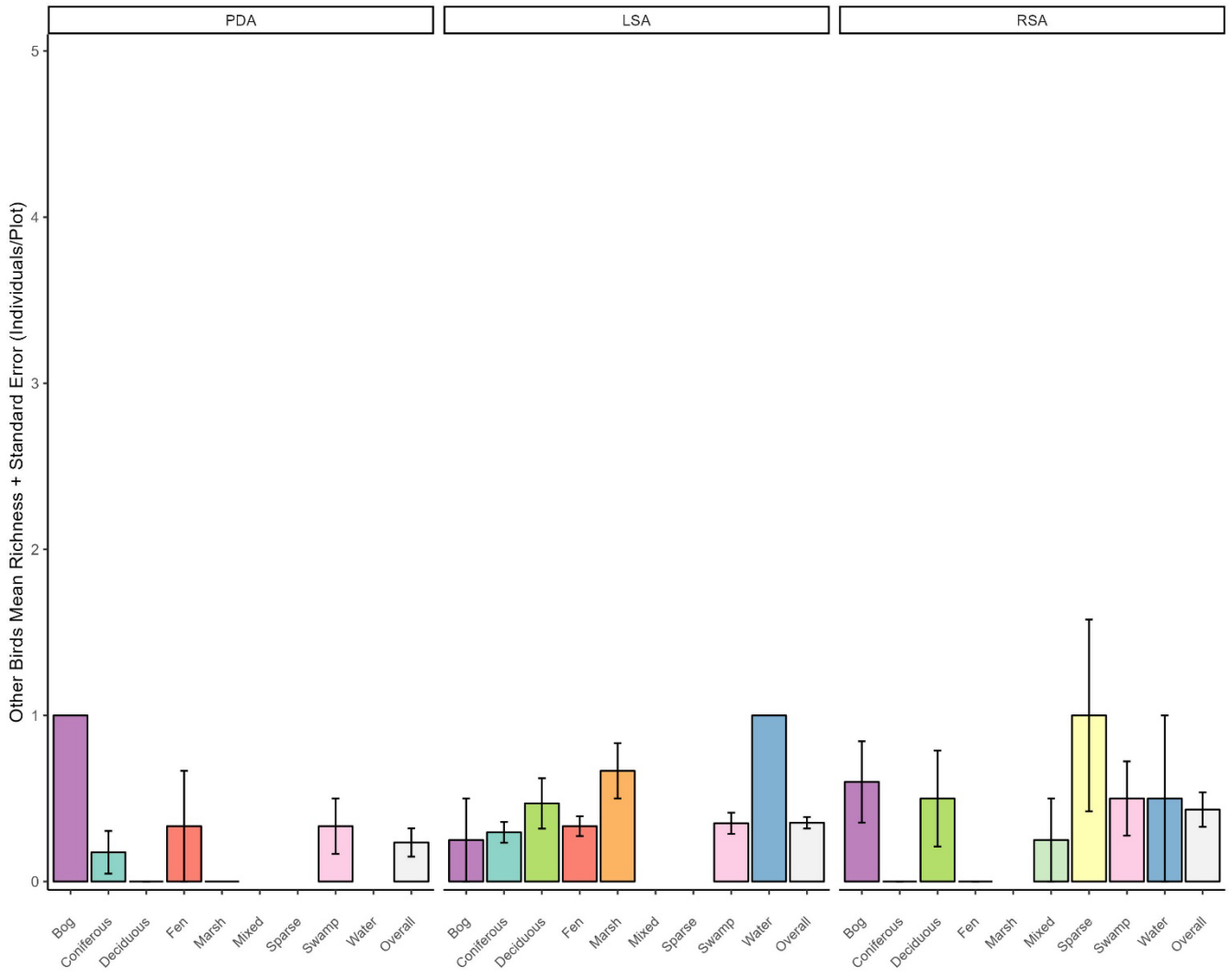
The lowest mean species richness of other land birds in the Project Development Area was recorded in the coniferous forest habitat type (0.2 ± 0.1 species). No species were recorded in marsh habitat in the Project Development Area and no individuals confirmed to species level were observed in deciduous forest habitat, though an unidentified bird and unidentified flycatcher species were recorded. The highest mean species richness of other land birds in the Project Development Area was recorded in the bog habitat type (1.0 [SE not able to be calculated due to low sample size] species). Within the Local Study Area, the lowest mean species richness of other land birds was detected in the bog habitat type (0.3 ± 0.3 species) and the highest in the water habitat type (1.0 [SE not able to be calculated due to low sample size] species). The mean species richness of other land birds in the Regional Study Area was lowest in the mixed forest habitat type (0.3 ± 0.3 species) and highest in the sparse forest habitat type (1.0 ± 0.6 species). No species were detected in coniferous forest or fen habitat types in the Regional Study Area. Across pooled habitat types, point count plots in the Regional Study Area had a higher mean species richness of other land birds (0.4 ± 0.1 species) than both the Local Study Area (0.4 ± 0.03 species) and Project Development Area (0.2 ± 0.09 species) (**Figure 5-30**).

Figure 5-29: Other Land Birds Mean Relative Abundance Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 5-30: Other Land Birds Mean Species Richness Across Habitat Type and Season Recorded During Point Count Surveys, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

5.6.2.2 Bird Autonomous Recording Unit Surveys

A total of 18 other land bird species were recorded on bird autonomous recording units, including two federally and provincially listed species: common nighthawk and eastern whip-poor-will (**Table 5-17**). Nine species were observed during both autonomous recording unit and point count surveys. Autonomous recording units detected nine species at plots established within the Project Development Area and 18 species at plots within the Local Study Area (**Table 5-17**)**.** The total number of other land birds detected at all autonomous recording unit plots varied by season as follows (**Table 5-17**)**:**

- Spring: 12 species;
- Breeding: 12 species;
- Fall: 8 species; and
- Winter: 3 species.

The other land bird species with the greatest number of detections recorded on all-season autonomous recording units were common nighthawk (207 detections), Wilson's warbler (189 detections), and savannah sparrow (116 detections) (**Table 5-17**). The other land birds detected at the highest relative abundance (i.e., the maximum number of individuals detected during a single survey visit across all monitoring seasons) on autonomous recording units were Wilson's warbler, common redpoll (*Acanthis flammea*), American crow (Oji-Cree translation, *andaag*) (*Corvus brachyrhynchos*), and common nighthawk. Nine species were only detected on autonomous recording units and were not detected during breeding bird point count surveys.

Table 5-17: Other Land Birds Detections During All-Season Autonomous Recording Unit Surveys, 2022

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
American crow	*Corvus brachyrhynchos*	17	18	42	0	17	60	77
American pipit	*Anthus rubescens*	0	0	10	0	3	7	10
Belted kingfisher	*Megaceryle alcyon*	5	1	4	0	1	9	10
Common nighthawk	*Chordeiles minor*	0	204	3	0	23	184	207
Common raven	*Corvus corax*	19	18	20	2	14	45	59
Common redpoll	*Acanthis flammea*	14	0	0	4	3	15	18
Eastern whip-poor-will	*Antrostomus vociferus*	0	3	0	0	0	3	3

Common Name	Scientific Name	Number of Detections						Total Number of Detections
		By Season				By Study Area		
		Spring	Breeding	Fall	Winter	PDA	LSA	
European starling	*Sturnus vulgaris*	0	1	0	0	0	1	1
Horned lark	*Eremophila alpestris*	1	0	2	0	0	3	3
Lapland longspur	*Calcarius lapponicus*	7	0	0	0	0	7	7
Leconte's sparrow	*Ammodramus leconteii*	3	2	2	0	0	7	7
Savannah sparrow	*Passerculus sandwichensis*	27	89	0	0	0	116	116
Snow bunting	*Plectrophenax nivalis*	4	0	1	2	0	7	7
Song sparrow	*Melospiza melodia*	14	28	0	0	6	36	42
Tree swallow	*Tachycineta bicolor*	0	16	0	0	1	15	16
White-crowned sparrow	*Zonotrichia leucophrys*	1	0	0	0	0	1	1
Wilson's warbler	*Cardellina pusilla*	14	175	0	0	38	151	189
Yellow warbler	*Setophaga petechia*	0	31	0	0	0	31	31
Number of Species Detected		**12**	**12**	**8**	**3**	**9**	**18**	**18**

PDA = Project Development Area; LSA = Local Study Area.

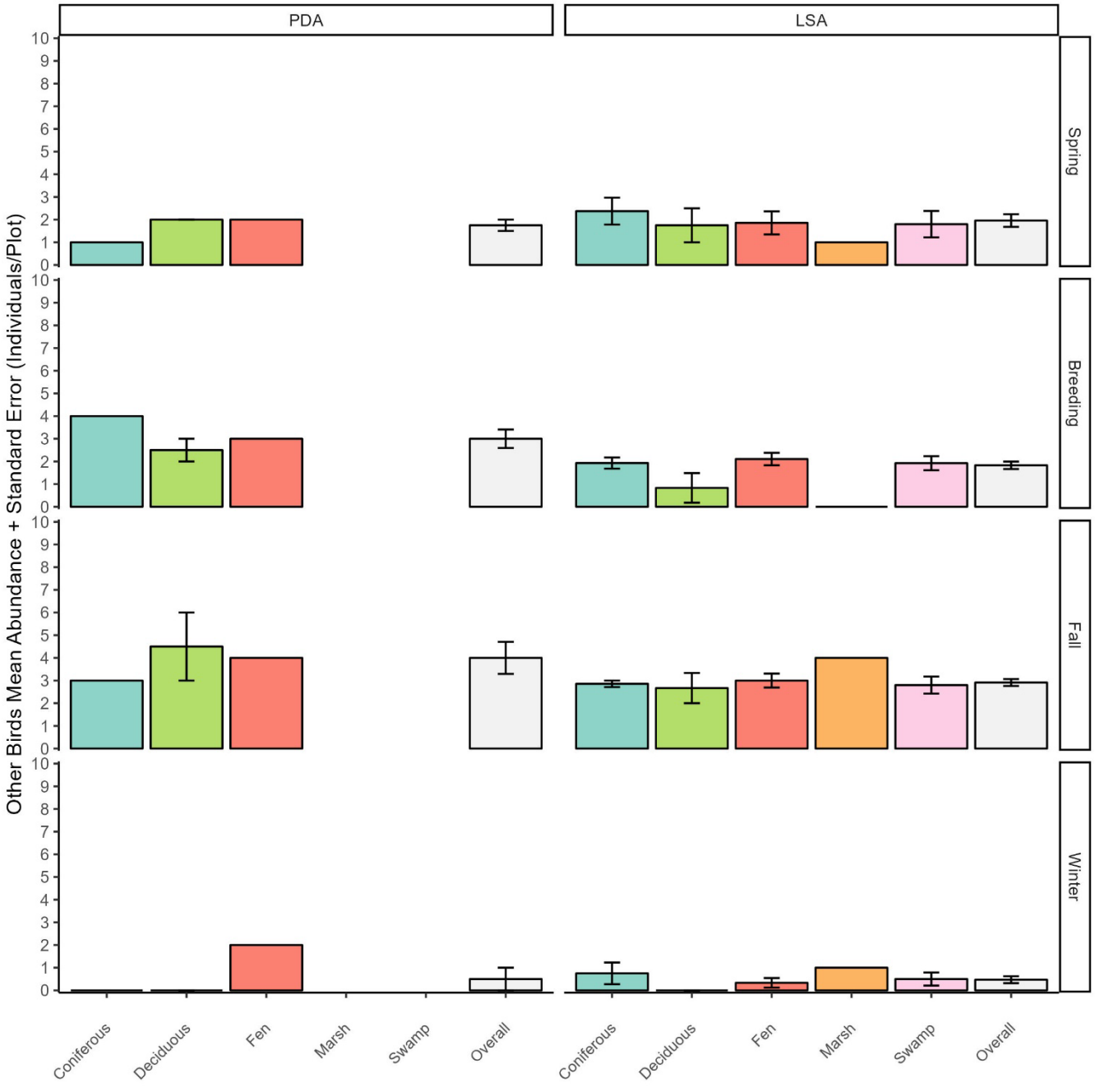
Figure 5-31 and **Figure 5-32** provide a visual summary of other land bird relative abundance and species richness recorded on autonomous recording units during the 2022 field surveys. Results are presented by habitat type and by season to illustrate how detection trends changed throughout the year (2022 to early 2023) and across the various habitats sampled. Note that no autonomous recording units were established within the Regional Study Area but outside of the Local Study Area boundaries (**Section 4.2.3**). The following information provides a summary of other land bird observations made on autonomous recording units in 2022 and early 2023 with a focus on the breeding season when these species are most likely to occur in the study area and also most likely to be spontaneously calling or singing from breeding territory.

Mean relative abundance for all other land birds was highest during the fall and breeding seasons, and generally within the coniferous forest and fen habitat types (**Figure 5-31**). Within the Local Study Area, autonomous recording unit monitoring during the breeding season indicated that the relative abundance of other land birds was highest in the fen (2.1 ± 0.3 individuals per plot visit), coniferous forest (1.9 ± 0.2 individuals per plot visit), and swamp (1.9 ± 0.3 individuals per plot visit) habitat types (**Figure 5-31**). Within the Project Development Area, relative abundance was highest in the coniferous forest (1.0 individuals per plot visit [SE not able to be calculated due to low sample size]) and fen (3.0 ± 0.4 individuals per plot visit) habitat types. When data were pooled across habitat types during the breeding season, other land bird abundance recorded on autonomous recording units was higher in the Project

Development Area (3.0 ± 0.4 individuals per plot visit) than in the Local Study Area (1.8 ± 0.2 individuals per plot visit) (**Figure 5-31**).

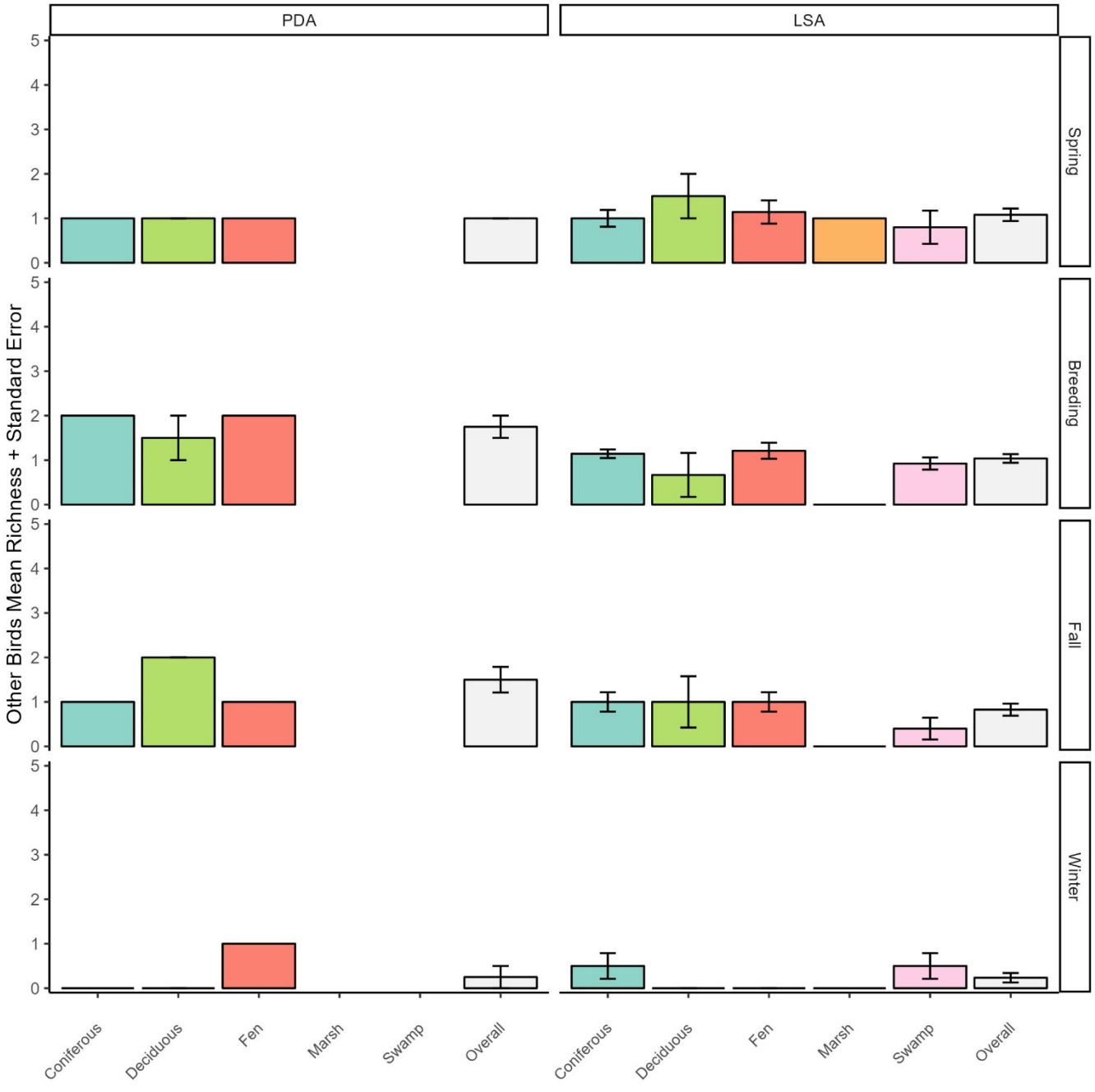
Recorded species richness values for other land birds reflected patterns observed for relative abundance with the highest species richness observed in the fen, coniferous forest and swamp habitat types in the Local Study Area and in the fen and coniferous forest habitat types in the Project Development Area (**Figure 5-32**). Mean species richness of other land birds recorded in the Project Development Area during the breeding season varied across habitat types and study areas and ranged from 1.5 (± 0.5) species recorded at autonomous recording unit plots in deciduous habitat to 2.0 (SE not able to be calculated due to low sample size) species detected at autonomous recording units in coniferous forest habitat (**Figure 5-32**). Within the Local Study Area during the breeding season, no species were detected in the marsh habitat type and the highest in the fen habitat type (1.2 ± 0.2 species). Across pooled habitat types during the breeding season, autonomous recording unit plots in the Project Development Area recorded a higher mean species richness (1.8 ± 0.3 species) than autonomous recording units placed in the Local Study Area (1.0 ± 0.1 species).

Figure 5-31: Other Land Bird Mean Relative Abundance Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

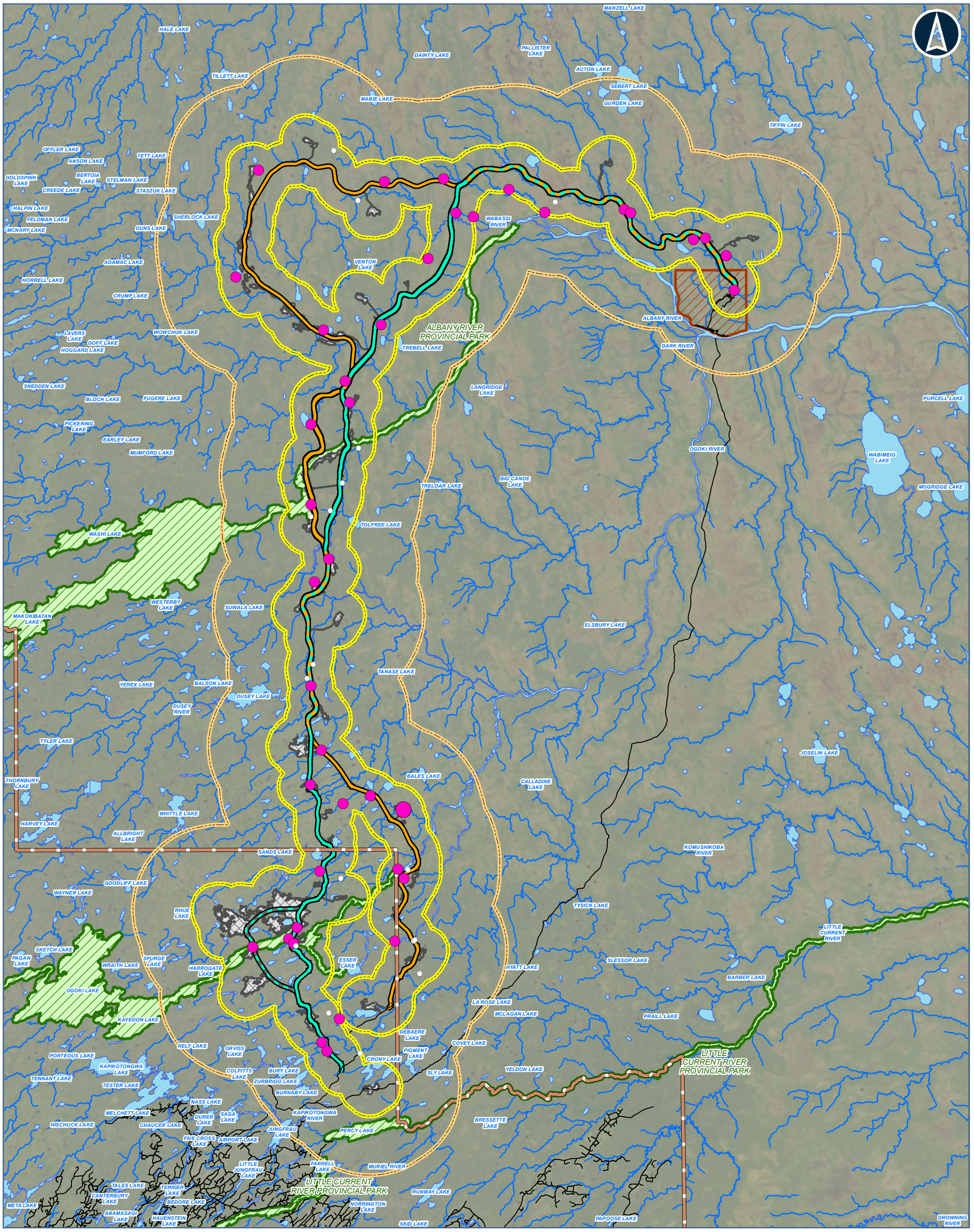
Figure 5-32: Other Land Bird Mean Species Richness Across Habitat Type and Season Recorded During Autonomous Recording Unit Surveys, 2022

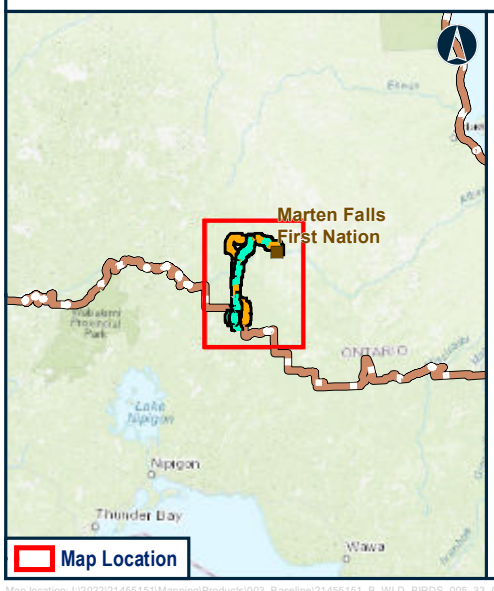


Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Two species of other land birds were detected as part of species at risk autonomous recording unit monitoring in 2022: common nighthawk and eastern whip-poor-will.

Figure 5-33 displays abundance values recorded at all-season autonomous recording unit plots during the breeding season to demonstrate where other land bird breeding “hotspots” occurred within the Project study areas. Abundance of other land birds was relatively consistent across the Local Study Area (**Figure 5-33**).





Legend

ABUNDANCE OF OTHER LAND BIRDS AT AUTONOMOUS RECORDING UNIT SURVEY LOCATIONS

- 2
- 1
- 0

COMMUNITY ACCESS ROAD ALTERNATIVES

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- BIRDS RSA

Notes:
None

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Other Land Bird Abundance Recorded During Autonomous Recording Unit Breeding Season Surveys in the Local Study Area, 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Nov, 2024	1:500,000 * when printed 11"x17"
Rev:0	

Figure 5-33

Contains information provided by Ontario Ministry of the Environment, Conservation and Parks or by Ontario Ministry of Natural Resources and Forestry (Copyright: King's Printer of Ontario 2023), through a Sensitive Data License Agreement. This drawing has been prepared for use of AECOM client and may not be reproduced or relied upon by third parties, except as agreed by AECOM and its client, as required by law or for use by governmental reviewing agencies. AECOM accepts no responsibility, and denies any liability whatsoever, to any party that modifies this drawing without AECOM express written consent. The use of Sensitive Data in this drawing does not constitute an endorsement by the Ministry for this drawing or by AECOM of the Sensitive Data.

Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_005_33_GIS_Abundance_OtherBirds_ARU_2022.mxd
Date Saved: 11/25/2024 9:04:24 AM User Name: gld_rduval

5.6.2.3 Targeted Species at Risk Autonomous Recording Unit Surveys

Common nighthawk was detected at seven of eight targeted species at risk autonomous recording unit survey locations that were selected for this species. Eastern whip-poor-will was detected at one targeted survey location in 2022, at the southern extremity of the Local Study Area (**Figure 6-27**).

5.6.2.4 Incidental Observations

A total of four other land bird species were detected incidentally during field surveys from 2018 to 2022; all were detected during point count or autonomous recording unit surveys.

5.7 Significant Wildlife Habitat

5.7.1 Priority Areas or Sanctuaries for Birds

The birds Regional Study Area intersects two Canada Protected and Conservation Areas: Albany River Provincial Park and Ogoki River Provincial Park (Government of Canada, 2022).

The birds Regional Study Area does not intersect any United Nations Educational, Scientific and Cultural Organization Heritage Sites (UNESCO, 2023), national parks (Government of Canada, 2022), migratory bird sanctuaries (ECCC, 2023a), national wildlife areas (ECCC, 2023b), Areas of Natural or Scientific Interest (Government of Ontario, 2023b), or Important Bird Areas (IBA, 2023). The nearest important bird area (Albany River estuary and associated coastline) is approximately 280 km northeast of the Regional Study Area along the coast of James Bay (IBA, 2023) and the nearest migratory bird sanctuary (Moose River) is near Moosonee on the James Bay coast (approximately 370 km east of the Regional Study Area). The nearest Areas of Natural or Scientific Interest is Jobes Creek, which is a provincially significant site and is approximately 15 km west of the birds Regional Study Area, near the centre of the Project alignment.

5.7.2 Critical Habitat for Federal Species at Risk

Critical habitat has only been identified, for natural areas, for three species at risk that may occur in the Project study areas: bank swallow, red knot, and eastern whip-poor-will. There is no known critical habitat for any of these species in the Regional Study Area. The closest critical habitat location for eastern whip-poor-will is near Ouimet Canyon, approximately 250 km southwest of the Regional Study Area (ECCC, 2018). The closest critical habitat location for bank swallow is on the Albany River approximately 200 km east of the Regional Study Area (ECCC, 2022). The closest critical habitat location for red knot is in James Bay, approximately 300 km east of the Regional Study Area (ECCC, 2017).

Based on a desktop review and aerial / ground reconnaissance surveys, no suitable nesting habitat for barn swallow and bank swallow was identified within a 2.5 km buffer of the Project footprint (Golder, 2019). Although suitable nesting habitat for chimney swift may be present, it was determined through desktop review that this species is well outside its range within the Regional Study Area.

5.7.3 Pileated Woodpecker Nests

Under changes enacted in 2022 to the *Migratory Birds Regulations* under the *Migratory Birds Convention Act, 1994*, several bird species have designated waiting periods before a nest can be disturbed, damaged, removed, or destroyed, including one species that has potential to occur in the Project study areas: pileated woodpecker. Pileated woodpecker nests are protected for 36 months after they are last actively used by any bird species protected under the *Migratory Birds Convention Act, 1994.* Pileated woodpecker pairs inhabit their territories year-round, but calling and drumming activity may increase during the breeding period (Bull and Jackson, 2020). As such, detections of pileated woodpecker made any time of the year during field surveys from 2018 to 2022 are discussed below.

No pileated woodpecker nests were detected during baseline surveys. However, pileated woodpeckers were observed within 100 m of observers at two breeding bird point count survey locations in 2018 and outside of 100 m from observers at one breeding bird point count survey location in 2022. Pileated woodpeckers were detected at 24 autonomous recording unit survey locations during the spring, summer, or fall seasons; no pileated woodpecker detections were recorded in the winter season. Pileated woodpecker was detected on four autonomous recording units in the Project Development Area and 20 autonomous recording units in the Local Study Area.

6. Summary of Proxy Valued Component Observations

The following sections provide a high-level summary of the occurrence and abundance of each of the proxy Valued Components within the Project study areas.

6.1 Forest Birds

6.1.1 Red-eyed Vireo

Red-eyed vireo (Oji-Cree translation, *misko-binechiinch gaanitaanigamoch*) (*Vireo olivaceus*) was one of the most abundant forest songbird species detected during field surveys and was detected each survey year from 2018 to 2022. During the breeding season, this species was recorded in each of the Project study areas (**Table 6-1**). This species was detected most frequently in the southern portion of the Local Study Area and near the Albany River**.**

Table 6-1: Red-eyed Vireo Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	4	4	7	31
LSA	30	54	40	210
RSA	-	-	9	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During the breeding season from 2018 to 2022, red-eyed vireo had the highest relative abundance at point count plots that occurred in the Regional Study Area (0.47 ± 0.14 individuals per plot; **Table 6-2**). Mean relative abundance of individuals was highest in 2018 (0.29 ± 0.04 individuals per plot), and lowest in 2019 (0.20 ± 0.14 individuals per plot). Red-eyed vireo was most common in deciduous forest in all Project study areas and mixed forest in the Regional Study Area (**Table 6-2**; **Figure 6-1**). Red-eyed vireo was least abundant during point count surveys in the fen and water habitat types (**Table 6-2**; **Figure 6-1**).

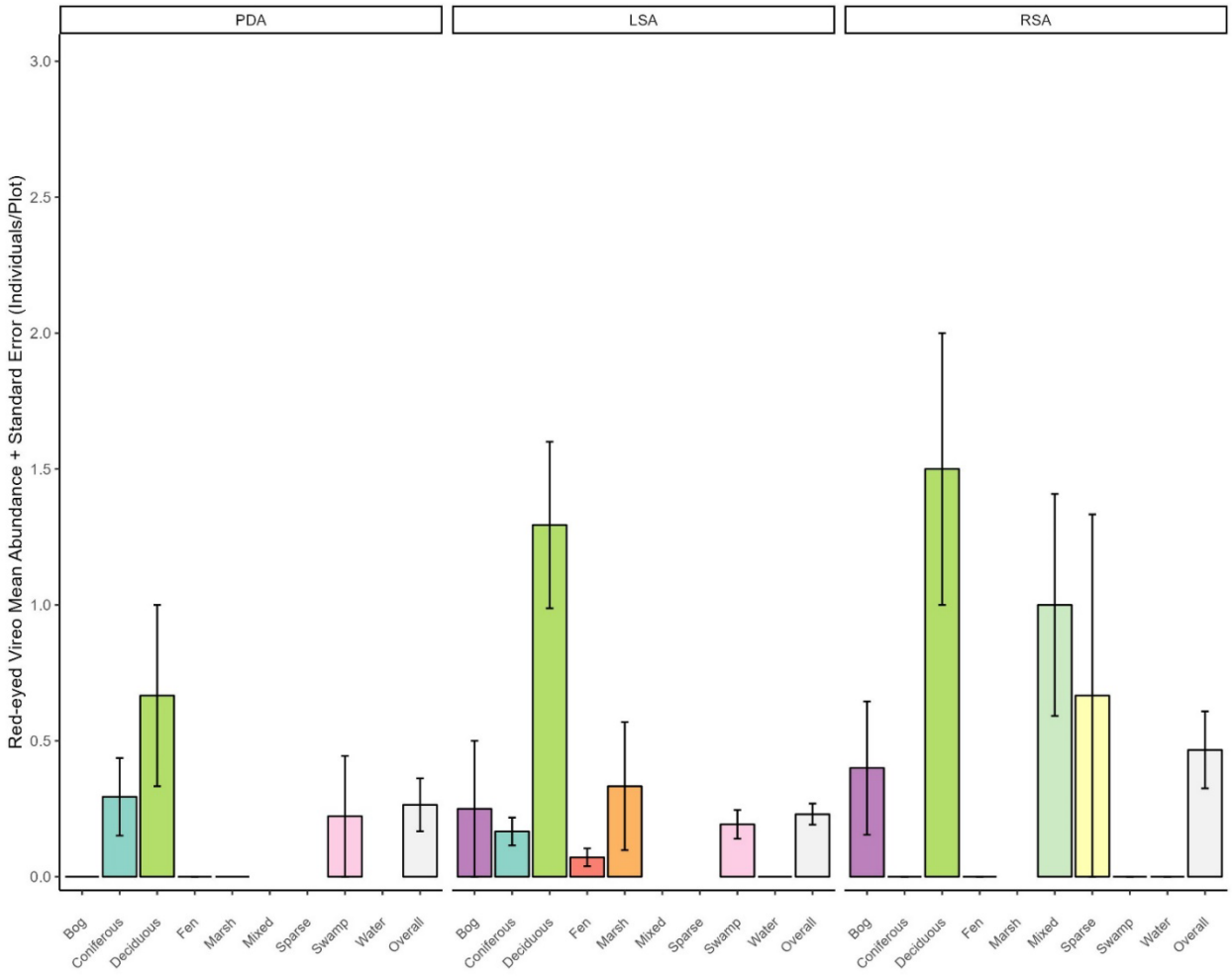
During autonomous recording unit surveys completed during the breeding season in 2022, red-eyed vireo was detected at a higher relative abundance in the Project Development Area (1.75 ± 0.48 individuals per plot) than in the Local Study Area (0.87 ± 0.12 individuals per plot) (**Table 6-2**). During the breeding season, red-eyed vireo had the highest relative abundance within the deciduous and coniferous forest habitat categories in both study areas (**Table 6-2**; **Figure 6-2**). Red-eyed vireo were least abundant during autonomous recording unit surveys in the Local Study Area in the fen, marsh, and swamp habitat types.

Table 6-2: Mean Relative Abundance of Red-Eyed Vireo Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Red-eyed Vireo (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.25 ± 0.25	0.40 ± 0.24
Coniferous Forest	2.00[b]	1.21 ± 0.24	n/a	0.29 ± 0.14	0.17 ± 0.05	0.00 ± 0.00
Deciduous Forest	2.00 ± 1.00	2.00 ± 0.26	n/a	0.67 ± 0.33	1.29 ± 0.31	1.50 ± 0.50
Fen	1.00[b]	0.37 ± 0.11	n/a	0.00 ± 0.00	0.07 ± 0.03	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	0.33 ± 0.24	-
Mixed Forest	-	-	n/a	-	-	1.00 ± 0.41
Early Successional Sparse Treed	-	-	n/a	-	-	0.67 ± 0.67
Swamp	-	0.77 ± 0.26	n/a	0.22 ± 0.22	0.19 ± 0.05	0.00 ± 0.00
Water	-	-	n/a	-	0.00[b]	0.00 ± 0.00
All Habitat Types	**1.75** ± 0.48	**0.87** ± 0.12	**n/a**	**0.26** ± 0.10	**0.23** ± 0.04	**0.47** ± 0.14

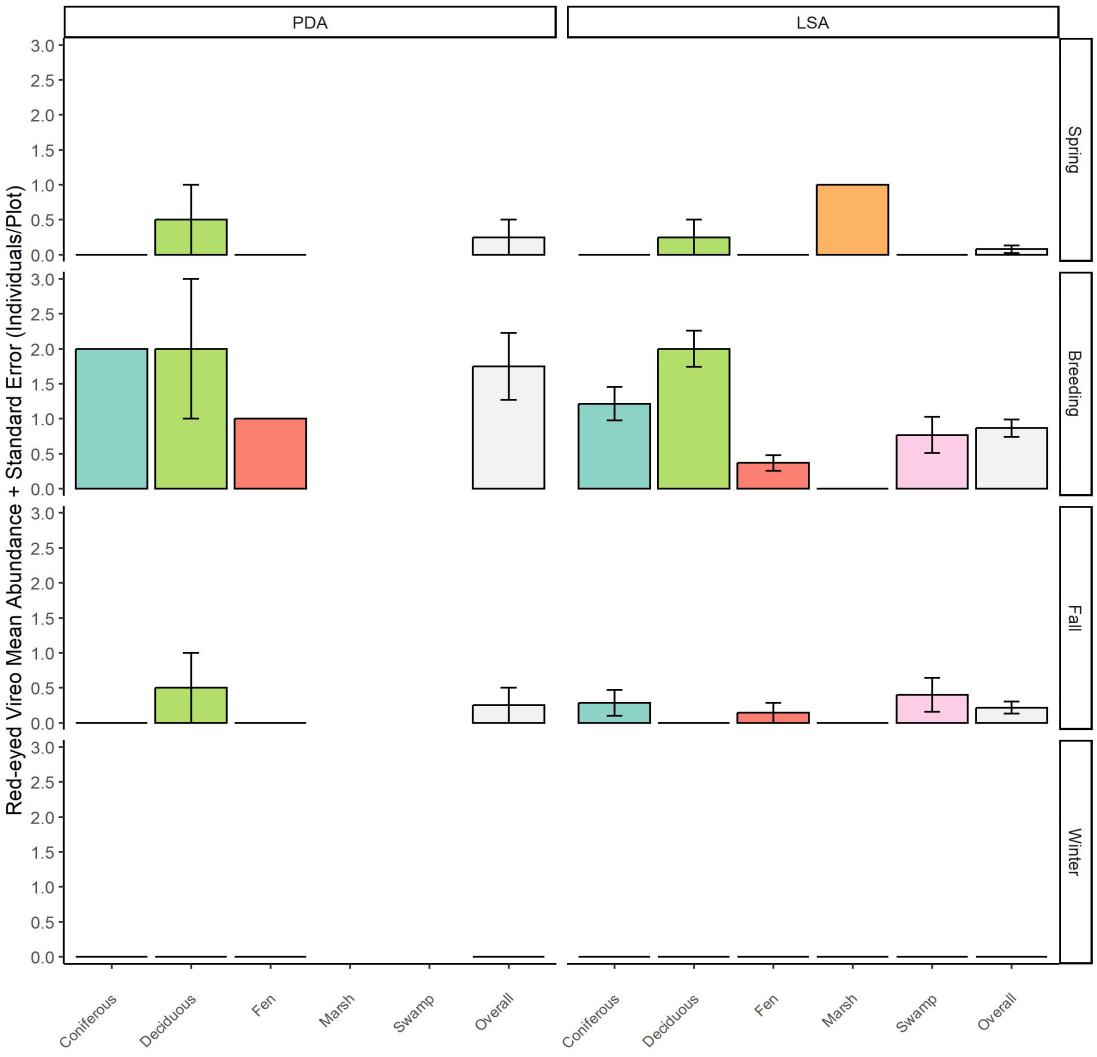
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; RSA = Regional Study Area; LSA = Local Study Area.

Figure 6-1: Red-eyed Vireo Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

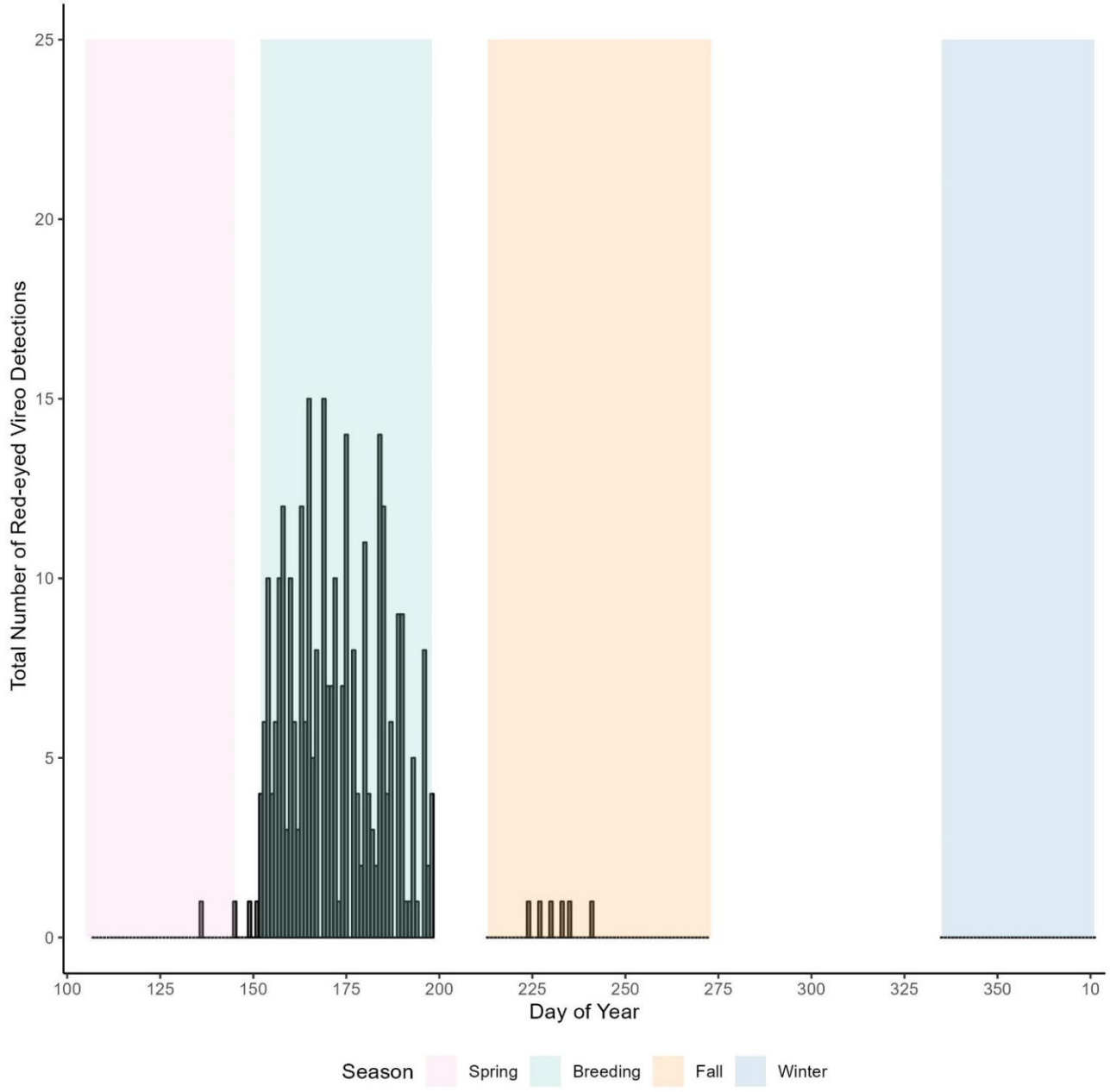
Figure 6-2: Red-eyed Vireo Relative Abundance Observed during Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of red-eyed vireo use of the Project study areas throughout the year. **Figure 6-3** provides a summary of the total observations of red-eyed vireo by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected red-eyed vireo at highest relative abundance at dawn during the breeding season (0.91 ± 0.12 individuals per plot), followed by fall at dawn (0.22 ± 0.08 individuals per plot), spring at dawn (0.10 ± 0.06 individuals per plot), and the breeding season at night (0.04 ± 0.02 individuals per plot). No detections were recorded during the winter. The peak red-eyed vireo observations were recorded in early to mid-June (**Figure 6-3**).

Figure 6-3: Red-eyed Vireo Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.1.2 Ovenbird

Ovenbird (Oji-Cree translation, *binechiinch ganitanigamoch*) (*Seiurus aurocapilla*)was detected each survey year from 2018 to 2022. During the breeding season, this species was recorded in each of the Project study areas (**Table 6-4**). Ovenbirds were detected throughout the study areas, but more observations were recorded south of the Albany River than in the northern portions of the study areas.

Table 6-3: Ovenbird Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	4	4	4	31
LSA	21	54	29	210
RSA	-	-	7	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was highest in 2018 (0.21 ± 0.04 individuals per plot), and lowest in 2019 (0.05 ± 0.05 individuals per plot). During the breeding season from 2018 to 2022, ovenbird had the highest relative abundance at plots that occurred in the Regional Study Area (0.37 ± 0.13 individuals per plot) than in the Project Development Area and Local Study Area (0.15 ± 0.03 individuals per plot for both the Local Study Area and Project Development Area) (**Table 6-4**; **Figure 6-4**). Ovenbird was most common in deciduous forest in all Project study areas followed by coniferous forest in the Project Development Area and Local Study Area and bog in the Regional Study Area (**Table 6-4**; **Figure 6-4**). No detections of ovenbirds occurred in the marsh, early successional sparse treed, or water habitat types (**Table 6-4**; **Figure 6-4**).

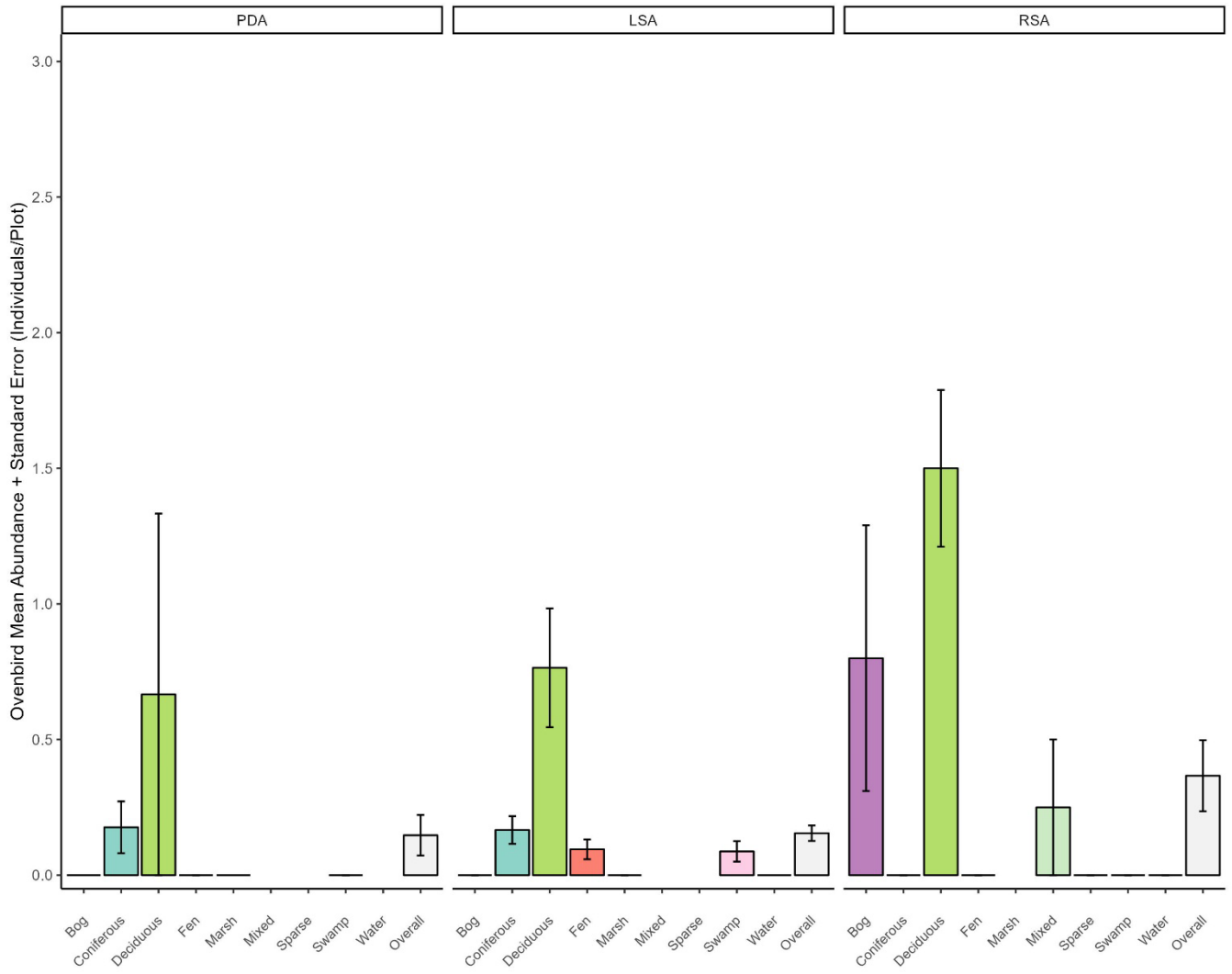
During autonomous recording unit surveys completed during the breeding season in 2022, ovenbird was detected at a higher relative abundance in the Project Development Area (0.75 ± 0.25 individuals per plot) than in the Local Study Area (0.53 ± 0.11 individuals per plot) (**Table 6-4**). During the breeding season, ovenbird had the highest relative abundance within deciduous forest, coniferous forest, and marsh habitat types (**Table 6-4**; **Figure 6-5**). Ovenbirds were least abundant in the swamp and fen habitat types (**Table 6-4**; **Figure 6-5**).

Table 6-4: Mean Relative Abundance of Ovenbird Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Ovenbird (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.00 ± 0.00	0.80 ± 0.49
Coniferous Forest	1.00[b]	0.57 ± 0.20	n/a	0.18 ± 0.10	0.17 ± 0.05	0.00 ± 0.00
Deciduous Forest	1.00 ± 0.00	1.83 ± 0.31	n/a	0.67 ± 0.67	0.76 ± 0.22	1.50 ± 0.29
Fen	0.00[b]	0.00 ± 0.00	n/a	0.00 ± 0.00	0.10 ± 0.04	0.00 ± 0.00
Marsh	-	1.00[b]	n/a	0.00[b]	0.00 ± 0.00	-
Mixed Forest	-	-	n/a	-	-	0.25 ± 0.25
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00
Swamp	-	0.62 ± 0.21	n/a	0.00 ± 0.00	0.09 ± 0.04	0.00 ± 0.00
Water	-	-	n/a	-	0.00[b]	0.00 ± 0.00
All Habitat Types	**0.75** ± 0.25	**0.53** ± 0.11	**n/a**	**0.15** ± 0.07	**0.15** ± 0.03	**0.37** ± 0.13

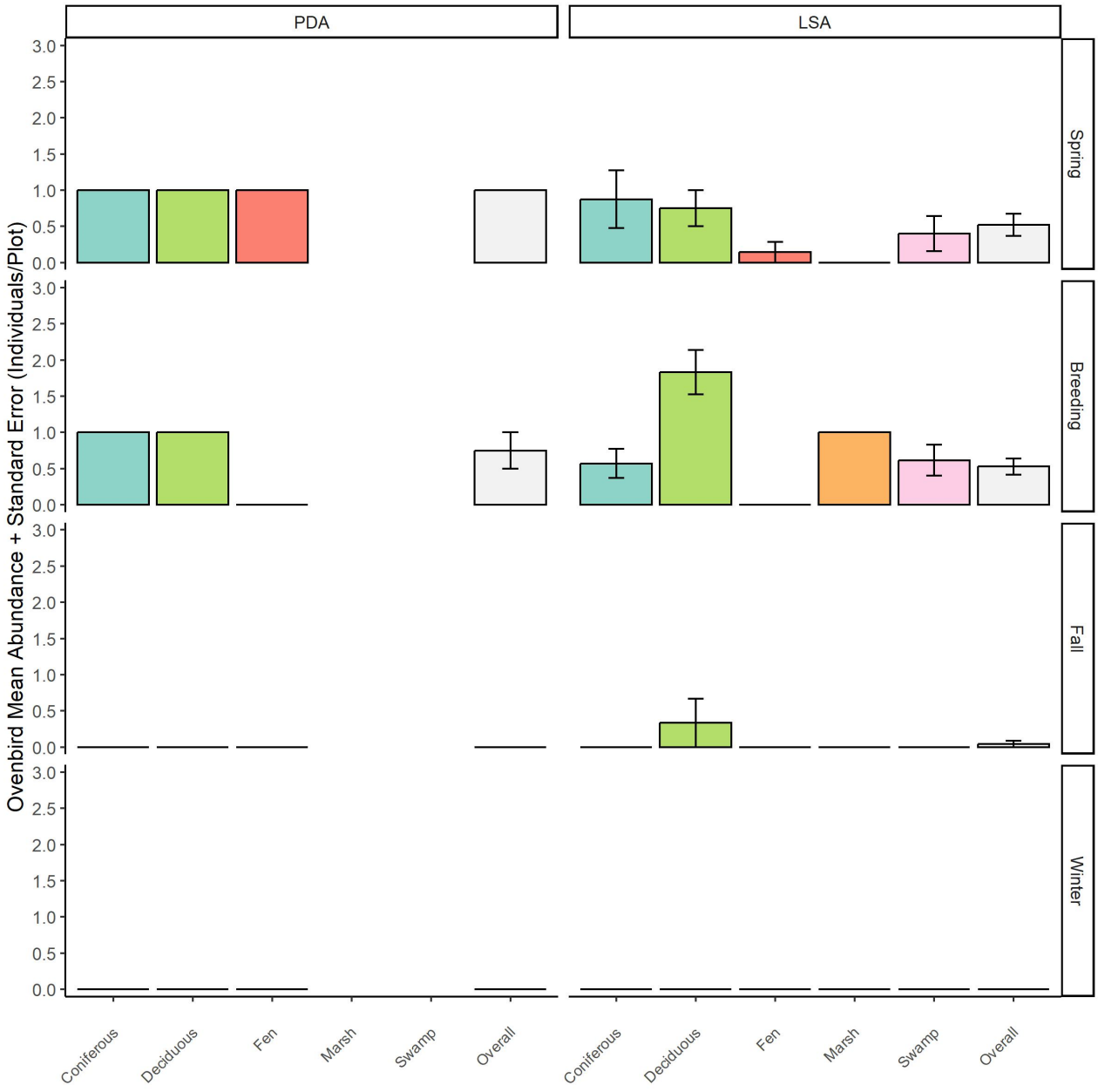
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-4: Ovenbird Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

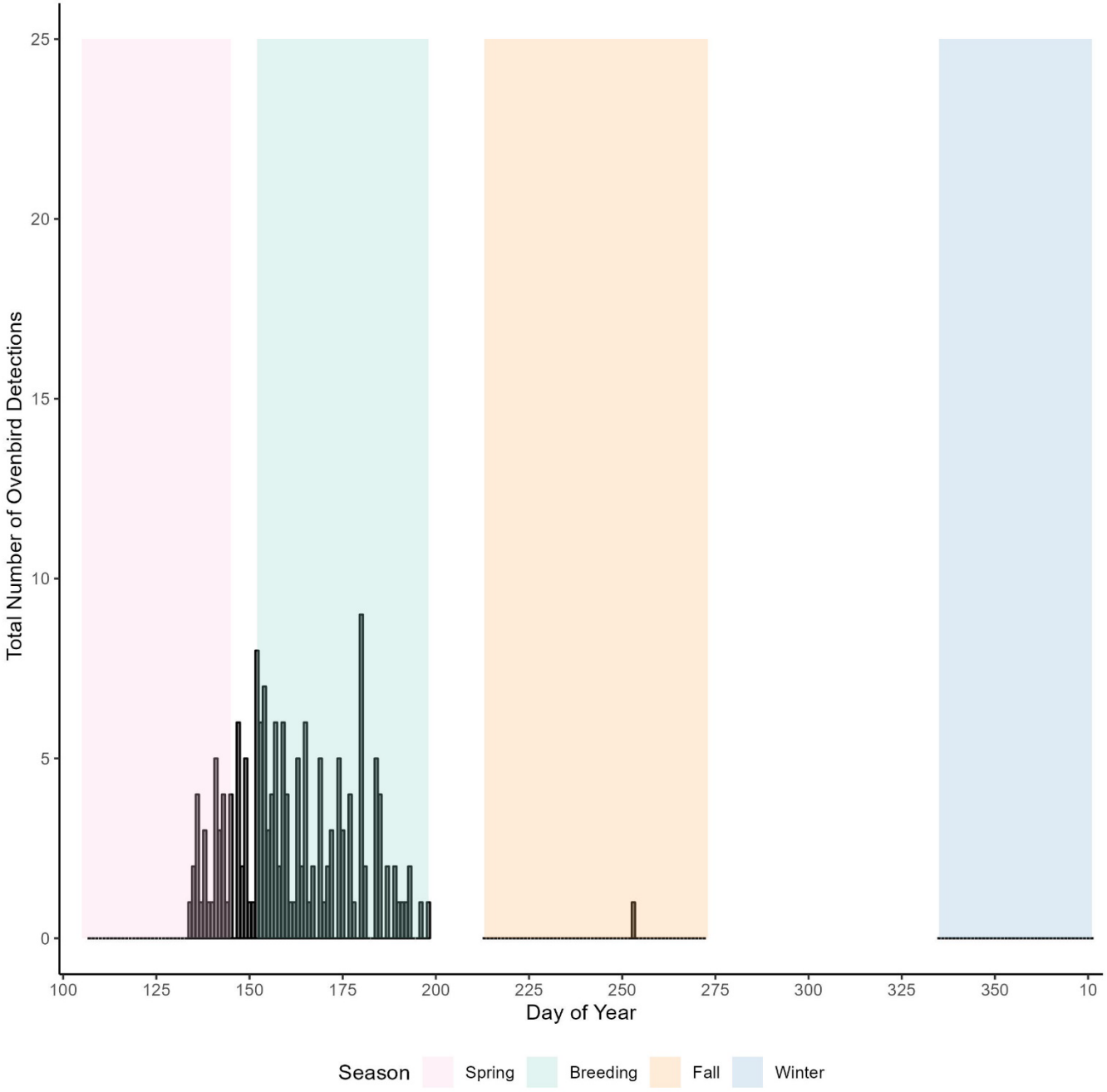
Figure 6-5: Ovenbird Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of ovenbird use of the Project study areas throughout the year. **Figure 6-6** provides a summary of the total observations of ovenbird by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected ovenbird at the highest relative abundance at dawn during the spring season (0.59 ± 0.14 individuals per plot) and dawn during the summer (0.51 ± 0.10 individuals per plot), followed by the breeding season at night (0.16 ± 0.05 individuals per plot) and fall migration at dawn (0.04 ± 0.04 individuals per plot). No detections were recorded during winter. The peak in ovenbird observations was recorded in early June and early July (**Figure 6-6**).

Figure 6-6: Ovenbird Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.1.3 Dark-eyed Junco

Dark-eyed junco was detected each survey year from 2018 to 2022. During the breeding season, this species was recorded in each of the Project study areas (**Table 6-5**). This species was detected evenly throughout the study areas.

Table 6-5: Dark-eyed Junco Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	4	4	12	31
LSA	48	54	114	210
RSA	-	-	7	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was highest in 2022 (0.96 ± 0.10 individuals per plot), and lowest in 2019 (0.41 ± 0.11 individuals per plot). During the breeding season from 2018 to 2022, dark-eyed junco had the highest relative abundance at plots that occurred in the Local Study Area (0.70 ± 0.05 individuals per plot; **Table 6-6**; **Figure 6-7**). Generally, species relative abundance was highest in wetland habitat types with the highest relative abundance found in bog habitat types in the Local Study Area followed by marsh, fen, and swamp, in the Local Study Area (**Table 6-6**; **Figure 6-7**). Within the Project Development Area and Regional Study Area, the highest relative abundance was in fen and early successional sparse treed habitat types, respectively (**Table 6-6**; **Figure 6-7**).

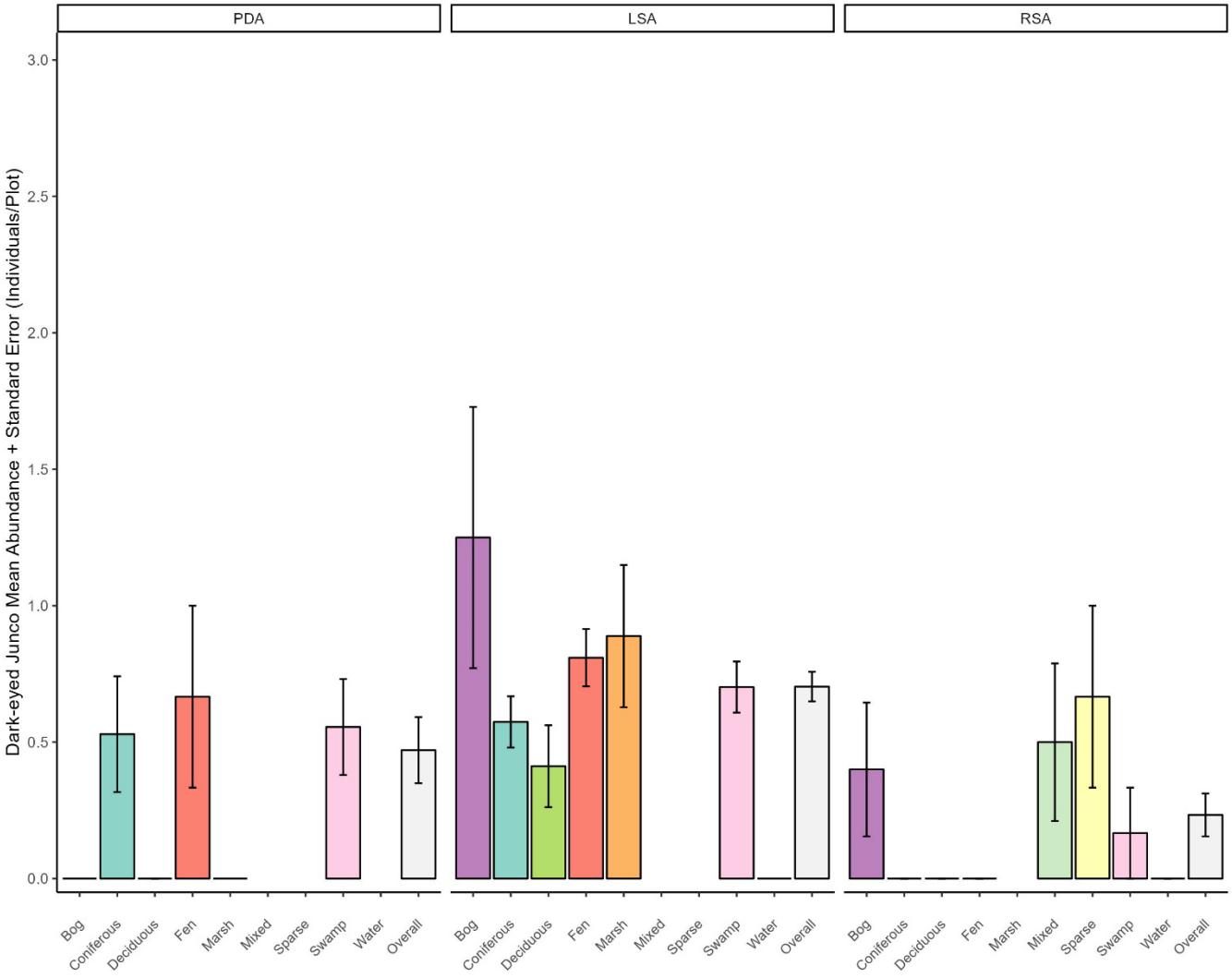
During autonomous recording unit surveys completed during the breeding season in 2022, dark-eyed junco was detected at similar relative abundance in the Project Development Area (1.25 ± 0.48 individuals per plot) and the Local Study Area (1.19 ± 0.13 individuals per plot) (**Table 6-6**; **Figure 6-8**). During the breeding season, dark-eyed junco had the highest relative abundance within coniferous forest and deciduous forest in the Project Development Area, and in fen and swamp habitat types in the Local Study Area (**Table 6-6**; **Figure 6-8**).

Table 6-6: Mean Relative Abundance of Dark-eyed Junco Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Dark-eyed Junco (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	1.25 ± 0.48	0.40 ± 0.24
Coniferous Forest	2.00[b]	0.79 ± 0.19	n/a	0.53 ± 0.21	0.57 ± 0.09	0.00 ± 0.00
Deciduous Forest	1.50 ± 0.50	0.50 ± 0.22	n/a	0.00 ± 0.00	0.41 ± 0.15	0.00 ± 0.00
Fen	0.00[b]	1.68 ± 0.24	n/a	0.67 ± 0.33	0.81 ± 0.11	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	0.89 ± 0.26	-
Mixed Forest	-	-	n/a	-	-	0.50 ± 0.29
Early Successional Sparse Treed	-	-	n/a	-	-	0.67 ± 0.33
Swamp	-	1.31 ± 0.24	n/a	0.56 ± 0.18	0.70 ± 0.09	0.17 ± 0.17
Water	-	-	n/a	-	0.00[b]	0.00 ± 0.00
All Habitat Types	**1.25** ± 0.48	**1.19** ± 0.13	**n/a**	**0.47** ± 0.12	**0.70** ± 0.05	**0.23** ± 0.08

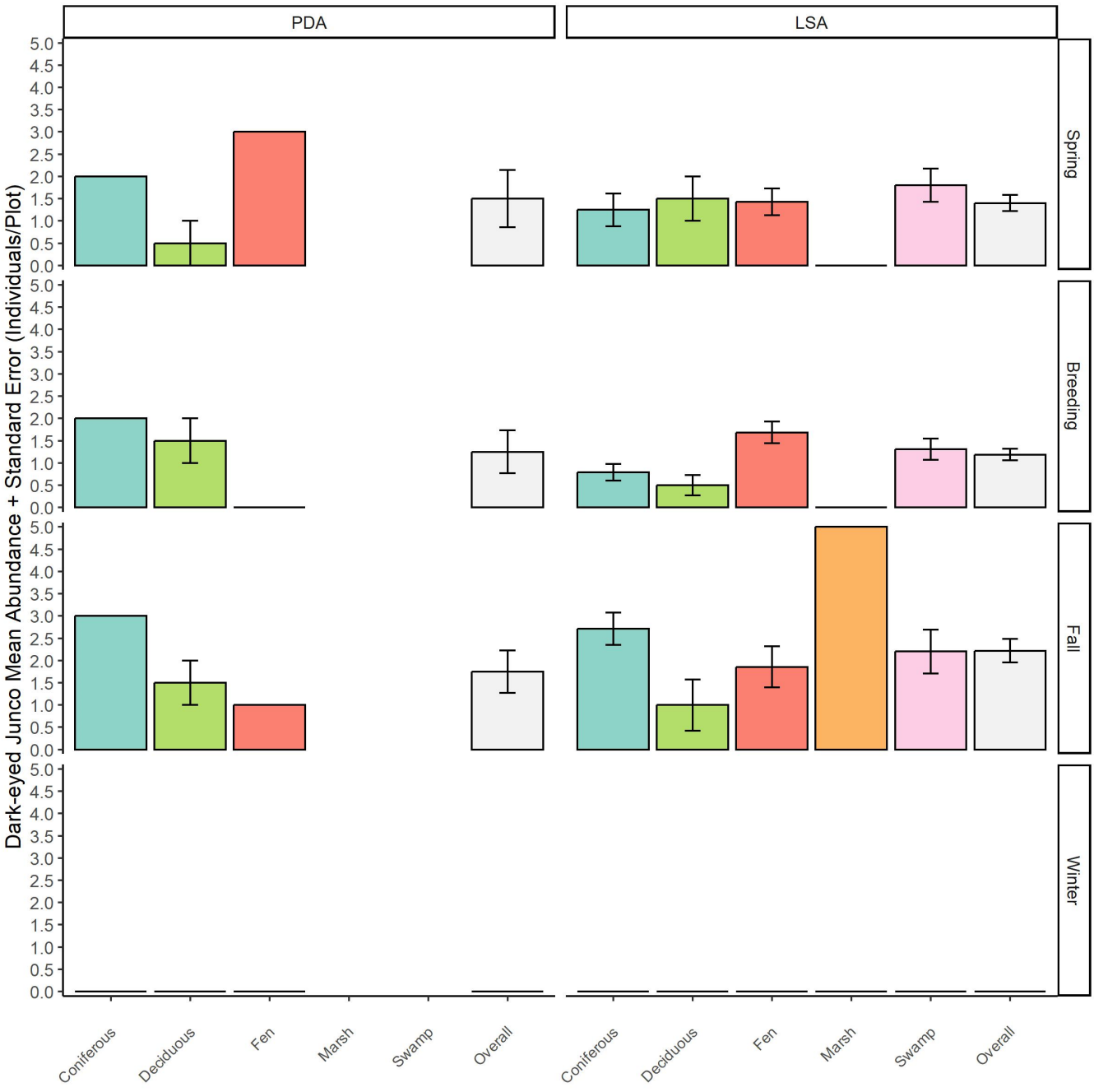
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-7: Dark-eyed Junco Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

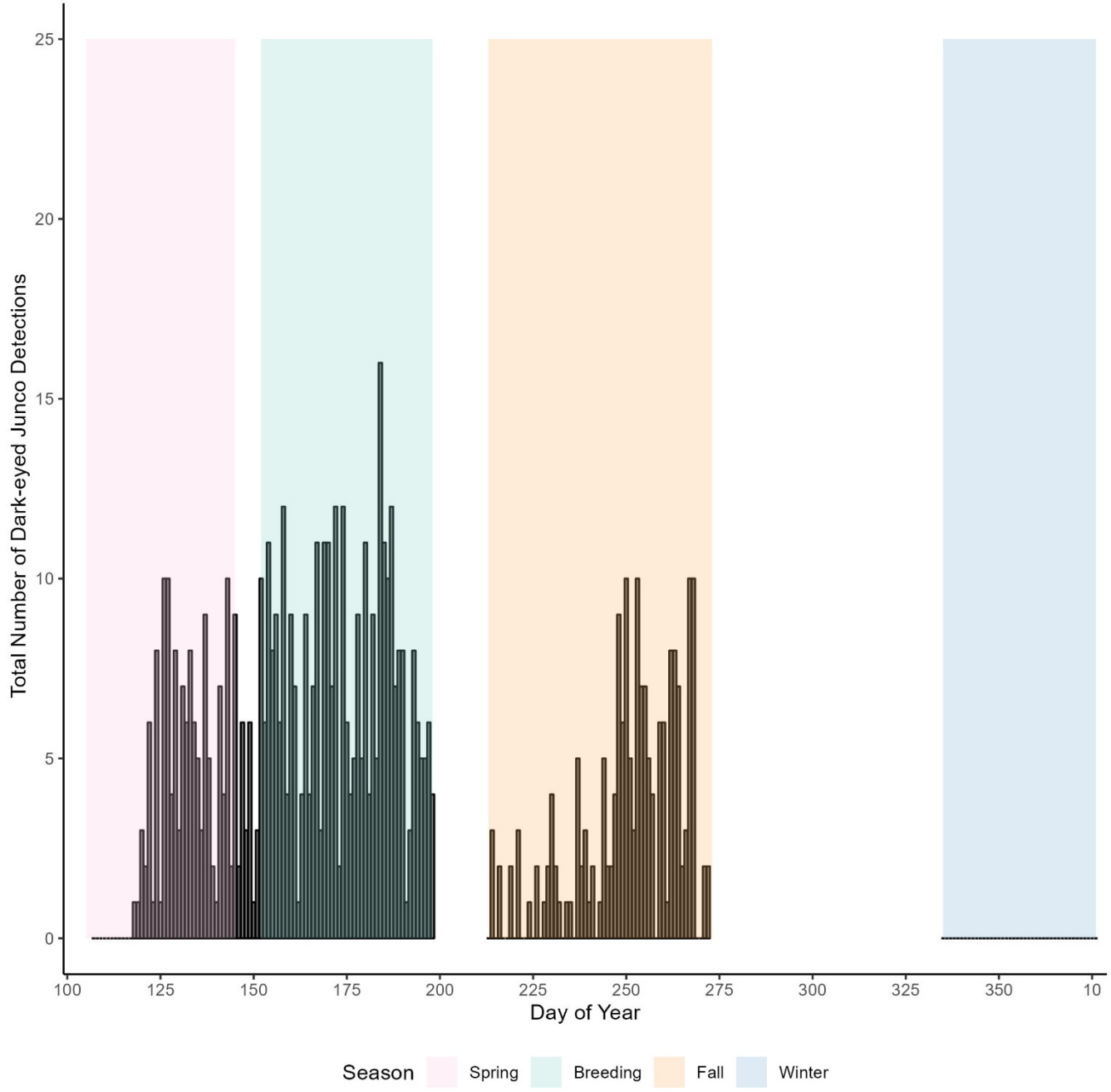
Figure 6-8: Dark-eyed Junco Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of dark-eyed junco use of the Project study areas throughout the year. **Figure 6-9** provides a summary of the total observations of dark-eyed junco by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected dark-eyed junco at the highest relative abundance during fall at dawn (2.15 ± 0.24 individuals per plot), followed by spring at dawn (1.41 ± 0.18 individuals per plot) and the breeding season at dawn (1.18 ± 0.13 individuals per plot). This species was recorded at night during the spring and summer seasons (0.14 ± 0.08 and 0.54 ± 0.08 individuals per plot, respectively). No detections were recorded during the winter. Activity was highest during the breeding season (i.e., June 1 to July 17); however, detections were made from mid-spring until the end of the fall season. The peak in dark-eyed junco observations was recorded in early July (**Figure 6-9**).

Figure 6-9: Dark-eyed Junco Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023

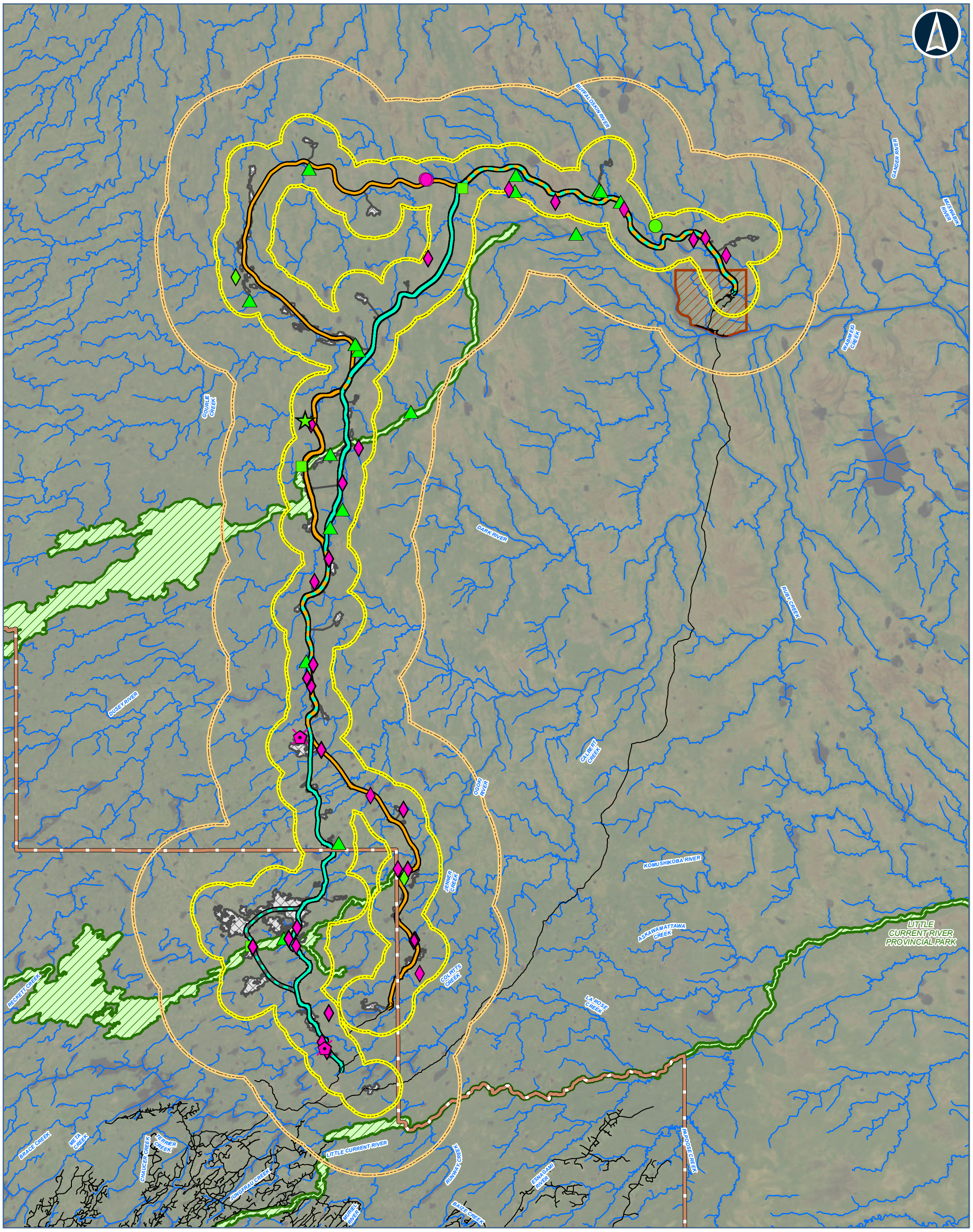


6.2 Raptors

6.2.1 Osprey

Osprey (*Pandion haliaetus*) were relatively uncommonly observed in the Local Study Area during aerial surveys, point count surveys, and autonomous recording unit surveys (**Figure 6-10**). Five ospreys were observed in the Local Study Area during waterfowl and waterbird breeding aerial surveys in June 2022 and one individual was observed in the Local Study Area during fall migration aerial surveys in September 2022 (**Figure 6-10**). Additionally, one osprey nest was found during aerial surveys in 2022; one adult and three young were observed at the nest (**Figure 5-8**). Two additional osprey nests were recorded during 2018 surveys but were found to be inactive during 2022 surveys. Ospreys were detected sporadically throughout the Local Study Area. The lone active osprey nest identified in the Local Study Area during 2022 surveys is along the edge of the Ogoki River, approximately 5 km northwest of Dusey Lake.

During point count surveys, osprey was recorded at one location in 2022 in the Local Study Area (**Figure 6-10)**. During autonomous recording unit surveys in the breeding season of 2022, ospreys were recorded at two of 54 autonomous recording unit survey plots in the Local Study Area; no detections were made in the Project Development Area or in the Regional Study Area (**Figure 6-10**). All autonomous recording unit recordings of ospreys were made during the breeding season at night. Recordings occurred in fen and swamp habitat types.





Legend

PROXY RAPTOR SPECIES OBSERVATION

BREEDING BIRD SURVEY OBSERVATION
- BOREAL OWL
- OSPREY

AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- BOREAL OWL
- OSPREY

SPECIES AT RISK TARGETED AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- BOREAL OWL

AERIAL WATERFOWL AND WATERBIRD BREEDING SURVEY OBSERVATION
- OSPREY
- OSPREY NEST

AERIAL MIGRATION SPRING AND FALL SURVEY OBSERVATION
- OSPREY

INCIDENTAL OBSERVATION
- BOREAL OWL

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

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Observations of Proxy Raptor Species During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

Oct, 2023	1:500,000 * when printed 11"x17"
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Figure 6-10

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6.2.2 Boreal Owl

Boreal owl was observed in the Project Development Area and Local Study Area and detected during autonomous recording unit surveys and point count surveys in 2018 and 2022; no detections of this species were made in the Regional Study Area or in 2019 (**Figure 6-10**). The boreal owl is a resident species in Canada and its breeding season is different than that of migratory birds. This species starts breeding in February and the calling period can extend through May (Hayward and Hayward, 2020); this aligns with the spring recording period (i.e., April 15 to May 31). During the spring recording season, this species was recorded at four out of four autonomous recording unit survey plots in the Project Development Area in 2022, at 27 of 54 autonomous recording unit survey plots in the Local Study Area in 2022, and at two of 119 point count plots in the Local Study Area in 2018; this species was not recorded in the Project Development Area or Regional Study Area during point count surveys. Boreal owls were detected throughout the Local Study Area, although detections were absent in the northwestern portion of the Local Study Area (**Figure 6-10**).

During point count surveys, boreal owls were recorded in the swamp habitat type (**Figure 6-10**). During autonomous recording unit surveys completed during the spring season in 2022, boreal owl was detected at a higher relative abundance in the Project Development Area (1.50 ± 0.29 individuals per plot) than in the Local Study Area (1.28 ± 0.17 individuals per plot) (**Table 6-7**; **Figure 6-11**). During the spring season, boreal owl was detected on autonomous recording units at the highest relative abundance within the coniferous forest and fen habitat types in the Project Development Area and in the deciduous forest and marsh habitat types in the Local Study Area (**Table 6-7**; **Figure 6-11**). Autonomous recording unit surveys detected boreal owl at highest relative abundance at night during the spring (1.36 individuals per plot), followed by night during the summer (0.39 individuals per plot), dawn during the spring (0.24 individuals per plot), and dawn during the fall (0.04 individuals per plot). No detections were recorded during winter season.

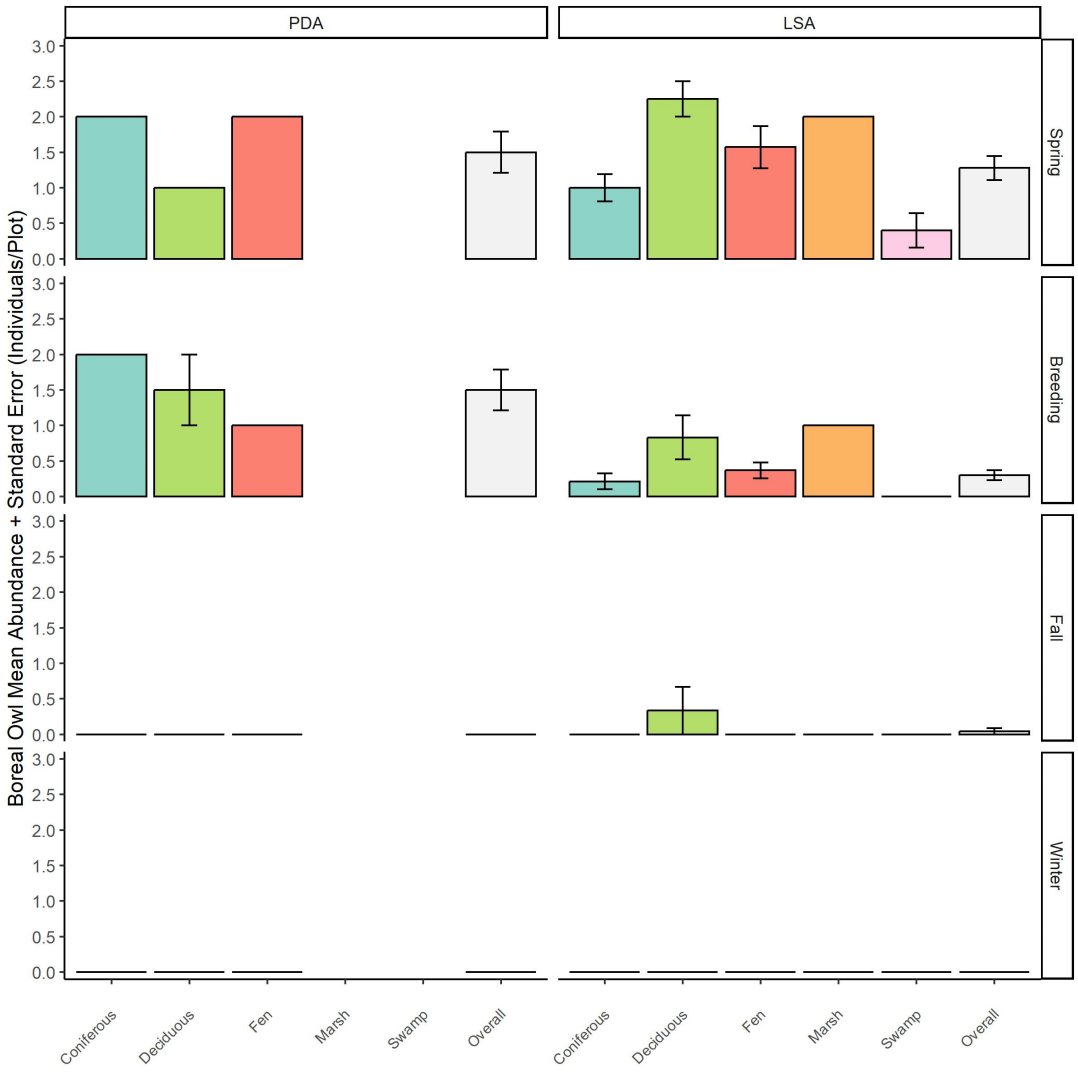
Boreal owl was incidentally recorded at two targeted species at risk autonomous recording unit surveys locations in the Local Study Area in 2022; observations were made in the rock barren and fen habitat types.

Table 6-7: Mean Relative Abundance of Boreal Owl Observed During Spring Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Boreal Owl (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	2.00[(b)]	1.00 ± 0.19	n/a
Deciduous Forest	1.00 ± 0.00	2.25 ± 0.25	n/a
Fen	2.00[(b)]	1.57 ± 0.30	n/a
Marsh	-	2.00[(b)]	n/a
Swamp	-	0.40 ± 0.24	n/a
All Habitat Types	**1.50** ± 0.29	**1.28** ± 0.17	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-11: Boreal Owl Relative Abundance Observed During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.3 Shorebirds

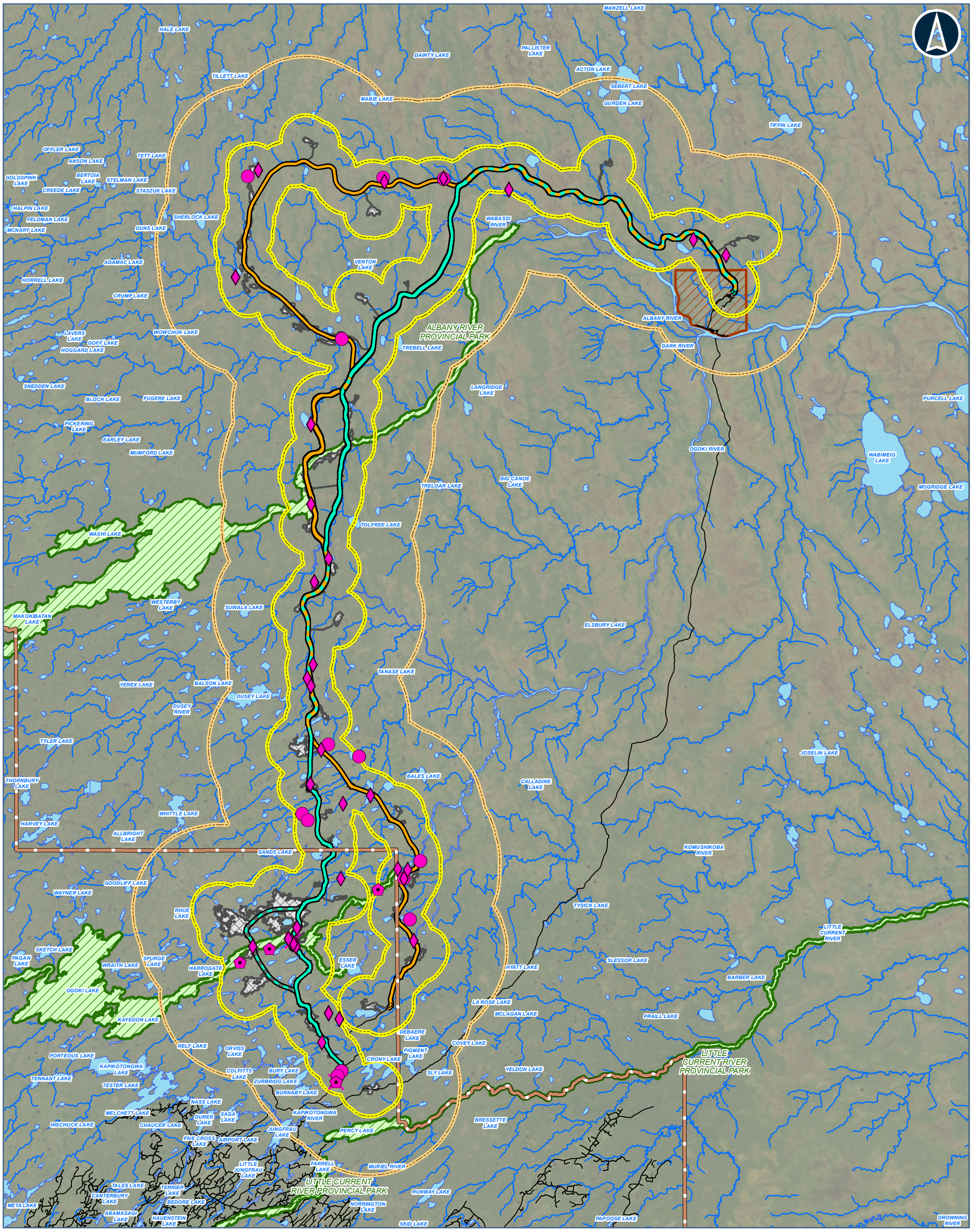
6.3.1 Wilson's Snipe

Wilson's snipe was the most common shorebird species observed during field surveys and was detected each survey year from 2018 to 2022. During the breeding season, this species was recorded in the Project Development Area and Local Study Area but was not detected in the Regional Study Area (**Table 6-8**). This species was also not detected during spring or fall migration or brood aerial surveys. This species was detected throughout the Local Study Area; however, more detections of the species occurred in the southern portion of the Local Study Area (**Figure 6-12**).

Table 6-8: Wilson's Snipe Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	3	4	2	31
LSA	23	54	10	210
RSA	-	-	0	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.





Legend

BREEDING BIRD SURVEY OBSERVATION
- WILSON'S SNIPE

AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- WILSON'S SNIPE

SPECIES AT RISK TARGETED AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- WILSON'S SNIPE

INCIDENTAL OBSERVATION
- WILSON'S SNIPE

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

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Observations of Wilson's Snipe During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 6-12

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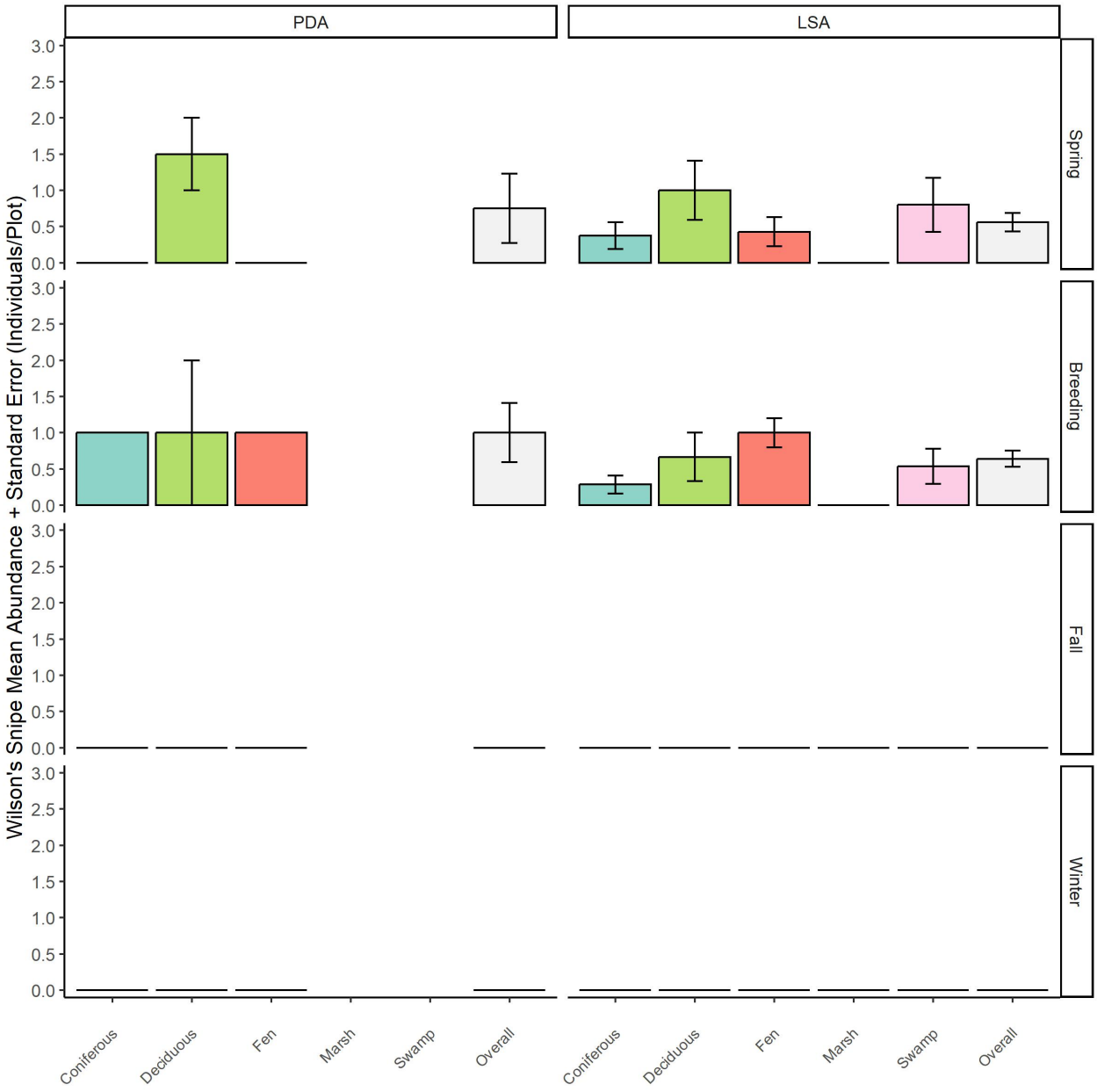
During autonomous recording unit surveys completed during the breeding season in 2022, Wilson's snipe was detected at a higher relative abundance in the Project Development Area (1.00 ± 0.41 individuals per plot) than in the Local Study Area (0.64 ± 0.11 individuals per plot) (**Table 6-9**; **Figure 6-13**). During the breeding season, Wilson's snipe was detected on autonomous recording units at the highest relative abundance within the fen habitat type in the Local Study Area (**Table 6-9**; **Figure 6-13**). The species was recorded at equal relative abundance in coniferous forest, deciduous forest, and fen habitat types sampled in the Project Development Area.

Table 6-9: Mean Relative Abundance of Wilson's Snipe Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Wilson's snipe (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	1.00[(b)]	0.29 ± 0.13	n/a
Deciduous Forest	1.00 ± 1.00	0.67 ± 0.33	n/a
Fen	1.00[(b)]	1.00 ± 0.20	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.54 ± 0.24	n/a
All Habitat Types	**1.00** ± 0.41	**0.64** ± 0.11	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-13: Mean Relative Abundance of Wilson's Snipe Detected on Autonomous Recording Units in the Project Study Areas, 2022 to 2023

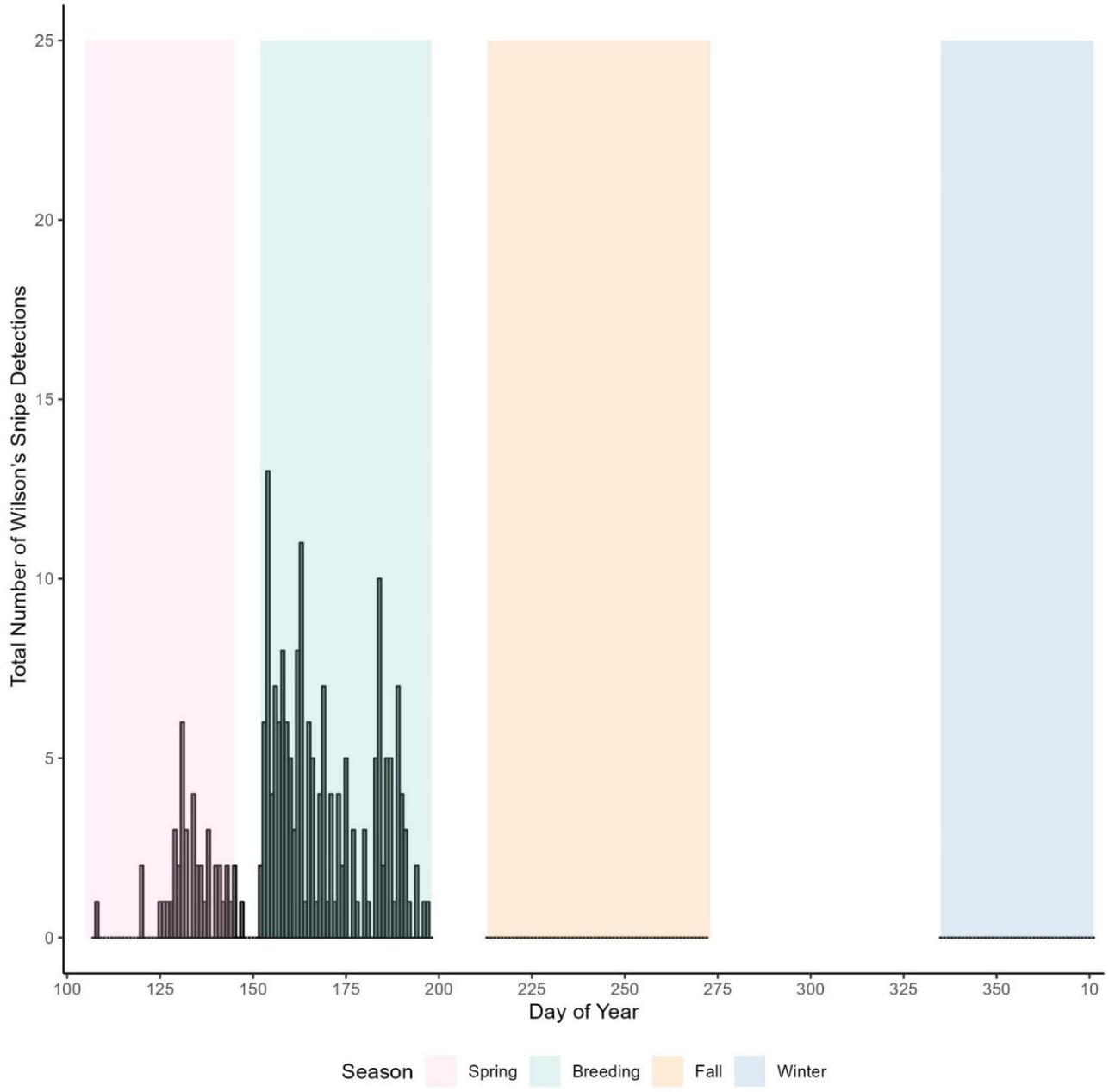


Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of Wilson's snipe use of the Project study areas throughout the year. **Figure 6-14** provides a summary of the total observations of Wilson's snipe by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording units in the Project Development Area and Local Study Area detected Wilson's snipe at the highest relative abundance at night during the breeding season (0.56 ± 0.10 individuals per plot), followed by the spring and breeding season at dawn (0.48 ± 0.12 and 0.47 ± 0.09 individuals per plot, respectively). No detections were recorded during the fall or winter seasons. Activity was highest during the breeding season (i.e., June 1 to July 17); however, detections were made beginning in early spring. The peak in Wilson's snipe observations was recorded in early June (**Figure 6-14**).

Wilson's snipe was incidentally recorded at two targeted species at risk autonomous recording unit survey locations in the Local Study Area in 2022; detections were made in the coniferous forest and marsh habitat types.

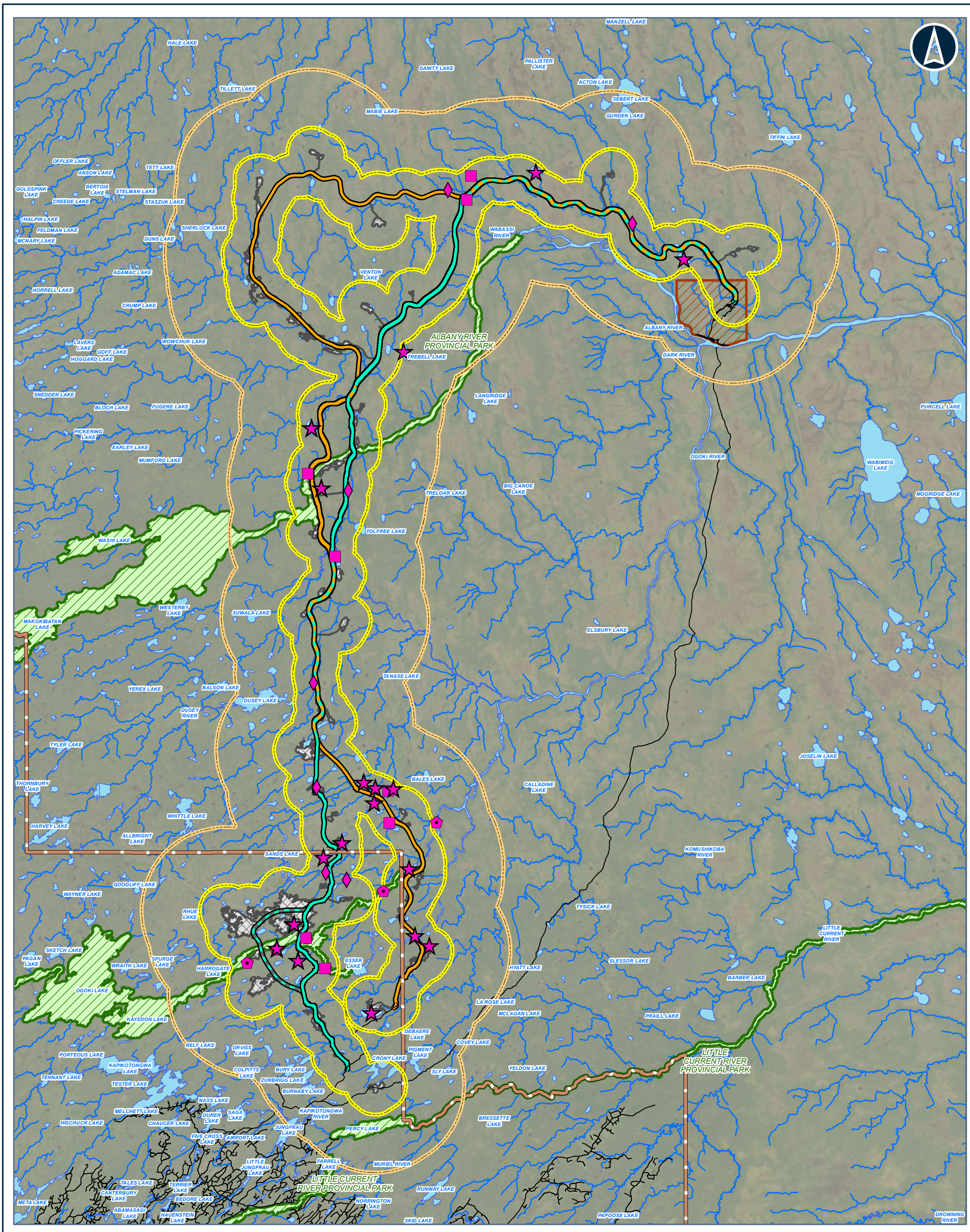
Figure 6-14: Wilson's Snipe Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.4 Waterfowl and Waterbirds

6.4.1 Mallard

Mallards were among the most common waterfowl and waterbird species observed in the Project Development Area, Local Study Area and Regional Study Area during field surveys in 2018 to 2022 (**Figure 6-15**). The species was detected in the Local Study Area during autonomous recording unit surveys, during both spring and fall migration aerial surveys, and during brood aerial surveys. Mallard was not detected at any point count plots from 2018 to 2022.





Legend

AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- MALLARD

AERIAL MIGRATION SPRING AND FALL SURVEY
- MALLARD

AERIAL WATERFOWL AND WATERBRID BREEDING SURVEY
- MALLARD

INCIDENTAL OBSERVATION
- MALLARD

COMMUNITY ACCESS ROAD ALTERNATIVES
- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT
- BIRDS LSA
- BIRDS RSA

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MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Mallards During Field Surveys in the Project Study Areas, 2018 to 2022

0 5 10 20
Kilometres

Datum: NAD 1983 CSRS UTM Zone 16N

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Figure 6-15

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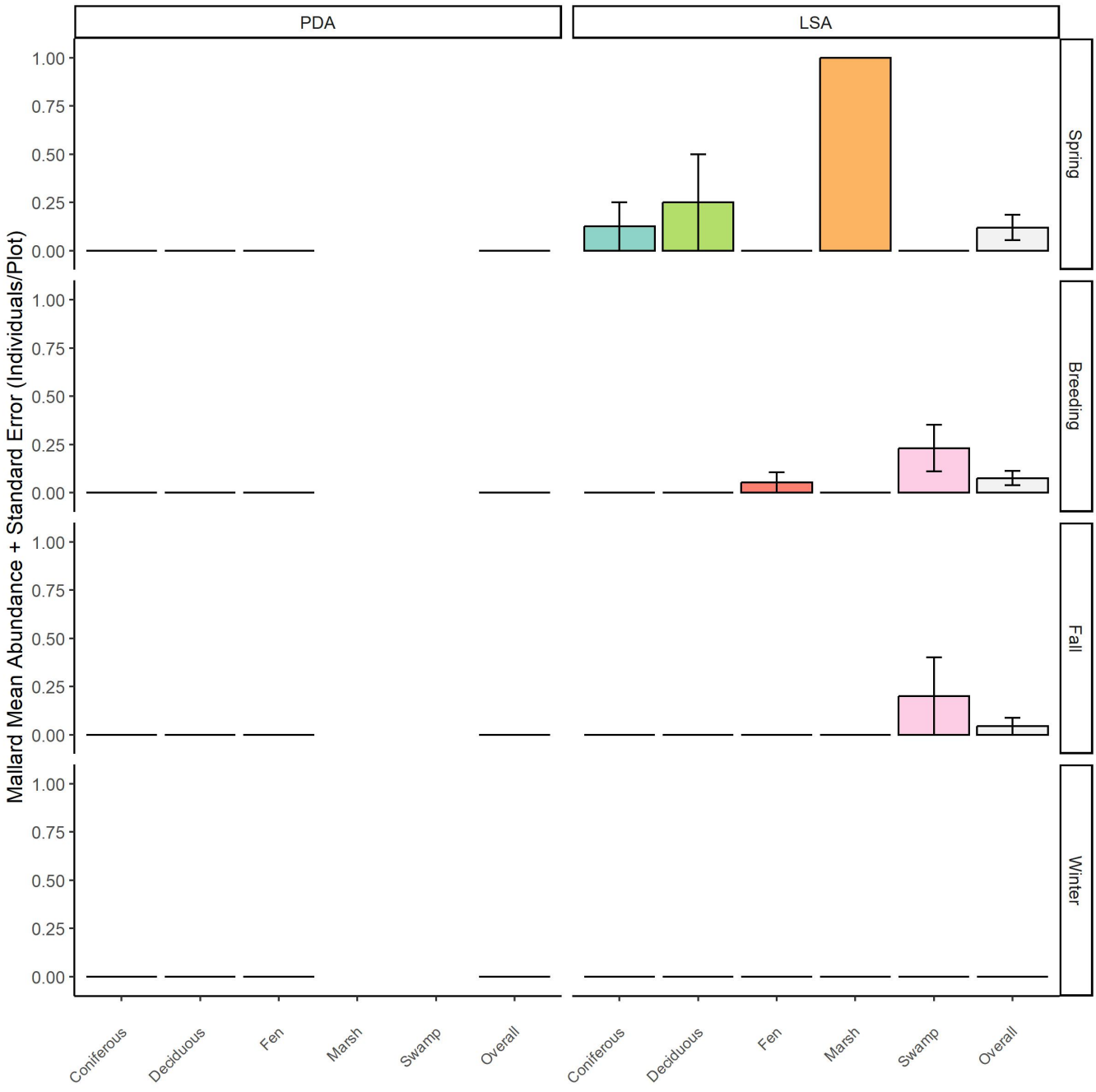
Mallard was recorded on five of 54 autonomous recording unit survey plots in the Local Study Area in 2022; no detections were recorded in the Project Development Area (**Table 6-10**; **Figure 6-16**). Mallard was detected in swamp and fen habitat types (**Table 6-10**; **Figure 6-16**). Autonomous recording units detected mallard at the highest relative abundance at night during the spring season (0.07 ± 0.05 individuals per plot) and at similar relative abundance during the breeding season during the dawn and night periods and fall at dawn (0.04 ± 0.02 to 0.04 ± 0.04 individuals per plot). No detections were recorded during the winter.

Table 6-10: Mean Relative Abundance of Mallard Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Mallard (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	0.00[(b)]	0.00 ± 0.00	n/a
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a
Fen	0.00[(b)]	0.05 ± 0.05	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.23 ± 0.12	n/a
All Habitat Types	**0.00** ± 0.00	**0.08** ± 0.04	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-16: Mean Relative Abundance of Mallard Detected on Autonomous Recording Units in the Project Study Areas, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

During aerial surveys, mallards were observed during all survey rounds. During waterfowl and waterbird breeding surveys, a total of 51 adults and 7 pairs were observed. During spring migration surveys, a total of 100 individuals were observed at 15 different sites in the Local Study Area and Regional Study Area (**Figure 6-15**). Of these sites, one was located along the Albany River and three were along the Ogoki River. Eleven sites were waterbodies including Glaze, Saarimaki, Byford, Brundrit, and Trebell lakes. During the first round of fall migration surveys, 38 individuals were observed in the Local Study Area and Regional Study Area including along the Albany and Ogoki Rivers, and at four lakes including Painter, Saarimaki, and Gittens Lake (**Figure 6-16**). During the second round of fall migration surveys, 56 individuals were observed at 4 different sites in the Local Study Area and Regional Study Area. Of these sites, two were along the Ogoki and Albany Rivers (**Figure 6-16**).

6.5 Bog / Fen Birds and Other Wetland Birds

6.5.1 Palm Warbler

Palm warbler was one of the more abundant forest songbird species detected during field surveys and was detected each survey year from 2018 to 2022. During the breeding season, the species was recorded in the Project Development Area, Local Study Area, and Regional Study Area (**Table 6-11**).

Table 6-11: Palm Warbler Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	3	4	5	31
LSA	29	54	74	210
RSA	-	-	7	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was highest in 2022 (0.64 ± 0.09 individuals per plot) and lowest in 2018 (0.30 ± 0.05 individuals per plot). During the breeding season from 2018 to 2022, palm warbler had the highest relative abundance at plots that occurred in the Local Study Area (0.48 ±0.05 individuals per plot; **Table 6-12**; **Figure 6-17**), followed by the Regional Study Area (0.30 ± 0.11 individuals per plot) and then the Project Development Area (0.21 ± 0.08 individuals per plot). In all study areas, palm warblers were most common in wetland habitat types. This species was most common in marsh habitats in the Project Development Area, in bog and fen habitats in the Local Study Area, and bog habitats in the Regional Study Area (**Table 6-12**; **Figure 6-17**).

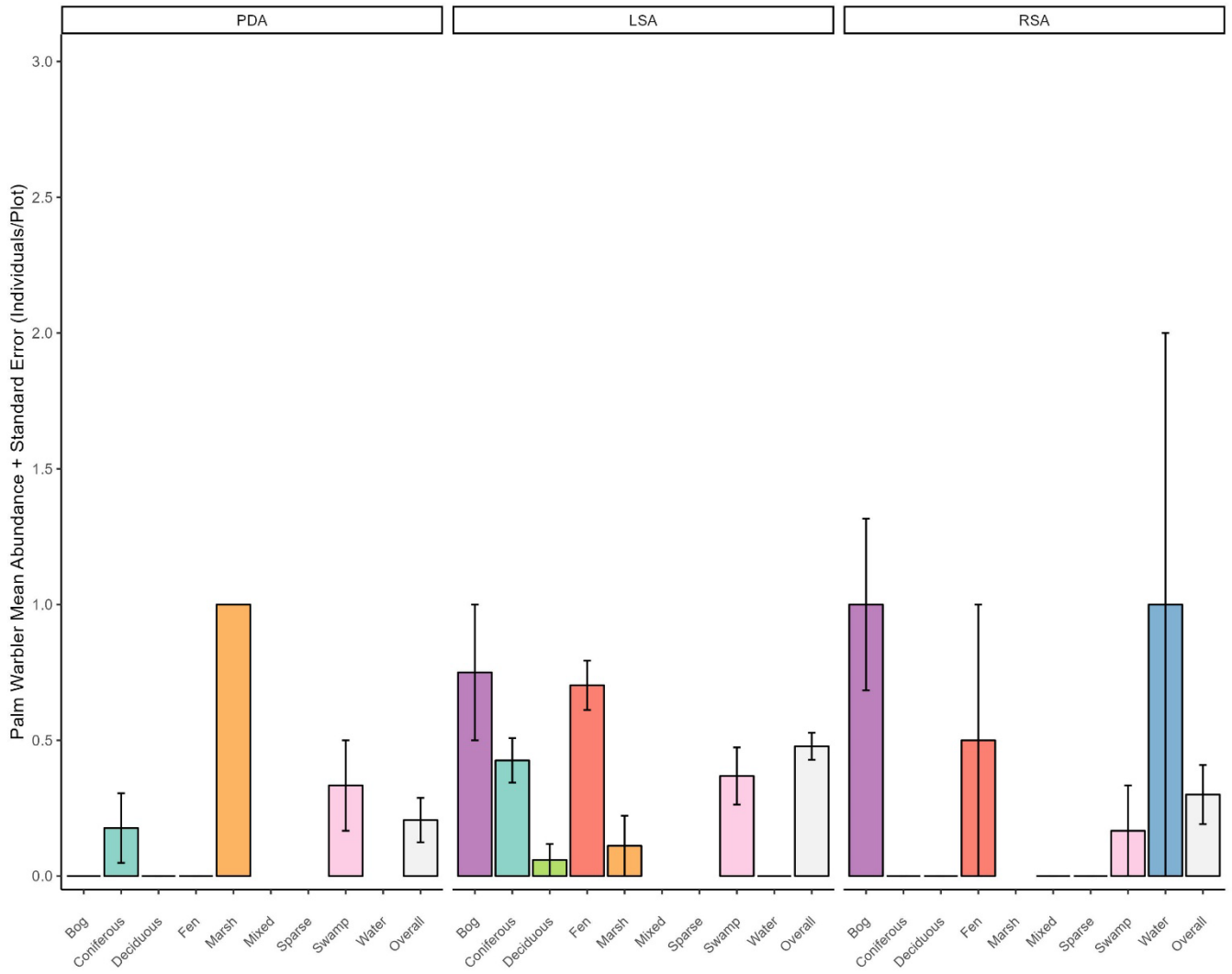
During autonomous recording unit surveys completed during the breeding season in 2022, palm warbler was detected at a similar relative abundance in the Project Development Area (1.25 ± 0.63 individuals per plot) and in the Local Study Area (1.0 ± 0.15 individuals per plot) (**Table 6-12**; **Figure 6-18**). During the breeding season, palm warbler had the highest relative abundance within the fen habitat type in both the Project Development Area and Local Study Area (**Table 6-12**; **Figure 6-18**).

Table 6-12: Mean Relative Abundance of Palm Warbler Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Palm Warbler (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.75 ± 0.25	1.00 ± 0.32
Coniferous Forest	1.00[b]	0.64 ± 0.27	n/a	0.18 ± 0.13	0.43 ± 0.08	0.00 ± 0.00
Deciduous Forest	0.50 ± 0.50	0.00 ± 0.00	n/a	0.00 ± 0.00	0.06 ± 0.06	0.00 ± 0.00
Fen	3.00[b]	1.68 ± 0.24	n/a	0.00 ± 0.00	0.70 ± 0.09	0.50 ± 0.50
Marsh	-	0.00[b]	n/a	1.00[b]	0.11 ± 0.11	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00
Swamp	-	0.92 ± 0.29	n/a	0.33 ± 0.17	0.37 ± 0.11	0.17 ± 0.17
Water	-	-	n/a	-	0.00[b]	1.00 ± 1.00
All Habitat Types	**1.25** ± 0.63	**1.00** ± 0.15	**n/a**	**0.21** ± 0.08	**0.48** ± 0.05	**0.30** ± 0.11

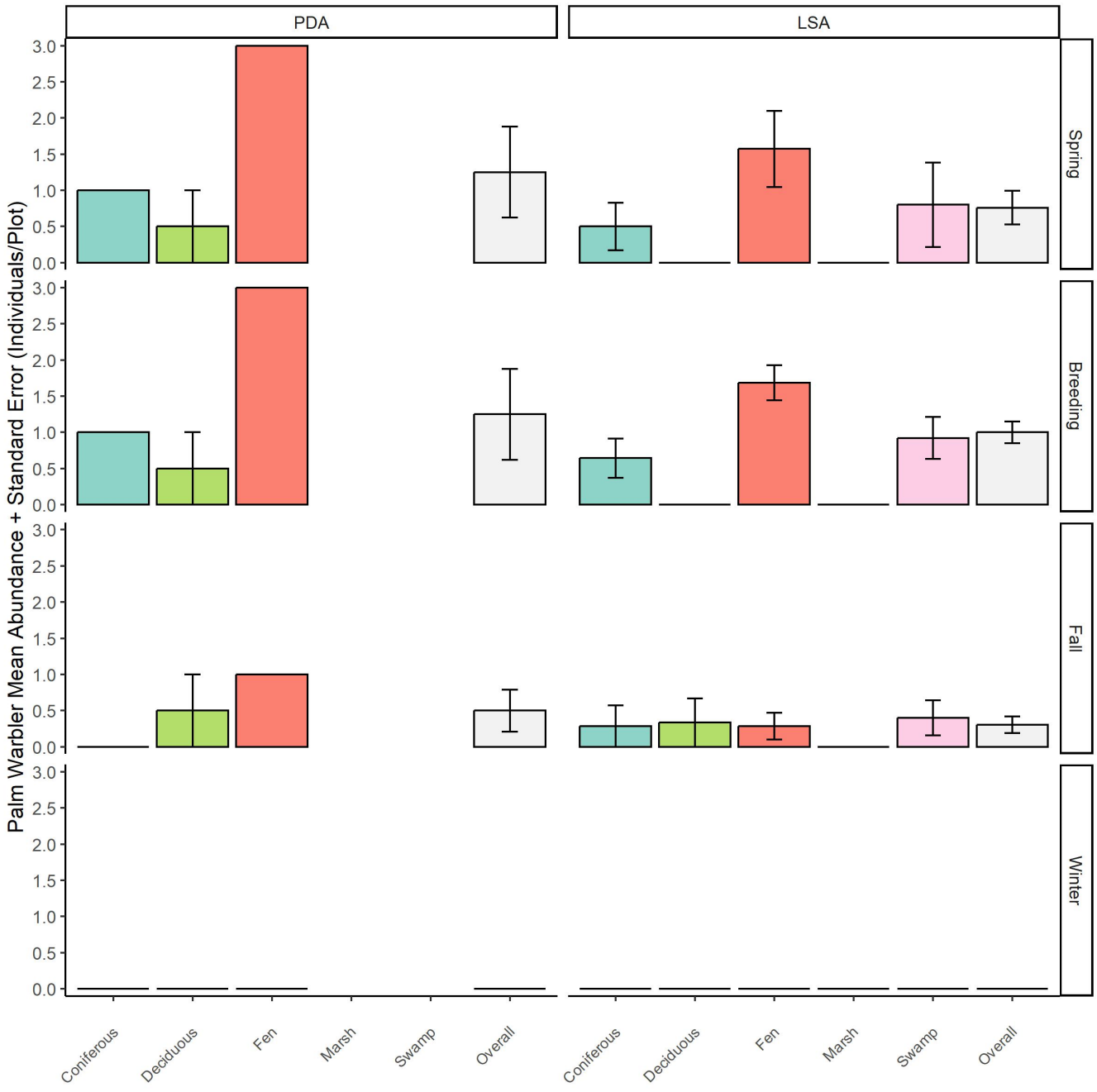
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-17: Palm Warbler Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

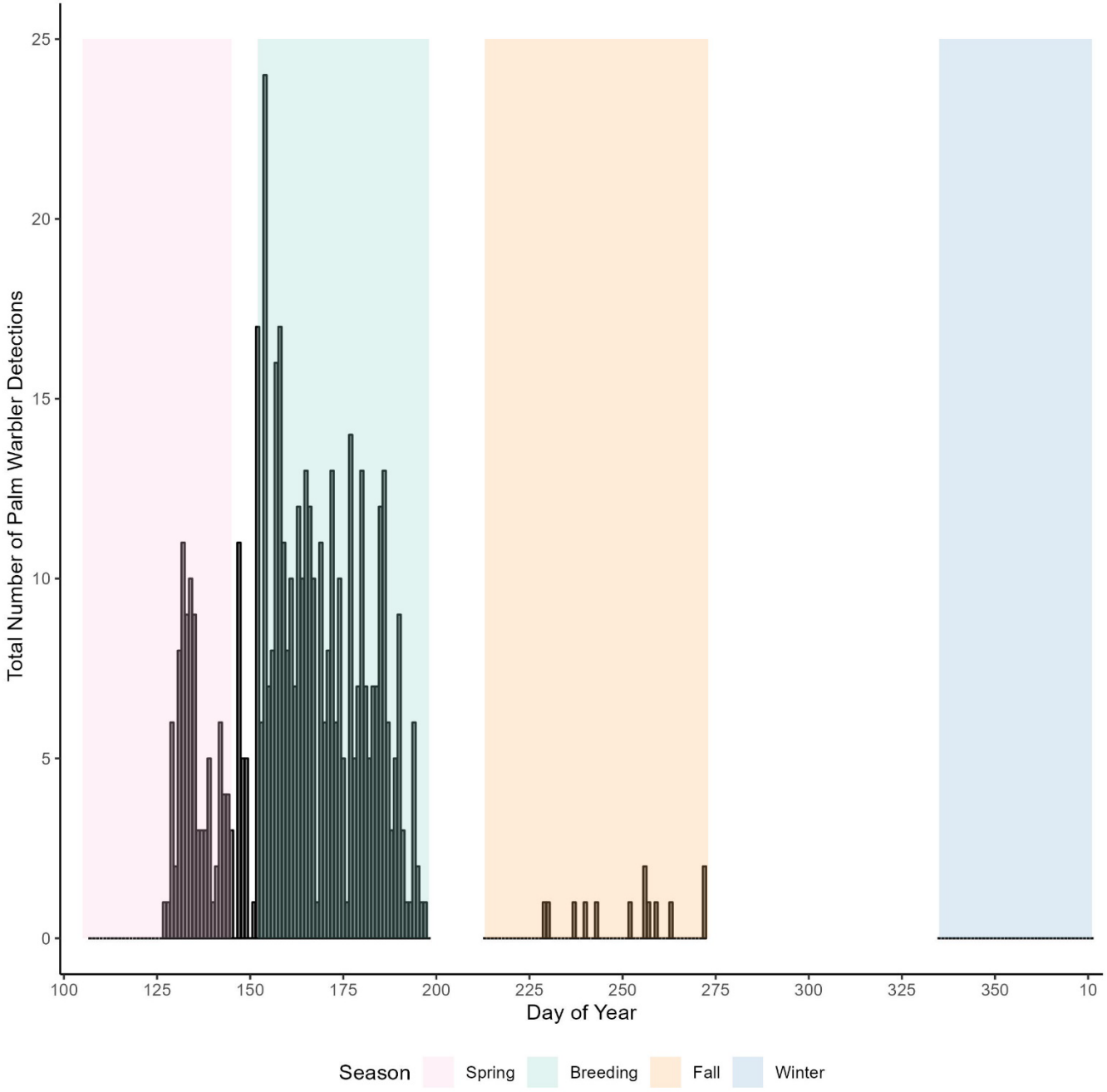
Figure 6-18: Palm Warbler Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of palm warbler use of the Project study areas throughout the year. **Figure 6-19** provides a summary of the total observations of palm warbler by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected palm warbler at the highest relative abundance at dawn during the breeding season (1.02 ± 0.15 individuals per plot), followed by the dawn during spring (0.83 ± 0.22 individuals per plot), dawn during fall (0.33 ± 0.11 individuals per plot), and night during the breeding season (0.30 ± 0.07 individuals per plot). No detections were recorded during the winter. Detections of palm warbler began in early-May and the peak in palm warbler observations was recorded in early June. Detections decreased throughout the breeding season and into fall.

Figure 6-19: Palm Warbler Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.5.2 Common Yellowthroat

Common yellowthroat was detected during each survey year from 2018 to 2022. During the breeding season, the species was recorded in the Project Development Area, Local Study Area, and Regional Study Area (**Table 6-13**).

Table 6-13: Common Yellowthroat Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	2	4	8	31
LSA	32	54	53	210
RSA	-	-	4	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was highest in 2022 (0.47 ± 0.08 individuals per plot), and lowest in 2018 (0.24 ± 0.04 individuals per plot). During the breeding season from 2018 to 2022, common yellowthroat was had the highest relative abundance at plots that occurred in the Local Study Area (0.33 ± 0.05 individuals per plot; **Table 6-14**; **Figure 6-20**). Common yellowthroats were most common in the water habitat type in both the Local Study Area and Regional Study Area, marsh habitats in the Local Study Area, and bog habitats in the Project Development Area (**Table 6-14**; **Figure 6-20**).

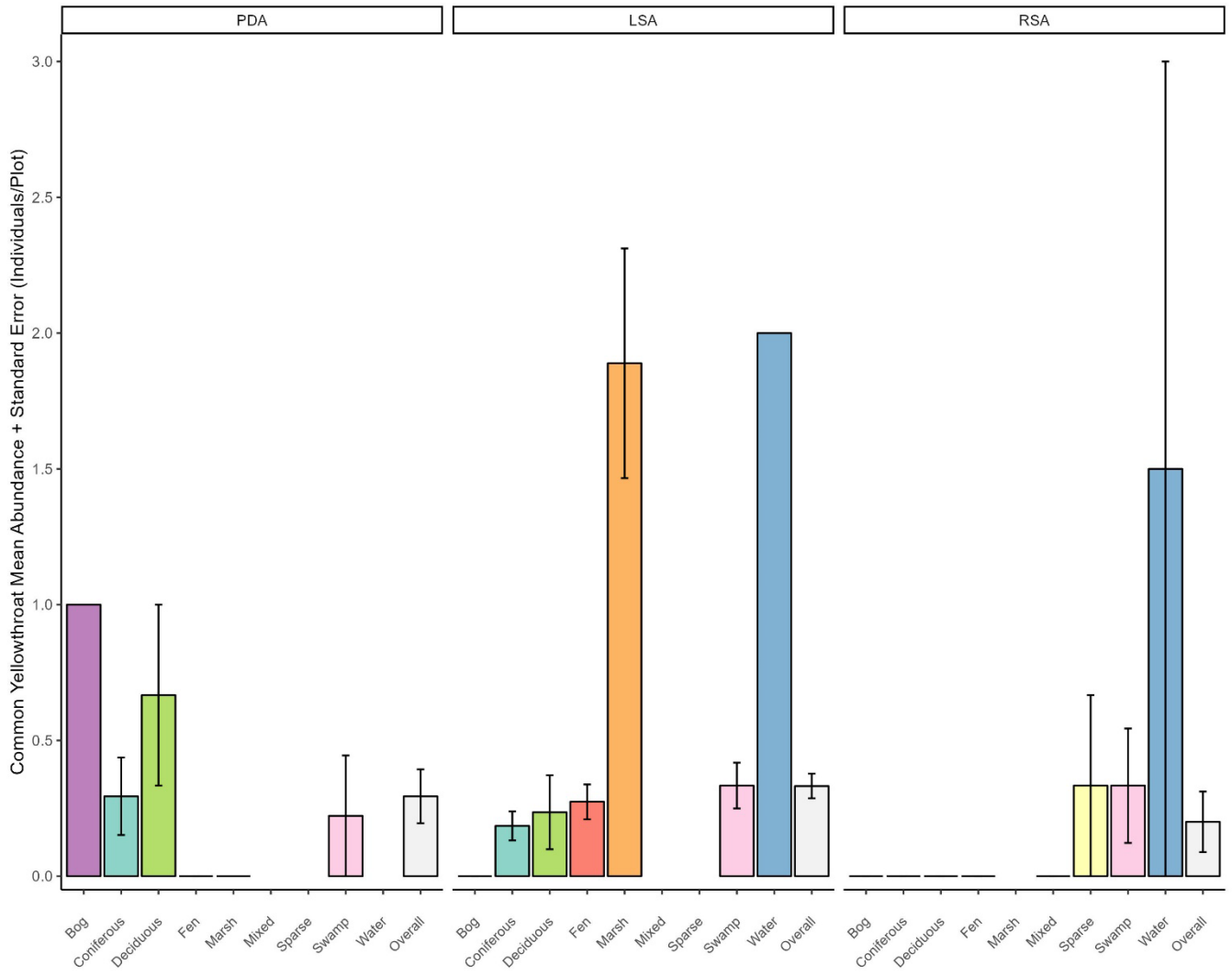
During autonomous recording unit surveys completed during the breeding season in 2022, common yellowthroat was detected at a higher relative abundance in the Local Study Area (0.92 ± 0.13 individuals per plot) than in the Project Development Area (0.75 ± 0.48 individuals per plot) (**Table 6-14**; **Figure 6-21**). During the breeding season, common yellowthroat had the highest relative abundance within swamp followed by fen habitat types in the Local Study Area and within the fen followed by coniferous forest habitat types in the Project Development Area (**Table 6-14**; **Figure 6-21**).

Table 6-14: Mean Relative Abundance of Common Yellowthroat Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Common Yellowthroat (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	1.00[b]	0.00 ± 0.00	0.00 ± 0.00
Coniferous Forest	1.00[b]	0.71 ± 0.24	n/a	0.29 ± 0.14	0.19 ± 0.05	0.00 ± 0.00
Deciduous Forest	0.00 ± 0.00	0.83 ± 0.31	n/a	0.67 ± 0.33	0.24 ± 0.14	0.00 ± 0.00
Fen	2.00[b]	0.95 ± 0.22	n/a	0.00 ± 0.00	0.27 ± 0.06	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	1.89 ± 0.42	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.33 ± 0.33
Swamp	-	1.23 ± 0.26	n/a	0.22 ± 0.22	0.33 ± 0.08	0.33 ± 0.21
Water	-	-	n/a	-	2.00[b]	1.50 ± 1.50
All Habitat Types	**0.75** ± 0.48	**0.92** ± 0.13	**n/a**	**0.29** ± 0.10	**0.33** ± 0.05	**0.20** ± 0.11

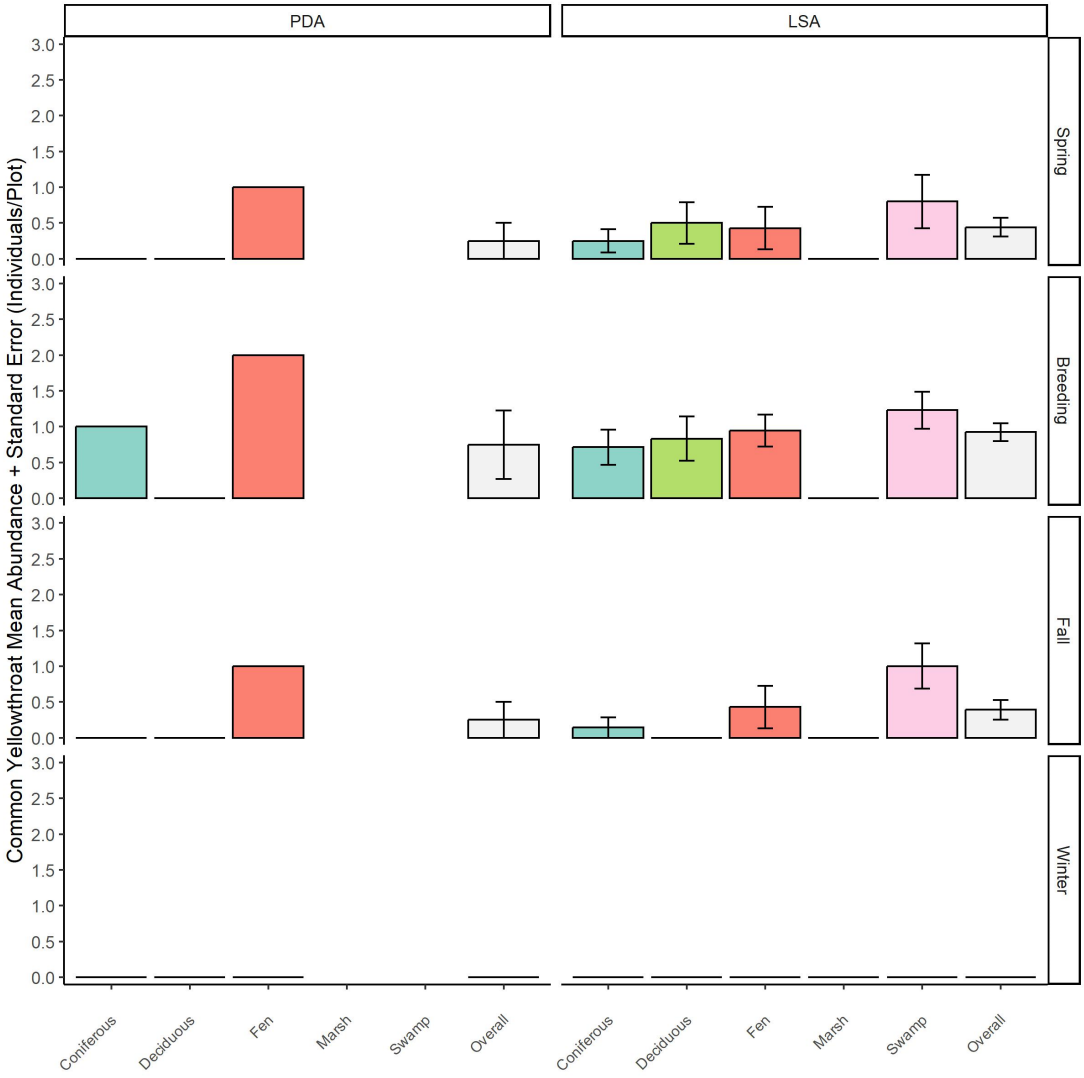
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-20: Common Yellowthroat Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 6-21: Common Yellowthroat Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023

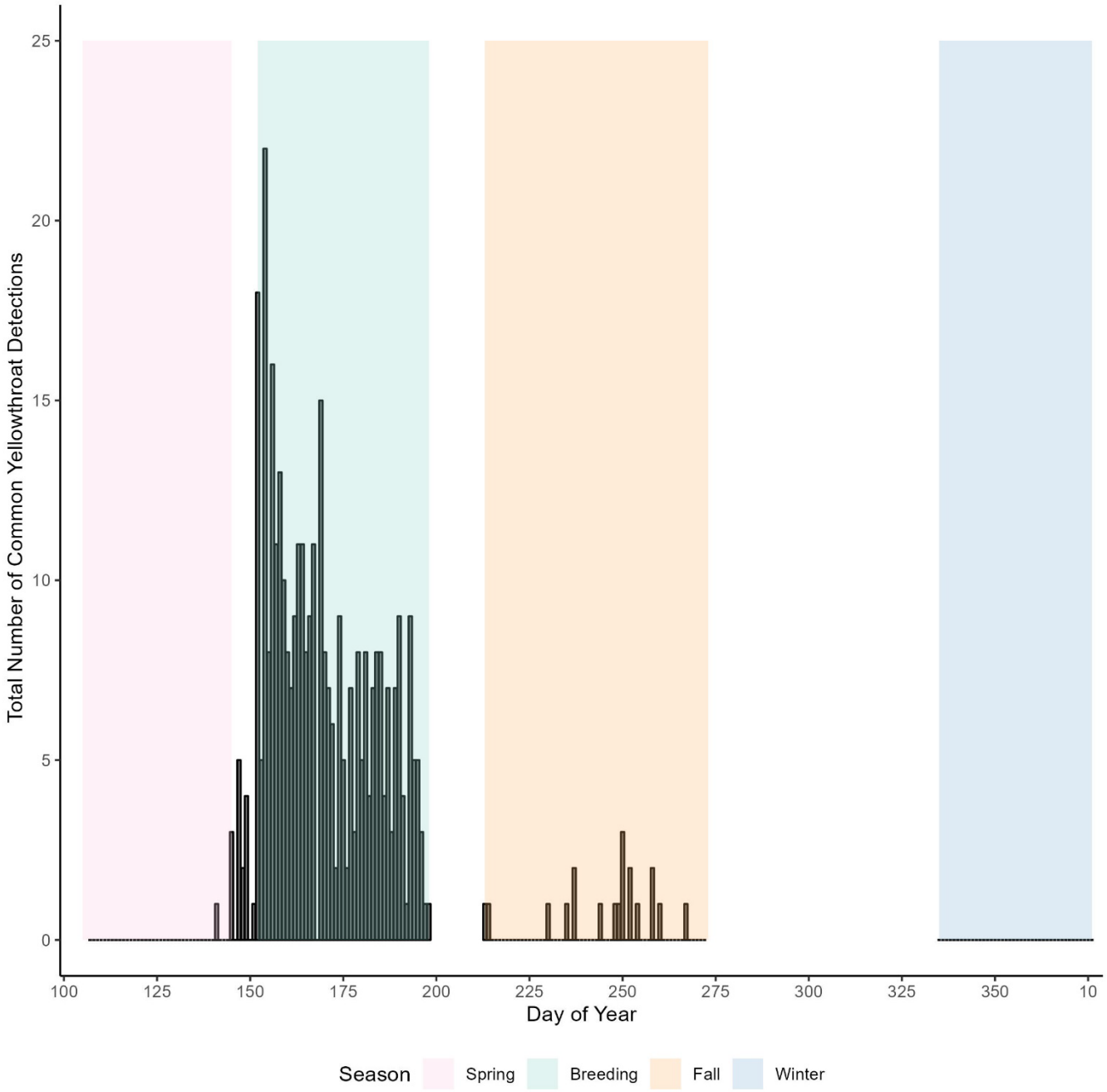


Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of common yellowthroat use of the Project study areas throughout the year. **Figure 6-22** provides a summary of the total observations of common yellowthroat by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected common yellowthroat at the highest relative abundance at dawn during the breeding season (0.86 ± 0.12 individuals per plot), followed by the breeding season at night (0.54 ± 0.09 individuals per plot), and the spring at dawn (0.41 ± 0.12 individuals per plot) and fall at dawn (0.37 ±

0.12 individuals per plot). Peak common yellowthroat observations were recorded in early June (**Figure 6-22**). No detections were recorded during the winter.

Figure 6-22: Common Yellowthroat Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.5.3 Northern Waterthrush

Northern waterthrush was detected during field surveys across each survey year from 2018 to 2022. During the breeding season, the species was detected in the Project Development Area, Local Study Area and Regional Study Area (**Table 6-15**).

Table 6-15: Northern Waterthrush Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	2	4	6	31
LSA	32	54	49	210
RSA	-	-	11	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was similar across years but was highest in 2022 (0.31 ± 0.06 individuals per plot) and lowest in 2018 (0.28 ± 0.05 individuals per plot). During the breeding season from 2018 to 2022, northern waterthrush had the highest relative abundance at plots that occurred in the Regional Study Area (**Table 6-16**; **Figure 6-23**). Northern waterthrush were most common in wetland habitat types throughout all study areas occurring most commonly in bog in the Project Development Area, water in the Local Study Area, and fen, swamp and water in the Regional Study Area (**Table 6-16**; **Figure 6-23**).

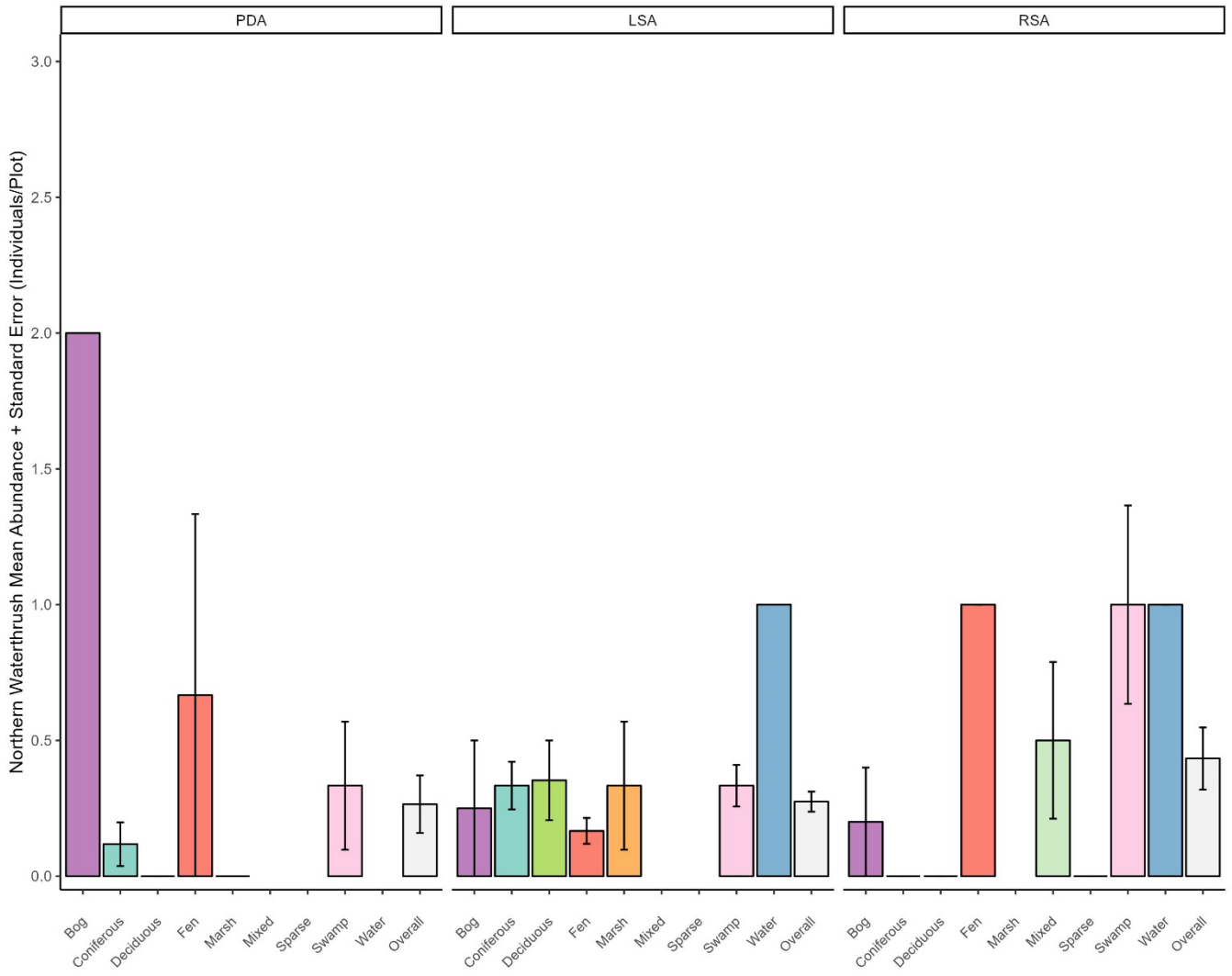
During autonomous recording unit surveys completed during the breeding season in 2022, northern waterthrush was detected at a higher relative abundance in the Local Study Area (0.91 ± 0.12 individuals per plot) than in the Project Development Area (0.75 ± 0.48 individuals per plot) (**Table 6-16**; **Figure 6-24**). During the breeding season, northern waterthrush had the highest relative abundance within deciduous forest and fen habitats in the Project Development Area, and marsh and coniferous forest in the Local Study Area (**Table 6-16**; **Figure 6-24**).

Table 6-16: Mean Relative Abundance of Northern Waterthrush Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Northern Waterthrush (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	2.00[b]	0.25 ± 0.25	0.20 ± 0.20
Coniferous Forest	0.00[b]	1.43 ± 0.23	n/a	0.12 ± 0.08	0.33 ± 0.09	0.00 ± 0.00
Deciduous Forest	1.00 ± 1.00	1.17 ± 0.31	n/a	0.00 ± 0.00	0.35 ± 0.15	0.00 ± 0.00
Fen	1.00[b]	0.37 ± 0.16	n/a	0.67 ± 0.67	0.17 ± 0.05	1.00 ± 0.00
Marsh	-	2.00[b]	n/a	0.00[b]	0.33 ± 0.24	-
Mixed Forest	-	-	n/a	-	-	0.50 ± 0.29
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00
Swamp	-	0.92 ± 0.21	n/a	0.33 ± 0.24	0.33 ± 0.08	1.00 ± 0.37
Water	-	-	n/a	-	1.00[b]	1.00 ± 0.00
All Habitat Types	**0.75** ± 0.48	**0.91** ± 0.12	**n/a**	**0.26** ± 0.11	**0.27** ± 0.04	**0.43** ± 0.11

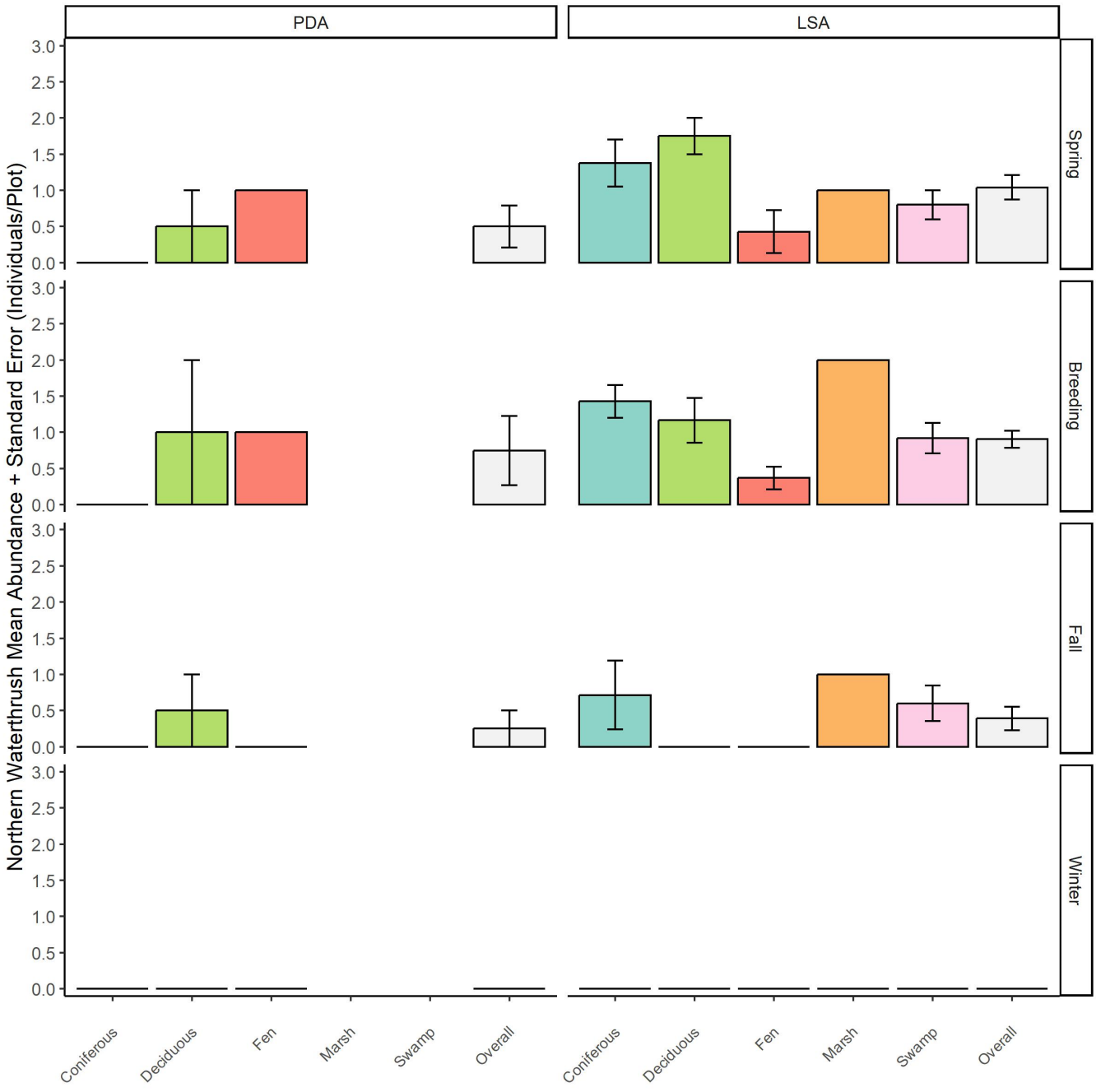
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-23: Northern Waterthrush Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

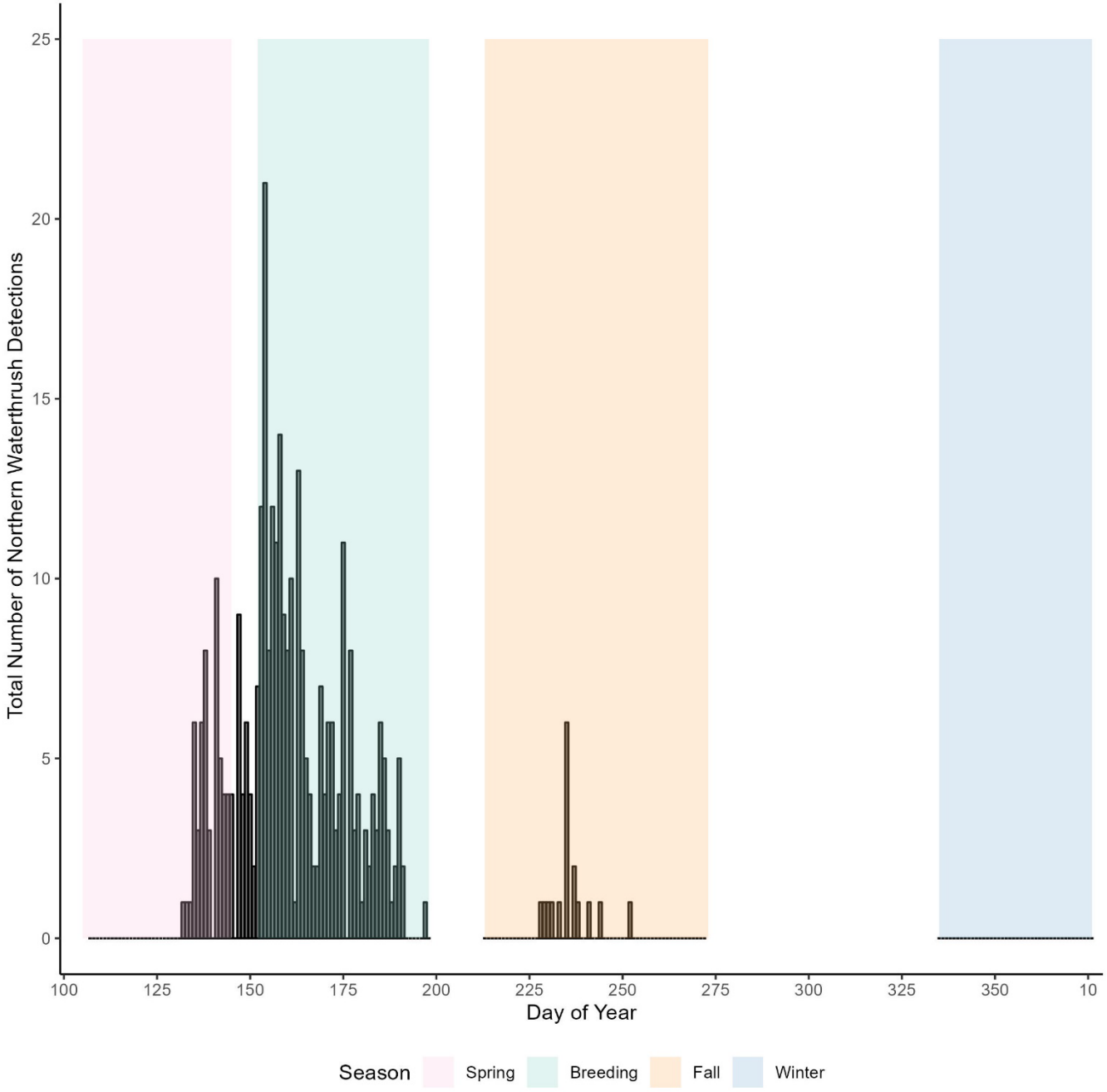
Figure 6-24: Northern Waterthrush Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of northern waterthrush use of the Project study areas throughout the year. **Figure 6-25** provides a summary of the total observations of northern waterthrush by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected northern waterthrush at the highest relative abundance at dawn during the spring (0.97 ± 0.15 individuals per plot), followed by dawn during the breeding season (0.89 ± 0.11 individuals per plot), dawn during the fall (0.37 ± 0.14 individuals per plot), and night during the breeding season (0.14 ± 0.05 individuals per plot). Peak northern waterthrush observations were recorded in early June (**Figure 6-25**). No detections were recorded during the winter.

Figure 6-25: Northern Waterthrush Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.5.4 Sora

Sora was only detected in the Local Study Area in 2022. Sora was recorded at 8 of 54 autonomous recording unit survey plots in the Local Study Area during the breeding season (**Table 6-17**).

The species was most commonly detected in fen habitat types and was also detected in swamp and coniferous forest habitat types (**Table 6-17**; **Figure 6-26**). The highest relative abundance of sora was recorded at night during the spring (0.11 ± 0.06 individuals per plot), followed by the breeding season at night (0.07 ± 0.03 individuals per plot) and the breeding season at dawn (0.04 ± 0.02 individuals per plot). No detections were recorded during the fall or winter seasons.

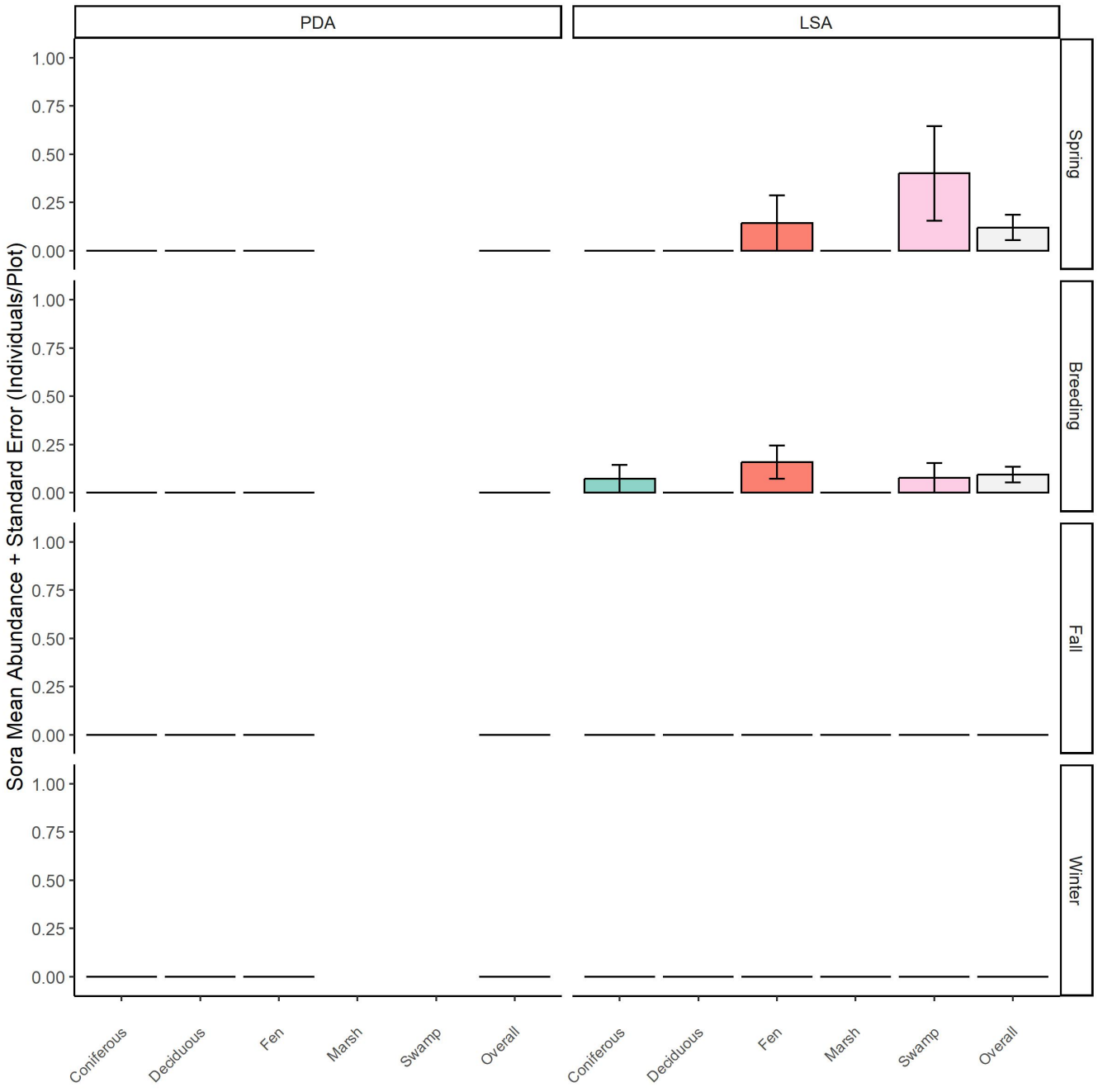
Sora was incidentally recorded at one targeted species at risk autonomous recording unit survey location in the Local Study Area in 2022; this observation was made in the fen habitat type.

Table 6-17: Mean Relative Abundance of Sora Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Sora (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	0.00[(b)]	0.07 ± 0.07	n/a
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a
Fen	0.00[(b)]	0.16 ± 0.09	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.08 ± 0.08	n/a
All Habitat Types	**0.00** ± 0.00	**0.09** ± 0.04	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-26: Sora Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.6 Species at Risk

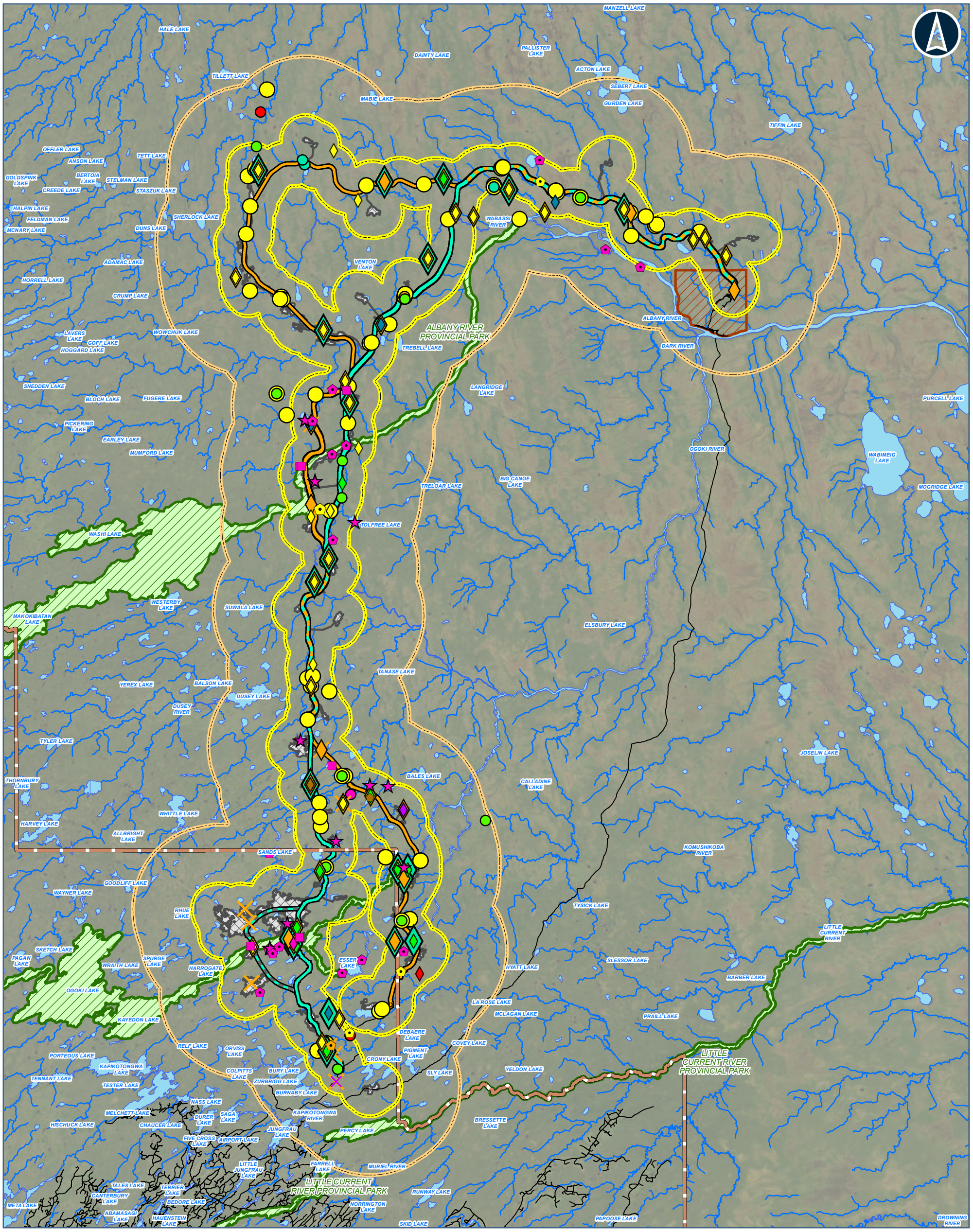
6.6.1 Canada Warbler

Canada warbler was detected during field surveys in 2018 and 2022. During the breeding season, this species was recorded in the Project Development Area, Local Study Area, and Regional Study Area; however, the species was not detected in the Project Development Area during point count surveys (**Table 6-18**; **Figure 6-27**).

Table 6-18: Canada Warbler Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	1	4	0	31
LSA	8	54	11	210
RSA	-	-	2	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.





Legend

SPECIES AT RISK OBSERVATION

- BREEDING BIRD SURVEY OBSERVATION
- AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- SPECIES AT RISK TARGETED AUTONOMOUS RECORDING UNIT SURVEY OBSERVATION
- AERIAL WATERFOWL AND WATERBIRD BREEDING SURVEY OBSERVATION
- AERIAL MIGRATION SPRING AND FALL SURVEY OBSERVATION
- MARSH BIRD CALL PLAYBACK SURVEY OBSERVATION
- INCIDENTAL OBSERVATION

SPECIES

- BALD EAGLE
- CANADA WARBLER
- COMMON NIGHTHAWK
- EASTERN WOOD-PEEWEE
- EASTERN WHIP-POOR-WILL
- LESSER YELLOWLEGS
- OLIVE-SIDED FLYCATCHER
- RUSTY BLACKBIRD
- YELLOW RAIL

COMMUNITY ACCESS ROAD ALTERNATIVES CENTERLINE

- ALTERNATIVE 1
- ALTERNATIVE 4
- ALTERNATIVE 1 AND ALTERNATIVE 4
- ALTERNATIVE 4 - WESTERN OGOKI RIVER CROSSING OPTION
- FAR NORTH BOUNDARY
- ROAD
- WATERCOURSE
- WATERBODY
- FIRST NATION COMMUNITY
- PROVINCIAL PARK
- PROPOSED DEVELOPMENT AREA
- BIRDS LSA
- BIRDS RSA

Data Source:
Base Data: Provided by MNRF 2019; Route Infrastructure - Provided by AECOM 2019. Contains Information licensed under the Open Government Licence Ontario.
Aerial photography provided by:
Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase,

MARTEN FALLS FIRST NATION COMMUNITY ACCESS ROAD

Observations of Species at Risk During Field Surveys in the Project Study Areas, 2018 to 2022

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Figure 6-27

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Map location: I:\2022\21455151\Mapping\Products\003_Baseline\21455151_B_WLD_BIRDS_006_27_GIS_SpeciesAtRisk_Observations_2018to2022.mxd
Date Saved: 10/18/2023 2:04:48 PM User Name: gld_rduval

Canada warbler was detected in 2018 and 2022 during point count surveys. Mean relative abundance of individuals was higher in 2018 (0.10 ± 0.03 individuals per plot) than in 2022 (0.01 ± 0.01 individuals per plot). During the breeding seasons in 2018 and 2022, Canada warbler was detected at the highest relative abundance at plots that occurred in the Regional Study Area (0.10 individuals per plot; **Table 6-19**; **Figure 6-28**). Canada warbler were most common in bog habitat types in the Local Study Area and in water and bog habitat types in the Regional Study Area (**Table 6-19**; **Figure 6-28**).

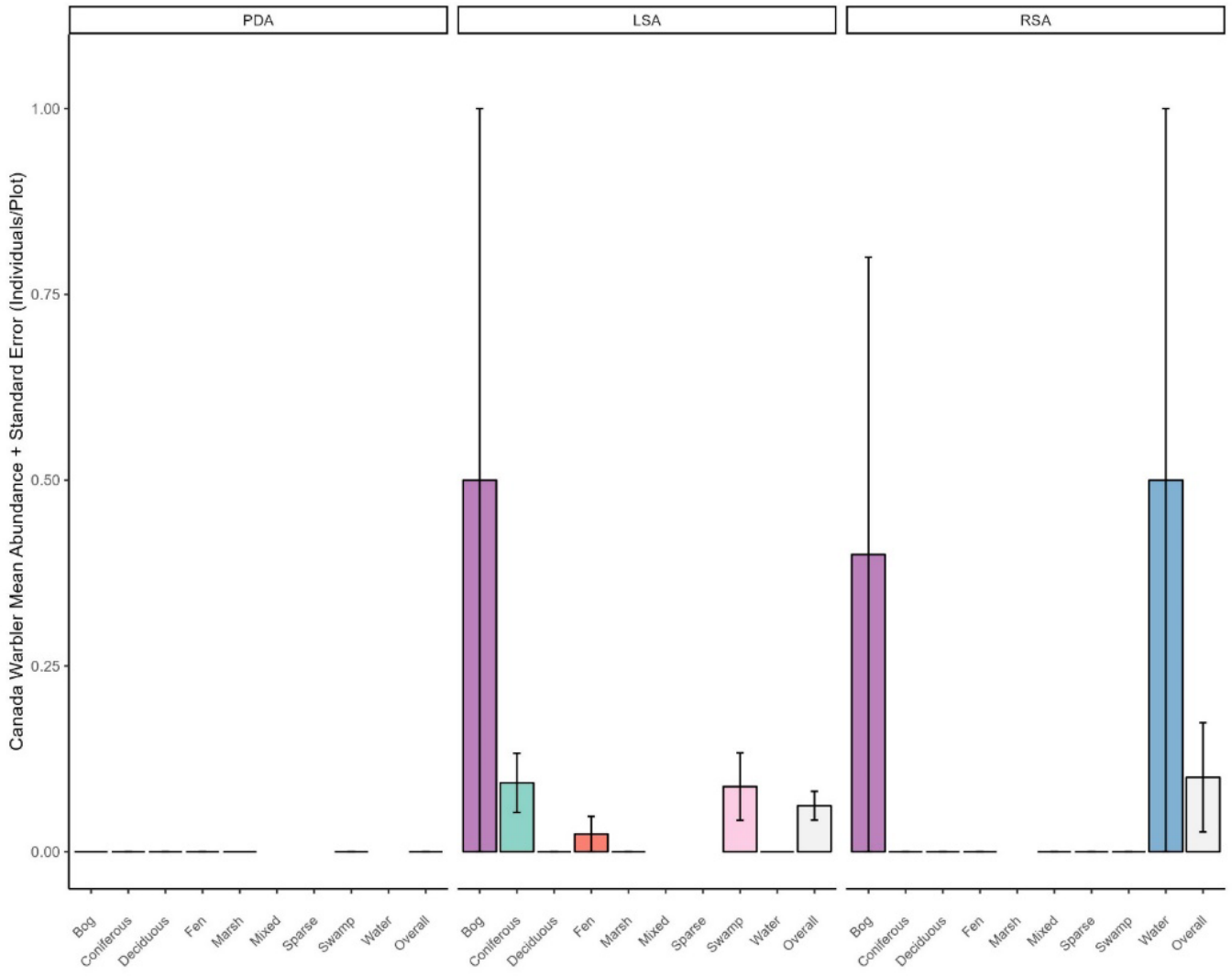
During autonomous recording unit surveys completed during the breeding season in 2022, Canada warbler was detected at a higher relative abundance in the Project Development Area (0.25 ± 0.25 individuals per plot) than in the Local Study Area (0.15 ± 0.05 individuals per plot) (**Table 6-19**; **Figure 6-29**). In the Project Development Area, Canada warbler were only detected in deciduous forest habitat types (**Table 6-19**; **Figure 6-29**). In the Local Study Area, Canada warbler was detected on autonomous recording units at the highest relative abundance within marsh habitat types (**Table 6-19**; **Figure 6-29**).

Table 6-19: Mean Relative Abundance of Canada Warbler Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Canada Warbler (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.50 ± 0.50	0.40 ± 0.40
Coniferous Forest	0.00[b]	0.29 ± 0.13	n/a	0.00 ± 0.00	0.09 ± 0.04	0.00 ± 0.00
Deciduous Forest	0.50 ± 0.50	0.00 ± 0.00	n/a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Fen	0.00[b]	0.05 ± 0.05	n/a	0.00 ± 0.00	0.02 ± 0.02	0.00 ± 0.00
Marsh	-	1.00[b]	n/a	0.00[b]	0.00 ± 0.00	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00
Swamp	-	0.15 ± 0.10	n/a	0.00 ± 0.00	0.09 ± 0.05	0.00 ± 0.00
Water	-	-	n/a	-	0.00[b]	0.50 ± 0.50
All Habitat Types	**0.25** ± 0.25	**0.15** ± 0.05	**n/a**	**0.00** ± 0.00	**0.06** ± 0.02	**0.10** ± 0.07

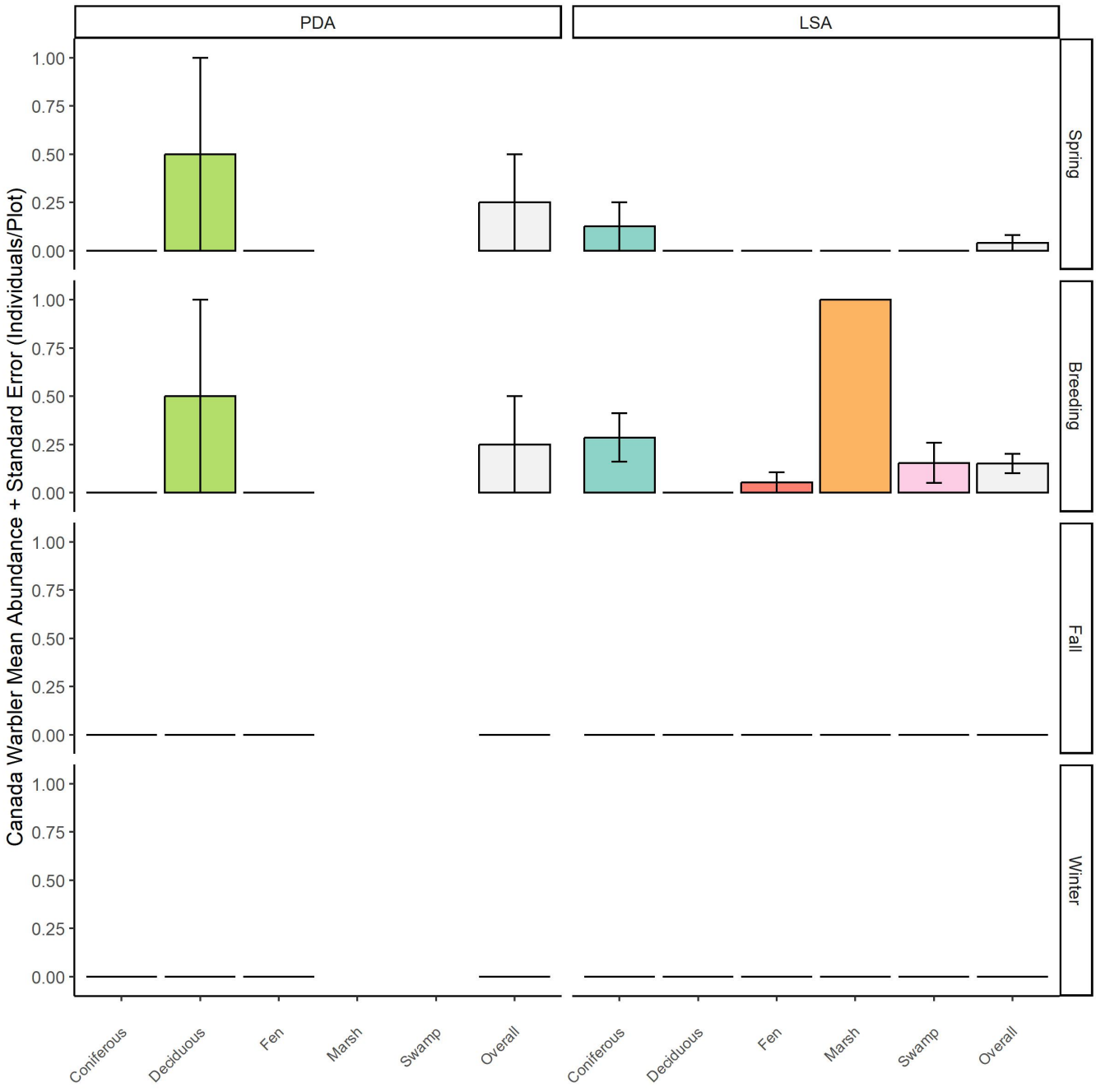
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-28: Canada Warbler Relative Abundance Observed During Point Count Surveys in the Project Study Area, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 6-29: Canada Warbler Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of Canada warbler use of the Project study areas throughout the year. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected Canada warbler at the highest relative abundance at dawn during the breeding season (0.16 ± 0.05 individuals per plot), followed by dawn during the spring (0.07 ± 0.05 individuals per plot), and the breeding season at night (0.02 ± 0.02 individuals per plot). No detections were recorded during the fall or winter seasons (**Figure 6-29**).

6.6.2 Evening Grosbeak

No observations of evening grosbeak were made during extensive field work from 2018 to 2022 in the Project study areas. No historical observations of evening grosbeaks were recorded by Natural Heritage Information Centre or the Ontario Breeding Bird Atlas. Evening grosbeak observations were recorded in eBird approximately 40 km west of the birds Regional Study Area in 2016 and approximately 70 km northeast of the birds Regional Study Area in 2003 (eBird, 2023). Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope and Skibi Lake (**Section 5.1.1**).

6.6.3 Chimney Swift

No observations of chimney swift were made during extensive field work from 2018 to 2022 in the Project study areas and no desktop sources included chimney swift observations within or near the Project Regional Study Area. Results of the desktop review and aerial surveys within the Local Study Area indicated that there is limited suitable nesting habitat for this species in the Regional Study Area (**Section 4.2.7.2**). While some patches of large-diameter trees (i.e., approximately 50 cm diameter-at-breast height) were documented along rivers within the Local Study Area, the patchy distribution of these trees in combination with the Regional Study Area being >250 km from the nearest breeding site in Ontario within the last 10 years and the species never being documented nesting north of the 49-parallel in Ontario (Government of Ontario, 2022; eBird, 2023) confirms that the likelihood of this species occurring in the Regional Study Area is extremely low.

6.6.4 Common Nighthawk

During the breeding season, common nighthawk was detected during field surveys in the Project Development Area and Local Study Area (**Table 6-20**; **Figure 6-30**). Common nighthawk were also detected during targeted species at risk surveys in the Local Study Area at seven of eight autonomous recording unit plots targeting the species in 2022. Additionally, a single common nighthawk was incidentally detected during aerial waterfowl and waterbird breeding surveys in the Local Study Area in 2022.

Table 6-20: Common Nighthawk Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	3	4	0	31
LSA	37	54	1	210
RSA	-	-	0	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During autonomous recording unit surveys completed during the breeding season in 2022, common nighthawk was detected at a higher relative abundance in the Project Development Area (1.50 ± 0.50 individuals per plot) than in the Local Study Area (1.11 ± 0.14 individuals per plot) (**Table 6-21**; **Figure 6-30**). During the breeding season, common nighthawk was detected on autonomous recording units at the highest relative abundance within the coniferous forest and fen habitat types in both study areas and within swamp habitat in the Local Study Area (**Table 6-21**; **Figure 6-30**).

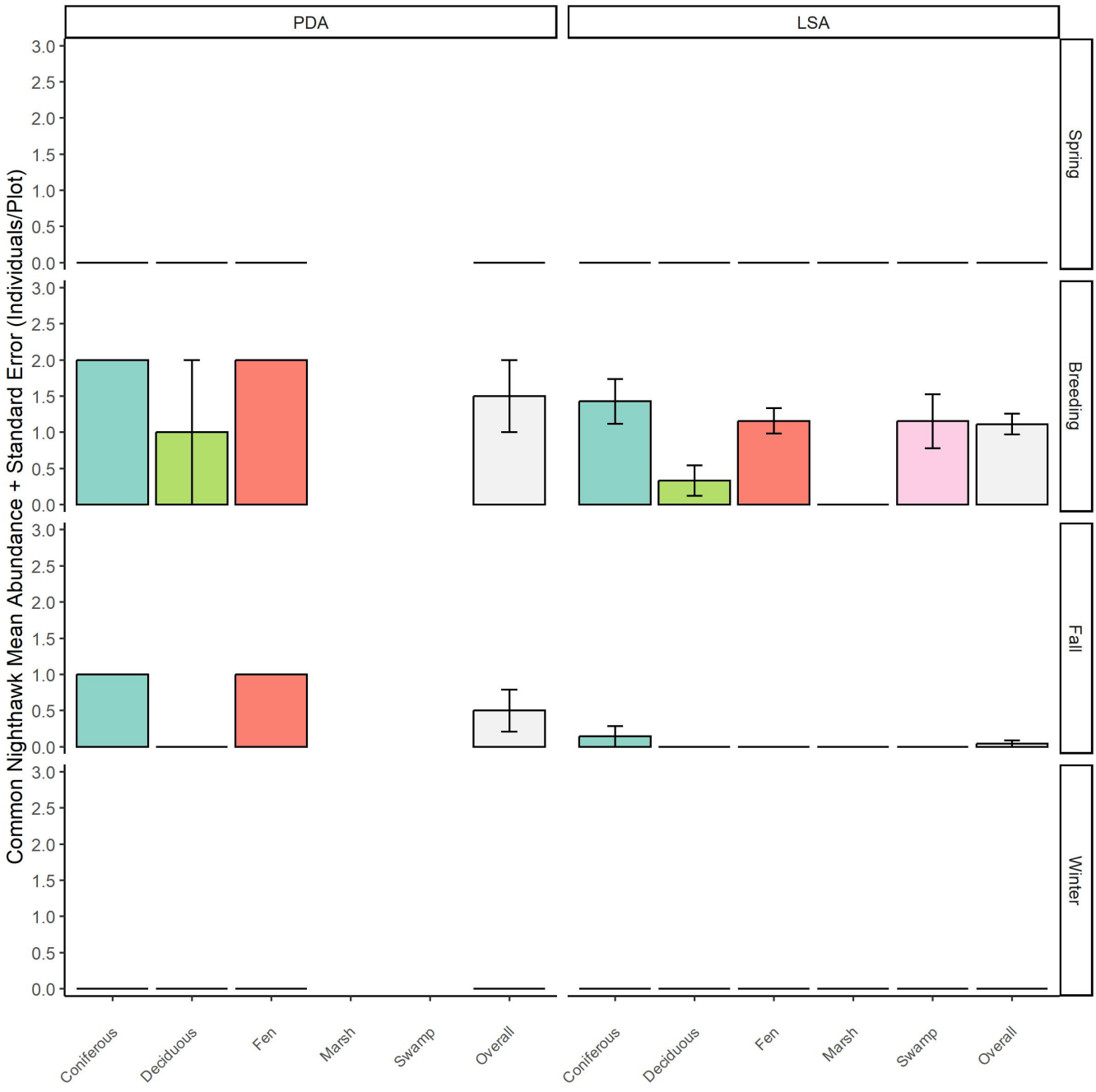
Autonomous recording units detected common nighthawk at the highest relative abundance at night during the breeding season (1.11 ± 0.14 individuals per plot), followed by at dawn during the breeding and fall seasons (0.23 ± 0.08 individuals per plot and 0.11 ± 0.06 individuals per plot, respectively). No detections were recorded during the spring or winter seasons.

Table 6-21: Mean Relative Abundance of Common Nighthawk Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Common Nighthawk (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	2.00[(b)]	1.43 ± 0.31	n/a
Deciduous Forest	1.00 ± 1.00	0.33 ± 0.21	n/a
Fen	2.00[(b)]	1.16 ± 0.18	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	1.15 ± 0.37	n/a
All Habitat Types	**1.50** ± 0.50	**1.11** ± 0.14	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-30: Common Nighthawk Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.6.5 Eastern Whip-poor-will

During the breeding season, eastern whip-poor-will was recorded during autonomous recording unit surveys in the Local Study Area at 1 of 54 autonomous recording unit survey plots in the Local Study Area in 2022; this species was not detected in the Project Development Area or Regional Study Area during point count or autonomous recording unit surveys (**Table 6-22**; **Figure 6-31**). Eastern whip-poor-will was only recorded in the deciduous forest habitat type (**Table 6-22**; **Figure 6-31**). Autonomous recording units detected eastern whip-poor-will at night during the breeding season (0.02 ± 0.02 individuals per plot). No detections were made during any other season or period.

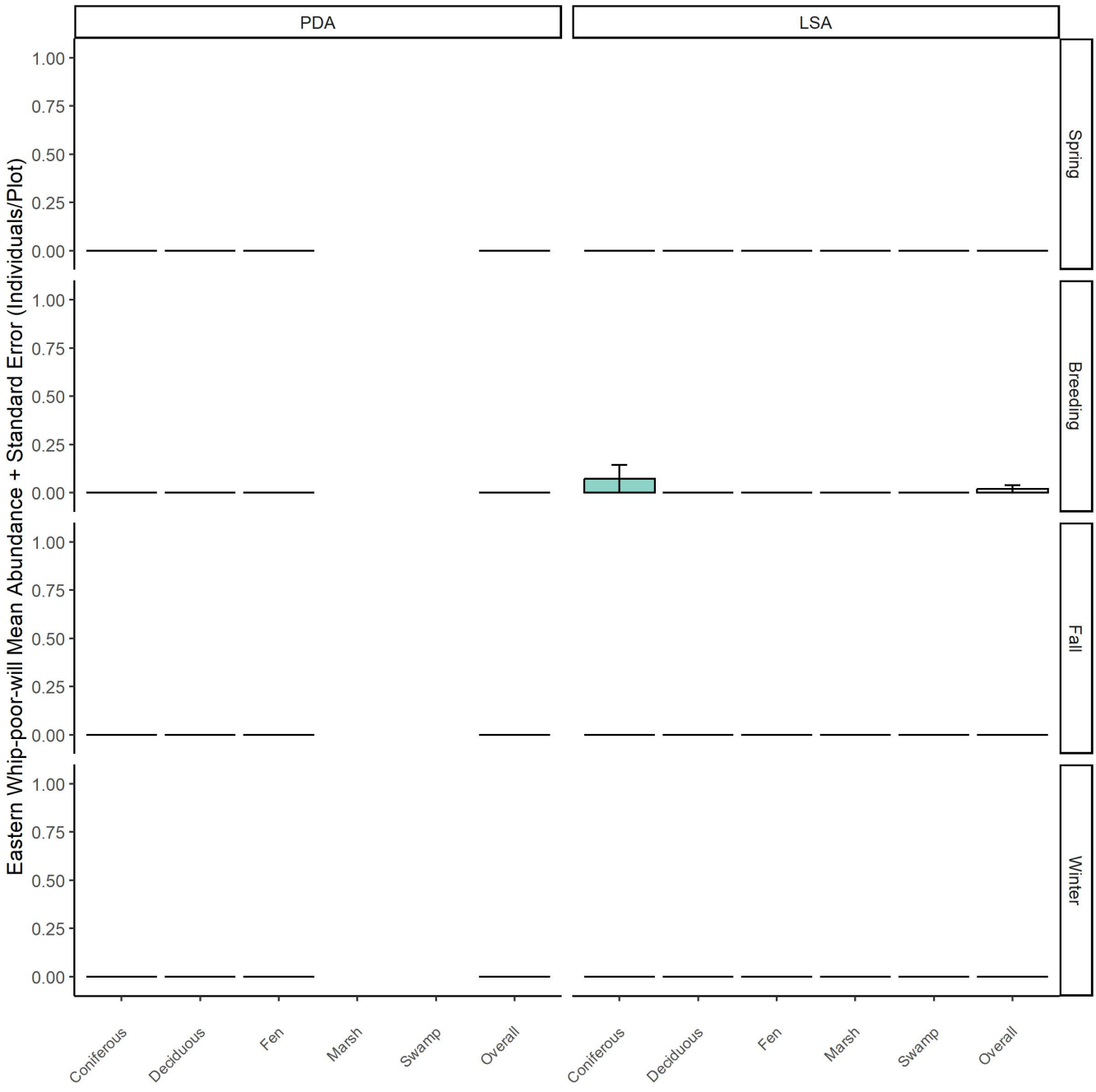
During targeted species at risk autonomous recording unit surveys, eastern whip-poor-will was recorded on seven different dates in June 2022 at one survey location in coniferous forest habitat in the Local Study Area.

Table 6-22: Mean Relative Abundance of Eastern Whip-poor-will Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Eastern Whip-poor-will (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	0.00[(b)]	0.00 ± 0.00	n/a
Deciduous Forest	0.00 ± 0.00	0.17 ± 0.17	n/a
Fen	0.00[(b)]	0.00 ± 0.00	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.00 ± 0.00	n/a
All Habitat Types	**0.00** ± 0.00	**0.02** ± 0.02	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-31: Eastern Whip-poor-will Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.6.6 Eastern Wood-pewee

Eastern wood-pewee was detected during field surveys in the Project Development Area, Local Study Area, and Regional Study Area (**Table 6-23, Figure 6-27**). Eastern wood-pewee was detected during point count surveys in 2018 and 2022 and was not recorded in 2019. During the breeding season, this species was recorded on one of 54 autonomous recording unit survey plots in the Local Study Area in 2022, and at two of 30 point count plots in the Regional Study Area from 2018 to 2022. The species was not recorded at any point count plots in the Project Development Area or Local Study Area from 2018 to 2022.

During point count surveys, mean relative abundance of individuals was similar among years but slightly higher in 2018 (0.02 ± 0.01 individuals per plot) than in 2022 (0.01 ± 0.01 individuals per plot); no individuals were detected in 2019. During the breeding season in 2018 and 2022, eastern wood-pewee had the highest relative abundance at plots that occurred in the Regional Study Area (0.10 ± 0.07 individuals per plot; **Table 6-23**; **Figure 6-32**). No detections of the species were made in the Local Study Area during point count surveys. Eastern wood-pewee were only observed in deciduous forest and bog habitat types in the Regional Study Area (**Table 6-23**; **Figure 6-32**).

During autonomous recording unit surveys completed during the breeding season in 2022, eastern wood-pewee was only detected in the Local Study Area (0.02 ± 0.02 individuals per plot) in the coniferous forest habitat type (**Table 6-23**; **Figure 6-33**). Eastern wood-pewee was only detected by autonomous recording units at dawn during the breeding season.

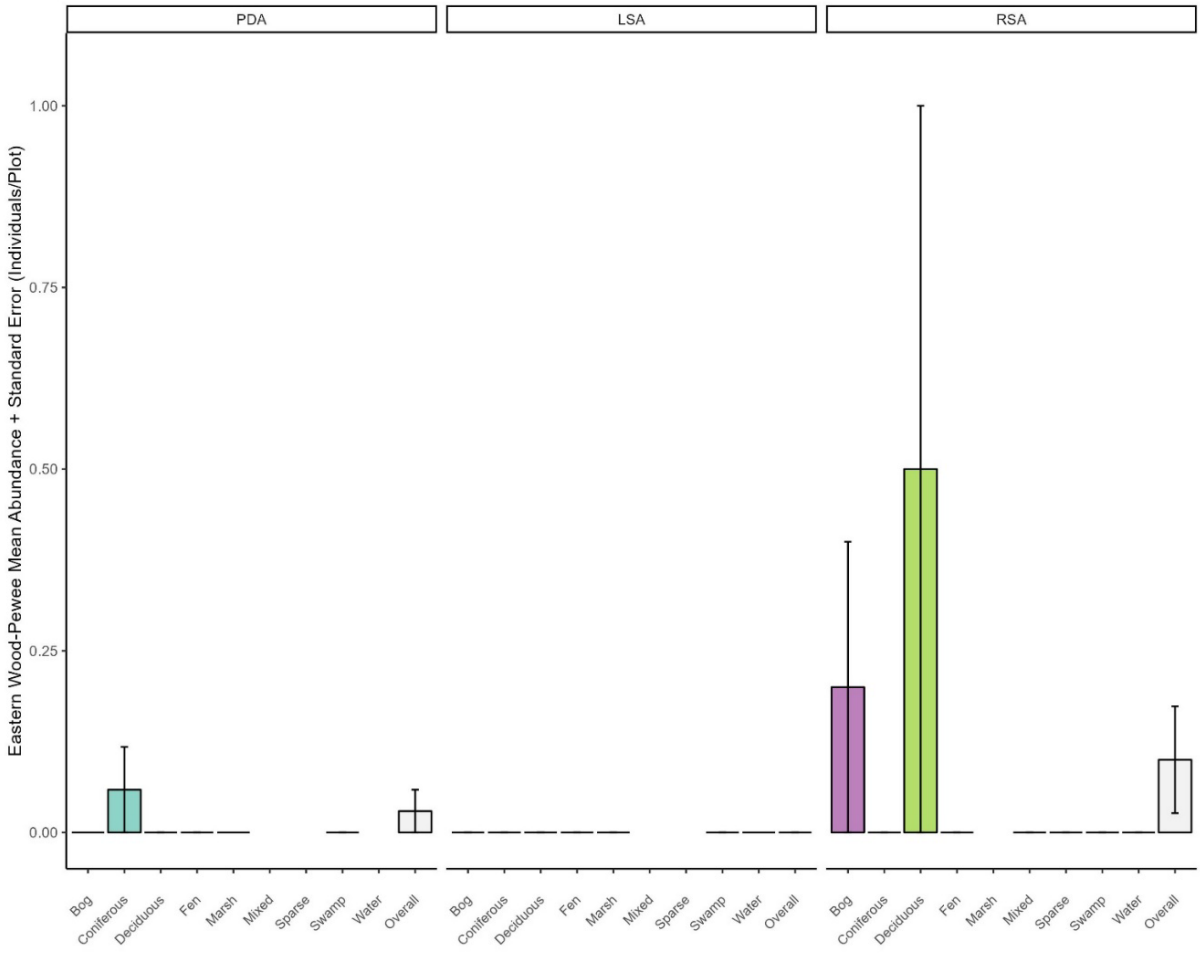
Table 6-23: Mean Relative Abundance of Eastern Wood-pewee Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Eastern Wood-pewee (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.00 ± 0.00	0.20 ± 0.20
Coniferous Forest	0.00[b]	0.07 ± 0.07	n/a	0.06 ± 0.06	0.00 ± 0.00	0.00 ± 0.00
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a	0.00 ± 0.00	0.00 ± 0.00	0.50 ± 0.50
Fen	0.00[b]	0.00 ± 0.00	n/a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	0.00 ± 0.00	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00

Habitat Type	Mean Relative Abundance of Eastern Wood-pewee (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[(a)]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Swamp	-	0.00 ± 0.00	n/a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Water	-	-	n/a	-	0.00[(b)]	0.00 ± 0.00
All Habitat Types	**0.00** ± 0.00	**0.02 ± 0.02**	**n/a**	**0.03** ± 0.03	**0.00** ± 0.00	**0.10** ± 0.07

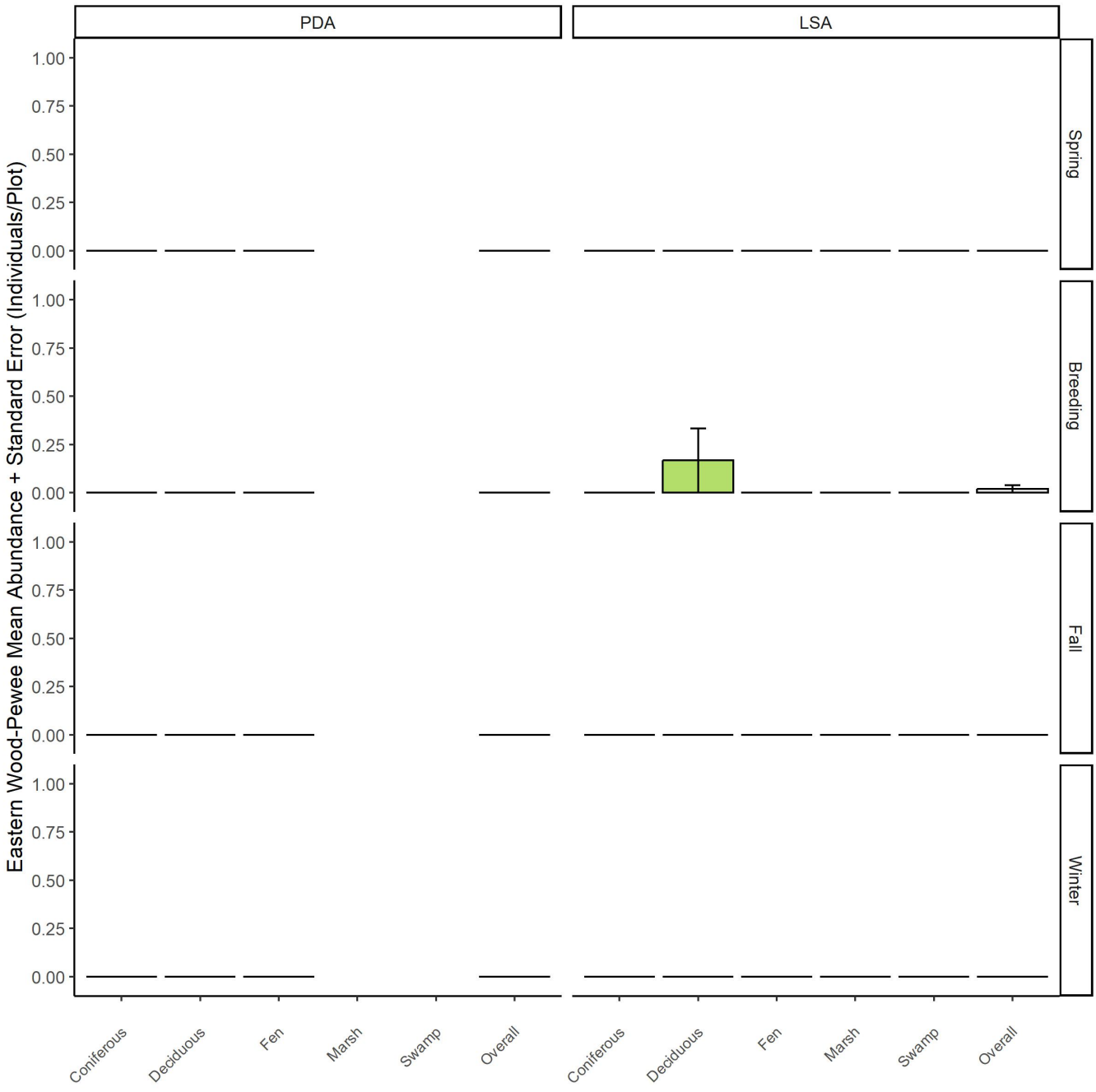
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-32: Eastern Wood-pewee Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

Figure 6-33: Eastern Wood-pewee Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.6.7 Olive-sided Flycatcher

Olive-sided flycatcher was detected each survey year from 2018 to 2022. During the breeding season, this species was detected in the Project Development Area, Local Study Area, and Regional Study Area (**Table 6-24, Figure 6-27**).

Table 6-24: Olive-sided Flycatcher Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	1	4	7	31
LSA	33	54	50	210
RSA	-	-	5	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was highest in 2022 (0.35 ± 0.06 individuals per plot), and lowest in 2019 (0.05 ± 0.03 individuals per plot). During the breeding season from 2018 to 2022, olive-sided flycatcher was detected at similar abundance in all study areas (0.24 ± 0.03 to 0.27 ± 0.14 individuals per plot; **Table 6-25**). Olive-sided flycatcher was most common in bog habitats in the Local Study Area and swamp habitats in the Regional Study Area; relative abundance in the Project Development Area was similar among coniferous forest, fen, and swamp habitats (**Table 6-25**; **Figure 6-34**).

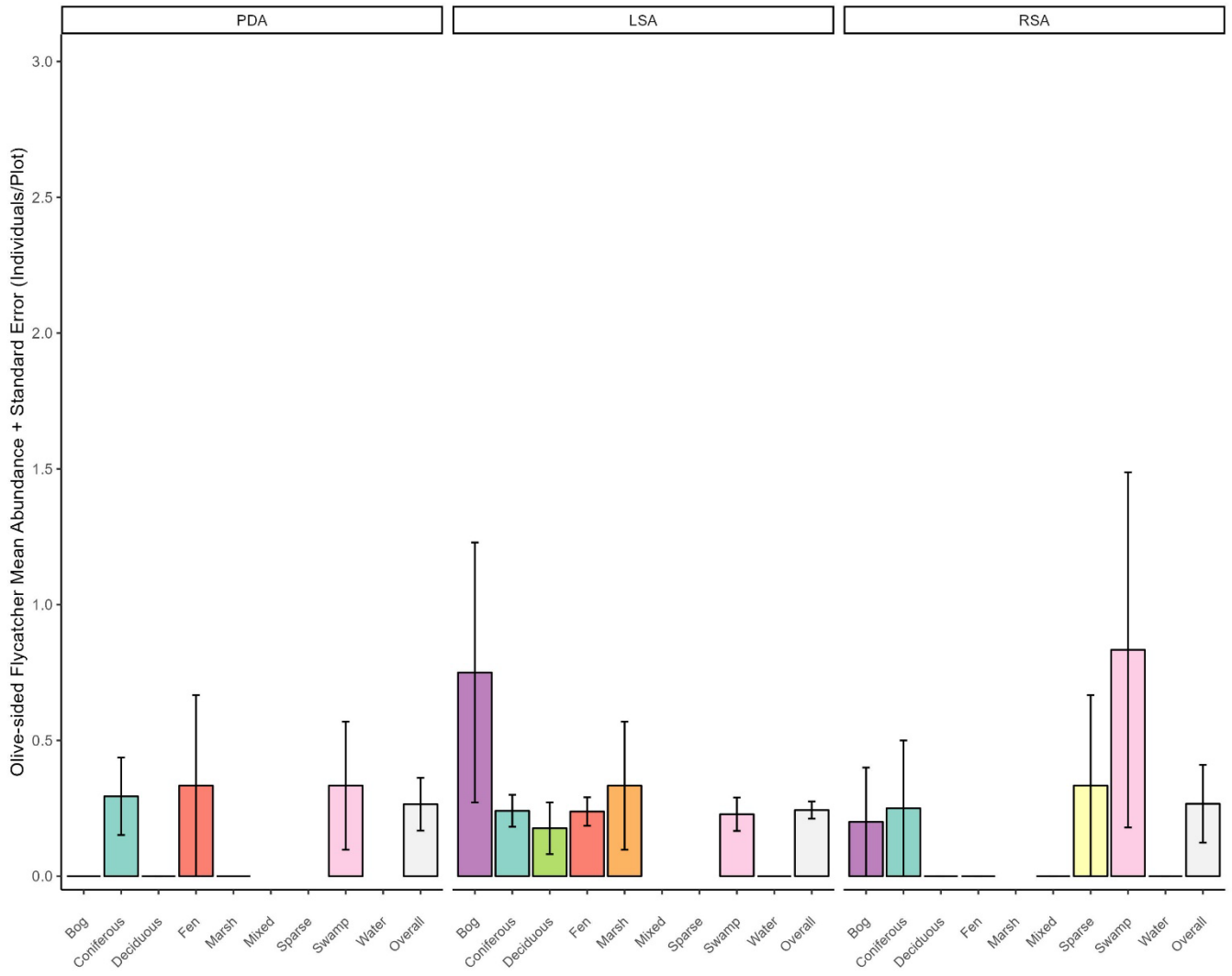
During autonomous recording unit surveys completed during the breeding season in 2022, olive-sided flycatcher was only detected in the Local Study Area (0.77 ± 0.10 individuals per plot; **Table 6-25**). The species was most commonly detected in fen, followed by swamp habitat types (**Table 6-25**; **Figure 6-35**).

Table 6-25: Mean Relative Abundance of Olive-sided Flycatcher Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Olive-sided Flycatcher (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.75 ± 0.48	0.20 ± 0.20
Coniferous Forest	0.00[b]	0.57 ± 0.20	n/a	0.29 ± 0.14	0.24 ± 0.06	0.25 ± 0.25
Deciduous Forest	0.00 ± 0.00	0.33 ± 0.21	n/a	0.00 ± 0.00	0.18 ± 0.10	0.00 ± 0.00
Fen	0.00[b]	1.05 ± 0.12	n/a	0.33 ± 0.33	0.24 ± 0.05	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	0.33 ± 0.24	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.33 ± 0.33
Swamp	-	0.85 ± 0.22	n/a	0.33 ± 0.24	0.23 ± 0.06	0.83 ± 0.65
Water	-	-	n/a	-	0.00[b]	0.00 ± 0.00
All Habitat Types	**0.00** ± 0.00	**0.77** ± 0.10	**n/a**	0.26 ± 0.10	0.24 ± 0.03	0.27 ± 0.14

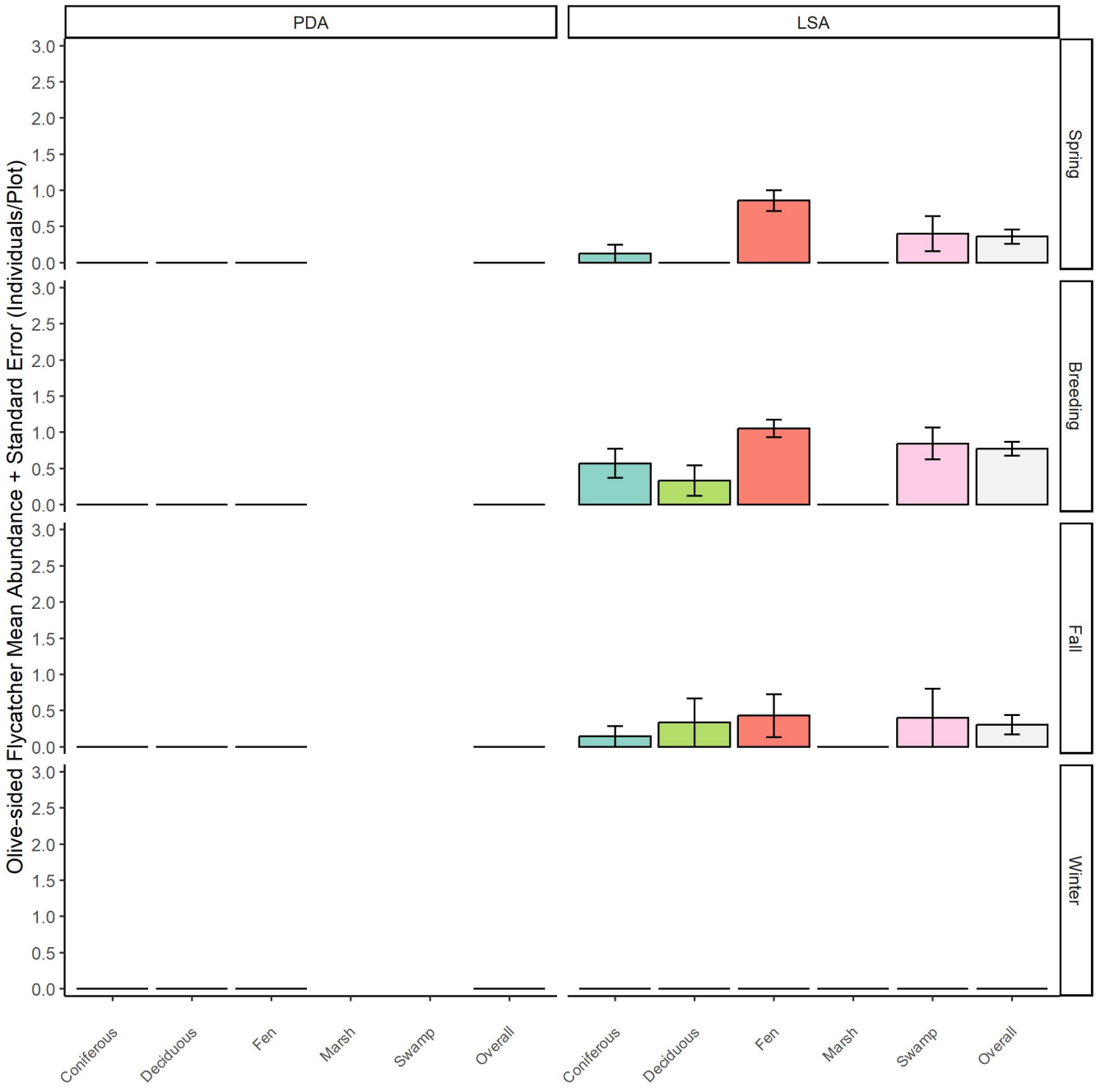
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-34: Olive-sided Flycatcher Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

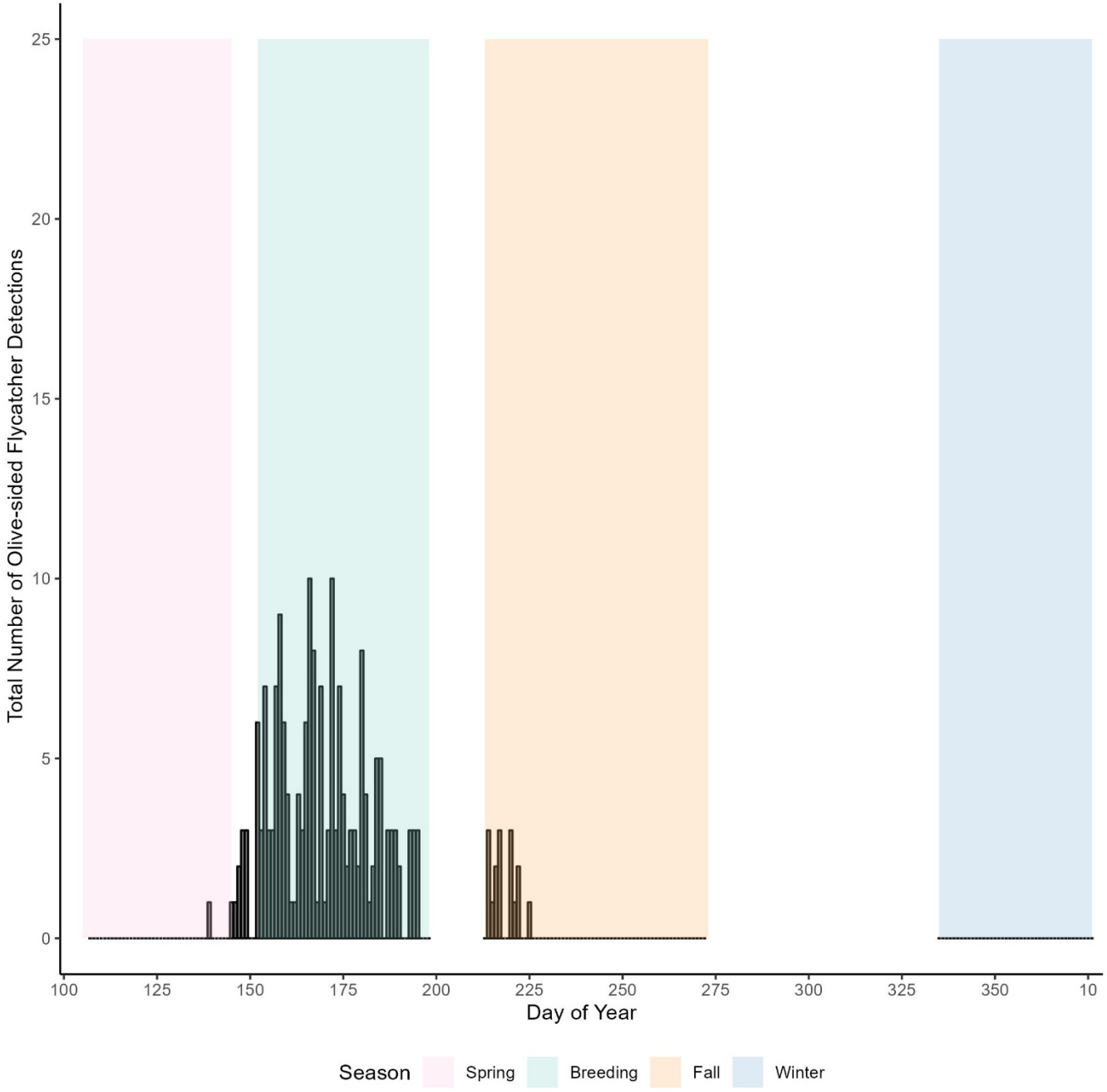
Figure 6-35: Olive-sided Flycatcher Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of olive-sided flycatcher use of the Project study areas throughout the year. **Figure 6-36** provides a summary of the total observations of olive-sided flycatcher by Julian date from April 15, 2022, to January 10, 2023. Autonomous recording unit surveys in the Project Development Area and Local Study Area detected olive-sided flycatcher at the highest relative abundance at dawn during the breeding season (0.72 ± 0.09 individuals per plot), followed by dawn during the spring (0.31 ± 0.09 individuals per plot), dawn during the fall (0.26 ± 0.11 individuals per plot), and night during the breeding season (0.05 ± 0.03 individuals per plot). No detections were recorded during the winter season or during the night during the spring or fall seasons. The peak in olive-sided flycatcher observations were recorded in early- to mid-June (**Figure 6-36**).

Figure 6-36: Olive-sided Flycatcher Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.6.8 Bald Eagle

Bald eagles were detected during waterfowl and waterbird breeding and spring and fall migration aerial surveys, point count surveys, and autonomous recording unit surveys in the Local Study Area and Regional Study Area. Bald eagle was not detected in the Project Development Area (**Figure 6-27**).

During aerial surveys, bald eagles were observed during all survey rounds. During waterfowl and waterbird breeding surveys, a total of 13 individual adults and two pairs were observed. During spring migration surveys, 23 individuals were observed at nine different sites in the Local Study Area and Regional Study Area (**Figure 6-27**). Of these sites, two were watercourses and included the Ogoki and Albany Rivers and seven were waterbodies and included Glaze, Saarimaki, Brundrit, Winslow, and Tolfree lakes. During the first round of fall migration surveys, four individuals were observed along the Albany River (**Figure 6-27**). During the second round of fall migration surveys, five individuals were observed at four different sites in the Local Study Area and Regional Study Area, including, three along the Ogoki and Albany Rivers and one at Saarimaki Lake (**Figure 6-27**).

Five active bald eagle nests were recorded during aerial surveys in the Local Study Area in 2022 (**Figure 5-8**). Two additional bald eagle nests were observed during field surveys in the Regional Study Area in 2018; one of these nests was not rechecked in 2022 and the other of was of unknown status in 2022.

During point count surveys from 2018 to 2022, bald eagle was recorded incidentally (fly-over) at one of 210 point count plots in the Local Study Area. Bald eagle was not detected at any point count plots in the Project Development Area or Regional Study Area from 2018 to 2022.

During autonomous recording unit surveys in 2022, bald eagles were recorded at one of 54 autonomous recording unit survey plots in the Local Study Area; no detections were made in the Project Development Area (**Figure 6-27**). All records of bald eagle (2 individuals) were made during the fall season at dawn in the fen habitat type.

6.6.9 Peregrine Falcon

No observations of peregrine falcon were made during extensive field work from 2018 to 2022 in the Project study areas. A review of the Natural Heritage Information Centre Database, Ontario Breeding Bird Atlas, and eBird data that occurred within the Regional Study Area indicated that no historical observations of peregrine falcon have been made in the study areas. Results of the desktop review and aerial surveys indicated that no suitable nesting habitat for peregrine falcon (i.e., cliffs or tall structures) occurred in the Regional Study Area (**Section 5.6.1**). Therefore, follow up surveys for this species were not completed.

6.6.10 Short-eared Owl

No short-eared owls were detected during targeted species at risk autonomous recording unit surveys completed in 2022 and no incidental observations of this species were made during field surveys in 2018 to 2022. The nearest short-eared owl observations recorded through eBird were made near Fort Hope, approximately 80 km west of the Project. Additional publicly accessible datasets that monitor for raptors (**Section 4.1**) were reviewed as part of the desktop summary; no available data were collected within or near the Regional Study Area boundaries.

6.6.11 Bank Swallow

No observations of bank swallow were made during extensive field work from 2018 to 2022 in the Project study areas. A review of the Natural Heritage Information Centre Database, Ontario Breeding Bird Atlas, and eBird data indicated that bank swallow was recorded at the Ogoki Post airport in 2022 (eBird, 2023; MNRF, 2023). Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope. Results of the desktop review and aerial surveys indicated that no suitable nesting habitat for bank swallows occurred in the Regional Study Area (**Section 5.6.1**). Similarly, Golder (2019) identified no suitable nesting habitat for bank swallow in or near the Project footprint based on a desktop review and aerial / ground reconnaissance surveys. Therefore, follow up surveys for this species were not completed.

6.6.12 Barn Swallow

No observations of barn swallow were made during extensive field work from 2018 to 2022 in the Project study areas. No historical observations of barn swallow were recorded by Natural Heritage Information Centre or the Ontario Breeding Bird Atlas. A barn swallow observation was recorded through eBird approximately 18 km east of the Ogoki, Ontario in 2022 (eBird, 2023). Additional sightings have been recorded through eBird from 2018 to 2022 near Fort Hope and Skibi Lake. Golder (2019) identified no suitable nesting habitat for barn swallow in or near the Project footprint based on a desktop review and aerial / ground reconnaissance surveyed. Therefore, follow up surveys for this species, were not completed.

6.6.13 Black Tern

No observations of black tern were made during extensive field work from 2018 to 2022 in the Project study areas. A black tern observation was made along the Ogoki River, outside of the Regional Study Area, in 2004 (eBird, 2023; MNRF, 2023).

6.6.14 Lesser Yellowlegs

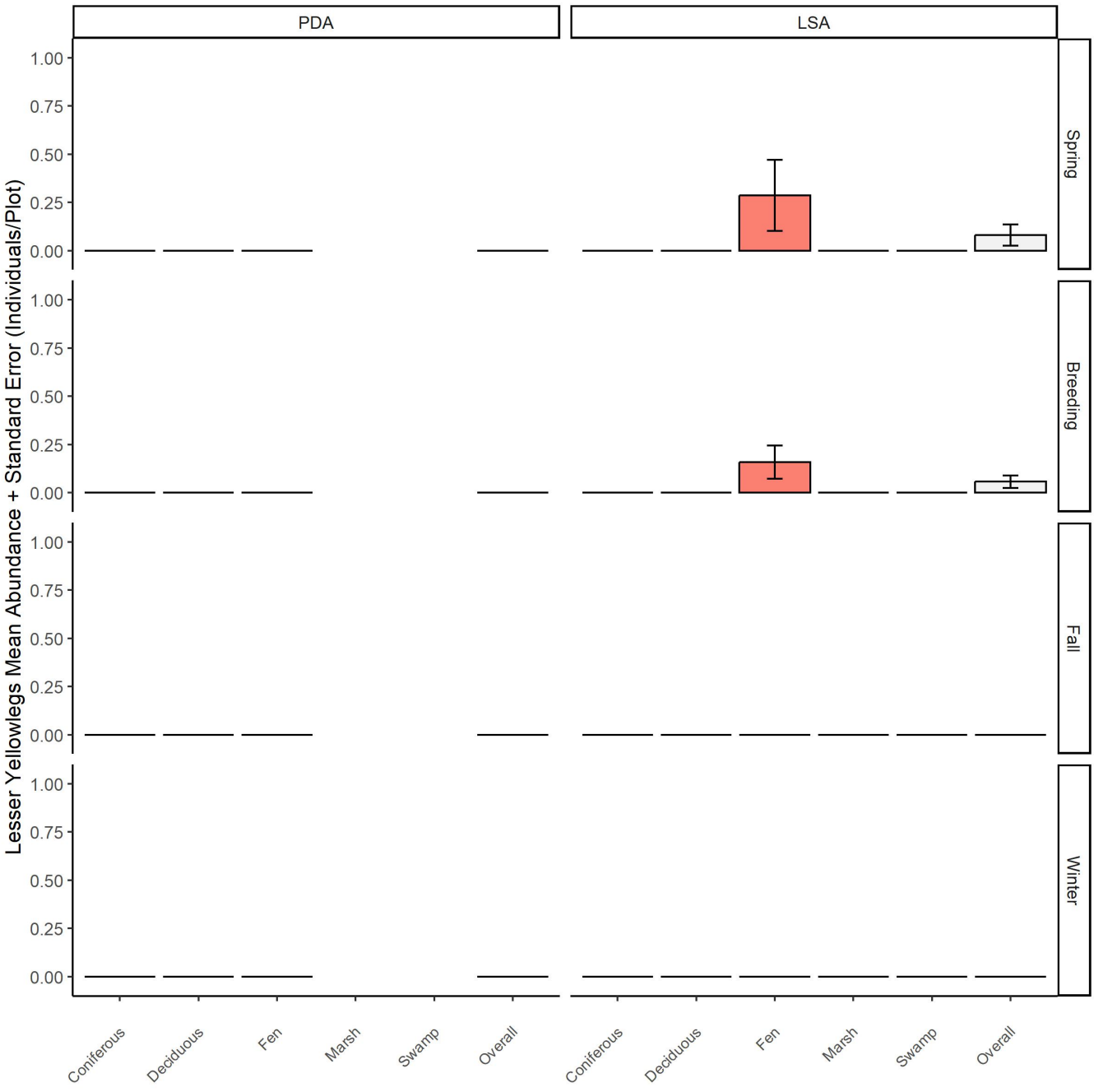
Lesser yellowlegs was recorded during autonomous recording unit surveys in the Local Study Area at 4 of 54 autonomous recording unit survey plots, in the Local Study Area in 2022. This included twice at one plot for a total of 5 detections. No detections were made in the Project Development Area (**Table 6-26**; **Figure 6-37**). Lesser yellowlegs was recorded in the fen habitat type (**Table 6-26**). Autonomous recording unit surveys in the Local Study Area detected lesser yellowlegs at dawn during the spring and breeding seasons (0.07 ± 0.05 individuals per plot and 0.05 ± 0.03 individuals per plot, respectively). No detections were made during any other season or period.

Table 6-26: Mean Relative Abundance of Lesser Yellowlegs Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Lesser Yellowlegs (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	0.00[(b)]	0.00 ± 0.00	n/a
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a
Fen	0.00[(b)]	0.16 ± 0.09	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.00 ± 0.00	n/a
All Habitat Types	**0.00** ± 0.00	**0.06** ± 0.03	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-37: Mean Relative Abundance of Lesser Yellowlegs Detected During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

6.6.15 Rusty Blackbird

Rusty blackbird was detected each survey year from 2018 to 2022. During the breeding season, the species was recorded in the Project Development Area and Local Study Area (**Table 6-27**; **Figure 6-27**). No detections were recorded at any point count plots in the Project Development Area or Regional Study Area from 2018 to 2022 (**Table 6-27**).

Table 6-27: Rusty Blackbird Observations During the Breeding Season in the Project Study Areas, 2018, 2019 and 2022

Study Area	Autonomous Recording Unit Surveys (2022)		Point Count Surveys (2018, 2019 and 2022)	
	Plots Observed	Total Number of Plots Surveyed	Plots Observed	Total Number of Plots Surveyed
PDA	2	4	0	31
LSA	18	54	3	210
RSA	-	-	0	30

"-" = no plots established; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

During point count surveys, mean relative abundance of individuals was similar among year but slightly higher in 2022 and 2019 (0.02 ± 0.02 individuals per plot) than in 2018 (0.01 ± 0.01 individuals per plot). During the breeding season, rusty blackbird was only detected in the Local Study Area (0.02 ± 0.01 individuals per plot; **Table 6-28**; **Figure 6-38**). The species was detected at equal relative abundance in fen and swamp habitat types (**Table 6-28**; **Figure 6-38**).

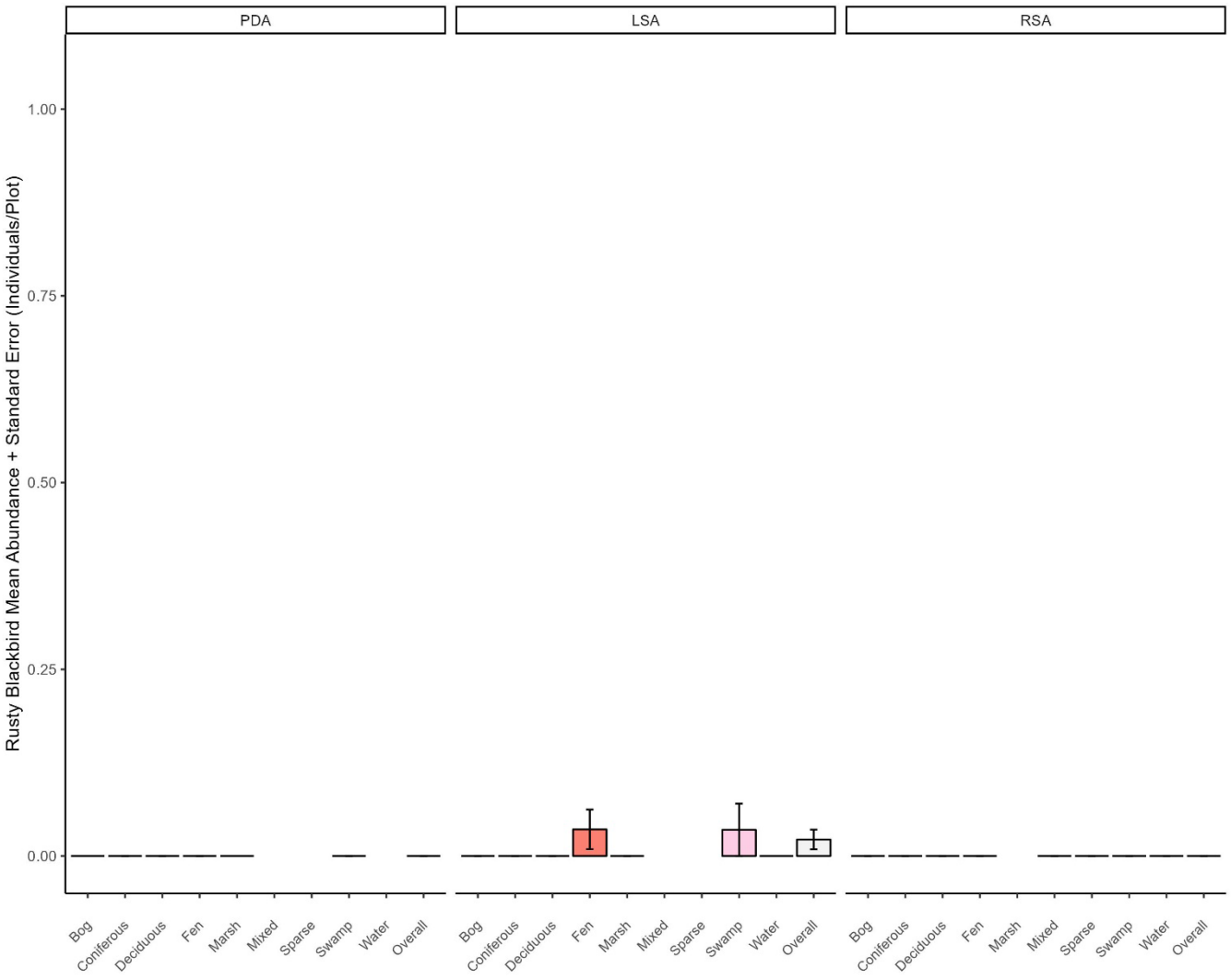
During autonomous recording unit surveys completed during the breeding season in 2022, rusty blackbird was only detected in the Local Study Area (0.21 ± 0.07 individuals per plot; **Table 6-28**; **Figure 6-39**). Rusty blackbird was detected on autonomous recording units at the highest relative abundance within fen, followed by coniferous forest habitat types (**Table 6-28**; **Figure 6-39**).

Table 6-28: Mean Relative Abundance of Rusty Blackbird Observed During Breeding Season Point Count and Autonomous Recording Unit Surveys, 2018 to 2022

Habitat Type	Mean Relative Abundance of Rusty Blackbird (individuals / survey plot / survey round ± standard error)					
	Autonomous Recording Unit Surveys			Point Count Surveys		
	PDA	LSA (excluding PDA plots)	RSA[a]	PDA	LSA (excluding PDA plots)	RSA (excluding LSA Plots)
Bog	-	-	n/a	0.00[b]	0.00 ± 0.00	0.00 ± 0.00
Coniferous Forest	0.00[b]	0.14 ± 0.10	n/a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a	0.00 ± 0.00	0.00 ± 0.00	0.00 ± 0.00
Fen	0.00[b]	0.42 ± 0.16	n/a	0.00 ± 0.00	0.04 ± 0.03	0.00 ± 0.00
Marsh	-	0.00[b]	n/a	0.00[b]	0.00 ± 0.00	-
Mixed Forest	-	-	n/a	-	-	0.00 ± 0.00
Early Successional Sparse Treed	-	-	n/a	-	-	0.00 ± 0.00
Swamp	-	0.08 ± 0.08	n/a	0.00 ± 0.00	0.04 ± 0.04	0.00 ± 0.00
Water	-	-	n/a	-	0.00[b]	0.00 ± 0.00
All Habitat Types	**0.00** ± 0.00	**0.21** ± 0.07	**n/a**	**0.00** ± 0.00	**0.02** ± 0.01	**0.00** ± 0.00

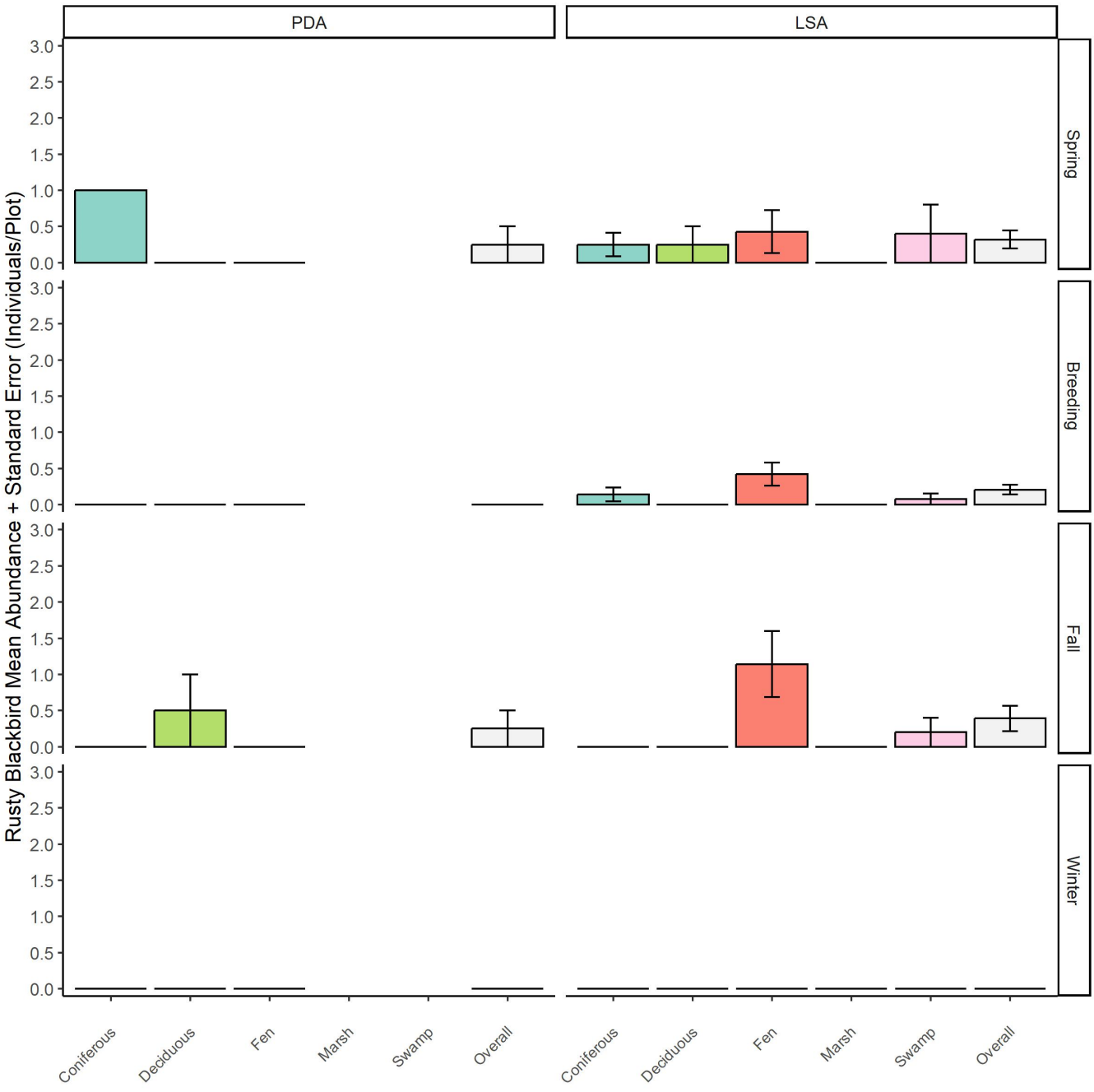
Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-38: Rusty Blackbird Relative Abundance Observed During Point Count Surveys in the Project Study Areas, 2018 to 2022



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area.

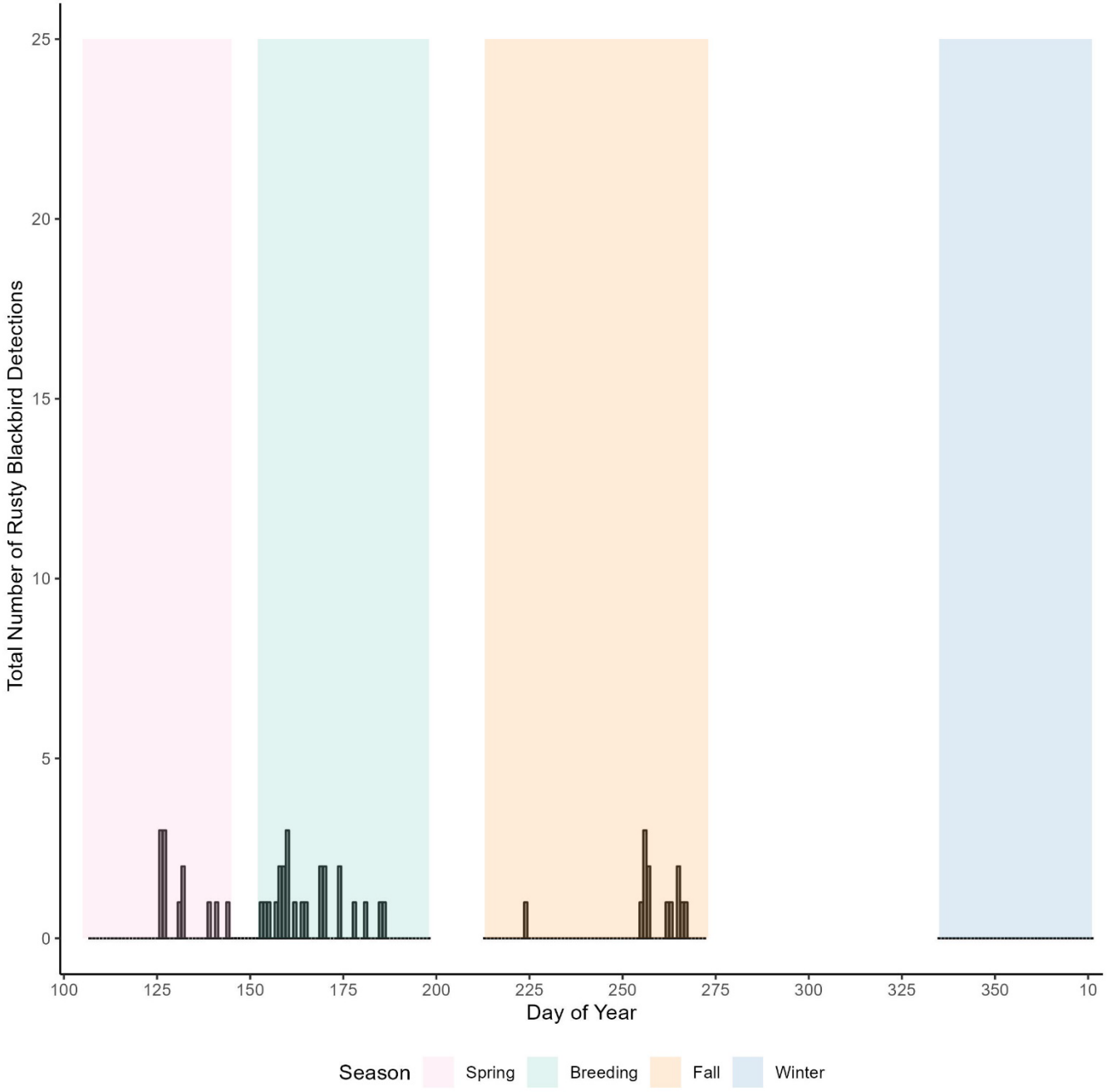
Figure 6-39: Rusty Blackbird Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

Autonomous recording unit monitoring completed across seasons in 2022 to 2023 provided a snapshot of the relative abundance of rusty blackbird use of the Project study areas throughout the year. Autonomous recording units in the Local Study Area detected rusty blackbird at the highest relative abundance during the fall season at dawn (0.37 ± 0.15 individuals per plot), followed by dawn during the spring (0.31 ± 0.11 individuals per plot), dawn during the breeding season (0.16 ± 0.05 individuals per plot), and night during the breeding season (0.07 ± 0.04 individuals per plot). Detections began in early-May and continued through late September. No detections were recorded during the winter (**Figure 6-40**).

Figure 6-40: Rusty Blackbird Detections by Julian Date Recorded During Autonomous Recording Unit Surveys in the Project Study Areas, 2022 to 2023



6.6.16 Yellow Rail

Yellow rail was recorded during autonomous recording unit surveys in the Local Study Area at one of 54 autonomous recording unit survey plots in the Local Study Area in 2022 (**Table 6-29**; **Figure 6-27**). Yellow rail was only recorded in the swamp habitat type at dawn during the breeding season (0.02 ± 0.02 individuals per plot) (**Table 6-29**; **Figure 6-41**).

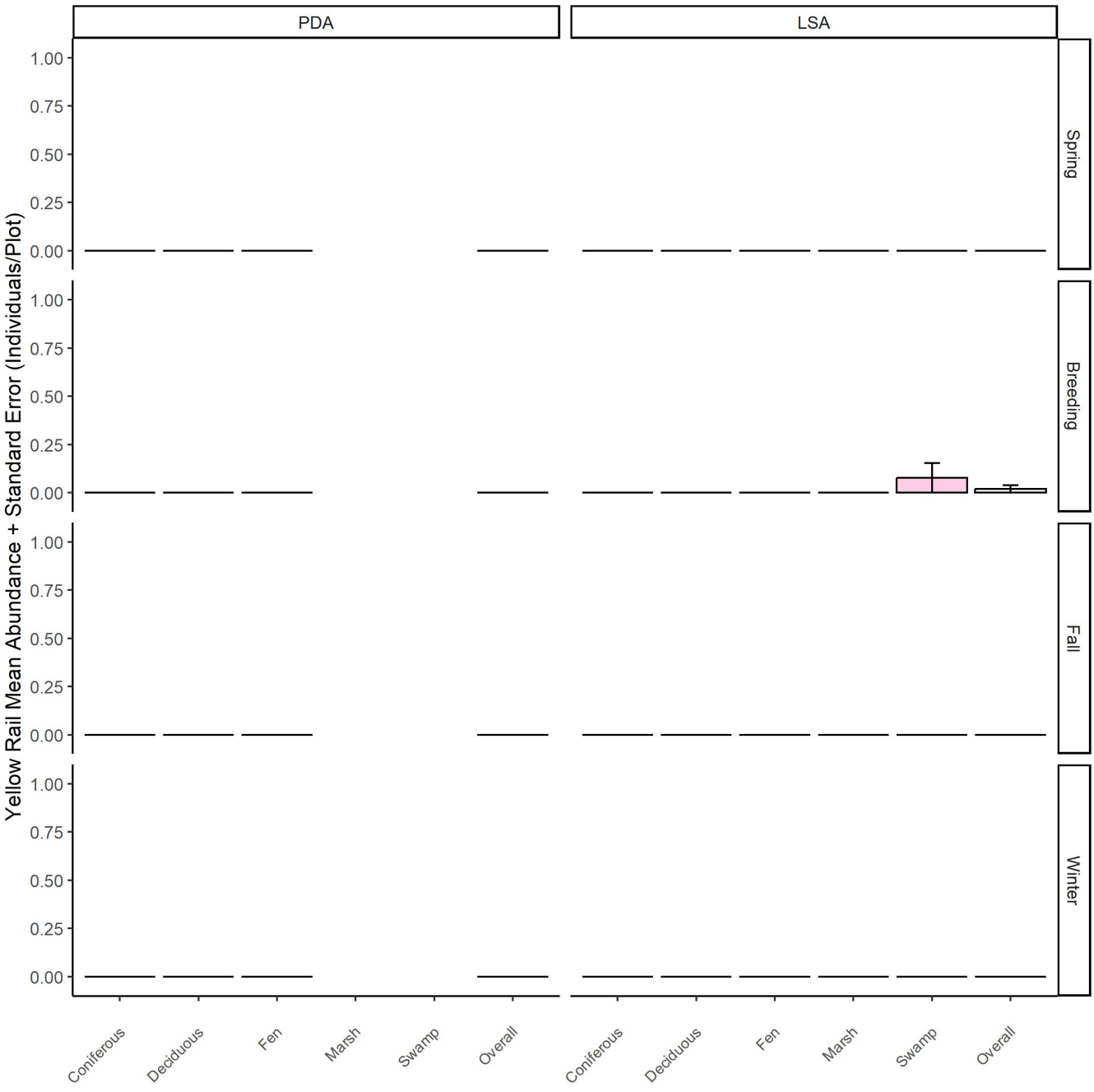
During marshbird call playback surveys, a single yellow rail individual was observed along the shore of a lake in marsh habitat dominated by sedges (*Carex* spp.) south of Brundrit Lake (**Figure 6-27**).

Table 6-29: Mean Relative Abundance of Yellow Rail Observed During Breeding Season Autonomous Recording Unit Surveys, 2022 to 2023

Habitat Type	Mean Relative Abundance of Yellow Rail (individuals / survey plot / survey round ± standard error)		
	PDA	LSA (excluding PDA plots)	RSA[(a)]
Coniferous Forest	0.00[(b)]	0.00 ± 0.00	n/a
Deciduous Forest	0.00 ± 0.00	0.00 ± 0.00	n/a
Fen	0.00[(b)]	0.00 ± 0.00	n/a
Marsh	-	0.00[(b)]	n/a
Swamp	-	0.08 ± 0.08	n/a
All Habitat Types	**0.00** ± 0.00	**0.02** ± 0.02	**n/a**

Notes:
(a) No autonomous recording units were established outside of the Local Study Area boundaries.
(b) Standard error not able to be calculated due to low sample size.
"-" = no plots established in habitat type; PDA = Project Development Area; LSA = Local Study Area; RSA = Regional Study Area; n/a = not applicable.

Figure 6-41: Yellow Rail Relative Abundance Observed During Autonomous Recording Unit Surveys, 2022 to 2023



Note: Error bars equal one standard error.
PDA = Project Development Area; LSA = Local Study Area.

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Annex A: Bird Species List

Common Name	Scientific Name	G-rank[1]	S-rank[2]	ESA Status[3]	SARA Status[4]	SARA Schedule[4]	NHIC Tracked	Bird Conservation Region Priority		Bird Conservation Region Population Objective	Valued Component Group	Observed during Baseline	Season When Possible to Occur in the RSA
								7	8				
Alder Flycatcher	*Empidonax alnorum*	G5	S5B				N	Y	Y	7: Assess/Maintain 8: Maitain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
American Bittern	*Botaurus lentiginosus*	G5	S5B				N	Y	Y	Maintain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
American Black Duck	*Anas rubripes*	G5	S4				N	Y	Y	7: Assess/Maintain 8: Increase	Waterfowl and Waterbirds	Yes	Breeding
American Coot	*Fulica americana*	G5	S3B,S4N	NAR			Y	N	N		Waterfowl and Waterbirds	Yes	Breeding
American Crow	*Corvus brachyrhynchos*	G5	S5				N	N	N		Other Land Birds	Yes	Breeding
American Golden-plover	*Phuvialis dominica*	G5	S2B,S4M				Y	Y	N	Migrant	Shorebirds	No	Migration
American Goldfinch	*Spinus tristis*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
American Pipit	*Anthus rubescens*	G5	S4B				N	N	N		Other Land Birds	Yes	Breeding
American Redstart	*Setophaga ruticilla*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
American Robin	*Turdus migratorius*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
American Three-toed Woodpecker	*Picoides dorsalis*	G5	S4				N	N	N		Forest Birds	Yes	Year-round
American Wigeon	*Mareca americana*	G5	S4B,S4N,S5M				N	N	Y	Maintain current	Waterfowl and Waterbirds	Yes	Breeding
American Woodcock	*Scolopax minor*	G5	S4B				N	N	N		Shorebirds	Yes	Breeding
Bald Eagle	*Haliaeetus leucocephalus*	G5	S4	SC			Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Raptors	Yes	Breeding
Bank Swallow	*Riparia riparia*	G5	S4B	THR	THR	1	Y	N	Y	Assess/Maintain	Other Land Birds	No	Breeding
Barn Swallow	*Hirundo rustica*	G5	S4B	SC	THR	1	Y	N	Y	Recovery objective	Other Land Birds	No	Breeding
Bay-breasted Warbler	*Setophaga castanea*	G5	S5B				N	Y	Y	7: Assess/Maintain 8: Maintain current	Forest Birds	Yes	Breeding
Belted Kingfisher	*Megaceryle alcyon*	G5	S5B,S4N				N	N	Y	Maintain current	Other Land Birds	Yes	Breeding
Black-and-white Warbler	*Mniotilta varia*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Black-backed Woodpecker	*Picoides arcticus*	G5	S5				N	Y	Y	7: Maintain current 8: Assess/Maintain	Forest Birds	Yes	Year-round
Black-bellied Plover	*Pluvialis squatarola*	G5	S4M				N	Y	N	Migrant	Shorebirds	Yes	Migration
Blackburnian Warbler	*Setophaga fusca*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Black-capped Chickadee	*Poecile atricapillus*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Blackpoll Warbler	*Setophaga striata*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Black Tern	*Chlidonias niger*	G4G5	S3B,S4M	SC			Y	Y	Y	7: Assess/Maintain 8: Recovery Objective	Waterfowl and Waterbirds	No	Breeding
Black-throated Green Warbler	*Setophaga virens*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Blue Jay	*Cyanocitta cristata*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Blue-headed Vireo	*Vireo solitarius*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Blue-winged Teal	*Spatula discors*	G5	S3B,S4M				Y	N	N		Waterfowl and Waterbirds	Yes	Breeding
Bohemian Waxwing	*Bombycilla garrulus*	G5	S4B,S5N				N	N	N		Forest Birds	Yes	Non-breeding
Bonaparte's Gull	*Chroicocephalus philadelphia*	G5	S5				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Boreal Chickadee	*Poecile hudsonicus*	G5	S4				N	Y	N	Maintain current	Forest Birds	Yes	Year-round
Boreal Owl	*Aegolius funereus*	G5	S4	NAR			N	N	Y	Assess/Maintain	Raptors	Yes	Year-round
Broad-winged Hawk	*Buteo platypterus*	G5	S5B				N	N	N		Raptors	Yes	Breeding
Brown Creeper	*Certhia americana*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Bufflehead	*Bucephala albeola*	G5	S5				N	N	Y	Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Canada Goose	*Branta canadensis*	G5	S5				N	Y	N	Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Canada Jay	*Perisoreus canadensis*	G5	S5				N	Y	N	Maintain current	Forest Birds	Yes	Year-round
Canada Warbler	*Cardellina canadensis*	G5	S5B	SC	THR	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Forest Birds	Yes	Breeding
Cape May Warbler	*Setophaga tigrina*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Cedar Waxwing	*Bombycilla cedrorum*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
Chestnut-sided Warbler	*Setophaga pensylvanica*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Chipping Sparrow	*Spizella passerina*	G5	S5B,S3N				N	N	N		Forest Birds	Yes	Breeding
Chimney Swift	*Chaetura pelagica*	G4G5	S3B	THR	THR	1	Y	N	N		Other Land Birds	No	Breeding
Clay-colored Sparrow	*Spizella pallida*	G5	S4B				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Common Goldeneye	*Bucephala clangula*	G5	S5				N	Y	Y	7: Assess/Maintain 8: Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Common Grackle	*Quiscalus quiscula*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
Common Loon	*Gavia immer*	G5	S5	NAR			N	N	Y	Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Common Merganser	*Mergus merganser*	G5	S5				N	N	Y	Maintain current	Waterfowl and Waterbirds	Yes	Breeding

Common Name	Scientific Name	G-rank[1]	S-rank[2]	ESA Status[3]	SARA Status[4]	SARA Schedule[4]	NHIC Tracked	Bird Conservation Region Priority		Bird Conservation Region Population Objective	Valued Component Group	Observed during Baseline	Season When Possible to Occur in the RSA
								7	8				
Common Nighthawk	*Chordeiles minor*	G5	S4B	SC	SC	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Other Land Birds	Yes	Breeding
Common Raven	*Corvus corax*	G5	S5				N	N	N		Other Land Birds	Yes	Year-round
Common Redpoll	*Acanthis flammea*	G5	S5				N	N	N		Other Land Birds	Yes	Breeding
Common Tern	*Sterna hirundo*	G5	S4B	NAR			N	N	Y	Assess/Maintain	Waterfowl and Waterbirds	No	Breeding
Common Yellowthroat	*Geothlypis trichas*	G5	S5B,S3N				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Connecticut Warbler	*Oporornis agilis*	G4G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Cooper's hawk	*Accipiter cooperii*	G5	S4				N	N	N		Raptors	No	Breeding
Dark-eyed Junco	*Junco hyemalis*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
Double-crested Cormorant	*Phalacrocorax auritus*	G5	S5B,S4N	NAR			N	N	N		Waterfowl and Waterbirds	No	Breeding
Downy Woodpecker	*Dryobates pubescens*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Dunlin	*Calidris alpina*	G5	S4B,S5M				N	Y	N	Assess/Maintain	Shorebirds	No	Migration
Eastern Kingbird	*Tyrannus tyrannus*	G5	S4B				N	N	Y	Assess/Maintain	Forest Birds	Yes	Breeding
Eastern Whip-poor-will	*Antrostomus vociferus*	G5	S4B	SC	THR	1	Y	N	Y	Recovery objective	Other Land Birds	Yes	Breeding
Eastern Wood-pewee	*Contopus virens*	G5	S4B	SC	SC	1	Y	N	N		Forest Birds	Yes	Breeding
Evening grosbeak	*Coccothraustes vespertinus*	G5	S4	SC	SC	1	Y	N	Y	Assess/Maintain	Forest Birds	No	Year-round
European Starling	*Sturnus vulgaris*	G5	SNA				N	N	N		Other Land Birds	Yes	Year-round
Fox Sparrow	*Passerella iliaca*	G5	S5B,S3N				N	N	N		Forest Birds	Yes	Breeding
Golden Eagle	*Aquila chrysaetos*	G5	S1B,S4N	END			Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Raptors	Yes	Breeding
Golden-crowned Kinglet	*Regulus satrapa*	G5	S5				N	N	N		Forest Birds	Yes	Breeding
Great Blue Heron	*Ardea herodias*	G5	S4				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Great Gray Owl	*Strix nebulosa*	G5	S4	NAR			N	N	N		Raptors	Yes	Year-round
Great Horned Owl	*Bubo virginianus*	G5	S4				N	N	N		Raptors	Yes	Year-round
Greater Yellowlegs	*Tringa melanoleuca*	G5	S4B,S5M				N	Y	Y	7: Maintain current 8: Assess/Maintain	Shorebirds	Yes	Breeding
Green-winged Teal	*Anas crecca*	G5	S4B,S4N,S5M				N	Y	Y	7: Assess/Maintain 8: Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Hairy Woodpecker	*Dryobates villosus*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Hermit Thrush	*Catharus guttatus*	G5	S5B,S4N				N	N	N		Forest Birds	Yes	Breeding
Herring Gull	*Larus argentatus*	G5	S4B,S5N				N	N	Y	Assess/Maintain	Waterfowl and Waterbirds	Yes	Breeding
Hooded Merganser	*Lophodytes cucullatus*	G5	S5				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Horned Lark	*Eremophila alpestris*	G5	S4				N	N	N		Other Land Birds	Yes	Breeding
Killdeer	*Charadrius vociferus*	G5	S4B				N	N	N		Shorebirds	Yes	Breeding
Lapland Longspur	*Calcarius lapponicus*	G5	S3B,S4N				Y	N	N		Other Land Birds	Yes	Breeding
Least Flycatcher	*Empidonax minimus*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Least Sandpiper	*Calidris minutilla*	G5	S4B,S5M				N	Y	N	Maintain current	Shorebirds	Yes	Migration
LeConte's Sparrow	*Ammospiza leconteii*	G5	S5B				N	N	N		Other Land Birds	Yes	Breeding
Lesser Scaup	*Aythya affinis*	G5	S4B,S4N,S5M				N	N	Y	Assess/Maintain	Waterfowl and Waterbirds	Yes	Breeding
Lesser Yellowlegs	*Tringa flavipes*	G5	S3S4B,S5M	THR			Y	Y	Y	Assess/Maintain	Shorebirds	Yes	Migration and Breeding
Lincoln's Sparrow	*Melospiza lincolnii*	G5	S5B				N	Y	N	Maintain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Long-billed Dowitcher	*Limnodromus scolopaceus*	G5	S4M				N	N	N		Shorebirds	No	Migration
Long-eared Owl	*Asio otus*	G5	S4				N	N	N		Raptors	Yes	Breeding
Long-tailed Duck	*Clangula hyemalis*	G5	S3B,S5N				Y	Y	Y	7: Assess/Maintain 8: Migrant (no BCR 8-ON population objective)	Waterfowl and Waterbirds	Yes	Breeding
Magnolia Warbler	*Setophaga magnolia*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Mallard	*Anas platyrhynchos*	G5	S5				N	Y	Y	7: Assess/Maintain 8: Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Merlin	*Falco columbarius*	G5	S5	NAR			N	N	N		Raptors	Yes	Breeding
Mourning Warbler	*Geothlypis philadelphia*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Nashville Warbler	*Leiothlypis ruficapilla*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Northern Flicker	*Colaptes auratus*	G5	S5				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Northern Harrier	*Circus hudsonius*	G5	S5B,S4N	NAR			N	N	N		Raptors	Yes	Breeding
Northern Hawk Owl	*Surnia ulula*	G5	S4	NAR			N	Y	N	Assess/Maintain	Raptors	Yes	Year-round
Northern Parula	*Setophaga americana*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Northern Saw-whet Owl	*Aegolius acadicus*	G5	S5				N	N	N		Raptors	Yes	Year-round
Northern Shoveler	*Anas clypeata*	G5	S4B,S4N,S5M				N	N	N		Waterfowl and Waterbirds	No	Breeding
Northern Waterthrush	*Parkesia noveboracensis*	G5	S5B				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding

Common Name	Scientific Name	G-rank[1]	S-rank[2]	ESA Status[3]	SARA Status[4]	SARA Schedule[4]	NHIC Tracked	Bird Conservation Region Priority		Bird Conservation Region Population Objective	Valued Component Group	Observed during Baseline	Season When Possible to Occur in the RSA
								7	8				
Olive-sided Flycatcher	*Contopus cooperi*	G4	S4B	SC	SC	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Forest Birds	Yes	Breeding
Orange-crowned Warbler	*Leiothlypis celata*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Osprey	*Pandion haliaetus*	G5	S5B				N	N	N		Raptors	Yes	Breeding
Ovenbird	*Seiurus aurocapilla*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Palm Warbler	*Setophaga palmarum*	G5	S5B				N	Y	N	Maintain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Pectoral Sandpiper	*Calidris melanotos*	G5	S1B,S4M				Y	Y	N	Assess/Maintain	Shorebirds	No	Migration
Peregrine Falcon	*Falco peregrinus*	G4	S4	SC			Y	N	Y	Recovery objective	Raptors	No	Breeding
Philadelphia Vireo	*Vireo philadelphicus*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Pied-billed Grebe	*Podilymbus podiceps*	G5	S4B,S2N				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Pileated Woodpecker	*Dryocopus pileatus*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Pine Grosbeak	*Pinicola enucleator*	G5	S4B,S5N				N	Y	Y	Assess/Maintain	Forest Birds	Yes	Year-round
Pine Siskin	*Spinus pinus*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Purple Finch	*Haemorhous purpureus*	G5	S5				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Red Crossbill	*Loxia curvirostra*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Red-breasted Merganser	*Mergus serrator*	G5	S5				N	N	N		Waterfowl and Waterbirds	No	Breeding
Red-breasted Nuthatch	*Sitta canadensis*	G5	S5				N	N	N		Forest Birds	Yes	Year-round
Red-eyed Vireo	*Vireo olivaceus*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Red Knot (*rufus* subspecies)	*Calidris canutus rufa*	G4T2	S1M	END	END	1	Y	Y	N	Migrant	Shorebirds	No	Migration
Red-necked Grebe	*Podiceps grisegena*	G5	S3	NAR			Y	N	Y	Assess/Maintain	Waterfowl and Waterbirds	Yes	Breeding
Red-necked Phalarope	*Phalaropus lobatus*	G4G5	S3B,S4M	SC	SC	1	Y	N	N		Shorebirds	No	Migration
Red-tailed Hawk	*Buteo jamaicensis*	G5	S5	NAR			N	N	N		Raptors	Yes	Breeding
Red-winged Blackbird	*Agelaius phoeniceus*	G5	S5				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Ring-billed Gull	*Larus delawarensis*	G5	S5				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Ring-necked Duck	*Aythya collaris*	G5	S5B,S4N				N	Y	Y	7: Assess/Maintain 8: Maintain current	Waterfowl and Waterbirds	Yes	Breeding
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Ruby-crowned Kinglet	*Corthylio calendula*	G5	S5B,S3N				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Ruby-throated Hummingbird	*Archilochus colubris*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Ruddy Turnstone	*Arenaria interpres*	G5	S4M				N	Y	N	Migrant	Shorebirds	No	Migration
Ruffed Grouse	*Bonasa umbellus*	G5	S5				N	N	Y	Assess/Maintain	Forest Birds	Yes	Year-round
Rusty Blackbird	*Euphagus carolinus*	G4	S4B,S3N	SC	SC	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Sanderling	*Calidris alba*	G5	S4M				N	Y	N	Migrant	Shorebirds	No	Migration
Sandhill Crane	*Antigone canadensis*	G5	S5B,S3N				N	Y	N	Maintain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Savannah Sparrow	*Passerculus sandwichensis*	G5	S5B,S3N				N	N	N		Other Land Birds	Yes	Breeding
Semipalmated Plover	*Charadrius semipalmatus*	G5	S4B,S5M				N	Y	N	Assess/Maintain	Shorebirds	No	Migration
Semipalmated Sandpiper	*Calidris pusilla*	G5	S2B,S4M				Y	Y	N	Assess/Maintain	Shorebirds	Yes	Migration
Sharp-shinned Hawk	*Accipiter striatus*	G5	S5	NAR			N	N	Y	Assess/Maintain	Raptors	Yes	Breeding
Sharp-tailed Grouse	*Tympanuchus phasianellus*	G5	S4				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Year-round
Short-billed Dowitcher	*Limnodromus griseus*	G5	S3B,S4M				Y	Y	N	Assess/Maintain	Shorebirds	Yes	Migration
Short-eared Owl	*Asio flammeus*	G5	S4?B,S2S3N	SC	SC	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Raptors	No	Breeding
Snow Bunting	*Plectrophenax nivalis*	G5	S4N				N	N	N		Other Land Birds	Yes	Non-breeding
Snow Goose	*Anser caerulescens*	G5	S5B				N	N	N		Waterfowl and Waterbirds	Yes	Migration
Solitary Sandpiper	*Tringa solitaria*	G5	S4B,S5M				N	Y	Y	Assess/Maintain	Shorebirds	Yes	Breeding
Song Sparrow	*Melospiza melodia*	G5	S5				N	N	N		Other Land Birds	Yes	Breeding
Sora	*Porzana carolina*	G5	S5B				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Spotted Sandpiper	*Actitis macularius*	G5	S5B				N	N	N		Shorebirds	Yes	Breeding
Spruce Grouse	*Canachites canadensis*	G5	S5				N	Y	N	Assess/Maintain	Forest Birds	Yes	Year-round
Stilt Sandpiper	*Calidris himantopus*	G5	S3B,S4M				Y	N	N		Shorebirds	No	Migration
Swainson's Thrush	*Catharus ustulatus*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Swamp Sparrow	*Melospiza georgiana*	G5	S5B,S4N				N	Y	Y	Maintain current	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Tennessee Warbler	*Leiothlypis peregrina*	G5	S5B				N	Y	Y	7: Maintain current 8: Assess/Maintain	Forest Birds	Yes	Breeding
Tree Swallow	*Tachycineta bicolor*	G5	S4S5B				N	N	Y	Increase	Other Land Birds	Yes	Breeding
Trumpeter Swan	*Cygnus buccinator*	G4	S4	NAR			N	N	N		Waterfowl and Waterbirds	Yes	Migration
Tundra Swan	*Cygnus columbianus*	G5	S2B,S4N,S3M				Y	N	N		Waterfowl and Waterbirds	Yes	Migration

Common Name	Scientific Name	G-rank[1]	S-rank[2]	ESA Status[3]	SARA Status[4]	SARA Schedule[4]	NHIC Tracked	Bird Conservation Region Priority		Bird Conservation Region Population Objective	Valued Component Group	Observed during Baseline	Season When Possible to Occur in the RSA
								7	8				
Turkey Vulture	*Cathartes aura*	G5	S5B,S3N				N	N	N		Raptors	Yes	Breeding
Veery	*Catharus fuscescens*	G5	S5B				N	N	N		Forest Birds	Yes	Breeding
Virginia Rail	*Rallus limicola*	G5	S4S5B				N	N	N		Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
White-crowned Sparrow	*Zonotrichia leucophrys*	G5	S5B,S3N				N	N	N		Other Land Birds	Yes	Breeding
White-rumped Sandpiper	*Calidris fuscicollis*	G5	S5M				N	Y	N	Migrant	Shorebirds	No	Migration
White-throated Sparrow	*Zonotrichia albicollis*	G5	S5				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
White-winged Crossbill	*Loxia leucoptera*	G5	S5				N	Y	N	Assess/Maintain	Forest Birds	Yes	Year-round
Wilson's Snipe	*Gallinago delicata*	G5	S5B				N	Y	Y	Assess/Maintain	Shorebirds	Yes	Breeding
Wilson's Warbler	*Cardellina pusilla*	G5	S5B				N	N	N		Other Land Birds	Yes	Breeding
Winter Wren	*Troglodytes hiemalis*	G5	S5B,S4N				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Wood Duck	*Aix sponsa*	G5	S5B,S3N				N	N	N		Waterfowl and Waterbirds	Yes	Breeding
Wood Thrush	*Hylocichla mustelina*	G4	S4B	SC	THR	1	Y	N	N		Forest Birds	Yes	Breeding
Yellow Rail	*Coturnicops noveboracensis*	G4	S3B	SC	SC	1	Y	Y	Y	7: Assess/Maintain 8: Recovery objective	Bog / Fen Birds and Other Wetland Birds	Yes	Breeding
Yellow Warbler	*Setophaga petechia*	G5	S5B				N	N	N		Other Land Birds	Yes	Breeding
Yellow-bellied Flycatcher	*Empidonax flaviventris*	G5	S5B				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Yellow-bellied Sapsucker	*Sphyrapicus varius*	G5	S5B,S3N				N	N	Y	Maintain current	Forest Birds	Yes	Breeding
Yellow-rumped Warbler	*Setophaga coronata*	G5	S5B,S4N				N	N	N		Forest Birds	Yes	Breeding

[1] Global Ranks (GRANK) are Rarity Ranks assigned to a species based on their range-wide status. GRANKS are assigned by a group of consensus of Conservation Data Centres (CDCs), scientific experts and the Nature Conservancy. These ranks are not legal designations. G1 (Extreemly Rare), G2 (Very Rare), G3 (Rare to uncommon), G4 (Common), G5 (Very Common), GH (Historic, no record in last 20yrs), GU (Status uncertain), GX (Globally extinct), ? (Inexact number rank), G? (Unranked), Q (Questionable), T (rank applies to subspecies or variety). Last assessed August 2011

[2] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2019.

[3] *Endangered Species Act* (ESA), 2007. General (O.Reg 242/08 last amended 1 April 2021 as O. Reg 228/21). Species at Risk in Ontario List (O.Reg 230/08 last amended 25 January 2023 asO. Reg. 9/23); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

[4] *Species at Risk Act* (SARA), 2002. Schedule 1 (Last amended 3 February 2023); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

Attachment C – Birds Habitat Modelling Report

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Attachment C: Birds Habitat Modelling Report

February 2026

Disclaimer: WSP Canada

WSP Canada Inc. prepared this report solely for the use of the intended recipient, AECOM Canada Ltd., in accordance with the professional services agreement between the parties. The report is intended to be used in its entirety. No excerpts may be taken to be representative of the findings in the assessment.

The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP Canada Inc. at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP Canada Inc. and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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WSP Canada Inc. makes no other representations whatsoever concerning the legal significance of its findings.

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In preparing this report, WSP Canada Inc. has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP Canada Inc.is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

Design recommendations given in this report are applicable only to the project and areas as described in the text and then only if constructed in accordance with the details stated in this report. The comments made in this report on potential construction issues and possible methods are intended only for the guidance of the designer. The number of testing and/or sampling locations may not be sufficient to determine all the factors that may affect construction methods and costs. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

This limitations statement is considered an integral part of this report.

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Table 3-35: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Olive-sided Flycatcher Model 37

1. Background

Two types of habitat models were developed for bird proxy Valued Components for the Marten Falls Community Access Road (the Project) Impact Assessment / Environmental Assessment: empirical habitat models and habitat suitability index models. Empirical habitat models were developed for 10 proxy Valued Components that had sufficient data to develop empirical models. Habitat suitability index models were developed for the remaining 17 proxy Valued Components as there were insufficient data collected during baseline surveys to support empirical models.

The analyses and models were developed to support the evaluation of existing conditions in the bird Regional Study Area and were guided by requirements outlined in the Impact Assessment Agency of Canada's *Tailored Impact Statement Guidelines* and input from the Ontario Ministry of Natural Resources and Forestry.

Empirical models that predicted relative abundance were used to provide spatially-explicit descriptions of habitat quality for 10 proxy Valued Components. Empirical models leverage large datasets of observation data (i.e., from breeding bird point count and autonomous recording unit surveys) in combination with landcover data and existing relationships derived from scientific literature to produce defensible estimates of habitat quality. These empirical models were developed for the Regional Study Area. Where applicable, multiple validation approaches were used to evaluate the reliability in predicting habitat quality from empirical models.

Habitat suitability index models were used to provide spatially-explicit descriptions of habitat quality for 17 proxy Valued Components. Habitat suitability index models were developed using landcover data and existing relationships derived from scientific literature to produce defensible estimates of habitat quality. Habitat suitability index models were developed for the Regional Study Area.

2. Proxy Valued Components

The type of models used to estimate habitat quality for each proxy Valued Component are listed in **Table 2-1**; detailed descriptions of the models are provided below.

Table 2-1: Proxy Valued Component Models

Common Name	Scientific Name	Model
Red-eyed vireo	*Vireo olivaceus*	Empirical model; generalized linear model with QPAD offset
Ovenbird	*Seiurus aurocapilla*	Empirical model; generalized linear model with QPAD offset
Dark-eyed junco	*Junco hyemalis*	Empirical model; generalized linear model with QPAD offset
Osprey	-	Habitat suitability index model
Boreal owl	*Aegolius funereus*	Empirical model; generalized linear model (no offset)
Wilson's snipe	*Gallinago delicata*	Empirical model; generalized linear model with QPAD offset
Palm warbler	*Setophaga palmarum*	Empirical model; generalized linear model with QPAD offset
Common yellowthroat	*Geothlypis trichas*	Empirical model; generalized linear model with QPAD offset
Northern waterthrush	*Parkesia noveboracensis*	Empirical model; generalized linear model with QPAD offset
Sora	*Porzana carolinus*	Habitat suitability index model
Canada warbler	*Cardellina canadensis*	Habitat suitability index model
Evening grosbeak	*Coccothraustes vespertinus*	Habitat suitability index model
Chimney swift	*Chaetura pelagica*	Habitat suitability index model
Common nighthawk	*Chordeiles minor*	Empirical model; generalized linear model (no offset)
Eastern whip-poor-will	*Antrostomus vociferus*	Habitat suitability index model
Eastern wood-pewee	*Contopus virens*	Habitat suitability index model
Olive-sided flycatcher	*Contopus cooperi*	Empirical model; generalized linear model with QPAD offset

Common Name	Scientific Name	Model
Bald eagle	*Haliaeetus leucocephalus*	Habitat suitability index model
Peregrine falcon	*Falco peregrinus*	Habitat suitability index model
Short-eared owl	*Asio flammeus*	Habitat suitability index model
Bank swallow	*Riparia riparia*	Habitat suitability index model
Barn swallow	*Hirundo rustica*	Habitat suitability index model
Black tern	*Chlidonias niger*	Habitat suitability index model
Lesser yellowlegs	*Tringa flavipes*	Habitat suitability index model
Rusty blackbird	*Euphagus carolinus*	Habitat suitability index model
Yellow rail	*Coturnicops noveboracensis*	Habitat suitability index model

QPAD = offset to account for detection probability

3. Empirical Models

3.1 Methods

Initially, three modelling approaches were considered to develop maps of habitat quality for each proxy valued component: generalized linear models, boosted regression trees, and occupancy models. Each of these modelling approaches were suited for data collected from breeding bird surveys and autonomous recording units. However, based on preliminary analyses, boosted regression tree and occupancy models were excluded from the estimation of species-specific habitat quality and efforts were focused on the development of generalized linear models. Generalized linear models were ultimately used because they allowed for the incorporation of detection probabilities as offsets for each proxy valued component (where applicable) and the incorporation of a random intercept to account for multiple autonomous recording unit recordings at a single plot (where applicable). Using a model selection approach, the top generalized linear model was identified for each proxy valued component and predicted across the Regional Study Area. Predictions of habitat quality were then validated based on internal (i.e., leave-one-out cross validation) and external data sources. External sources included alternative survey data collected within the Regional Study Area and national density maps of each proxy valued component developed by the Boreal Avian Modelling Project [2020]). Validation with alternative survey data implies using autonomous recording unit records to test model predictions from breeding bird survey plot observations or evaluating model predictions from autonomous recording unit data with breeding bird survey plot observations (**Section 3.1.1** and **Section 3.1.6**).

3.1.1 Data Sources

Data supporting model development were collected from multiple sources. Breeding bird survey data used to develop empirical models were collected by Marten Falls First Nations and obtained from the Ministry of Natural Resources and Forestry. Autonomous recording unit data used to develop empirical models were collected by Marten Falls First Nations and obtained from the Ministry of Natural Resources and Forestry. Habitat data used in the development of empirical models were obtained from Land Inventory Ontario (accessible at https://geohub.lio.gov.on.ca).

Breeding bird surveys were conducted from 2018 to 2022 resulting in 616 unique visits across 271 distinct plots. Breeding bird survey plots were spatially distributed across the Local Study Area to maximize coverage of the proposed extent of the Project footprint. Among all sample years, a total of 31 unique bird point count plots were established in the Project Development Area, 210 unique bird point count plots were established in the Local Study Area, and an additional 30 point count plots were established in the Regional Study Area, outside of the Local Study Area boundary. Data from all survey years (2018-2022)

were included in the analysis to account for interannual variation. Refer to the *Birds Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026) for more details on breeding bird survey methods.

Autonomous recording unit data were collected during 2022 with 29 spring season plots and 57 breeding season plots. There were 588 and 861 unique visits (i.e., recordings) during the dawn period across the spring and breeding seasons, respectively. In addition, there were 424 and 865 unique visits (i.e., recordings) during the night period across the spring and breeding seasons, respectively. Autonomous recording unit plot selection followed the study design described for breeding bird point count surveys in Section 4.2.3.2 of the *Birds Technical Support Document: Existing Conditions and Effects Assessment (WSP, 2026).* Based on Section 8.9 of the *Tailored Impact Statement Guidelines* (the Agency, 2020), autonomous recording units were deployed at approximately 40% of the proposed 150 breeding bird survey stations during the breeding season (i.e., 60 stations). For more details on autonomous recording unit methods, refer to the *Birds Technical Support Document: Existing Conditions and Effects Assessment* (WSP, 2026).

3.1.2 Offsets

The ‘QPAD’ approach develops statistical offsets to account for differences in bird species detectability and survey methods (Solymos et al. 2013, Solymos 2016). In the acronym ‘QPAD’, *Q* represents the probability that an individual is detected, given that it sings during the survey; *P* represents the probability of an individual singing during the survey; *A* represents the area sampled by the survey; and *D* represents density. The QPAD offsets are developed based on removal and distance sampling models with linear and quadratic predictor variables (Julian day, hours since local sunrise, days since local spring [developed by McKenney et al. (2006) using data on temperature and precipitation], overstory canopy cover, and land cover type) (**Table 3-1**). The offsets developed for each species are provided in Solymos et al. (2013) and Solymos (2016) and were included in the development of abundance models (i.e., generalized linear models).

An attempt was made to develop offsets using methodology outlined in Solymos et al. (2013) for this project using locally derived data. However, only 158 of 506 breeding bird survey plots had suitable data (i.e., time of first detection recorded for each individual). Therefore, the decision was made to use global offsets from the Boreal Avian Modelling Project (Solymos et al. 2013, Solymos 2016) for all breeding bird survey plots. The top models for each species used to develop offsets are provided in Solymos et al. (2013) and Solymos (2016). Global offsets are developed primarily for passerines and other species frequently detected during breeding bird surveys. Global offsets were not available for boreal owl or common nighthawk, and therefore no offsets were used for these species.

3.1.3 Correction Factors

Pooling data from autonomous recording unit and breeding bird survey data in the same models requires development of correction factors due to differences in effective detection radius between these two survey methods. A method for developing these correction factors is presented in Van Wilgenburg et al. (2017). Ideally, paired autonomous recording unit and breeding bird survey plots are used, where an observer performs the field-based breeding bird survey plot and later transcribes autonomous recording unit data to develop survey-specific correction factors. Distance models are used to relate autonomous recording unit data to breeding bird survey data, which can be used to estimate effective detection radius. Removal models are then fit to pooled autonomous recording unit and breeding bird survey data with survey method (i.e., autonomous recording unit or breeding bird survey) as a predictor variable in models to test for differences in species availability (i.e., the probability of a species vocalizing). Only species that do not show a difference in availability by survey method can be carried forward to determine correction factors.

Paired autonomous recording unit and breeding bird surveys were not analysed for this Project. An attempt was made to determine correction factors using unpaired breeding bird survey and autonomous recording unit data following methods in Van Wilgenburg et al. (2017). The only species that met the availability assumption was dark-eyed junco. Therefore, the decision was made to use breeding bird survey data for passerine species and autonomous recording unit data to validate models. For boreal owl, common nighthawk, and Wilson's snipe more detections were made from autonomous recording units than breeding bird surveys; therefore, these models were developed using autonomous recording unit data and validated with breeding bird survey data, where applicable.

3.1.4 Predictor Variables

Predictor variables in empirical models were primarily developed with land cover types using Ontario Far North Land Cover, digital elevation model, Ontario Hydrological Network watercourse, forest fires, and silvicultural depletion data (Land Inventory Ontario) (**Table 3-1**). The resolution of the landcover data was 30 m x 30 m raster grid cells. Land cover variables were developed to represent the amount of habitat at the local and regional scales across the Regional Study Area. Local scale of land cover variables were developed using a 210 m x 210 m moving window (the approximate area sampled by a breeding bird survey) across the Regional Study Area. Regional scale land cover variables represented the amount of core area of a habitat type in a 6 km x 6 km moving window across the Regional Study Area (Mahon et al. 2016). Core area was defined as the proportion of a land cover type within the extent of the moving window after removing the edge (30 m pixel) around patches of said land cover type (i.e., excluding pixels of a land cover type that are adjacent to a different land cover type; McGarigal and Marks 1995). Anthropogenic disturbance, forest fires, silvicultural harvest, linear features, marsh, and

rock land cover at both spatial scales (210 m^2 and 6 km^2), deciduous land cover at the 210 m^2, and mature forest and riparian land cover at the 6 km^2 scale were not included in candidate models due to minimal variation across the Regional Study Area.

Table 3-1: Predictor Variables Used in Models

Variable	Definition	Source
Bog_{210}	Proportion of bog forest at the 210 m^2 scale	Far North Land Cover
Bog_{core}	Proportion of bog forest at the 6 km^2 scale	Far North Land Cover
$Coniferous_{210}$	Proportion of upland coniferous forest at the 210 m^2 scale	Far North Land Cover
$Coniferous_{core}$	Proportion of upland coniferous forest at the 6 km^2 scale	Far North Land Cover
$Deciduous_{core}$	Proportion of deciduous forest at the 6 km^2 scale	Far North Land Cover
$Sparse_{210}$	Proportion of upland sparse forest at the 210 m^2 scale	Far North Land Cover
$Sparse_{core}$	Proportion of upland sparse forest at the 6 km^2 scale	Far North Land Cover
Elevation	Elevation at the 30 m x 30 m pixel scale. Values were normalized from 0 to 1	Digital Elevation Model
Fen_{210}	Proportion of fen forest at the 210 m^2 scale	Far North Land Cover
Fen_{core}	Proportion of fen forest at the 6 km^2 scale	Far North Land Cover
Mature $forest_{210}$	Proportion of mature forest (coniferous forest, deciduous forest, and mixed forest > 60 years, based on fire and silviculture depletion data) at the 210 m^2 scale	Far North Land Cover
$Mixed_{210}$	Proportion of mixed forest at the 210 m^2 scale	Far North Land Cover
$Mixed_{core}$	Proportion of mixed forest at the 6 km^2 scale	Far North Land Cover
$Riparian_{210}$	Proportion of riparian at the 210 m^2 scale, where riparian was defined as area within a 200 m buffer of watercourse features	Ontario Hydrological Network Watercourse
$Swamp_{210}$	Proportion of swamp forest at the 210 m^2 scale	Far North Land Cover
$Swamp_{core}$	Proportion of swamp forest at the 6 km^2 scale	Far North Land Cover
Terrain	Dispersion of vectors orthogonal to grid cells within a 7 x 7-cell neighbourhood around each cell (Sappington 2007, Sappington et al. 2007). Values range from 0 (no terrain variation) to 1 (complete terrain variation)	Digital Elevation Model
$Water_{210}$	Proportion of water at the 210 m^2 scale	Far North Land Cover
$Water_{core}$	Proportion of water at the 6 km^2 scale	Far North Land Cover

m^2 = square metres; km^2 = square kilometres
Notes: Far North Land Cover, digital elevation model, and Ontario Hydrological Network Watercourse maps accessible via Land Inventory Ontario at https://geohub.lio.gov.on.ca

3.1.5 Generalized Linear Models

Due to an unbalanced number of visits per plot (one to four visits per plot), the maximum count of each proxy valued component was determined for each breeding bird survey plot based on songs (i.e., excluded calls) and used in model development. Additionally, 15 recordings (visits) per autonomous recording unit were randomly sampled to model the abundance of each proxy valued component.

Seven candidate models were developed for each species based on known habitat preferences and variables that demonstrated strong relationships with count estimates during data exploration, where count data (Count) were modelled as a function of landscape covariates and a QPAD offset and random intercept, where applicable. Within each candidate set of models a statistical null model was included, where no predictor variables were included (i.e., only an intercept, offset, and random intercept [when applicable) were included). There was no correlation (Pearson's correlation coefficient, $| r | > 0.6$) between predictor covariates included in candidate models. Candidate models developed with breeding bird survey data (i.e., red-eyed vireo, ovenbird, dark-eyed junco, palm warbler, common yellowthroat, northern waterthrush, and olive-sided flycatcher) were fit using a generalized linear model (GLM) with a Poisson distribution by implementing the *glmmTMB* package in *R* (R Core Team, 2023). Candidate models developed with autonomous recording unit data (i.e., boreal owl, common nighthawk, and Wilson's snipe) were fit using a generalized linear mixed-effects model (GLMM) with a Poisson distribution by implementing the *glmmTMB* package in *R* and included a random intercept for plot ID (to account for the 15 visits randomly selected per plot). Upon preliminary analysis of common nighthawk, a negative binomial distribution was determined to provide a better fit of residuals when compared to the Poisson distribution; therefore, a negative binomial distribution was used. Residual fit was evaluated using the *Dharma* package in *R*.

An information-theoretic approach (Akaike information criterion corrected for small sample sizes: AICc) was used to select the top model for predicting relative abundance of each proxy valued component (Burnham and Anderson, 2002). The AICc and Akaike weights (w_i) were calculated for each model in the candidate set. Akaike weights provide the relative likelihood of a model being the top model given the candidate set, where an Akaike's weight closer to 1 indicates a higher likelihood that the model is the top model (Burnham and Anderson, 2002). Akaike weights were calculated such that all Akaike weights for the candidate set sum to 1. Models within ΔAICc <2.0 were considered competitive (Burnham and Anderson, 2002), but the top model was selected based on the competitive model with fewest parameters (i.e., most parsimonious model). The top model of each proxy valued component was used to predict relative abundance across the Regional Study Area using the beta coefficient from each predictor variable. Larger negative or positive beta coefficients indicate a relatively larger influence on predicting relative abundance compared to smaller beta coefficients. In addition, if the 95% confidence intervals of the beta coefficient do not overlap zero it indicates higher

confidence in the relationship between the predictor variables and the relative abundance of each proxy valued component.

3.1.5.1 Red-eyed Vireo

The red-eyed vireo model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing red-eyed vireo were detected at 54 of 271 plots. Red-eyed vireo counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and QPAD offset. Seven candidate models were tested for red-eyed vireo based on known habitat preferences and variables that demonstrated strong relationships with red-eyed vireo counts during data exploration (**Table 3-2**). Detections of red-eyed vireo from autonomous recording units were used to validate model predictions. Red-eyed vireo were detected at 33 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-2: Red-eyed Vireo Candidate Models

Model Name	Model Structure	Number of Parameters
RIVE0	Count ~ 1 + Offset	2
RIVE1	Count ~ $Deciduous_{core}$ + $Sparse_{210}$ + $Riparian_{210}$ + Offset	5
RIVE2	Count ~ $Deciduous_{core}$ + $Mixed_{core}$ + $Riparian_{210}$ + Offset	5
RIVE3	Count ~ $Mature\ forest_{210}$ + $Sparse_{core}$ + $Riparian_{210}$ + Offset	5
RIVE4	Count ~ $Deciduous_{core}$ + $Mixed_{210}$ + $Sparse_{210}$ + Offset	5
RIVE5	Count ~ $Mature\ forest_{210}$ + $Sparse_{core}$ + Bog_{210} + $Riparian_{210}$ + Offset	6
RIVE6	Count ~ $Deciduous_{core}$ + $Mixed_{210}$ + $Riparian_{210}$ + Elevation + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.2 Ovenbird

The ovenbird model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing ovenbird were detected at 40 of 271 plots. Ovenbird counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and QPAD offset. Seven candidate models were tested for ovenbird based on known habitat preferences and variables that demonstrated strong relationships with ovenbird counts during data exploration (**Table 3-3**). Detections of ovenbird from autonomous recording units were used to validate model predictions. Ovenbird were detected at 20 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-3: Ovenbird Candidate Models

Model Name	Model Structure	Number of Parameters
OVEN0	Count ~ 1 + Offset	2
OVEN1	Count ~ $Deciduous_{core}$ + $Sparse_{210}$ + $Mixed_{210}$ + Offset	5
OVEN2	Count ~ $Deciduous_{core}$ + $Sparse_{core}$+ $Mixed_{core}$+ Offset	5
OVEN3	Count ~ $Mature\ forest_{210}$+ $Sparse_{core}$+ $Riparian_{210}$ + Offset	5
OVEN4	Count ~ $Deciduous_{core}$ + $Mixed_{core}$+ $Water_{core}$ + Offset	5
OVEN5	Count ~ $Swamp_{210}$ + Bog_{210} + $Deciduous_{core}$ + $Mixed_{210}$ + Offset	6
OVEN6	Count ~ $Water_{core}$ + $Mixed_{core}$ + $Deciduous_{core}$+ Terrain + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.3 Dark-eyed Junco

The dark-eyed junco model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing dark-eyed junco were detected at 128 of 271 plots. Dark-eyed junco counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and QPAD offset. Seven candidate models were tested for dark-eyed junco based on known habitat preferences and variables that demonstrated strong relationships with dark-eyed junco counts during data exploration (**Table 3-4**). Detections of dark-eyed junco from autonomous recording units were used to validate model predictions. Dark-eyed junco were detected at 41 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-4: Dark-eyed Junco Candidate Models

Model Name	Model Structure	Number of Parameters
DEJU0	Count ~ 1 + Offset	2
DEJU1	Count ~ $Coniferous_{210}$ + $Deciduous_{core}$ + $Water_{210}$ + Offset	5
DEJU2	Count ~ $Mature\ forest_{210}$ + $Sparse_{210}$ + $Mixed_{core}$ + Offset	5
DEJU3	Count ~ $Coniferous_{210}$ + $Mixed_{210}$ + $Riparian_{210}$ + Offset	5
DEJU4	Count ~ $Mixed_{210}$ + $Sparse_{210}$ +Bog_{210} + Offset	5
DEJU5	Count ~ $Coniferous_{210}$ + $Sparse_{core}$ + $Riparian_{210}$ + Elevation + Offset	6
DEJU6	Count ~ $Water_{core}$ + $Deciduous_{core}$ + $Mixed_{210}$ + Terrain + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.4 Boreal Owl

The boreal owl model used spring and breeding, night time recordings from autonomous recording units (n = 1312 visits; n = 57 unique plots). Boreal owls were detected at 30 of 57 autonomous recording unit plots. Boreal owl counts at each visit (recording) were modelled using a Generalized Linear Mixed-Effects Model with a Poisson distribution. A random intercept for plot ID was included, and no QPAD offset was used. Seven candidate models were tested for boreal owl based on known habitat preferences and variables that demonstrated strong relationships with boreal owl counts during data exploration (**Table 3-5**). No validation data were available for boreal owl.

Table 3-5: Boreal Owl Candidate Models

Model Name	Model Structure	Number of Parameters
BOOW0	Count ~ 1 + (1|Plot)	2
BOOW1	Count ~ Mixed tree$_{210}$ + Sparse$_{210}$ + Bog$_{210}$ + (1|Plot)	5
BOOW2	Count ~ Coniferous$_{210}$ + Mixed$_{210}$ + Deciduous$_{core}$ + (1|Plot)	5
BOOW3	Count ~ Coniferous$_{core}$ + Sparse$_{210}$ + Mixed$_{core}$ + (1|Plot)	5
BOOW4	Count ~ Mature forest$_{210}$ + Coniferous$_{core}$+ Swamp$_{210}$ + (1|Plot)	5
BOOW5	Count ~ Coniferous$_{core}$ + Deciduous$_{core}$ + Mixed$_{core}$ + Sparse$_{210}$ + (1|Plot)	6
BOOW6	Count ~ Elevation + Sparse$_{core}$+ Coniferous$_{core}$ + Mixed$_{core}$ + (1|Plot)	6

Note: 1 = intercept (also applied to all model candidates); (1|Plot) = random intercept

3.1.5.5 Wilson's Snipe

The Wilson's snipe model used breeding recordings from autonomous recording units (n = 1726 visits; n = 57 unique plots). Wilson's snipe were detected at 18 of 57 autonomous recording unit plots. Wilson's snipe counts at each visit (recording) were modelled using a Generalized Linear Mixed-Effects Model with a Poisson distribution. A random intercept for plot ID and QPAD offset were included. Seven candidate models were tested for Wilson's snipe based on known habitat preferences and variables that demonstrated strong relationships with Wilson's snipe counts during data exploration (**Table 3-6**). Detections of Wilson's snipe from breeding bird survey plots were used to validate model predictions. Wilson's snipe were detected at 7 of 89 breeding bird survey plots during the 2022 breeding season.

Table 3-6: Wilson's Snipe Candidate Models

Model Name	Model Structure	Number of Parameters
WISN0	Count ~ 1 + Offset+ (1|Plot)	3
WISN1	Count ~ $Water_{210}$ + $Swamp_{210}$ + Fen_{210} + Offset + (1|Plot)	6
WISN2	Count ~ $Water_{core}$ + Bog_{210} + $Sparse_{210}$ + Offset + (1|Plot)	6
WISN3	Count ~ $Riparian_{210}$ + Fen_{core} + $Sparse_{core}$ + Offset + (1|Plot)	6
WISN4	Count ~ $Water_{210}$ + $Swamp_{core}$ + Bog_{core} + Offset + (1|Plot)	6
WISN5	Count ~ $Riparian_{210}$ + Bog_{core} + $Sparse_{core}$ + Fen_{210} + Offset + (1|Plot)	7
WISN6	Count ~ Bog_{210} + $Swamp_{210}$ + $Water_{core}$ + Elevation + Offset + (1|Plot)	7

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD; (1|Plot) = random intercept

3.1.5.6 Palm Warbler

The palm warbler model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing palm warbler were detected at 85 of 271 plots. Palm warbler counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and a QPAD offset. Seven candidate models were tested for palm warbler based on known habitat preferences and variables that demonstrated strong relationships with palm warbler counts during data exploration (**Table 3-7**). Detections of palm warbler from autonomous recording units were used to validate model predictions. Palm warbler were detected at 32 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-7: Palm Warbler Candidate Models

Model Name	Model Structure	Number of Parameters
PAWA0	Count ~ 1 + Offset	2
PAWA1	Count ~ Bog_{210} + $Sparse_{210}$ + $Coniferous_{210}$ + Offset	5
PAWA2	Count ~ Bog_{core} + $Water_{210}$ + $Mature\ forest_{210}$ + Offset	5
PAWA3	Count ~ $Coniferous_{210}$ + $Water_{core}$+ $Sparse_{core}$+ Offset	5
PAWA4	Count ~ Bog_{210} + $Mature\ forest_{210}$ + $Riparian_{210}$ + Offset	5
PAWA5	Count ~ $Coniferous_{210}$ + Bog_{210} + $Sparse_{210}$ + $Riparian_{210}$ + Offset	6
PAWA6	Count ~ Bog_{210} + $Coniferous_{core}$ + $Swamp_{core}$ + $Mature\ forest_{210}$ + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.7 Common Yellowthroat

The common yellowthroat model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing common yellowthroat were detected at 64 of 271 plots. Common yellowthroat counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and a QPAD offset. Seven candidate models were tested for common yellowthroat based on known habitat preferences and variables that demonstrated strong relationships with common yellowthroat counts during data exploration (**Table 3-8**). Detections of common yellowthroat from autonomous recording units were used to validate model predictions. Common yellowthroats were detected at 33 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-8: Common Yellowthroat Candidate Models

Model Name	Model Structure	Number of Parameters
COYE0	Count ~ 1 + Offset	2
COYE1	Count ~ $Riparian_{210}$ + $Mature\ forest_{210}$ + Fen_{210} + Offset	5
COYE2	Count ~ $Water_{210}$ + Bog_{210} + $Mature\ forest_{210}$ + Offset	5
COYE3	Count ~ $Water_{210}$ + $Sparse_{core}$ + $Mature\ forest_{210}$ + Offset	5
COYE4	Count ~ $Riparian_{210}$ + Fen_{210} + $Swamp_{210}$ + Offset	5
COYE5	Count ~ $Water_{core}$ + $Sparse_{210}$ + Fen_{core} + Terrian + Offset	6
COYE6	Count ~ $Water_{core}$ + $Sparse_{210}$ + $Riparian_{210}$ + Elevation + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.8 Northern Waterthrush

The northern waterthrush model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing northern waterthrush were detected at 66 of 271 plots. Northern waterthrush counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and a QPAD offset. Seven candidate models were tested for northern waterthrush based on known habitat preferences and variables that demonstrated strong relationships with northern waterthrush counts during data exploration (**Table 3-9**). Detections of northern waterthrush from autonomous recording units were used to validate model predictions. Northern waterthrush were detected at 34 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-9: Northern Waterthrush Candidate Models

Model Name	Model Structure	Number of Parameters
NOWA0	Count ~ 1 + Offset	2
NOWA1	Count ~ $Riparian_{210}$ + Bog_{core} + $Swamp_{210}$ + Offset	5
NOWA2	Count ~ $Water_{210}$ + $Mixed_{core}$ + $Deciduous_{core}$+ Offset	5
NOWA3	Count ~ $Swamp_{210}$ + Bog_{core} + $Mixed_{210}$ + Offset	5
NOWA4	Count ~ $Water_{core}$+ Mature $forest_{210}$+ $Swamp_{210}$ + Offset	5
NOWA5	Count ~ $Water_{210}$ + $Mixed_{210}$ + $Swamp_{core}$+ Bog_{core} + Offset	6
NOWA6	Count ~ $Water_{210}$ + $Deciduous_{core}$ + Bog_{core} + $Sparse_{210}$ + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.5.9 Common Nighthawk

The common nighthawk model used breeding, night time recordings from autonomous recording units (n = 865 visits; n = 57 unique plots). Common nighthawk were detected at 33 of 57 plots. Common nighthawk counts at each visit (recording) were modelled using a Generalized Linear Mixed-Effects Model with negative binomial distribution. A random intercept for plot ID was included and no QPAD offset was used. Seven candidate models were tested for common nighthawk based on known habitat preferences and variables that demonstrated strong relationships with common nighthawk counts during data exploration (**Table 3-10**). No validation data were available for common nighthawk from breeding bird survey plots in the 2022 breeding season.

Table 3-10: Common Nighthawk Candidate Models

Model Name	Model Structure	Number of Parameters
CONI0	Count ~ 1 + (1|Plot)	2
CONI1	Count ~ $Sparse_{210}$ + $Water_{core}$ + Fen_{core} + (1|Plot)	5
CONI2	Count ~ $Sparse_{210}$ + $Riparian_{210}$ + Fen_{210} + (1|Plot)	5
CONI3	Count ~ $Sparse_{core}$ + Mature $forest_{210}$ + $Water_{210}$ + (1|Plot)	5
CONI4	Count ~ $Sparse_{core}$ + $Riparian_{210}$ + $Water_{core}$ + (1|Plot)	5
CONI5	Count ~ Fen_{210} + $Water_{core}$ + Mature $forest_{210}$ + Elevation + (1|Plot)	6
CONI6	Count ~ $Sparse_{210}$ + $Riparian_{210}$ + Mature $forest_{210}$ + Terrain + (1|Plot)	6

Note: 1 = intercept (also applied to all model candidates); (1|Plot) = random intercept

3.1.5.10 Olive-sided Flycatcher

The olive-sided flycatcher model used breeding bird survey data from 2018, 2019, and 2022. Due to unbalanced sample sizes among years the maximum number of individuals at each plot across years was included for a total of 271 breeding bird survey plots. Singing olive-sided flycatcher were detected at 50 of 271 plots. Olive-sided flycatcher counts at each visit were modelled using a Generalized Linear Model with a Poisson distribution and a QPAD offset. Seven candidate models were tested for olive-sided flycatcher based on known habitat preferences and variables that demonstrated strong relationships with olive-sided flycatcher counts during data exploration (**Table 3-11**). Detections of olive-sided flycatcher from autonomous recording units were used to validate model predictions. Olive-sided flycatcher were detected at 34 of 57 autonomous recording unit plots during dawn in the breeding season.

Table 3-11: Olive-sided Flycatcher Candidate Models

Model Name	Model Structure	Number of Parameters
OSFL0	Count ~ 1 + Offset	2
OSFL1	Count ~ Bog_{core} + $Swamp_{210}$ + $Water_{210}$ + Offset	5
OSFL2	Count ~ $Sparse_{core}$ + $Coniferous_{210}$ + Bog_{core}+ Offset	5
OSFL3	Count ~ $Coniferous_{core}$ + $Swamp_{210}$ + $Sparse_{210}$ + Offset	5
OSFL4	Count ~ $Mixed_{core}$ + Fen_{210} + $Coniferous_{core}$+ Offset	5
OSFL5	Count ~ $Riparian_{210}$ + $Mature\ forest_{210}$ + Bog_{core} + $Deciduous_{core}$ + Offset	6
OSFL6	Count ~ $Mixed_{core}$ + $Deciduous_{core}$ + $Coniferous_{core}$+ $Sparse_{210}$ + Offset	6

Note: 1 = intercept (also applied to all model candidates); Offset = QPAD

3.1.6 Validation

Three forms of validation were conducted for each top model of the proxy Valued Component; one used internal data to evaluate the robustness of the model, whereas the two other approaches used external data sources. A leave-one-out cross validation was used to evaluate the robustness of the model based on data used to fit the model, where the model was sequentially fit after removing one of the observation plots (either breeding bird survey or autonomous recording unit). The root-mean-square error (i.e., leave-one-out cross validation value) was calculated between the predictions of the model with one plot removed and the observed abundance of the excluded plot, across all iterations of removing each plot. Higher root-mean-square error values indicate a poor validation of the model.

Additionally, alternative survey data (i.e., autonomous recording units and breeding bird survey plot data) collected within the study area were used to validate these top models, where possible. For example, if the species-specific model was developed using breeding bird survey data, the binned predictions of habitat quality (four bins: high, moderate, low, poor) across the Regional Study Area were compared to area-corrected observations of the species from autonomous recording units. Predicted relative abundance for each proxy valued component was initially binned into 10 categories based on the 10 equal-width quantiles calculated across the range of values within the Regional Study Area. These 10 bins were further collapsed into four bins to reflect habitat quality ranks (high, moderate, low, poor), based on the comparison between the initial 10 bins and area-corrected abundance estimates derived from alternative survey data. When an alternative survey was unavailable (boreal owl and common nighthawk), four equal-width quantiles were used to bin predicted relative abundance. A Spearman rho correlation value between predictions of four-binned habitat quality and area-corrected autonomous recording unit observations is reported as a metric of validation.

The four-binned habitat quality predictions from the top models of each proxy valued component were also compared to existing Boreal Avian Modelling Project Canada-wide maps of species density (1 km resolution; Boreal Avian Modelling Project 2020), where possible. Specifically, the binned predictions of habitat quality of each proxy valued component were compared to the Boreal Avian Modelling Project species-specific predicted density at 1,000 random points across the Regional Study Area. For more details on the Boreal Avian Modelling density models see Boreal Avian Modelling Project (2020).

Models were not used in the environmental assessment when the leave-one-out cross validation performed poorly and there was poor correspondence between the predictions and alternative survey data. In cases where exterior data was unavailable for validation, models were used in the environmental assessment with moderate to high confidence when the leave-one-out cross validation performed well.

3.2 Results

Using the top models highlighted below and the median offset (Error! Reference source not found.; offsets were not used for boreal owl and common nighthawk) for each proxy valued component, maps of relative abundance and habitat suitability ranks (high, moderate, low, and poor) were predicted across the Regional Study Area. Based on a comparison between the initial 10-binned predictions of relative abundance and area-corrected abundance from autonomous recording units (or breeding bird surveys for Wilson's snipe), predictions were re-binned into four habitat suitability ranks, whereas four equal-width quantiles were used for boreal owl and common nighthawk (Error! Reference source not found.**; Table 3-14**). For example, with red-eyed vireo, the initial bins one, two, and three were collapsed into habitat bin one (poor), bins four, five, and, six were collapsed into habitat bin two (low), bins seven and eight were collapsed into habitat bin

three (moderate), and bins nine and ten were collapsed into habitat bin four (high). Majority of the top models validated well based on internal data used to fit each model and when comparing model predictions to alterative survey data except for dark-eyed junco (**Table 3-15**). There was generally low correlation between model predictions for each proxy valued component and Boreal Avian Modelling Project national maps of species density (**Table 3-15**); however, differences in scale of resolution (this study: 30 m^2, Boreal Avian Modelling Project: 1 km^2) and location of data sources may account for these poor correlations. Importantly, Boreal Avian Modelling Project (2020) caution that conditions in northern environments were underrepresented in the development of these species-specific models.

Table 3-12: Median Offsets Used to Spatially Predict Relative Abundance from Top Models for each Proxy Valued Component

Species	Median Offset
common yellowthroat	0.64
dark-eyed junco	-0.11
northern waterthrush	0.79
olive-sided flycatcher	1.02
ovenbird	1.09
palm warbler	-0.08
red-eyed vireo	0.92
Wilson's snipe	0.95

Table 3-13: Re-binning the Initial Ten Bins into Four Biological Derived Ranks of Habitat Suitability

Species	Poor	Low	Moderate	High
red-eyed vireo	1,2,3	4,5,6	7,8	9,10
ovenbird	1,2,3,4	5	6,7	8,9,10
dark-eyed junco	1	2,3,4	5,6,7,8	9,10
Wilson's snipe	1,2,3,4	5	6,7,8	9,10
palm warbler	1	2,3	4,5,6	7,8,9,10
common yellowthroat	1	2,3	4,5,6	7,8,9,10
northern waterthrush	1,2,3	4,5,6	7,8	9,10
olive-sided flycatcher	1	2,3,4	5,6,7,8	9,10

Table 3-14: Cut-off Values used to Bin Predictions of Relative Abundance into Four Biological Derived Ranks of Habitat Suitability

Species	High	Moderate	Low	Poor
boreal owl	>0.09	>0.05-0.09	>0.03-0.05	<0.03
common nighthawk	>0.12	>0.10-0.12	>0.07-0.10	<0.07
common yellowthroat	>0.19	>0.15-0.19	>0.09-0.15	<0.09
dark-eyed junco	>0.80	>0.63-0.80	>0.28-0.63	<0.28
northern waterthrush	>0.38	>0.17-0.38	>0.13-0.17	<0.13
olive-sided flycatcher	>0.35	>0.27-0.35	>0.04-0.27	<0.04
ovenbird	>0.17	>0.13-0.17	>0.12-0.13	<0.12
palm warbler	>0.67	>0.27-0.67	>0.05-0.27	<0.05
red-eyed vireo	>0.26	>0.17-0.26	>0.12-0.17	<0.12
Wilson’s snipe	>0.05	>0.02-0.05	>0.007-0.02	<0.007

Table 3-15: Validation Results of Top Model for Each Species

Species	Data source	Validation survey	LOO cross-validation	Survey correlation	BAM correlation
boreal owl	ARU	None	0.39	NA	NA
common nighthawk	ARU	None	0.40	NA	NA
common yellowthroat	BBS	ARU	0.61	0.80	0.03
dark-eyed junco	BBS	ARU	0.76	-0.40	0.10
northern waterthrush	BBS	ARU	0.56	0.80	0.001
olive-sided flycatcher	BBS	ARU	0.52	1.00	0.01
ovenbird	BBS	ARU	0.49	0.80	0.002
palm warbler	BBS	ARU	0.67	1.00	0.31
red-eyed vireo	BBS	ARU	0.61	1.00	0.57
Wilson’s snipe	ARU	BBS	0.26	0.80	-0.69

ARU = autonomous recording unit; BBS = breeding bird survey; LOO = leave-one-out; NA = not applicable; BAM = Boreal Avian Modelling Project

3.2.1 Red-eyed Vireo

3.2.1.1 Model Selection

Based on the top model for red-eyed vireo, higher counts were documented at breeding bird survey plots with higher elevation and greater proportions of mixed forest and riparian habitat at the 210 m^2 scale and deciduous forest at the 6 km^2 scale (**Table 3-16**; **Table 3-17**). However, it was a weak relationship between proportions of deciduous forest at the 6 km^2 scale and elevation and the abundance of red-eyed vireo (based on 95% confidence intervals overlapping zero).

Table 3-16: Model Selection Results for Red-eyed Vireo

Model Name	Model Structure	K	ΔAICc	wi
REVI6	Count ~ $Deciduous_{core}$ + $Mixed_{210}$ + $Riparian_{210}$ + Elevation + Offset	6	0.00	0.78
REVI5	Count ~ $Mature\ forest_{210}$ + $Sparse_{core}$ + Bog_{210} + $Riparian_{210}$ + Offset	6	3.67	0.12
REVI4	Count ~ $Deciduous_{core}$ + $Mixed_{210}$ + $Sparse_{210}$ + Offset	5	4.18	0.10
REVI3	Count ~ $Mature\ forest_{210}$ + $Sparse_{core}$ + $Riparian_{210}$ + Offset	5	11.82	0.00
REVI2	Count ~ $Deciduous_{core}$ + $Mixed_{core}$ + $Riparian_{210}$ + Offset	5	20.46	0.00
REVI1	Count ~ $Deciduous_{core}$ + $Sparse_{210}$ + $Riparian_{210}$ + Offset	5	26.51	0.00
REVI0	Count ~ 1 + Offset	2	36.40	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-17: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Red-eyed Vireo Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Deciduous_{core}$	1.60	-1.06	4.25
$Mixed_{210}$	2.96	1.93	3.98
$Riparian_{210}$	0.88	0.28	1.48
Elevation	0.68	-0.81	2.16

3.2.1.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.61, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations, and the Boreal Avian Modelling Project density map were 1.00 and 0.57, respectively (**Figure 3-1**; **Figure 3-2**). Given the correspondence between model predictions when using a leave-one-out cross validation, autonomous recording unit observations, and Boreal Avian Modelling Project density, there is high confidence in the model's capacity to predict habitat quality. This red-eyed vireo model was used in the environmental assessment.

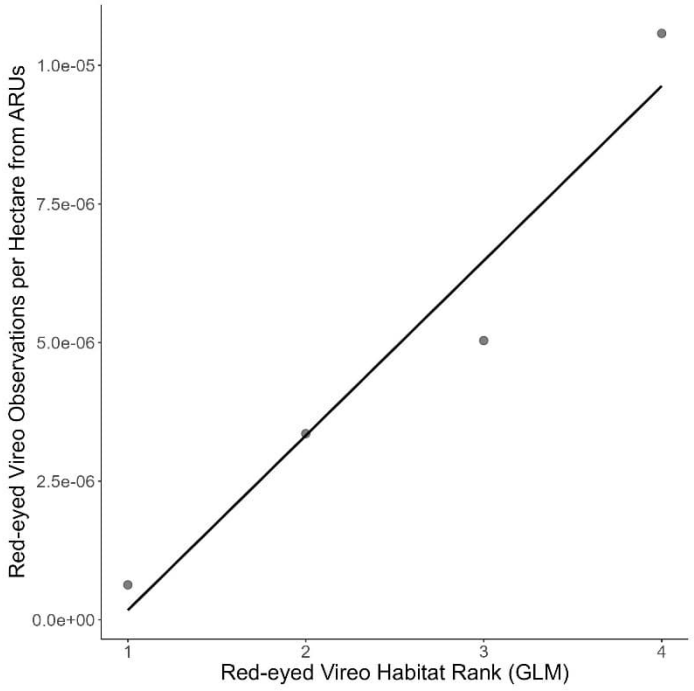

Figure 3-1: Relationship between Autonomous Recording Unit Observations of Red-eyed Vireo by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

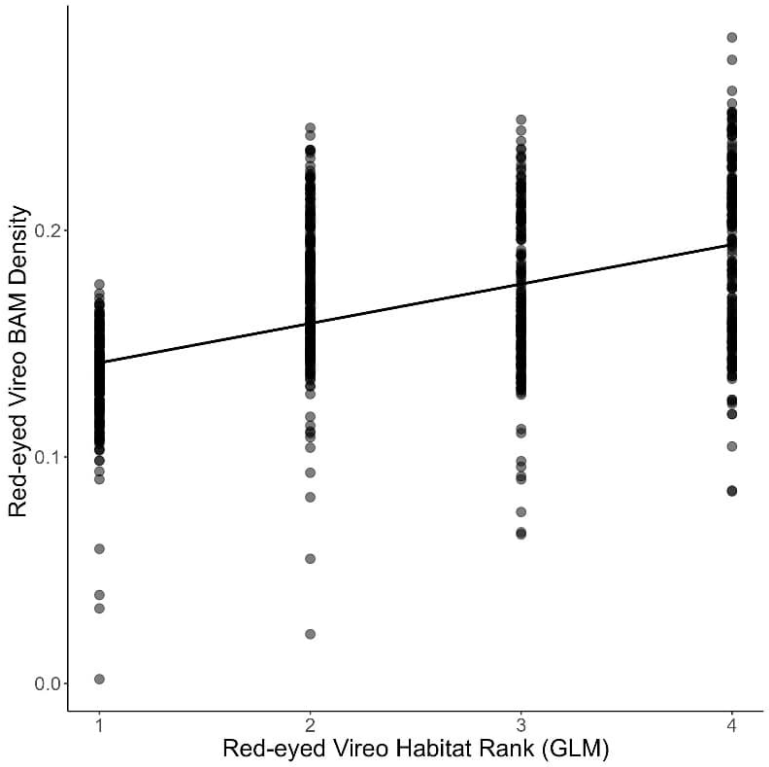

Figure 3-2: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Red-eyed Vireo and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.2 Ovenbird

3.2.2.1 Model Selection

Based on the top model for ovenbird, higher counts were documented at breeding bird survey plots with higher terrain ruggedness and higher proportions of water and deciduous forest but lower proportion of mixed forest at the 6 km^2 scale, although the relationship was weak (i.e., 95% confidence intervals overlap zero) (**Table 3-18**; **Table 3-19**).

Table 3-18: Model Selection Results for Ovenbird

Model Name	Model Structure	K	ΔAICc	w_i
OVEN6	Count ~ $Water_{core}$ + $Mixed_{core}$ + $Deciduous_{core}$+ Terrain + Offset	6	0.00	0.66
OVEN3	Count ~ $Mature\ forest_{210}$+ $Sparse_{core}$+ $Riparian_{210}$ + Offset	5	2.09	0.23
OVEN4	Count ~ $Deciduous_{core}$ + $Mixed_{core}$+ $Water_{core}$ + Offset	5	4.60	0.07
OVEN5	Count ~ $Swamp_{210}$ + Bog_{210} + $Deciduous_{core}$ + $Mixed_{210}$ + Offset	6	5.73	0.04
OVEN1	Count ~ $Swamp_{210}$ + Bog_{210} + $Deciduous_{core}$ + $Mixed_{210}$ + Offset	2	8.81	0.01
OVEN0	Count ~ 1 + Offset	5	11.55	0.00
OVEN2	Count ~ $Deciduous_{core}$ + $Sparse_{core}$+ $Mixed_{core}$+ Offset	5	12.43	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-19: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Ovenbird Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Water_{core}$	1.59	0.35	2.84
$Mixed_{core}$	-1.26	-3.59	1.08
$Deciduous_{core}$	4.90	1.51	8.29
Terrian	5.27	1.66	8.88

3.2.2.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.49, whereas the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 0.80 and 0.002, respectively (**Figure 3-3**; **Figure 3-4**). Although predictions are not well correlated with the Boreal Avian Modelling Project, there is correspondence between model prediction when using a leave-one-out cross validation and autonomous recording unit observations. Therefore, there is moderate confidence in the model to predict ovenbird habitat and this model was used in the environmental assessment.

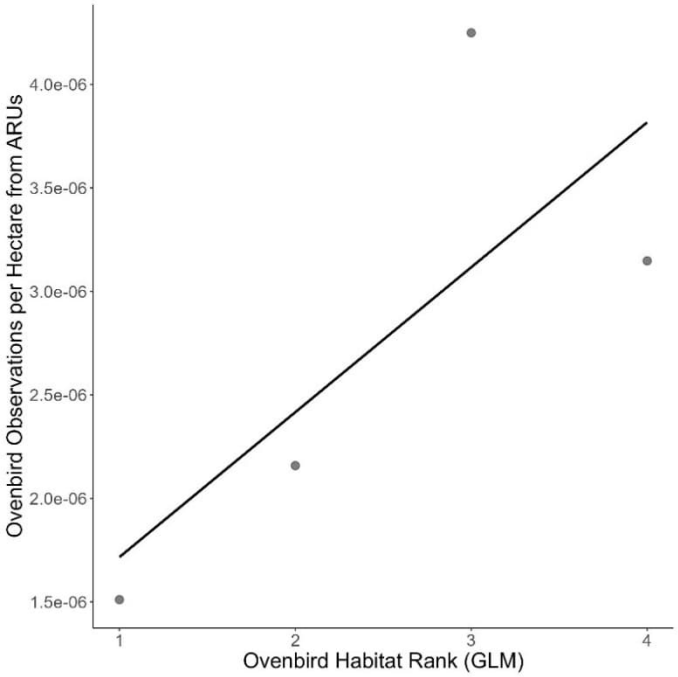

Figure 3-3: Relationship between Autonomous Recording Unit Observations of Ovenbird by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

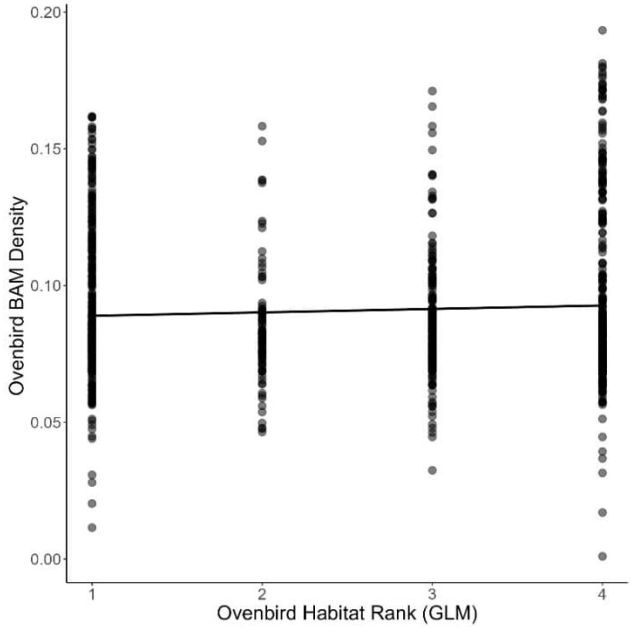

Figure 3-4: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Ovenbird and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.3 Dark-eyed Junco

3.2.3.1 Model Selection

Based on the top model for dark-eyed junco, higher counts were documented at breeding bird survey plots with lower terrain ruggedness and lower proportions of water at the 6 km^2 scale (**Table 3-20**; **Table 3-21**). However, it was a weak relationship between proportions of mixed forest at the 210 m^2 scale and deciduous forest at the 6 km^2 scale, and the abundance of dark-eyed junco (95% confidence intervals overlapping zero).

Table 3-20: Model Selection Results for Dark-eyed Junco

Model Name	Model Structure	K	ΔAICc	w_i
DEJU6	Count ~ $Water_{core}$ + $Deciduous_{core}$ + $Mixed_{210}$ + Terrain + Offset	6	0.00	0.99
DEJU2	Count ~ $Mature\ forest_{210}$ + $Sparse_{210}$ + $Mixed_{core}$ + Offset	5	9.65	0.01
DEJU4	Count ~ $Mixed_{210}$ + $Sparse_{210}$ +Bog_{210} + Offset	5	12.75	0.00
DEJU3	Count ~ $Coniferous_{210}$ + $Mixed_{210}$ + $Riparian_{210}$ + Offset	5	13.39	0.00
DEJU0	Count ~ 1 + Offset	2	19.74	0.00
DEJU1	Count ~ $Coniferous_{210}$ + $Deciduous_{core}$ + $Water_{210}$ + Offset	5	23.60	0.00
DEJU5	Count ~ $Coniferous_{210}$ + $Sparse_{core}$ + $Riparian_{210}$ + Elevation + Offset	6	24.65	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-21: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Dark-eyed Junco Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Water_{core}$	-1.70	-2.77	-0.63
$Deciduous_{core}$	0.15	-2.19	2.48
$Mixed_{210}$	-1.23	-2.79	0.34
Terrain	-4.35	-8.65	-0.06

3.2.3.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.76, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were -0.40 and 0.10, respectively (**Figure 3-5**; **Figure 3-6**). Across each validation, the dark-eyed junco model showed poor predictive capacity, particularly given the greatest leave-one-out cross validation value observed across model and a negative correlation with autonomous recording unit observations. Therefore, the dark-eyed junco model was not used in the environmental assessment.

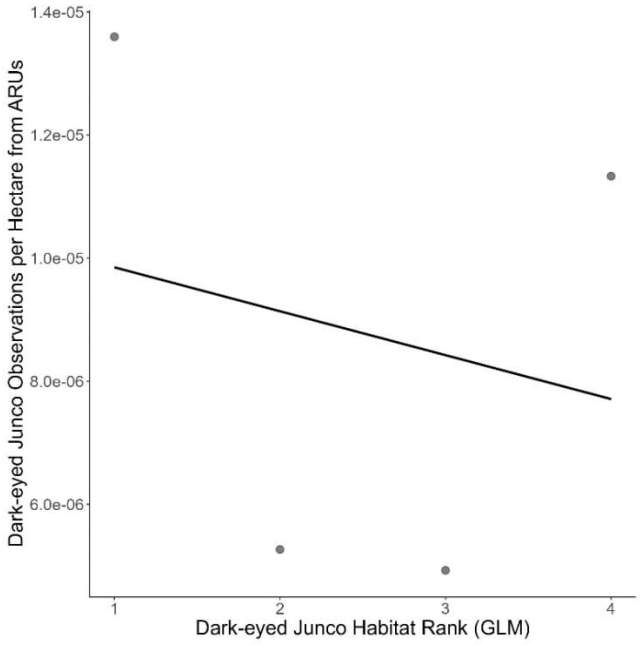

Figure 3-5: Relationship between Autonomous Recording Unit Observations of Dark-eyed Junco by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

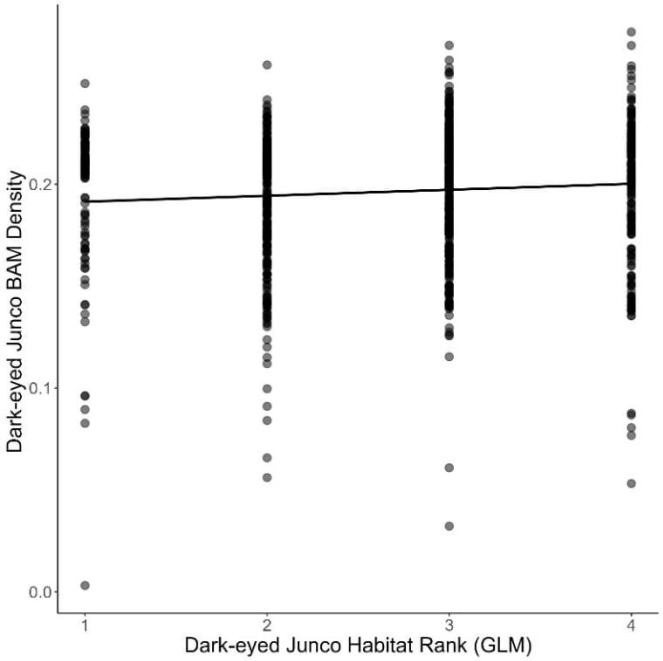

Figure 3-6: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Dark-eyed Junco and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.4 Boreal Owl

3.2.4.1 Model Selection

Based on the top model for boreal owl, higher counts were documented at autonomous recording unit plots with lower elevations, and higher proportions of sparse forest, coniferous forest (although weakly related based on 95% confidence intervals overlapping zero), and mixed forest at the 6 km^2 scale (**Table 3-22**; **Table 3-23**).

Table 3-22: Model Selection Results for Boreal Owl

Model Name	Model Structure	K	ΔAICc	wi
BOOW6	Count ~ Elevation + $Sparse_{core}$+ $Coniferous_{core}$ + $Mixed_{core}$ + (1|Plot)	6	0.00	0.66
BOOW2	Count ~ $Coniferous_{210}$ + $Mixed_{210}$ + $Deciduous_{core}$ + (1|Plot)	5	3.03	0.15
BOOW0	Count ~ 1 + (1|Plot)	2	3.90	0.09
BOOW4	Count ~ Mature $forest_{210}$ + $Coniferous_{core}$+ $Swamp_{210}$ + (1|Plot)	5	5.64	0.04
BOOW1	Count ~ $Mixed_{210}$ + $Sparse_{210}$ + Bog_{210} + (1|Plot)	5	6.67	0.02
BOOW3	Count ~ $Coniferous_{core}$ + $Sparse_{210}$ + $Mixed_{core}$ + (1|Plot)	5	6.85	0.02
BOOW5	Count ~ $Coniferous_{core}$ + $Deciduous_{core}$ + $Mixed_{core}$ + $Sparse_{210}$ + 1|Plot)	6	7.53	0.02

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-23: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Boreal Owl Model

Covariate	β	Lower 95% CI	Upper 95% CI
Elevation	-4.86	-6.39	-3.32
$Sparse_{core}$	3.71	0.55	6.86
$Coniferous_{core}$	0.56	-2.07	3.19
$Mixed_{core}$	7.49	1.34	13.65

3.2.4.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.39; no external data sources were available to conduct additional validations. Based on a leave-one-out cross validation value of 0.39, there is moderate confidence in the model's capacity to predict habitat quality. The boreal owl model was used in the environmental assessment.

3.2.5 Wilson's Snipe

3.2.5.1 Model Selection

Based on the top model for Wilson's snipe, higher counts were documented at breeding bird survey plots with greater proportions of fen forest and riparian habitat at the 210 m^2 scale and lower proportions of bog forest and sparse forest at 6 km^2 scale (**Table 3-24**;**Table 3-25**). However, it was a weak relationship between the proportions of riparian habitat at the 210 m^2 scale and sparse forest at the 6 km^2 scale, and the abundance of Wilson's snipe (based on 95% confidence intervals overlapping zero).

Table 3-24: Model Selection Results for Wilson's Snipe

Model Name	Model Structure	K	ΔAICc	w_i
WISN5	Count ~ $Riparian_{210}$ + Bog_{core} + $Sparse_{core}$ + Fen_{210} + Offset	6	0.00	0.90
WISN4	Count ~ $Water_{210}$ + $Swamp_{core}$ + Bog_{core} + Offset	6	5.39	0.06
WISN6	Count ~ Bog_{210} + $Swamp_{210}$ + $Water_{core}$ + Elevation + Offset	5	6.40	0.04
WISN0	Count ~ 1 + Offset	5	17.88	0.00
WISN1	Count ~ $Water_{210}$ + $Swamp_{210}$ + Fen_{210} + Offset	5	19.34	0.00
WISN3	Count ~ $Riparian_{210}$ + Fen_{core} + $Sparse_{core}$ + Offset	5	19.98	0.00
WISN2	Count ~ $Water_{core}$ + Bog_{210} + $Sparse_{210}$ + Offset	2	21.18	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-25: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Wilson's Snipe Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Riparian_{210}$	0.05	-1.39	1.49
Bog_{core}	-77.82	-137.59	-18.04
$Sparse_{core}$	-1.34	-3.84	1.16
Fen_{210}	3.25	0.62	5.89

3.2.5.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.26, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 0.80 and -0.69, respectively (**Figure 3-7**; **Figure 3-8**).

Although predictions are negatively correlated with the Boreal Avian Modelling Project, there is correspondence between model prediction when using leave-one-out cross validation and autonomous recording unit observations. Therefore, there is moderate confidence in the model to predict Wilson's snipe habitat and it was used in the environmental assessment.

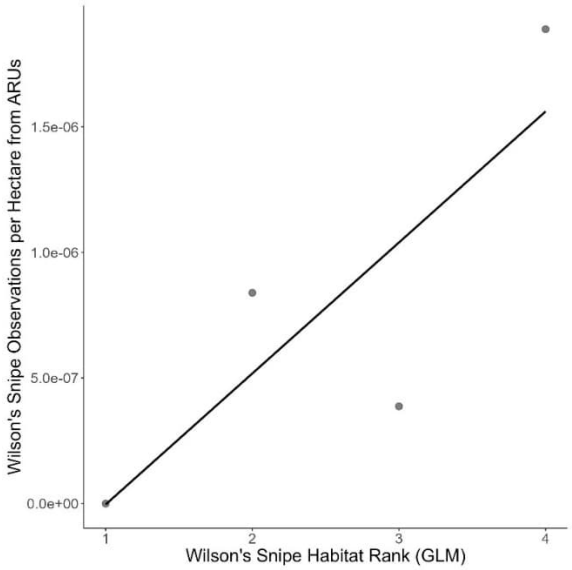

Figure 3-7: Relationship between Autonomous Recording Unit Observations of Wilson's Snipe by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

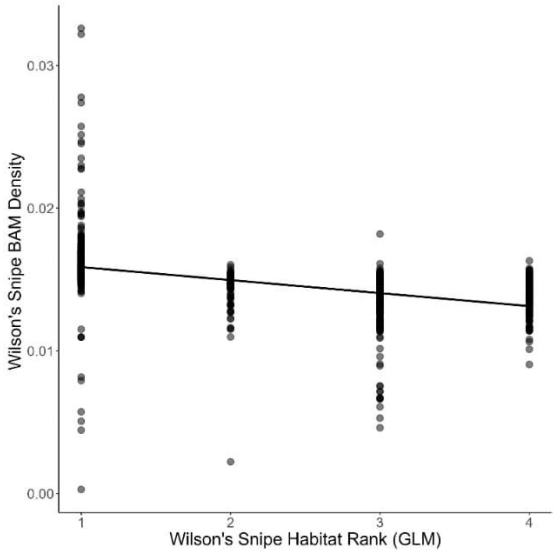

Figure 3-8: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Wilson's Snipe and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.6 Palm Warbler

3.2.6.1 Model Selection

Based on the top model for palm warbler, higher counts were documented at breeding bird survey plots with lower proportions of water and mature forest at the 210 m^2 scale and bog forest at the 6 km^2 scale (**Table 3-26**; **Table 3-27**).

Table 3-26: Model Selection Results for Palm Warbler

Model Name	Model Structure	K	ΔAICc	w_i
PAWA2	Count ~ Bog_{core} + $Water_{210}$ + Mature $forest_{210}$ + Offset	5	0.00	0.99
PAWA1	Count ~ Bog_{210} + $Sparse_{210}$ + $Coniferous_{210}$ + Offset	5	10.03	0.01
PAWA5	Count ~ $Coniferous_{210}$ + Bog_{210} + $Sparse_{210}$ + $Riparian_{210}$ + Offset	6	11.59	0.00
PAWA4	Count ~ Bog_{210} + Mature $forest_{210}$ + $Riparian_{210}$ + Offset	5	16.15	0.00
PAWA6	Count ~ Bog_{210} + $Coniferous_{core}$ + $Swamp_{core}$ + Mature $forest_{210}$ + Offset	6	17.69	0.00
PAWA3	Count ~ $Coniferous_{210}$ + $Water_{core}$+ $Sparse_{core}$+ Offset	2	28.29	0.00
PAWA0	Count ~ 1 + Offset	5	66.62	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-27: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Palm Warbler Model

Covariate	β	Lower 95% CI	Upper 95% CI
Bog_{core}	-1.64	-2.62	-0.67
$Water_{210}$	-3.70	-6.47	-0.93
Mature $forerst_{210}$	-3.77	-5.08	-2.46

3.2.6.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.67, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 1.00 and 0.31, respectively (**Figure 3-9; Figure 3-10**). Given the correspondence between model predictions when using leave-one-out cross validation, autonomous recording unit observations, and (a weak correlation with) the Boreal Avian Modelling Project density, there is high confidence in the model's capacity to predict habitat quality. The palm warbler model was used in the environmental assessment.

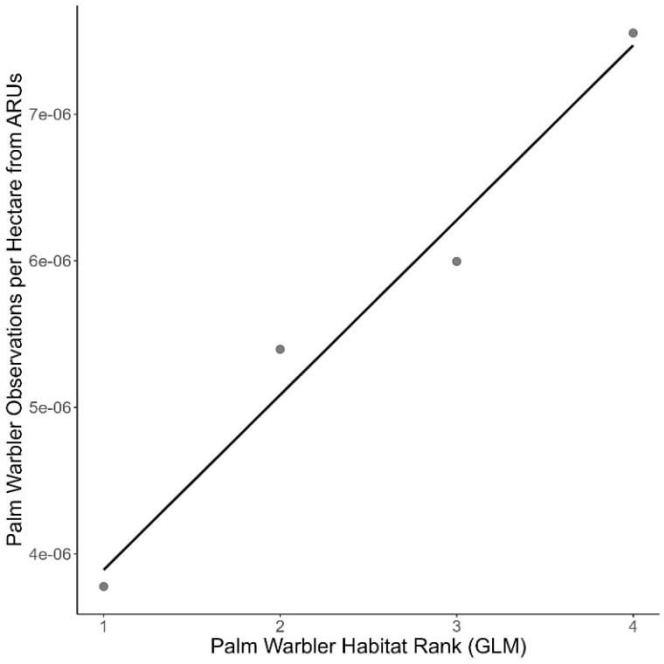

Figure 3-9: Relationship between Autonomous Recording Unit Observations of Palm Warbler by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

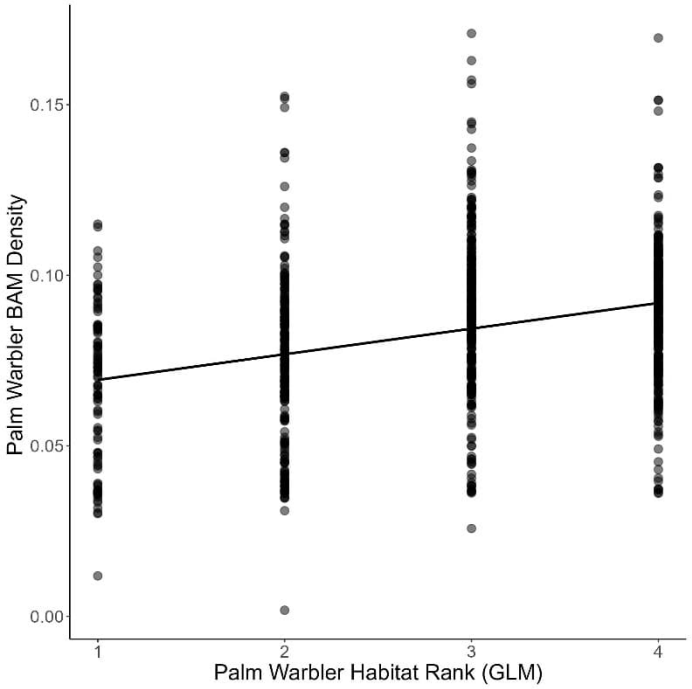

Figure 3-10: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Palm Warbler and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.7 Common Yellowthroat

3.2.7.1 Model Selection

Based on the top model for common yellowthroat, higher counts were documented at breeding bird survey plots with high proportions of riparian habitat and fen forest and lower proportions of mature forest at the 210 m^2 scale (**Table 3-28; Table 3-29**). However, there was a weak relationship between the proportions of fen forest at the 210 m^2 scale and the abundance of common yellowthroat (based on 95% confidence intervals overlapping zero).

Table 3-28: Model Selection Results for Common Yellowthroat

Model Name	Model Structure	K	ΔAICc	w_i
COYE1	Count ~ $Riparian_{210}$ + $Mature\ forest_{210}$ + Fen_{210} + Offset	5	0.00	0.95
COYE6	Count ~ $Water_{core}$ + $Sparse_{210}$ + $Riparian_{210}$ + Elevation + Offset	6	6.72	0.03
COYE4	Count ~ $Riparian_{210}$ + Fen_{210} + $Swamp_{210}$ + Offset	5	8.84	0.01
COYE2	Count ~ $Water_{210}$ + Bog_{210} + $Mature\ forest_{210}$ + Offset	5	11.86	0.00
COYE3	Count ~ Spar Count ~ $Water_{210}$ + $Sparse_{core}$ + $Mature\ forest_{210}$ + Offset	5	14.89	0.00
COYE5	Count ~ $Water_{core}$ + $Sparse_{210}$ + Fen_{core} + Terrian + Offset	6	39.60	0.00
COYE0	Count ~ 1 + (1|Plot)	2	42.09	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-29: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Common Yellowthroat Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Riparian_{210}$	1.74	1.17	2.30
$Mature\ forest_{210}$	-1.50	-2.56	-0.43
Fen_{210}	0.34	-0.87	1.55

3.2.7.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.61, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 0.80 and 0.03, respectively (**Figure 3-11**; **Figure 3-12**). Although predictions are not correlated with the Boreal Avian Modelling Project, there is correspondence between model predictions when using leave-one-out cross validation and autonomous recording unit observations. Therefore, there is high confidence in the model to predict common yellowthroat habitat and this model was used in the environmental assessment.

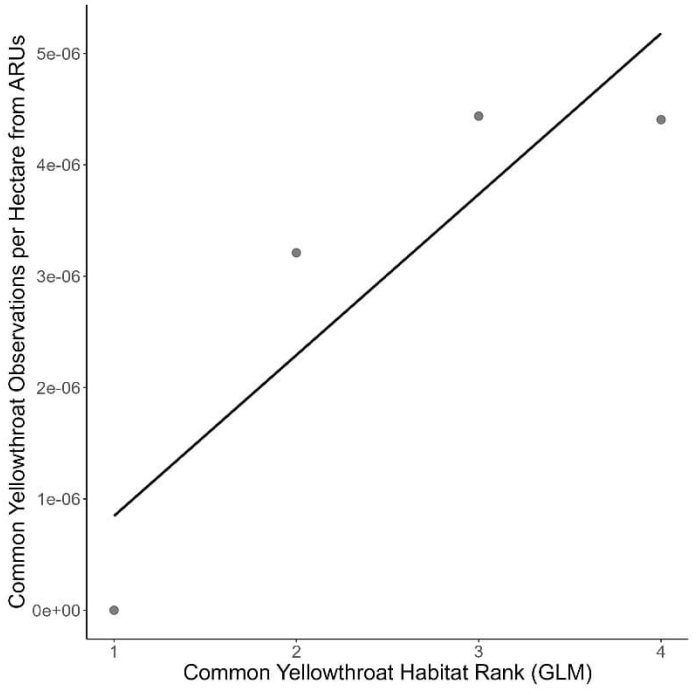

Figure 3-11: Relationship between Autonomous Recording Unit Observations of Common Yellowthroat by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

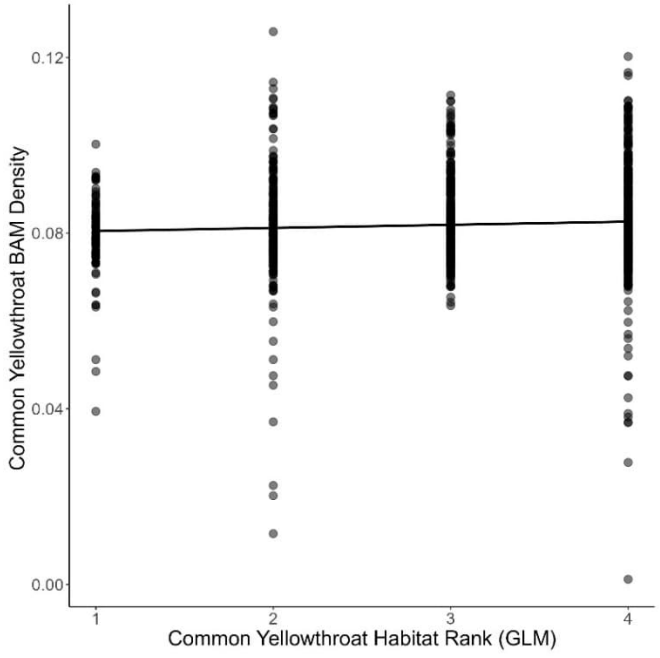

Figure 3-12: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Common Yellowthroat and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.8 Northern Waterthrush

3.2.8.1 Model Selection

Based on the top model for northern waterthrush, higher counts were documented at breeding bird survey plots with high proportions of riparian habitat and swamp forest at the 210 m^2 scale and bog forest at the 6 km^2 scale (**Table 3-30**; **Table 3-31**). However, there was a weak relationship between the proportions of swamp forest at the 210 m^2 scale and bog forest at the 6 km^2 scale, and the abundance of common yellowthroat (based on 95% confidence intervals overlapping zero).

Table 3-30: Model Selection Results for Northern Waterthrush

Model Name	Model Structure	K	ΔAICc	wi
NOWA1	Count ~ $Riparian_{210}$ + Bog_{core} + $Swamp_{210}$ + Offset	5	0.00	1.00
NOWA2	Count ~ $Water_{210}$ + $Mixed_{core}$ + $Deciduous_{core}$+ Offset	5	14.09	0.00
NOWA5	Count ~ $Water_{210}$ + $Mixed_{210}$ + $Swamp_{core}$+ Bog_{core} + Offset	6	14.74	0.00
NOWA6	Count ~ $Water_{210}$ + $Deciduous_{core}$ + Bog_{core} + $Sparse_{210}$ + Offset	6	15.45	0.00
NOWA0	Count ~ 1 + Offset	2	27.85	0.00
NOWA4	Count ~ $Water_{core}$+ Mature $forest_{210}$+ $Swamp_{210}$ + Offset	5	30.04	0.00
NOWA3	Count ~ $Swamp_{210}$ + Bog_{core} + $Mixed_{210}$ + Offset	5	30.44	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-31: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Northern Waterthrush Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Riparian_{210}$	1.59	1.00	2.17
Bog_{core}	0.43	-0.46	1.31
$Swamp_{210}$	0.40	-0.47	1.28

3.2.8.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.56, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 0.80 and 0.001, respectively (**Figure 3-13**; **Figure 3-14**). Although predictions are not correlated with the Boreal Avian Modelling Project, there is correspondence between model prediction when using leave-one-out cross validation and autonomous recording unit observations. Therefore, there is moderate confidence in the model to predict northern waterthrush habitat and this model was used in the environmental assessment.

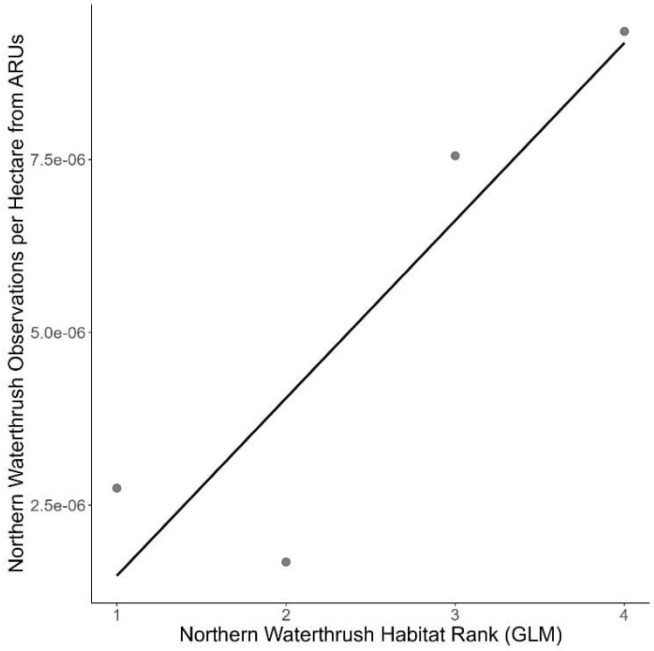

Figure 3-13: Relationship between Autonomous Recording Unit Observations of Northern Waterthrush by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

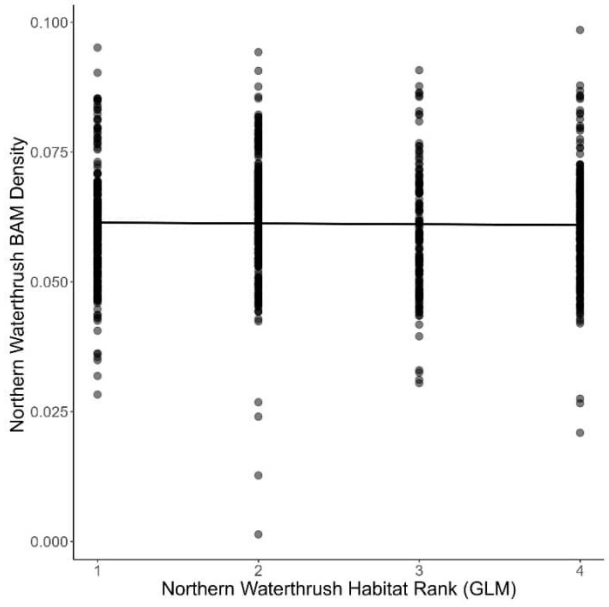

Figure 3-14: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Red-eyed Vireo and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

3.2.9 Common Nighthawk

3.2.9.1 Model Selection

Based on the top model for common nighthawk, higher counts were documented at autonomous recording units and lower terrain ruggedness with high proportions of sparse forest 210 m^2 scale and lower proportions of riparian habitat and mature forest at the 210 m^2 scale (**Table 3-32**; **Table 3-33**). However, there was a weak relationship between terrain ruggedness and riparian habitat at the 210 m^2 scale, and the abundance of common yellowthroat (based on 95% confidence intervals overlapping zero).

Table 3-32: Model Selection Results for Common Nighthawk

Model Name	Model Structure	K	ΔAICc	w_i
CONI6	Count ~ $Sparse_{210}$ + $Riparian_{210}$ + Mature $forest_{210}$ + Terrain + (1|Plot)	6	0.00	0.75
CONI3	Count ~ $Sparse_{core}$ + Mature $forest_{210}$ + $Water_{210}$ + (1|Plot)	5	4.31	0.09
CONI5	Count ~ Fen_{210} + $Water_{core}$ + Mature $forest_{210}$ + Elevation (1|Plot)	6	4.45	0.08
CONI1	Count ~ $Sparse_{210}$ + $Water_{core}$ + Fen_{core} + (1|Plot)	5	5.73	0.04
CONI4	Count ~ $Sparse_{core}$ + $Riparian_{210}$ + $Water_{core}$ + (1|Plot)	5	7.54	0.02
CONI2	Count ~ $Sparse_{210}$ + $Riparian_{210}$ + Fen_{210} + (1|Plot)	5	7.94	0.01
CONI0	Count ~ 1 + (1|Plot)	2	12.82	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-33: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Common Nighthawk Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Sparse_{210}$	1.38	0.38	2.38
$Riparian_{210}$	-0.13	-0.96	0.70
Mature $forest_{210}$	-1.55	-3.00	-0.10
Terrain	-7.12	-15.25	1.02

3.2.9.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.40: no external data sources were available to conduct additional validations. Based on a leave-one-out cross validation value of 0.40, there is moderate confidence in the model's capacity to predict habitat quality. The common nighthawk model was used in the environmental assessment.

3.2.10 Olive-sided Flycatcher

3.2.10.1 Model Selection

Based on the top model for olive-sided flycatcher, higher counts were documented at breeding bird survey plots with lower proportions of sparse forest at the 210 m^2 scale, and coniferous forest, mixed forest, and deciduous forest at the 6 km^2 scale. However, none of the relationships were considered strong as all 95% confidence intervals overlapped zero (**Table 3-34**;**Table 3-35**).

Table 3-34: Model Selection Results for Olive-side Flycatcher

Model Name	Model Structure	K	ΔAICc	w_i
OSFL6	Count ~ $Mixed_{core}$ + $Deciduous_{core}$ + $Coniferous_{core}$+ $Sparse_{210}$ + Offset	6	0.00	0.72
OSFL5	Count ~ $Riparian_{210}$ + $Mature\ forest_{210}$ + Bog_{core} + $Deciduous_{core}$ + Offset	6	2.57	0.20
OSFL4	Count ~ $Mixed_{core}$ + Fen_{210} + $Coniferous_{core}$+ Offset	5	4.63	0.07
OSFL2	Count ~ $Sparse_{core}$ + $Coniferous_{210}$ + Bog_{core}+ Offset	5	11.26	0.00
OSFL0	Count ~ 1 + Offset	2	16.04	0.00
OSFL1	Count ~ Bog_{core} + $Swamp_{210}$ + $Water_{210}$ + Offset	5	21.13	0.00
OSFL3	Count ~ $Coniferous_{core}$ + $Swamp_{210}$ + $Sparse_{210}$ + Offset	5	21.75	0.00

K = number of estimated parameters; ΔAICc = difference in Akaike's information criterion corrected for small sample sizes; w_i = Akaike weight

Table 3-35: Beta Coefficient Estimates (β) and Upper and Lower 95% Confidence Intervals (CIs) for Covariates in Top Olive-sided Flycatcher Model

Covariate	β	Lower 95% CI	Upper 95% CI
$Mixed_{core}$	-6.68	-13.68	0.33
$Deciduous_{core}$	-14.36	-29.11	0.38
$Coniferous_{core}$	-0.49	-3.01	2.04
$Sparse_{210}$	-0.36	-1.19	0.47

3.2.10.2 Validation and Conclusions

The leave-one-out cross validation resulted in a value of 0.66, and the correlations between predicted habitat quality from the top model and area-corrected autonomous recording unit observations and the Boreal Avian Modelling Project density map were 1.00 and 0.01, respectively (**Figure 3-15**; **Figure 3-16**). Although predictions are not correlated with the Boreal Avian Modelling Project, there is correspondence between model prediction when using leave-one-out cross validation and autonomous recording unit observations. Therefore, there is moderate confidence in the model to predict olive-sided flycatcher habitat and this model was used in the environmental assessment.

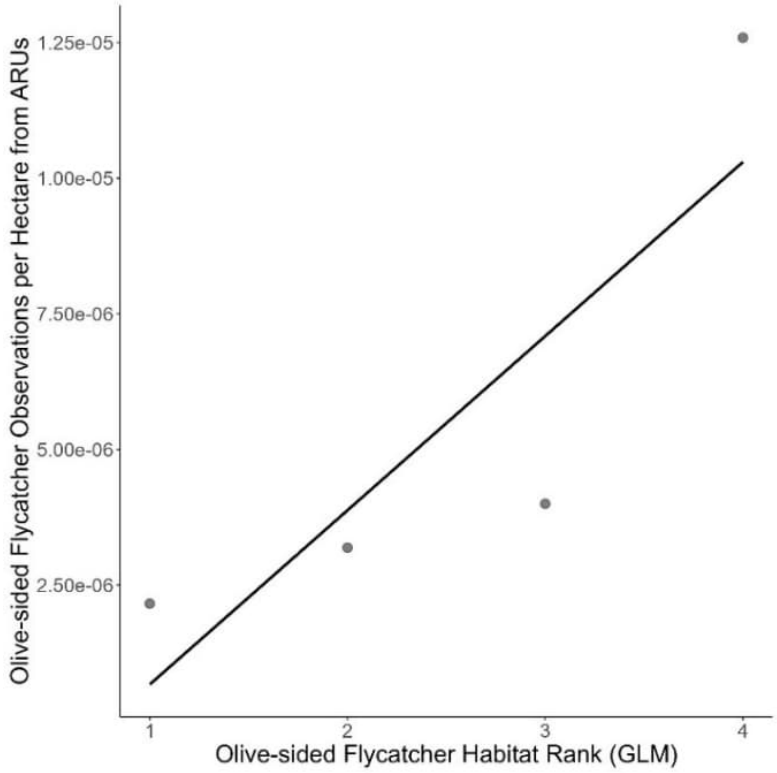

Figure 3-15: Relationship between Autonomous Recording Unit Observations of Olive-sided Flycatcher by Equal Area and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM

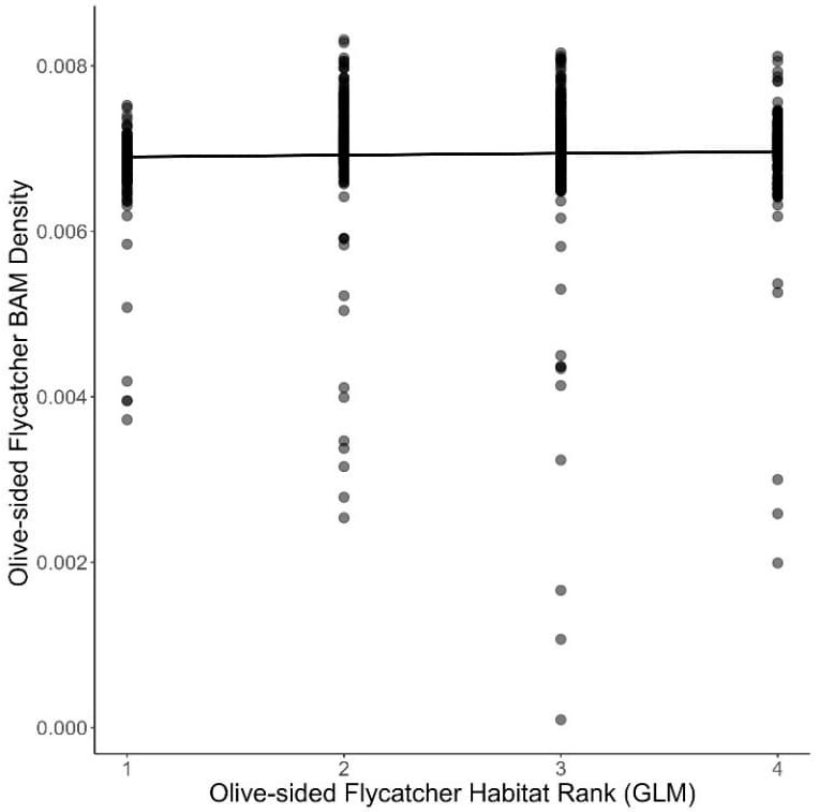

Figure 3-16: Relationship between Boreal Avian Modelling Project (BAM) Density Estimates of Olive-sided Flycatcher and Habitat Ranks based on Binned Predictions of Relative Abundance from Top GLM at 1,000 Random Locations across the RSA

4. Habitat Suitability Index Models

4.1 Dark-eyed Junco

Dark-eyed junco is a habitat generalist and breeds in a wide variety of habitats and levels of disturbance (Nolan et al. 2020). Dark-eyed junco was selected as a proxy valued component species for birds that use coniferous and disturbed forest habitats.

Suitable dark-eyed junco nesting habitats in the study areas are:

- Coniferous forest
- Early successional/sparse treed forest
- Mixedwood forest

4.2 Osprey

This species generally nests near shallow (0.5 to 2 metres deep), fish-bearing waterbodies (Bierregaard et al., 2020). Upland ecosystems are more likely to provide osprey nesting requirements than wetland ecosystems as upland habitats are more likely to support large trees that can be used by osprey for nesting.

Suitable osprey nesting habitats in the study areas are:

- Deciduous, coniferous, mixed, and early successional/sparse forest types that are within three kilometres of a waterbody or watercourse.

4.3 Sora

Soras prefer to nest in marshes that have shallow to intermediate water depths and dense emergent vegetation (e.g., cattails [*Typha* spp.], sedges [*Carex* spp.]) (Melvin and Gibbs 2020).

Suitable sora nesting habitats in the study areas are:

- Fens
- Marshes

4.4 Canada Warbler

Canada warblers nest in a range of wet forest types that have a dense shrub layer (Committee on the Status of Endangered Wildlife in Canada 2008a; Environment Canada, 2016a).

Suitable Canada warbler nesting habitats in the study areas are:

- Deciduous forest
- Early successional/sparse forest
- Mixedwood forest
- Swamps
- Water

4.5 Evening Grosbeak

Evening grosbeaks prefer open, mature, mixedwood forests that have a relatively open canopy and dense shrub layer (Committee on the Status of Endangered Wildlife in Canada 2016).

Suitable evening grosbeak nesting habitats in the study areas are:

- Coniferous forest
- Deciduous forest
- Mixedwood forest

4.6 Chimney Swift, Barn Swallow, and Bank Swallow

Chimney swifts are tolerant of human disturbance and have higher concentrations in urban areas where there are a large number of chimneys that can be used for nest sites (Steeves et al., 2020). Riparian areas along large rivers and pits and quarries provide most of the suitable habitat for bank swallow in the Canadian Shield (Falconer et al., 2016), where they excavate nest tunnels within banks or bluffs. Note, no suitable habitat for bank swallow was identified within the Study areas.Barn swallow usually construct their nests on anthropogenic structures such as bridges, tunnels, culverts, and buildings (Committee on the Status of Endangered Wildlife in Canada, 2021; Brown and Brown, 2020).

Suitable chimney swift, bank swallow, and barn swallow nesting habitats in the study areas are:

- Anthropogenic disturbance.

4.7 Eastern Whip-poor-will

Eastern whippoorwills are also commonly found in rock or sand barrens with scattered trees, old burns, other disturbed sites with early forest succession, and pine plantations (Cink, 2002, Committee on the Status of Endangered Wildlife in Canada, 2009a).

Suitable eastern whip-poor-will nesting habitats in the study areas are:

- Coniferous, deciduous, early successional/sparse treed, and mixedwood forest, rock/barren, and water habitats that are within 50 metres of forested and non-forest boundaries (i.e., edge habitat).

4.8 Eastern Wood-pewee

In Canada, eastern wood-pewees prefer to nest in clearings and edges in deciduous and mixed forests (Committee on the Status of Endangered Wildlife in Canada, 2013a).

Suitable eastern wood-pewee nesting habitats in the study areas are:

- Deciduous forest
- Mixedwood forest

4.9 Bald Eagle

Bald eagles are found in association with aquatic habitats (e.g., coastal areas, rivers, lakes, and reservoirs) with forested shorelines or cliffs (Buehler, 2020; Armstrong, 2014).

Suitable bald eagle nesting habitats in the study areas are:

- Deciduous, coniferous, and mixedwood forest, and swamp within 1.6 kilometres of major waterbodies (i.e., greater than 300 hectares), and stream order 7 or higher watercourses using the Strahler method in the Ministry of Natural Resources and Forestry waterbody dataset.

4.10 Peregrine Falcon

In natural environments, peregrines require cliffs that have open gulfs of air for nesting (White et al., 2020). Cliffs of 8 to 400 metres in height can be used but cliffs of 50 to 200 metres in height are preferred (White et al., 2020).

Suitable peregrine falcon nesting habitat in the study areas is:

- Rock/barren habitat.

4.11 Short-eared Owl

Short-eared owls nest in a variety of open grassland and wetland habitats that usually have short (<60 centimetres), dense grass or small willows (*Salix* spp.), which provide concealment for nesting females (Wiggins et al., 2020).

Suitable short-eared owl nesting habitats in the study areas are:

- Bogs
- Fens
- Marshes

4.12 Black Tern

Black terns nest on shallow waterbodies and in peat bogs and marshes that have dense emergent vegetation cover (Heath et al., 2020; Shephard et al., 2023). This species prefers large marshes and marsh complexes (Heath et al., 2020; Shephard et al., 2023).

Suitable black tern nesting habitats in the study areas are:

- marshes that are greater than 5.3 hectares.

4.13 Lesser Yellowlegs

Lesser yellowlegs nesting areas generally contain a mix of shallow wetlands, trees or shrubs, and open areas; burned over areas with a high density of fallen trees that are near to peat wetlands are also used (Tibbitts and Moskoff, 2020).

Suitable lesser yellowlegs nesting habitats in the study areas are:

- Fens

Deciduous, coniferous, mixed, and early successional/sparse forest within 200m of fens

4.14 Rusty Blackbird

Rusty blackbirds usually select wooded wetlands for breeding habitat, preferring peat bogs, treed fens, swamps, sedge meadows, and marshes (Committee on the Status of Endangered Wildlife in Canada, 2017; Avery, 2020; Bale et al., 2020).

Suitable rusty blackbird nesting habitats in the study areas are:

- Bogs
- Fens
- Swamps

4.15 Yellow Rail

Yellow rails primarily nest in wet sedge meadows that are dominated by slender sedge (*Carex lasiocarpa*), but this species may also nest in sites dominated by other sedges or rushes.

Suitable yellow rail nesting habitats in the study areas are:

- Fens
- Marshes

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Attachment D – Pre-Clearing Nest Sweep Protocol

MARTEN FALLS FIRST NATION
COMMUNITY ACCESS ROAD

Bird Nest And Nesting Surveys – High Level Protocol, Marten Falls First Nation Community Access Road

Version #1

February 2026

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In preparing this report, WSP has relied in good faith on information provided by others, as noted in the report. WSP has reasonably assumed that the information provided is correct and WSP is not responsible for the accuracy or completeness of such information.

Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

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Table 5-1: Public Consultation Information and How It Was Considered 15

1. Introduction

Marten Falls First Nation is a remote First Nation community in northern Ontario, approximately 430 km from Thunder Bay, Ontario, located at the junction of the Albany and Ogoki rivers. The Marten Falls First Nation community is proposing a Community Access Road (the Project) that will connect the Marten Falls First Nation community to the Ontario provincial highway network.

This document provides a high-level summary of the protocol to be used to abide by legislative protection when works and activities are required in bird nesting habitat during the construction and maintenance of phases of the Project. During subsequent Project planning and design phases, prior to construction, more detailed specific work instructions will be developed with input from stakeholders such as Indigenous communities. These more detailed work instructions will be outlined in the Project's Wildlife Management Plan. However, this document provides a high-level overview of the procedures to be used and is meant to be used as guidance only.

2. Background

The majority of bird species in Ontario are protected under the federal *Migratory Birds Convention Act*, 1994 (MBCA; Government of Canada, 1994), which prohibits killing, disturbing, or destroying birds, their nests (if it contains a live bird or egg), and their eggs. Incidental take is defined as “the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs”. It is not possible to obtain an authorization or permit for incidental take under the MBCA. Many of those species not protected under the MBCA, are protected under the provincial *Fish and Wildlife Conservation Act*, 1997 (FWCA; Government of Ontario, 1997), which prohibits the destruction, possession or take of a bird nest or egg unless authorized under the Act. Authorization under the FWCA may be possible in some circumstances. Combined, the MBCA and FWCA protect all birds in Ontario with the following exceptions: American crow, brown-headed cowbird, common grackle, rock pigeon, red-winged blackbird, European starling and house sparrow.

When conducting activities such as the clearing of vegetation, or ground disturbance, in areas that contain potential nesting habitat for birds, the best way to achieve compliance with the MBCA, and the FWCA is through avoidance, due diligence, and mitigation.

3. Approach and When to Survey

The most effective method to avoid harm to birds, their eggs and nests, is to conduct activities (e.g., clearing of vegetation) outside of the general nesting period. However, in some circumstances, activities may need to be undertaken within these timing windows.

Since birds' nest in a variety of habitats, both vegetated and unvegetated, as well as anthropogenic structures, there may be potential for incidental take anywhere birds occur. The need for a nesting survey should be evaluated ahead of any activity that requires the removal of vegetation, or alteration or removal of suitable structures. Some species even nest on open barren ground, so disturbance to these areas, if they are relatively undisturbed should also be evaluated. This applies to construction as well as maintenance activities. It is always advisable to schedule construction and pre-construction activities outside of the core nesting period, wherever possible.

Given that most birds are protected under the federal MBCA, ECCC has developed guidance to support with due diligence efforts to avoid harm or damage to migratory birds and their nests. ECCC foremost recommends avoidance of the migratory bird nesting period given that nests can be difficult to detect. A bird nest survey (i.e. qualified person(s) search for evidence of nesting birds and nests) can be part of a project's due diligence, but a bird nest survey does not guarantee compliance with the MBCA. Bird nest surveys can miss the observations of birds, active nests, nestlings, eggs, which may result in incidental take. The general nesting period for a project is determined from the nesting calendars developed by ECCC (Government of Canada, 2018) and in Ontario can be as long as late March to late August in southern Ontario (Area C1), or as short as early May to mid-August in far northwestern Ontario (Area C7). Based on these nesting calendars, the general nesting period for the Project is approximately April 27 to August 15. However, it should be noted that birds protected under the MBCA, their eggs, and nests containing a live bird or egg, are protected at any time of year, regardless of the calendars, if they occur.

Depending on the timing of project activities, site context and suite of bird species expected, additional nest surveys outside the regional general nesting period may be appropriate, such as in the event of an early spring when birds have initiated nesting earlier than expected, or when nesting of a few winter nesters is suspected (e.g. Canada Jay, White-winged Crossbill, Bald Eagle, some owl species). An avian specialist should be consulted ahead of project activities to confirm the need for surveys, regardless of the time of year.

Important to note is that the nests of some species are protected even when inactive. Most notable (and likely to be encountered in the Project Site) are:

- Pileated Woodpecker – nesting cavities are protected year-round up to 36 months since last active
- Great Blue Heron – nests are protected year-round up to 24 months since last active

Project works should be evaluated for their risk of interaction with the habitat of these species and nest surveys timed accordingly (e.g. 36 months prior to clearing trees with evidence of a Pileated woodpecker nesting cavity). In the Project Area, these habitats are generally limited to mature stands of deciduous or mixed forest, and wetlands with deciduous or dead trees present.

If any vegetation clearing is required during the migratory bird nesting season (April 27 to August 15; Environment and Climate Change Canada, 2023), non-intrusive pre-clearing nest surveys will occur. During the peak period (May 19 – July 30) within 3 days prior to disturbance and during off-peak (April 28 – May 18 and July 31 – August 14) within seven days prior to clearing. This is to make sure that the bird nest survey is as current as possible and new nests are not built between the time of the survey completion and the beginning of construction or vegetation clearing. This should be assessed on a case-by-case basis by an avian specialist.

Although ECCC does not recommend nest surveys as demonstration of MBCA compliance, ECCC suggests that nest surveys may be appropriate when the following conditions are met (Government of Canada, 2022b):

- Surveys are conducted by skilled and experienced observers
- Surveys are conducted using appropriate methods
- Only a few nesting areas or a small community of migratory birds is expected
- The project activities will take place in simple habitats such as:
    - An urban park consisting of mostly lawn with a few isolated trees
    - A vacant lot with few possible nest sites
    - A previously cleared area which might attract birds that nest on the ground
    - A structure such as a bridge, a beacon, a tower or a building

ECCC also suggests that nest surveys can be considered when looking for:

- Conspicuous nest structures (such as nests of Great Blue Herons, Bank Swallows, and Chimney Swifts)
- Cavity nesters in snags or poles (such as woodpeckers, goldeneyes, and nuthatches)
- Colonial-breeding species that can often be located from a distance (such as a colony of terns or gulls)

While ECCC outlines conditions for when nest surveys can be completed, industry standards and best management practices can also be applied in other habitats and circumstances not outlined above to ensure that appropriate due diligence is undertaken to reduce negative impacts on birds, such as this project. Each project activity should be assessed in advance to determine the best method to follow, with input from an avian specialist. For more details on each approach refer to Section 4.0 below.

4. Survey Methodology

In all cases, it's always preferable to clear vegetation outside of the general nesting periods, to make sure compliance and avoid contravention, or problematic delays. However, when required, a more detailed survey methodology and specific work instructions can be developed before vegetation clearing, construction, and maintenance begins. This will consider input from Project stakeholders such as Indigenous communities. The specific method used for the surveys will depend on the complexity of the habitat, the timing of the survey (e.g. early/late in the windows vs the peak nesting period), and other factors. The following is some general and high-level considerations, regardless of the specific survey methodology used. If a nest is found, an appropriate buffer will need to be implemented based on input from the avian specialist. Refer to Section 5.3 for more information on buffers.

4.1 Timing and Weather Conditions

The timing of the survey depends somewhat on the habitat, complexity of the habitat, and the type of methodology used, and needs to be closely coordinated with the project construction and maintenance schedule. Ideally, nesting surveys, or at least the observational part starts in the morning, when singing activity is highest. However, birds actively forage and feed young all day, so surveys can occur throughout the day. Exceptions to this are in periods of extreme heat, which activity is greatly reduced. Survey effort should take into consideration the environmental conditions encountered.

Surveys should usually be completed during appropriate weather conditions (i.e., temperatures ≥5°C, winds <25 km/h, and no precipitation or thick fog) to improve nest detectability and to reduce impacts to nesting birds should they flush from nests. The exception to this is the Specialized Surveys noted in Section 4.3 which can occur in any temperature, or in specific circumstances, under guidance of an avian specialist.

It is not possible to provide minimum search area coverage per day, as the amount of habitat that can be surveyed in each day is highly dependent on the site conditions, the number of surveyors, and bird activity at the time of the survey (i.e., early/late versus peak breeding season). Survey effort should never be cut short to accommodate clearing crews waiting on site. Therefore, unless the survey area is very simple (e.g., a handful of trees or a structure), it is advisable to schedule construction activities / vegetation removals for the day after the nest survey. Survey results are generally considered valid for 48 hours from the time of the survey, after which another nest survey is usually required to check for new nests if vegetation clearing or structure removal is delayed. This may be reduced or extended pending an assessment by an avian specialist.

4.2 Specialized Surveys

In the case of Schedule 1 species (e.g. Pileated Woodpecker and Great Blue Heron), or species that typically nest outside of this period (e.g. some owls), survey methodology will be different. Nests for these species, as well as large stick nesting species (e.g. Osprey), are in many cases easier to identify outside of the growing season, during leaf off, although surveys can and should also be conducted during the nesting period of each species to determine activity levels. Details of these methods is outside of the scope of this document, and a specific work instruction will be developed for these surveys, as needed by an avian specialist. In general, these methods include a combination of aerial surveys outside of the growing season (e.g. for stick nests), and on the ground habitat searches (e.g. mature forests for Pileated woodpecker). Drone technology may also be a valuable tool for these surveys.

4.3 Qualifications

Required qualifications will depend on the type and extent of habitat to be surveyed, as well as the timing of the survey. In ‘complex’ habitats surveys should be completed by at least one pair of surveyors working in tandem (to increase the likelihood of finding nests). The lead surveyor should be an ecologist who has extensive experience in conducting breeding bird surveys and bird nest surveys and habitat assessments, and who can identify all potential breeding bird species within the region by sight and sound. The secondary surveyor should be an ecologist with prior experience completing breeding bird surveys at a minimum, or another avian specialist if possible. Surveys in complex habitats should be avoided, where possible, given the challenges associated with finding nests in these habitats. However, if they are required, having expert surveyors is crucial.

In ‘simpler’ habitats, surveys should also be completed by one or more ecologists who have experience conducting ecological field surveys at a minimum and done under the guidance of an avian specialist. Training and detailed instructions can be provided by an avian specialist and any questions regarding species identification, behavioural observations or buffer / mitigation requirements can be verified with the avian specialist.

All surveys should be completed under the guidance of an avian specialist familiar with the Project, and regional avian ecology, regardless of the habitat type.

4.4 Hints and Tips

As noted, more detailed specific work instructions can and will be developed prior to any surveys being conducted for the Project, however some general hints and tips are provided below.

Nest surveys should begin with a period of watching and listening (for at least 10 min) from a distance (>10 m) for signs of breeding bird evidence indicating potential presence of a nest.

Signs of breeding bird evidence to watch and listen for include:

- **A singing male bird** – this often indicates that the bird has an established territory in that area and has a nest in the vicinity. Sometimes if the bird is singing from a tree, it may be observed repeatedly tilting its head down to get a view of the nest below. Some species may even sing while on the nest (e.g. Rose-breasted Grosbeak, Northern Cardinal).
- **A pair of birds that are remaining close to one another and/or mating** – this likely indicates that the birds have an established territory in that area and there is a nest in the vicinity.
- **A female bird suddenly appearing, often being followed closely by a male** – this applies to some groups of birds such as warblers and often indicates that a female has come off a nest of eggs to feed. Males will often closely guard the female from other males following closely, but presence of a male isn't necessary. If, the female becomes noticeably agitated and wants to return to a specific location or area, but is hesitant, the observer should back away until she feels comfortable and watch where she disappears.
- **An agitated bird or a bird feigning injury** – if a bird is hanging around, making a lot of noise or trying to distract the observer in some way (i.e. feigning an injured wing and trying to get you to follow it), this indicates that the observer is very close to a nest or to recently fledged young. The observer should stop in their tracks and look around their feet and the area where the agitated / feigning bird is located to see if they can observe the nest / young. The should then turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird that flushes from under the observer's feet at the last moment** – if a bird flushes from under the observer's feet at the last moment, this indicates that it was sitting on a nest hoping to remain undiscovered until it had to move at the last moment to prevent being stepped on. The observer should stop in their tracks and look around their feet and the area where the bird emerged from to see if they can observe the nest. Turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird carrying nesting material** – if a bird is observed carrying nesting material (i.e., mud, sticks, grasses/vegetation, feathers, or pieces of garbage such as streamers) this indicates that the bird is in the process of building a nest. The observer should then watch where it goes to determine the general location of the nest.

- **A bird carrying food** – if a bird is observed carrying food (e.g., insects), this may indicate that the bird is taking food back to the nest to feed young or to feed its partner that is sitting on the nest incubating eggs. Watch where it goes to determine the general location of the nest. If the bird stops and waits while watching the observer, then the observer is likely too close to the nest, and the bird doesn't want to reveal the nest location. The observer should back up and observe from a distance (>10m) using binoculars.
- **Continuous chirping/begging sounds** – if the observer hears a continuous (often loud) sound of chirping birds, this indicates that a nest or recent fledglings are nearby and the young are calling to the parents to come feed them. This is especially true for some bird groups such as woodpeckers.
- **A bird continually leaving and returning to a specific spot** – this indicates that a bird likely has a nest at that location and is returning to check on the nest, feed young or an incubating partner, or to switch off on incubation or nest guard duty. In some cases, a nest will not be visible, but nesting activity can be assumed based on the species and known nesting microhabitat.
- **Flight display** – if a bird is flying and singing while circling overhead, this indicates a flight display to establish/defend a breeding territory.

5. Next Steps

If an active bird nest is found, or suspected of occurring, the first step is identifying the location, or general location. If additional information cannot be retrieved, without the potential of harming the nest (e.g. specific species), or attracting predators to the nest etc., the suspected location of the nest should be noted, and a buffer established based on the type of bird identified (e.g. passerine, waterfowl, etc). For more information on suitable buffers refer to Section 5.3 below. However, if additional information can be safely collected the following additional steps should be carried out. Always err on the side of the birds.

5.1 Protected Status

The next step, if safe to do so, is to confirm legal protections based on the species involved. The nests of the following species are not protected under any legislation: American Crow, Brown-headed Cowbird, Common Grackle, Red-winged Blackbird, Rock Pigeon, European Starling, and House Sparrow.

The nests of most migratory birds (per MBCA) are only protected when active (i.e., containing live eggs or young); however, the nests of species listed on Schedule 1 of the Migratory Birds Regulations, 2022 (MBR, 2022; Government of Canada, 2022a) are protected year-round until they have been confirmed inactive for the prescribed number of years stated in the schedule (species-dependent)..

Raptor nests may be protected year-round; an avian specialist should be consulted to determine protected status of raptor nests. When in doubt assume the nest is protected until consultation with an avian specialist.

Special consideration may be required for species designated as threatened or endangered under the ESA or SARA (i.e. may depend on ESA/SARA permit conditions). An avian specialist should be consulted to determine nest and habitat protections for these species.

In addition, Indigenous communities should be consulted in advance while developing the specific work instructions and more detailed protocols to ensure that culturally significant species are protected and local knowledge is applied. Indigenous monitors should also be included in the surveys, whenever available.

5.2 Documentation

Inactive nests do not need to be documented, unless they belong to a species on Schedule 1 of the MBR, 2022, a raptor (in some cases), a species designated as threatened or endangered under the ESA or SARA, or if determined to be culturally important by the Indigenous monitor.

For all active nests and inactive nests specified above, the following information should be documented to the extent possible, and if it will not potentially harm the nest or birds:

- Species or nearest taxonomic category (e.g., sparrow, duck)
- Nest location (including coordinates) or approximation
- Nest height above ground (approximation)
- Number of eggs or young
- Habitat
- How the nest was found or suspected (e.g., adult behaviour)
- Nest identification number (assigned, for tracking)
- Mitigation applied (e.g., buffer distance, but depends on species/bird groups)

While documenting the nest, the surveyor needs to work quickly and be mindful of their actions. If a surveyor is slow and careless their actions can result in incidental take. A surveyor should minimize the effects their work has on the vegetation surrounding the nest. Always err on the side of the birds.

Photographs are helpful to communicate where a nest is to others. As a minimum, take a photo of the general area of the nest, including any marked buffers (e.g. flagging). If possible (accessible and won't potentially harm the birds or active nest), quickly take photos of the nest and or the nest contents to help determine if the nest is active. This should only be done if required, and its possible to safely do so. Active nests can often be assumed based on observations of the adults. When in doubt, always err on the side of the birds, to avoid incidental take.

5.3 Buffers

Buffers help protect the nest from project activities. Buffers should be marked using flagging tape, stake flags, pylons, caution tape or similar, to show construction personnel the area to avoid. Information about the nest (identification number, species, date found) can be written on the visual aids (flagging tape, etc.) to help identify the nest to other workers. Do not put visual aids on or immediately near a nest because the visual aids could help predators find the nest.

Appropriate buffer size depends on the species involved, the landscape surrounding the nest, how much disturbance the birds are used to (or anticipated to be acclimatized to), and how much disturbance will occur from project activities (ECCC 2022b).

Buffers will be established as part of the development of specific work instructions prior to project activities, and will include input from stakeholders, such as Indigenous communities, and utilize various sources. However, some examples of buffers are provided below.

Table 5-1: Examples of Nest or Nesting Habitat Buffers

Bird Group	Example Species	Example of Buffers
Most Passerines, Near Passerines	Warblers, Sparrows, Flycatchers, Most Woodpeckers.	3 to 20 m
Waterfowl, Secretive Marsh Birds	American Black Duck, Common Goldeneye, American Bittern, Rails.	20 to 50m
Raptors, Waders, Other Highly Sensitive Species	Bald Eagle, Broad-Winged Hawk, Sandhill Crane, Pileated Woodpecker, Great Blue Heron	50 to 1000m

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The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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4.1 Timing and Weather Conditions

The timing of the survey depends somewhat on the habitat, complexity of the habitat, and the type of methodology used, and needs to be closely coordinated with the project construction and maintenance schedule. Ideally, nesting surveys, or at least the observational part starts in the morning, when singing activity is highest. However, birds actively forage and feed young all day, so surveys can occur throughout the day. Exceptions to this are in periods of extreme heat, which activity is greatly reduced. Survey effort should take into consideration the environmental conditions encountered.

Surveys should usually be completed during appropriate weather conditions (i.e., temperatures ≥5°C, winds <25 km/h, and no precipitation or thick fog) to improve nest detectability and to reduce impacts to nesting birds should they flush from nests. The exception to this is the Specialized Surveys noted in Section 4.3 which can occur in any temperature, or in specific circumstances, under guidance of an avian specialist.

It is not possible to provide minimum search area coverage per day, as the amount of habitat that can be surveyed in each day is highly dependent on the site conditions, the number of surveyors, and bird activity at the time of the survey (i.e., early/late versus peak breeding season). Survey effort should never be cut short to accommodate clearing crews waiting on site. Therefore, unless the survey area is very simple (e.g., a handful of trees or a structure), it is advisable to schedule construction activities / vegetation removals for the day after the nest survey. Survey results are generally considered valid for 48 hours from the time of the survey, after which another nest survey is usually required to check for new nests if vegetation clearing or structure removal is delayed. This may be reduced or extended pending an assessment by an avian specialist.

4.2 Specialized Surveys

In the case of Schedule 1 species (e.g. Pileated Woodpecker and Great Blue Heron), or species that typically nest outside of this period (e.g. some owls), survey methodology will be different. Nests for these species, as well as large stick nesting species (e.g. Osprey), are in many cases easier to identify outside of the growing season, during leaf off, although surveys can and should also be conducted during the nesting period of each species to determine activity levels. Details of these methods is outside of the scope of this document, and a specific work instruction will be developed for these surveys, as needed by an avian specialist. In general, these methods include a combination of aerial surveys outside of the growing season (e.g. for stick nests), and on the ground habitat searches (e.g. mature forests for Pileated woodpecker). Drone technology may also be a valuable tool for these surveys.

4.3 Qualifications

Required qualifications will depend on the type and extent of habitat to be surveyed, as well as the timing of the survey. In ‘complex’ habitats surveys should be completed by at least one pair of surveyors working in tandem (to increase the likelihood of finding nests). The lead surveyor should be an ecologist who has extensive experience in conducting breeding bird surveys and bird nest surveys and habitat assessments, and who can identify all potential breeding bird species within the region by sight and sound. The secondary surveyor should be an ecologist with prior experience completing breeding bird surveys at a minimum, or another avian specialist if possible. Surveys in complex habitats should be avoided, where possible, given the challenges associated with finding nests in these habitats. However, if they are required, having expert surveyors is crucial.

In ‘simpler’ habitats, surveys should also be completed by one or more ecologists who have experience conducting ecological field surveys at a minimum and done under the guidance of an avian specialist. Training and detailed instructions can be provided by an avian specialist and any questions regarding species identification, behavioural observations or buffer / mitigation requirements can be verified with the avian specialist.

All surveys should be completed under the guidance of an avian specialist familiar with the Project, and regional avian ecology, regardless of the habitat type.

4.4 Hints and Tips

As noted, more detailed specific work instructions can and will be developed prior to any surveys being conducted for the Project, however some general hints and tips are provided below.

Nest surveys should begin with a period of watching and listening (for at least 10 min) from a distance (>10 m) for signs of breeding bird evidence indicating potential presence of a nest.

Signs of breeding bird evidence to watch and listen for include:

- **A singing male bird** – this often indicates that the bird has an established territory in that area and has a nest in the vicinity. Sometimes if the bird is singing from a tree, it may be observed repeatedly tilting its head down to get a view of the nest below. Some species may even sing while on the nest (e.g. Rose-breasted Grosbeak, Northern Cardinal).
- **A pair of birds that are remaining close to one another and/or mating** – this likely indicates that the birds have an established territory in that area and there is a nest in the vicinity.
- **A female bird suddenly appearing, often being followed closely by a male** – this applies to some groups of birds such as warblers and often indicates that a female has come off a nest of eggs to feed. Males will often closely guard the female from other males following closely, but presence of a male isn't necessary. If, the female becomes noticeably agitated and wants to return to a specific location or area, but is hesitant, the observer should back away until she feels comfortable and watch where she disappears.
- **An agitated bird or a bird feigning injury** – if a bird is hanging around, making a lot of noise or trying to distract the observer in some way (i.e. feigning an injured wing and trying to get you to follow it), this indicates that the observer is very close to a nest or to recently fledged young. The observer should stop in their tracks and look around their feet and the area where the agitated / feigning bird is located to see if they can observe the nest / young. The should then turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird that flushes from under the observer's feet at the last moment** – if a bird flushes from under the observer's feet at the last moment, this indicates that it was sitting on a nest hoping to remain undiscovered until it had to move at the last moment to prevent being stepped on. The observer should stop in their tracks and look around their feet and the area where the bird emerged from to see if they can observe the nest. Turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird carrying nesting material** – if a bird is observed carrying nesting material (i.e., mud, sticks, grasses/vegetation, feathers, or pieces of garbage such as streamers) this indicates that the bird is in the process of building a nest. The observer should then watch where it goes to determine the general location of the nest.

- **A bird carrying food** – if a bird is observed carrying food (e.g., insects), this may indicate that the bird is taking food back to the nest to feed young or to feed its partner that is sitting on the nest incubating eggs. Watch where it goes to determine the general location of the nest. If the bird stops and waits while watching the observer, then the observer is likely too close to the nest, and the bird doesn't want to reveal the nest location. The observer should back up and observe from a distance (>10m) using binoculars.
- **Continuous chirping/begging sounds** – if the observer hears a continuous (often loud) sound of chirping birds, this indicates that a nest or recent fledglings are nearby and the young are calling to the parents to come feed them. This is especially true for some bird groups such as woodpeckers.
- **A bird continually leaving and returning to a specific spot** – this indicates that a bird likely has a nest at that location and is returning to check on the nest, feed young or an incubating partner, or to switch off on incubation or nest guard duty. In some cases, a nest will not be visible, but nesting activity can be assumed based on the species and known nesting microhabitat.
- **Flight display** – if a bird is flying and singing while circling overhead, this indicates a flight display to establish/defend a breeding territory.

5. Next Steps

If an active bird nest is found, or suspected of occurring, the first step is identifying the location, or general location. If additional information cannot be retrieved, without the potential of harming the nest (e.g. specific species), or attracting predators to the nest etc., the suspected location of the nest should be noted, and a buffer established based on the type of bird identified (e.g. passerine, waterfowl, etc). For more information on suitable buffers refer to Section 5.3 below. However, if additional information can be safely collected the following additional steps should be carried out. Always err on the side of the birds.

5.1 Protected Status

The next step, if safe to do so, is to confirm legal protections based on the species involved. The nests of the following species are not protected under any legislation: American Crow, Brown-headed Cowbird, Common Grackle, Red-winged Blackbird, Rock Pigeon, European Starling, and House Sparrow.

The nests of most migratory birds (per MBCA) are only protected when active (i.e., containing live eggs or young); however, the nests of species listed on Schedule 1 of the Migratory Birds Regulations, 2022 (MBR, 2022; Government of Canada, 2022a) are protected year-round until they have been confirmed inactive for the prescribed number of years stated in the schedule (species-dependent)..

Raptor nests may be protected year-round; an avian specialist should be consulted to determine protected status of raptor nests. When in doubt assume the nest is protected until consultation with an avian specialist.

Special consideration may be required for species designated as threatened or endangered under the ESA or SARA (i.e. may depend on ESA/SARA permit conditions). An avian specialist should be consulted to determine nest and habitat protections for these species.

In addition, Indigenous communities should be consulted in advance while developing the specific work instructions and more detailed protocols to ensure that culturally significant species are protected and local knowledge is applied. Indigenous monitors should also be included in the surveys, whenever available.

5.2 Documentation

Inactive nests do not need to be documented, unless they belong to a species on Schedule 1 of the MBR, 2022, a raptor (in some cases), a species designated as threatened or endangered under the ESA or SARA, or if determined to be culturally important by the Indigenous monitor.

For all active nests and inactive nests specified above, the following information should be documented to the extent possible, and if it will not potentially harm the nest or birds:

- Species or nearest taxonomic category (e.g., sparrow, duck)
- Nest location (including coordinates) or approximation
- Nest height above ground (approximation)
- Number of eggs or young
- Habitat
- How the nest was found or suspected (e.g., adult behaviour)
- Nest identification number (assigned, for tracking)
- Mitigation applied (e.g., buffer distance, but depends on species/bird groups)

While documenting the nest, the surveyor needs to work quickly and be mindful of their actions. If a surveyor is slow and careless their actions can result in incidental take. A surveyor should minimize the effects their work has on the vegetation surrounding the nest. Always err on the side of the birds.

Photographs are helpful to communicate where a nest is to others. As a minimum, take a photo of the general area of the nest, including any marked buffers (e.g. flagging). If possible (accessible and won't potentially harm the birds or active nest), quickly take photos of the nest and or the nest contents to help determine if the nest is active. This should only be done if required, and its possible to safely do so. Active nests can often be assumed based on observations of the adults. When in doubt, always err on the side of the birds, to avoid incidental take.

5.3 Buffers

Buffers help protect the nest from project activities. Buffers should be marked using flagging tape, stake flags, pylons, caution tape or similar, to show construction personnel the area to avoid. Information about the nest (identification number, species, date found) can be written on the visual aids (flagging tape, etc.) to help identify the nest to other workers. Do not put visual aids on or immediately near a nest because the visual aids could help predators find the nest.

Appropriate buffer size depends on the species involved, the landscape surrounding the nest, how much disturbance the birds are used to (or anticipated to be acclimatized to), and how much disturbance will occur from project activities (ECCC 2022b).

Buffers will be established as part of the development of specific work instructions prior to project activities, and will include input from stakeholders, such as Indigenous communities, and utilize various sources. However, some examples of buffers are provided below.

Table 5-1: Examples of Nest or Nesting Habitat Buffers

Bird Group	Example Species	Example of Buffers
Most Passerines, Near Passerines	Warblers, Sparrows, Flycatchers, Most Woodpeckers.	3 to 20 m
Waterfowl, Secretive Marsh Birds	American Black Duck, Common Goldeneye, American Bittern, Rails.	20 to 50m
Raptors, Waders, Other Highly Sensitive Species	Bald Eagle, Broad-Winged Hawk, Sandhill Crane, Pileated Woodpecker, Great Blue Heron	50 to 1000m

6. Survey Follow Up

Once a survey is completed, the results need to be communicated to required parties (e.g. Construction Site Manager/Project Proponent), immediately. This will make sure appropriate mitigation is conducted or allow for activities to proceed if feasible. Following this, a technical memorandum should also be completed as soon as possible, to document the survey. The documentation should include all relevant survey information, recommendations, mitigations, and any limitations or caveats.

7. References

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Government of Ontario. 2007. Endangered Species Act. S.O. 2007, c. 6. Current to December 2024. Toronto, ON: Minister of Environment, Conservation and Parks. https://www.ontario.ca/laws/statute/07e06.

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The conclusions presented in this report are based on work performed by trained, professional and technical staff, in accordance with their reasonable interpretation of current and accepted engineering and scientific practices at the time the work was performed.

The content and opinions contained in the present report are based on the observations and/or information available to WSP at the time of preparation, using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by WSP and other engineering/scientific practitioners working under similar conditions, and subject to the same time, financial and physical constraints applicable to this project.

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Benchmark and elevations used in this report are primarily to establish relative elevation differences between the specific testing and/or sampling locations and should not be used for other purposes, such as grading, excavating, construction, planning, development, etc.

Design recommendations given in this report are applicable only to the project and areas as described in the text and then only if constructed in accordance with the details stated in this report. The comments made in this report on potential construction issues and possible methods are intended only for the guidance of the designer. The number of testing and/or sampling locations may not be sufficient to determine all the factors that may affect construction methods and costs. We accept no responsibility for any decisions made or actions taken as a result of this report unless we are specifically advised of and participate in such action, in which case our responsibility will be as agreed to at that time.

This limitations statement is considered an integral part of this report.

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1. Introduction

Marten Falls First Nation is a remote First Nation community in northern Ontario, approximately 430 km from Thunder Bay, Ontario, located at the junction of the Albany and Ogoki rivers. The Marten Falls First Nation community is proposing a Community Access Road (the Project) that will connect the Marten Falls First Nation community to the Ontario provincial highway network.

This document provides a high-level summary of the protocol to be used to abide by legislative protection when works and activities are required in bird nesting habitat during the construction and maintenance of phases of the Project. During subsequent Project planning and design phases, prior to construction, more detailed specific work instructions will be developed with input from stakeholders such as Indigenous communities. These more detailed work instructions will be outlined in the Project's Wildlife Management Plan. However, this document provides a high-level overview of the procedures to be used and is meant to be used as guidance only.

2. Background

The majority of bird species in Ontario are protected under the federal *Migratory Birds Convention Act*, 1994 (MBCA; Government of Canada, 1994), which prohibits killing, disturbing, or destroying birds, their nests (if it contains a live bird or egg), and their eggs. Incidental take is defined as “the inadvertent harming, killing, disturbance or destruction of migratory birds, nests and eggs”. It is not possible to obtain an authorization or permit for incidental take under the MBCA. Many of those species not protected under the MBCA, are protected under the provincial *Fish and Wildlife Conservation Act*, 1997 (FWCA; Government of Ontario, 1997), which prohibits the destruction, possession or take of a bird nest or egg unless authorized under the Act. Authorization under the FWCA may be possible in some circumstances. Combined, the MBCA and FWCA protect all birds in Ontario with the following exceptions: American crow, brown-headed cowbird, common grackle, rock pigeon, red-winged blackbird, European starling and house sparrow.

When conducting activities such as the clearing of vegetation, or ground disturbance, in areas that contain potential nesting habitat for birds, the best way to achieve compliance with the MBCA, and the FWCA is through avoidance, due diligence, and mitigation.

3. Approach and When to Survey

The most effective method to avoid harm to birds, their eggs and nests, is to conduct activities (e.g., clearing of vegetation) outside of the general nesting period. However, in some circumstances, activities may need to be undertaken within these timing windows.

Since birds' nest in a variety of habitats, both vegetated and unvegetated, as well as anthropogenic structures, there may be potential for incidental take anywhere birds occur. The need for a nesting survey should be evaluated ahead of any activity that requires the removal of vegetation, or alteration or removal of suitable structures. Some species even nest on open barren ground, so disturbance to these areas, if they are relatively undisturbed should also be evaluated. This applies to construction as well as maintenance activities. It is always advisable to schedule construction and pre-construction activities outside of the core nesting period, wherever possible.

Given that most birds are protected under the federal MBCA, ECCC has developed guidance to support with due diligence efforts to avoid harm or damage to migratory birds and their nests. ECCC foremost recommends avoidance of the migratory bird nesting period given that nests can be difficult to detect. A bird nest survey (i.e. qualified person(s) search for evidence of nesting birds and nests) can be part of a project's due diligence, but a bird nest survey does not guarantee compliance with the MBCA. Bird nest surveys can miss the observations of birds, active nests, nestlings, eggs, which may result in incidental take. The general nesting period for a project is determined from the nesting calendars developed by ECCC (Government of Canada, 2018) and in Ontario can be as long as late March to late August in southern Ontario (Area C1), or as short as early May to mid-August in far northwestern Ontario (Area C7). Based on these nesting calendars, the general nesting period for the Project is approximately April 27 to August 15. However, it should be noted that birds protected under the MBCA, their eggs, and nests containing a live bird or egg, are protected at any time of year, regardless of the calendars, if they occur.

Depending on the timing of project activities, site context and suite of bird species expected, additional nest surveys outside the regional general nesting period may be appropriate, such as in the event of an early spring when birds have initiated nesting earlier than expected, or when nesting of a few winter nesters is suspected (e.g. Canada Jay, White-winged Crossbill, Bald Eagle, some owl species). An avian specialist should be consulted ahead of project activities to confirm the need for surveys, regardless of the time of year.

Important to note is that the nests of some species are protected even when inactive. Most notable (and likely to be encountered in the Project Site) are:

- Pileated Woodpecker – nesting cavities are protected year-round up to 36 months since last active
- Great Blue Heron – nests are protected year-round up to 24 months since last active

Project works should be evaluated for their risk of interaction with the habitat of these species and nest surveys timed accordingly (e.g. 36 months prior to clearing trees with evidence of a Pileated woodpecker nesting cavity). In the Project Area, these habitats are generally limited to mature stands of deciduous or mixed forest, and wetlands with deciduous or dead trees present.

If any vegetation clearing is required during the migratory bird nesting season (April 27 to August 15; Environment and Climate Change Canada, 2023), non-intrusive pre-clearing nest surveys will occur. During the peak period (May 19 – July 30) within 3 days prior to disturbance and during off-peak (April 28 – May 18 and July 31 – August 14) within seven days prior to clearing. This is to make sure that the bird nest survey is as current as possible and new nests are not built between the time of the survey completion and the beginning of construction or vegetation clearing. This should be assessed on a case-by-case basis by an avian specialist.

Although ECCC does not recommend nest surveys as demonstration of MBCA compliance, ECCC suggests that nest surveys may be appropriate when the following conditions are met (Government of Canada, 2022b):

- Surveys are conducted by skilled and experienced observers
- Surveys are conducted using appropriate methods
- Only a few nesting areas or a small community of migratory birds is expected
- The project activities will take place in simple habitats such as:
    - An urban park consisting of mostly lawn with a few isolated trees
    - A vacant lot with few possible nest sites
    - A previously cleared area which might attract birds that nest on the ground
    - A structure such as a bridge, a beacon, a tower or a building

ECCC also suggests that nest surveys can be considered when looking for:

- Conspicuous nest structures (such as nests of Great Blue Herons, Bank Swallows, and Chimney Swifts)
- Cavity nesters in snags or poles (such as woodpeckers, goldeneyes, and nuthatches)
- Colonial-breeding species that can often be located from a distance (such as a colony of terns or gulls)

While ECCC outlines conditions for when nest surveys can be completed, industry standards and best management practices can also be applied in other habitats and circumstances not outlined above to ensure that appropriate due diligence is undertaken to reduce negative impacts on birds, such as this project. Each project activity should be assessed in advance to determine the best method to follow, with input from an avian specialist. For more details on each approach refer to Section 4.0 below.

4. Survey Methodology

In all cases, it's always preferable to clear vegetation outside of the general nesting periods, to make sure compliance and avoid contravention, or problematic delays. However, when required, a more detailed survey methodology and specific work instructions can be developed before vegetation clearing, construction, and maintenance begins. This will consider input from Project stakeholders such as Indigenous communities. The specific method used for the surveys will depend on the complexity of the habitat, the timing of the survey (e.g. early/late in the windows vs the peak nesting period), and other factors. The following is some general and high-level considerations, regardless of the specific survey methodology used. If a nest is found, an appropriate buffer will need to be implemented based on input from the avian specialist. Refer to Section 5.3 for more information on buffers.

4.1 Timing and Weather Conditions

The timing of the survey depends somewhat on the habitat, complexity of the habitat, and the type of methodology used, and needs to be closely coordinated with the project construction and maintenance schedule. Ideally, nesting surveys, or at least the observational part starts in the morning, when singing activity is highest. However, birds actively forage and feed young all day, so surveys can occur throughout the day. Exceptions to this are in periods of extreme heat, which activity is greatly reduced. Survey effort should take into consideration the environmental conditions encountered.

Surveys should usually be completed during appropriate weather conditions (i.e., temperatures ≥5°C, winds <25 km/h, and no precipitation or thick fog) to improve nest detectability and to reduce impacts to nesting birds should they flush from nests. The exception to this is the Specialized Surveys noted in Section 4.3 which can occur in any temperature, or in specific circumstances, under guidance of an avian specialist.

It is not possible to provide minimum search area coverage per day, as the amount of habitat that can be surveyed in each day is highly dependent on the site conditions, the number of surveyors, and bird activity at the time of the survey (i.e., early/late versus peak breeding season). Survey effort should never be cut short to accommodate clearing crews waiting on site. Therefore, unless the survey area is very simple (e.g., a handful of trees or a structure), it is advisable to schedule construction activities / vegetation removals for the day after the nest survey. Survey results are generally considered valid for 48 hours from the time of the survey, after which another nest survey is usually required to check for new nests if vegetation clearing or structure removal is delayed. This may be reduced or extended pending an assessment by an avian specialist.

4.2 Specialized Surveys

In the case of Schedule 1 species (e.g. Pileated Woodpecker and Great Blue Heron), or species that typically nest outside of this period (e.g. some owls), survey methodology will be different. Nests for these species, as well as large stick nesting species (e.g. Osprey), are in many cases easier to identify outside of the growing season, during leaf off, although surveys can and should also be conducted during the nesting period of each species to determine activity levels. Details of these methods is outside of the scope of this document, and a specific work instruction will be developed for these surveys, as needed by an avian specialist. In general, these methods include a combination of aerial surveys outside of the growing season (e.g. for stick nests), and on the ground habitat searches (e.g. mature forests for Pileated woodpecker). Drone technology may also be a valuable tool for these surveys.

4.3 Qualifications

Required qualifications will depend on the type and extent of habitat to be surveyed, as well as the timing of the survey. In ‘complex’ habitats surveys should be completed by at least one pair of surveyors working in tandem (to increase the likelihood of finding nests). The lead surveyor should be an ecologist who has extensive experience in conducting breeding bird surveys and bird nest surveys and habitat assessments, and who can identify all potential breeding bird species within the region by sight and sound. The secondary surveyor should be an ecologist with prior experience completing breeding bird surveys at a minimum, or another avian specialist if possible. Surveys in complex habitats should be avoided, where possible, given the challenges associated with finding nests in these habitats. However, if they are required, having expert surveyors is crucial.

In ‘simpler’ habitats, surveys should also be completed by one or more ecologists who have experience conducting ecological field surveys at a minimum and done under the guidance of an avian specialist. Training and detailed instructions can be provided by an avian specialist and any questions regarding species identification, behavioural observations or buffer / mitigation requirements can be verified with the avian specialist.

All surveys should be completed under the guidance of an avian specialist familiar with the Project, and regional avian ecology, regardless of the habitat type.

4.4 Hints and Tips

As noted, more detailed specific work instructions can and will be developed prior to any surveys being conducted for the Project, however some general hints and tips are provided below.

Nest surveys should begin with a period of watching and listening (for at least 10 min) from a distance (>10 m) for signs of breeding bird evidence indicating potential presence of a nest.

Signs of breeding bird evidence to watch and listen for include:

- **A singing male bird** – this often indicates that the bird has an established territory in that area and has a nest in the vicinity. Sometimes if the bird is singing from a tree, it may be observed repeatedly tilting its head down to get a view of the nest below. Some species may even sing while on the nest (e.g. Rose-breasted Grosbeak, Northern Cardinal).
- **A pair of birds that are remaining close to one another and/or mating** – this likely indicates that the birds have an established territory in that area and there is a nest in the vicinity.
- **A female bird suddenly appearing, often being followed closely by a male** – this applies to some groups of birds such as warblers and often indicates that a female has come off a nest of eggs to feed. Males will often closely guard the female from other males following closely, but presence of a male isn't necessary. If, the female becomes noticeably agitated and wants to return to a specific location or area, but is hesitant, the observer should back away until she feels comfortable and watch where she disappears.
- **An agitated bird or a bird feigning injury** – if a bird is hanging around, making a lot of noise or trying to distract the observer in some way (i.e. feigning an injured wing and trying to get you to follow it), this indicates that the observer is very close to a nest or to recently fledged young. The observer should stop in their tracks and look around their feet and the area where the agitated / feigning bird is located to see if they can observe the nest / young. The should then turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird that flushes from under the observer's feet at the last moment** – if a bird flushes from under the observer's feet at the last moment, this indicates that it was sitting on a nest hoping to remain undiscovered until it had to move at the last moment to prevent being stepped on. The observer should stop in their tracks and look around their feet and the area where the bird emerged from to see if they can observe the nest. Turn around and go back the way they came, carefully watching their step along the way to avoid potential damage / harm to the nest.
- **A bird carrying nesting material** – if a bird is observed carrying nesting material (i.e., mud, sticks, grasses/vegetation, feathers, or pieces of garbage such as streamers) this indicates that the bird is in the process of building a nest. The observer should then watch where it goes to determine the general location of the nest.

- **A bird carrying food** – if a bird is observed carrying food (e.g., insects), this may indicate that the bird is taking food back to the nest to feed young or to feed its partner that is sitting on the nest incubating eggs. Watch where it goes to determine the general location of the nest. If the bird stops and waits while watching the observer, then the observer is likely too close to the nest, and the bird doesn't want to reveal the nest location. The observer should back up and observe from a distance (>10m) using binoculars.
- **Continuous chirping/begging sounds** – if the observer hears a continuous (often loud) sound of chirping birds, this indicates that a nest or recent fledglings are nearby and the young are calling to the parents to come feed them. This is especially true for some bird groups such as woodpeckers.
- **A bird continually leaving and returning to a specific spot** – this indicates that a bird likely has a nest at that location and is returning to check on the nest, feed young or an incubating partner, or to switch off on incubation or nest guard duty. In some cases, a nest will not be visible, but nesting activity can be assumed based on the species and known nesting microhabitat.
- **Flight display** – if a bird is flying and singing while circling overhead, this indicates a flight display to establish/defend a breeding territory.

5. Next Steps

If an active bird nest is found, or suspected of occurring, the first step is identifying the location, or general location. If additional information cannot be retrieved, without the potential of harming the nest (e.g. specific species), or attracting predators to the nest etc., the suspected location of the nest should be noted, and a buffer established based on the type of bird identified (e.g. passerine, waterfowl, etc). For more information on suitable buffers refer to Section 5.3 below. However, if additional information can be safely collected the following additional steps should be carried out. Always err on the side of the birds.

5.1 Protected Status

The next step, if safe to do so, is to confirm legal protections based on the species involved. The nests of the following species are not protected under any legislation: American Crow, Brown-headed Cowbird, Common Grackle, Red-winged Blackbird, Rock Pigeon, European Starling, and House Sparrow.

The nests of most migratory birds (per MBCA) are only protected when active (i.e., containing live eggs or young); however, the nests of species listed on Schedule 1 of the Migratory Birds Regulations, 2022 (MBR, 2022; Government of Canada, 2022a) are protected year-round until they have been confirmed inactive for the prescribed number of years stated in the schedule (species-dependent)..

Raptor nests may be protected year-round; an avian specialist should be consulted to determine protected status of raptor nests. When in doubt assume the nest is protected until consultation with an avian specialist.

Special consideration may be required for species designated as threatened or endangered under the ESA or SARA (i.e. may depend on ESA/SARA permit conditions). An avian specialist should be consulted to determine nest and habitat protections for these species.

In addition, Indigenous communities should be consulted in advance while developing the specific work instructions and more detailed protocols to ensure that culturally significant species are protected and local knowledge is applied. Indigenous monitors should also be included in the surveys, whenever available.

5.2 Documentation

Inactive nests do not need to be documented, unless they belong to a species on Schedule 1 of the MBR, 2022, a raptor (in some cases), a species designated as threatened or endangered under the ESA or SARA, or if determined to be culturally important by the Indigenous monitor.

For all active nests and inactive nests specified above, the following information should be documented to the extent possible, and if it will not potentially harm the nest or birds:

- Species or nearest taxonomic category (e.g., sparrow, duck)
- Nest location (including coordinates) or approximation
- Nest height above ground (approximation)
- Number of eggs or young
- Habitat
- How the nest was found or suspected (e.g., adult behaviour)
- Nest identification number (assigned, for tracking)
- Mitigation applied (e.g., buffer distance, but depends on species/bird groups)

While documenting the nest, the surveyor needs to work quickly and be mindful of their actions. If a surveyor is slow and careless their actions can result in incidental take. A surveyor should minimize the effects their work has on the vegetation surrounding the nest. Always err on the side of the birds.

Photographs are helpful to communicate where a nest is to others. As a minimum, take a photo of the general area of the nest, including any marked buffers (e.g. flagging). If possible (accessible and won't potentially harm the birds or active nest), quickly take photos of the nest and or the nest contents to help determine if the nest is active. This should only be done if required, and its possible to safely do so. Active nests can often be assumed based on observations of the adults. When in doubt, always err on the side of the birds, to avoid incidental take.

5.3 Buffers

Buffers help protect the nest from project activities. Buffers should be marked using flagging tape, stake flags, pylons, caution tape or similar, to show construction personnel the area to avoid. Information about the nest (identification number, species, date found) can be written on the visual aids (flagging tape, etc.) to help identify the nest to other workers. Do not put visual aids on or immediately near a nest because the visual aids could help predators find the nest.

Appropriate buffer size depends on the species involved, the landscape surrounding the nest, how much disturbance the birds are used to (or anticipated to be acclimatized to), and how much disturbance will occur from project activities (ECCC 2022b).

Buffers will be established as part of the development of specific work instructions prior to project activities, and will include input from stakeholders, such as Indigenous communities, and utilize various sources. However, some examples of buffers are provided below.

Table 5-1: Examples of Nest or Nesting Habitat Buffers

Bird Group	Example Species	Example of Buffers
Most Passerines, Near Passerines	Warblers, Sparrows, Flycatchers, Most Woodpeckers.	3 to 20 m
Waterfowl, Secretive Marsh Birds	American Black Duck, Common Goldeneye, American Bittern, Rails.	20 to 50m
Raptors, Waders, Other Highly Sensitive Species	Bald Eagle, Broad-Winged Hawk, Sandhill Crane, Pileated Woodpecker, Great Blue Heron	50 to 1000m

6. Survey Follow Up

Once a survey is completed, the results need to be communicated to required parties (e.g. Construction Site Manager/Project Proponent), immediately. This will make sure appropriate mitigation is conducted or allow for activities to proceed if feasible. Following this, a technical memorandum should also be completed as soon as possible, to document the survey. The documentation should include all relevant survey information, recommendations, mitigations, and any limitations or caveats.

7. References

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