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WAASIGAN
TRANSMISSION LINE

FINAL ENVIRONMENTAL ASSESSMENT

Section 6.5 Wildlife and Wildlife Habitat

November 2023

Acknowledgements

We wish to acknowledge that the Waasigan Transmission Line Project is located within lands that represent the traditional territories and homelands of the Robinson-Superior Treaty (1850) and Treaty #3 (1873) First Nations, and traverse the Red Sky Métis Independent Nation, Northwestern Ontario Métis Community and Northern Lake Superior Métis Community.

Hydro One also wishes to acknowledge Indigenous artist, Storm Angeconeb, for developing the covering page and wildlife designs throughout the Final Environmental Assessment. Storm is a highly recognized visual artist from Lac Seul First Nation in Treaty #3 and currently resides in Red Lake. Many of her works include animals and birds as representations of herself or those close to her. The artist's description of the covering page is presented below.

Hydro One Environmental Study Art:

What stands out in this art piece is the symbolic representation of solar rays as "Bringing Power"; we can see the environment represented through the wildlife and Ojibwe floral visuals. This artwork is an excellent representation of Hope, Life, and Opportunity, visually portrayed through the Black Bear and her two cubs. The colour theme of this artwork comes from the Waasigan Transmission Line Project brand identity.

Artist: Storm Angeconeb

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6.5 Wildlife and Wildlife Habitat

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This section assesses and characterizes the environmental effects of the Waasigan Transmission Line Project (the Project) on wildlife and wildlife habitat. The assessment follows the general approach and concepts described in Section 5.0.

6.5.1 Input from Engagement

Comments pertaining to wildlife and wildlife habitat that were raised by Indigenous communities, government officials and agencies, and interested persons and organizations during engagement and how they are addressed in the environmental assessment (EA) are listed in Table 6.5-1. Comments and responses actions are provided in the Engagement Summary (Section 4.0). In addition, the Draft EA Report was provided to Indigenous communities, government officials and agencies, and interested persons and organizations for review and comment on May 17, 2023. A high-level summary of the key themes from the comments on the Draft EA Report and related engagement meetings are included in Table 6.5-1. The detailed responses to these comments are included in Appendix 4.0-A.

Table 6.5-1: Summary of Comment Themes Raised during Engagement Related to Wildlife

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Concerns regarding the use of herbicides and pesticides.	Through engagement during the Draft EA Report review process, Hydro One heard feedback from Indigenous communities and stakeholders regarding concerns with the use of herbicides to remove and manage vegetation on the Project. After extensive consideration of this feedback, herbicides will not be used during construction of the Project or for future maintenance of this transmission line. The Final EA has been updated to reflect this.	Gwayakocchigewin Limited Partnership Grand Council Treaty #3 Lac des Mille Lacs First Nation Mitaanjigamiing First Nation NWOMC and Region 2 Members of the public MNRF

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Mammals are important to Indigenous communities.	Multiple mammals were included in the assessment as criteria species including moose, gray fox, and furbearers (gray wolf, American marten, and beaver). A baited camera study was undertaken as part of baseline field studies which provided observations of many mammals in the local study area (LSA). Incidental observations and background data from the province was also used to develop an understanding of mammal populations in the study area.	Gwayakocchigewin Limited Partnership Grand Council Treaty #3 Lac des Mille Lacs First Nation Mitaanjigamiing First Nation NWOMC and Region 2
Turtles are Species at Risk (SAR) and of cultural significance for Indigenous communities. Concern regarding not including turtles as a valued component ('criteria') and the amount of field data planned to be collected for turtles and other reptiles.	Based on feedback from Indigenous communities regarding the cultural significance of turtles, a turtle basking program was conducted as an additional program to collect data on turtle presence and use of certain wetlands for overwintering. Habitat identified as candidate turtle nesting areas was also assessed during the nesting season June/July 2022 to search for sightings and sign (e.g., recently dug substrates, predated nests) that nesting activity was occurring. The results of these surveys are presented in Appendix 6.4-A. The reptile taxon that were assessed in the EA are turtles. The turtles known to occur in northwestern Ontario are the western painted turtle and the snapping turtle. Snapping turtle was selected as the proxy species for turtles, used as criterion in the effects assessment.	Gwayakocchigewin Limited Partnership Grand Council Treaty #3 Lac des Mille Lacs First Nation
Concerns regarding potential impacts to wetlands used for overwintering by turtles.	Additional mitigation measures alternatives applicable during active construction and guidance on potentially appropriate conditions for their use were added to Section 6.5.7.8.1, including potential use of exclusion fencing or consideration of isolating and dewatering an aquatic work area prior to September 1st in proximity to wetland habitat that may support reptile and amphibian overwintering, where practicable and appropriate.	Gwayakocchigewin Limited Partnership

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
The importance of wetlands as critical habitat for many of the species of concern, especially SAR.	A criterion for wetland ecosystems was included for the assessment of the Project footprint. Field surveys of wetlands were also completed to support the baseline characterization in the EA including ecological land classification (ELC) and botanical surveys in wetlands, wildlife surveys in wetlands, specifically: amphibian breeding surveys, turtle basking surveys, breeding bird surveys in wetlands, marsh bird surveys, and least bittern (a SAR) surveys.	Gwayakocchigewin Limited Partnership Grand Council Treaty #3 Lac des Mille Lacs First Nation
Input on the importance of traditional knowledge and local knowledge, including the observations of local hunters, fishers, and the Indigenous population, in the northwest where available information on species at risk may be limiting.	Where knowledge has been shared with permission by Indigenous communities on areas of habitat use or observations for species at risk, the Final EA Report has been updated to acknowledge the contribution of this important information in Section 6.5.5 related to wildlife and wildlife habitat. As well, information on wildlife and wildlife habitat that may affect the practice of Section 35 rights and interests or land uses by Indigenous communities are discussed in further detail in Section 7.7 (First Nations Rights, Interests and Use of Land and Resources) and Section 7.8 (Métis Rights, Interests and Use of Land and Resources).	Gwayakocchigewin Limited Partnership Lac des Mille Lacs First Nation Mitaanjigamiing First Nation NWOMC and Region 2
Concern around the date of the desktop data for moose and other species of concern to Indigenous communities and plans for post-Project monitoring.	Moose aerial inventories are conducted by the Ministry of Natural Resources and Forestry (MNRF) and are designed to provide estimates of the moose populations in Ontario's wildlife management units (WMUs). This includes documenting the age class (calf or adult) and sex of moose in these areas. Aerial inventories are conducted annually, but not every WMU is surveyed annually; in years where a survey is not conducted, MNRF conducts desktop modeling for the non-surveyed WMUs to estimate moose populations and provide population objectives and hunting allocations. A decade (past ten years) of data for the moose population in northeastern Minnesota was also used to inform the population demographics presented in the report. The assessment of effects in this section includes the identification of mitigation measures, which includes development of plans for implementation and monitoring, applicable to avoiding or reducing potential	Gwayakocchigewin Limited Partnership Grand Council Treaty #3 Lac des Mille Lacs First Nation

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
	effects, including to moose. Monitoring and commitments are summarized in Section 10.0.	
Role for Indigenous communities in post-construction monitoring, including related to noxious and invasive plant species in wildlife habitat.	As noted above, the assessment of effects in this section includes the identification of mitigation measures, which includes development of plans for implementation and monitoring, applicable to avoiding or reducing potential effects. Monitoring and commitments are summarized in Section 10.0. Hydro One commits to sharing and engaging on proposed plans such as the Environmental Protection Plan with Indigenous communities to provide opportunity to comment on and participate in the development of the monitoring and follow-up programs and plans. Hydro One is committed to supporting Indigenous Environmental Monitors and/or Guardians and will collaborate with communities in implementing monitoring of Project-related effects and compliance monitoring throughout all Project stages. Hydro One commits to developing an Indigenous Monitoring Plan in collaboration with affected Indigenous communities.	Gwayakocchigewin Limited Partnership Lac des Mille Lacs First Nation NWOMC and Region 2
Concerns regarding mitigation measures for bald eagle and other raptor nests.	Bald eagle was included as a criterion in the effects assessment as a representative species for all raptors due to its cultural significance for Indigenous communities and given that it is a species at risk (SAR) protected under the *Endangered Species Act* (ESA). The Final EA has been updated to specify that all moderate to high impact activities (including tree removal, helicopter flights, blasting, drilling and implosion splicing) must be avoided within 400 m of any raptor nest during the critical breeding period (March 1 to August 31) and that engagement with MNRF and permitting will be required where these measures cannot be adhered to. Furthermore, all known raptor nest sites within the LSA and Regional Study Area (RSA) have been mapped to assist in applying these mitigation measures to avoid potential impacts.	Gwayakocchigewin Limited Partnership Ministry of Natural Resources and Forestry (MNRF)
Request to include additional information on calculations and methodology (linear density, etc.).	Additional information has been included in Section 6.5.5.1.1 Previous and Existing Disturbances on the data and method used to characterize linear density.	Gwayakocchigewin Limited Partnership NWOMC and Region 2

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Request to revise or provide information on Moose/Gray Wolf RSA to include Wildlife Management Units crossed by the LSA.	Rationale for the selection of the WMUs to make the moose RSA is provided in Section 6.5.4.2. WMU 11C has now been added into the moose RSA, which encompasses Quetico Provincial Park.	Gwayakocchigewin Limited Partnership
Indigenous communities have noted the importance of moose to their communities and the need for mitigation effectiveness monitoring	Section 6.5.12 of the Final EA Report outlines the monitoring requirements for the Project, including proposed monitoring for wildlife and wildlife habitat. Hydro One will work with Indigenous communities to develop and implement mitigation effectiveness monitoring.	Gwayakocchigewin Limited Partnership
The importance of protecting SAR beyond the requirements set out in Ontario's ESA and the federal *Species at Risk Act* (SARA).	All SAR with potential to interact with the Project study area have been considered in the baseline characterization and effects assessment for the Project.	Grand Council Treaty #3
The disruption of critical habitats and the disruption/ creation of habitat corridors for wildlife.	Potential effects of the Project on wildlife and wildlife habitats have been considered in the effects assessment of the Project and appropriate design measures, avoidance measures and other mitigation measures have been identified to avoid or reduce those effects.	Grand Council Treaty #3
Concerns regarding the over-emphasis on birds and birds of non-relevance from a cultural perspective and the absence of mention of great blue heron.	The baseline field program for birds included the survey of habitat that has the potential to support great blue herons (e.g., candidate SWH program will confirm the sites that have the potential to be used for heronries. SWH type called Colonially Nesting Bird Breeding: Trees Shrubs) and other wetland surveys (e.g., marsh birds surveys, and vegetation surveys in wetlands) have the potential to document the presence of great blue heron throughout the study area. The results of the baseline characterization are presented in Appendix 6.4-A.	Grand Council Treaty #3

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Request for workers to be trained on reducing harm and protecting turtles during construction.	Mitigation has been added to Section 6.5.7.8 Herpetofauna: "Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified".	Lac des Mille Lacs First Nation
Consideration of Cougar.	The following text provides background context on cougars recorded in northern Ontario, as well as rationale regarding criteria selection, reported in the Terrestrial Field Work Plan. Cougar (Puma concolor) were not proposed as a criterion for this Project. Published reporting suggests observations of cougar in Ontario may not represent an established population, with possible origins including escaped pets and immigrants from the west, though some native individuals may exist (Rosatte 2011). Given the large range and elusiveness of this species, detection during the field program was considered unlikely. Monitoring over 17,000 camera-nights at locations across Ontario by the Ministry of Natural Resources (MNR) between 2008 and 2010, did not result in confirmed observations of cougar (Rosatte 2011). It is noted that Lac des Mille Lacs First Nation have identified approximately 4 observations of cougar over the last 20 years. In the event of an incidental sighting, details will be recorded.	Lac des Mille Lacs First Nation
Consideration of American white pelican.	There are no known breeding season records of these species with the Project study area (Cadman et. al. 2007). This species will commute daily >100 km from nesting colonies to forage, and sightings within the Project study area pertain to these foraging individuals and are not considered element occurrences (i.e., sightings of SAR that indicate likely presence of critical and thus protected habitats). Comprehensive breeding bird surveys were completed throughout the Project, which documented the presence of a single flock flying overhead, near Thunder Bay (Appendix 6.4-A). Refer to Section 6.5.3.1 for full consideration of this species.	Lac des Mille Lacs First Nation

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
The request for sharing field data that could be of particular interest to First Nations.	A summary of the field survey results are presented in Appendix 6.4-A. The raw data from field surveys has also been shared with Indigenous communities upon request, and under the provision of data sharing agreements with individual communities.	Lac des Mille Lacs First Nation
Guidance being used to define the significant wildlife habitats considered.	The draft criteria schedules for Ecoregion 3W (MNRF 2017a) will be consulted to define specific significant wildlife habitat (SWH) types. Criteria schedules have not been prepared for the other ecoregions that the Project overlaps. In the absence of criteria schedules for these ecoregions, the draft criteria schedules for Ecoregion 3W, as well as the Significant Wildlife Habitat Technical Guide (OMNR 2000), were consulted.	Mitaanjigamiing First Nation
Input on the field plan regarding the role for traditional ecological knowledge and noting caribou sightings in the region.	Caribou are not are not identified as a criteria species in the effects assessment as the Project is located south of their known distribution (caribou ranges as defined by Ontario Ministry of Environment, Conservation and Parks) in northern Ontario. Where knowledge has been shared with permission by Indigenous communities on areas of habitat use or observations for species at risk, the Final EA Report has been updated to acknowledge the contribution of this important information in Section 6.5.5 related to wildlife and wildlife habitat.	Mitaanjigamiing First Nation
Question around whether the EA will consider effects to SAR (i.e., birds, bats, pollinators) and caribou.	SAR are included as a criteria for the effects assessment. Some species that have similar habitat requirements, such as birds, have been considered within a similar grouping and other species that have very distinct habitat requirements through their lifecycle (e.g., little brown myotis) are assessed as individual species. As noted above, caribou are not identified as a criteria species in the effects assessment as the Project is located south of their known distribution (caribou ranges as defined by Ontario Ministry of Environment, Conservation and Parks) in northern Ontario.	NWOMC and Region 2

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Concern for impacts to the significant wildlife habitat present in proximity to Turtle River/ White Otter Provincial Park, including potential impact to migration routes and species viability. Minimizing disturbance to animal habitats as much as possible is important to citizens.	The assessment of effects for wildlife and wildlife habitat within this assessment consider the study areas defined in Section 6.2.4.2 and characterize baseline and effects at those relevant scales for criteria species. Mapping provided in Appendix 6.5B shows the areas of potential habitat for criteria relative to the Project, including in proximity to Turtle River/ White Otter Provincial Park. The indicator of habitat distribution considers changes to spatial configuration and connectivity of, and the spatial distribution and movement of animals. The indicator survival and reproduction seeks to consider changes to animal abundance/wildlife populations from altering survival and/or recruitment. Mitigation recommended in this section to help avoid or reduce potential effects of the Project to wildlife are summarized in Table 6.5-40. As well, information on wildlife and wildlife habitat that may affect the practice of Section 35 rights and interests or land uses by Indigenous communities are discussed in further detail in Section 7.7 (First Nations Rights, Interests and Use of Land and Resources) and Section 7.8 (Métis Rights, Interests and Use of Land and Resources).	NWOMC and Region 2
Concerns related potential impacts to wildlife and wildlife habitat though changes in acoustic, air and visual quality; including life stage seasonality, avoidance and preferences by wildlife and related cumulative effects reflecting the already declining quantity and quality of harvested resources.	Potential Project environment interactions for wildlife in Table 6.2-22 includes interaction between sensory disturbance and all wildlife criteria for all Project stages (construction, operations and maintenance and retirement). Sensory disturbance (e.g., lights, smells, noise, human activity, viewscape) was identified to have potential to interact with wildlife where it may change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution and adversely affect survival and reproduction. Potential effect, mitigation measures and net effects assessment considering these interactions are assessed in Section 6.5.7.	NWOMC and Region 2

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Concerns regarding the potential impacts of fly rock from blasting on Species at Risk (e.g., bats) and wildlife.	The current access plan for construction minimizes the need for blasting operations. Where blasting activities are required, all blasting operations will occur in accordance with the EPP Blasting and Communication Management Plan. The process and procedures for notifications and minimizing effects of blasting activities (i.e., avoidance of sensitive features and timing windows, where possible) will be developed collaboratively with Indigenous communities. Mitigations measures in Section 6.5.7.7.1 include timing and distance considerations for blasting activities relative to hibernacula.	NWOMC and Region 2 MECP
Concern regarding potential impacts to bank swallow from aggregate activities within proposed and existing aggregate pits.	The Final EA has been updated to include buffers around nesting colonies and timing windows for activities during the breeding bird active season (April 15 to August 31), as well as Best Management Practices for aggregate activities for protection of bank swallow.	Ministry of the Environment, Conservation and Parks (MECP)
Consideration of eastern meadowlark, lesser yellowlegs, red headed woodpecker.	There are no known breeding season records of these species with the Project study area (Cadman et. al. 2007). Thus these species were not considered in the assessment. If these species were expanding their breeding range to within the Project study area, then they would be detected during the breeding bird surveys. Refer to Section 6.5.3.1 for full consideration of these species.	MECP
Concern regarding timing of vegetation removals and other construction, operation and maintenance activities within the migratory bird nesting period (April 15 to August 31) and the use of pre-clearing nest searches as mitigation to avoid	Construction will be scheduled to minimize vegetation removal during the breeding bird active season (April 15 to August 31). Furthermore, the Final EA has been updated to specify that MECP will be consulted and necessary permits will be required if timing windows for activities within habitat for endangered and threatened SAR birds cannot be adhered to.	MECP

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
impacts to protected bird species.		
Consideration of short-eared owl.	In Ontario, the core breeding range occurs in the northern tundra; it is considered uncommon in the remaining breeding range, especially in the boreal forest where nesting habitat is limited (COSEWIC 2021). Although it occurs year-round in the Thunder Bay area (where there are several occurrence records) there are only two breeding season records in the Project study area and one of these is historical. Thus, this species is not considered in the assessment (COSEWIC 2021). If short-eared owl was expanding its range to within the Project study area, then it would be detected during the breeding bird surveys, grassland bird surveys, least bittern surveys, marsh bird surveys, and evening amphibian calling surveys or eastern whip-poor-will surveys. Refer to Section 6.5.3.1 for full consideration of this species.	MECP MNRF
Request to include additional information on management and mitigation measures for identified species.	Further clarity added in Section 6.5.7 based on feedback from MECP and MNRF (see Appendix 4.0A) related to timing and distance guidance for activities in proximity to species at risk habitat such as bat hibernaculum or migratory birds.	MECP MNRF
Consideration of an additional wetland bird species that is common and generalist.	Trumpeter Swan was selected as an indicator species for marsh birds as they thrive in high quality habitats. No minimum size criterion was applied as a threshold for suitable Trumpeter Swan habitat. This approach was specifically taken to capture habitat impacts for all marsh bird and wetland species. Therefore, the addition of another wetland indicator species that is more common and widespread is not necessary, as this will not change the results of the impact analysis for marsh birds.	MNRF
Consideration of effects of transmission line ROWs to mammal predator-prey dynamics.	Potential effects of the Project on wildlife, including predator-prey dynamics, have been considered in the effects assessment of the Project.	Member of the public

Comment Theme	How Comment Addressed in the Environmental Assessment	Indigenous Community or Indigenous Group / Stakeholder
Concerns regarding potential effects to wildlife and plants, including species at risk.	Potential effects related to wildlife and wildlife habitat, including species at risk, are assessed and appropriate mitigation measures are identified in this EA section. Potential changes to vegetation and wetlands are assessed in Section 6.4.	Members of the public

EA = Environmental Assessment; ELC = ecological land classification; ESA = *Endangered Species Act*; GLP = Gwayakocchigewin Limited Partnership; km = kilometre; LSA = Local Study Area; MNRF = Ministry of Natural Resources and Forestry; ROW = right-of-way; RSA = Regional Study Area; SAR = Species at Risk; SARA = *Species at Risk Act*; SC = Special Concern; SWH = significant wildlife habitat; QA/QC = Quality Assurance/Quality Control; WMU = Wildlife Management Unit

6.5.2 Information Sources

Information incorporated into the wildlife assessment was obtained from the following sources:

- Project Description (Section 3.0);
- Waasigan Transmission Line Project Terrestrial Baseline Report (2022, Appendix 6.4-A);
- Studies published in scientific journals and reports;
- Other EA reports in northwestern Ontario;
- Forest Management Plans (FMPs);
- Forest Resource Inventory (FRI) data (MNRF);
- Electronic data obtained from the MNRF through Land Information Ontario (LIO) (MNRF 2022);
- Natural Heritage Information Centre (NHIC 2022);
- Ontario Breeding Bird Atlas (Cadman et al. 2007);
- Ontario Hydro Network (OHN) – Waterbody (MNR 2011a); and
- OHN – Watercourse (MNR 2011b).
- Provincial and federal legislation and guidance such as:
  - Ontario's *Endangered Species Act, 2007* (ESA) (Government of Ontario 2007);
  - The federal *Species at Risk Act* (SARA) (Government of Canada 2002);

- The federal *Migratory Birds Convention Act* (MBCA) (Government of Canada 1994),
- Species assessment from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2022);
- Species assessment from the Committee on the Status of Species at Risk in Ontario (COSSARO; Government of Ontario 2022);
- Environment and Climate Change Canada's Species at Risk Public Registry (Government of Canada 2021);
- Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (MNR 2010a);
- The Significant Wildlife Habitat Technical Guide (MNR 2000); and
- Cervid Ecological Framework (MNR 2009).

- Some of the above sources were used to identify the locations of natural heritage features such as:
  - Wetland layer and provincially significant wetlands (PSW) (MNRF 2013a);
  - Specialized wildlife habitat (e.g., aquatic feeding habitat, bald eagle, and osprey nesting habitat); and
  - The location of Areas of Natural and Scientific Interest (ANSI).
- Abandoned Mines Information System (AMIS) (ENDM 2020);
- Additional information provided from MNRF included:
  - Aerial inventory survey results from 1975 to 2023 in WMUs in and near the area of the Project.

For the purposes of the EA, sufficient information was deemed to be available from the references listed above to assess the potential effects of the Project on wildlife.

6.5.3 Criteria and Indicators

6.5.3.1 Wildlife and Wildlife Habitat Criteria

Criteria are components of the environment that are considered to have economic, social, biological, conservation, aesthetic, or ethical value, as described in Section 5.2.

Wildlife and other biodiversity elements are also captured by the assessment of upland, wetland, and riparian ecosystems that were selected as criteria to assess effects on vegetation and wetlands, and overall biodiversity (refer to Section 6.4). Assessing and managing biodiversity at the vegetation and wetlands ecosystems level means that large numbers of biodiversity elements are addressed together. For example, wildlife guilds dependent on very old live trees, standing dead trees, coarse woody debris, and natural disturbance processes (fire, insects, and disease) found in mature and older forests will be captured by the assessment of forest ecosystems. Similarly, analysis of the availability, distribution, and function of wetland and riparian ecosystems provides an assessment of amphibians, aquatic, and semi-aquatic birds and mammals (e.g., beaver), and potential movement corridors connecting habitats across the landscape.

To complement the assessment of vegetation and wetland ecosystems (refer to Section 6.4), a fine-filter approach was applied by assessing effects to select a number of wildlife species. This fine-filter level of assessment is important to understand effects on biodiversity that sometimes are distinct from effects on ecosystems, and for which targeted mitigation actions at the species level may be required (e.g., listed species). The vegetation and wetland ecosystems and wildlife and wildlife habitat assessments complement and interact with one another, with each assessment providing context for the other. Combined, the coarse- and fine-filter assessments provide a holistic assessment of the potential effects of the Project on wildlife.

The criteria for wildlife and wildlife habitat were initially outlined in the Draft ToR. Feedback from Indigenous communities, government officials and agencies, and interested persons and organizations received during engagement was incorporated into the selection of the criteria and indicators in the approved Amended ToR. The list of wildlife and wildlife habitat criteria was further refined to a final list of criteria by applying the following steps:

1) In cases where effects would be similar for multiple wildlife species or taxa groups (e.g., raptors), only one species was selected as a criterion for the Project to minimize ecological and assessment redundancy.
2) Wildlife species were not selected as criteria if there was a clear lack of an interaction with the Project activities and therefore a lack of potential effect from the Project (refer to Section 5.4), or if the species was not found in the LSA or immediate vicinity (i.e., within the RSA) in baseline conditions.

The criteria and indicators selected for the assessment of Project effects on wildlife and wildlife habitat, and the rationale for their selection, are provided in Table 6.5-2.

Table 6.5-2: Rationale for Selected Wildlife and Wildlife Habitat Criteria

Criteria	Conservation Status Species at Risk in Ontario (SARO)[a]	Conservation Status COSEWIC[b]	Conservation Status SARA[C]	Rationale for Selection
Ungulates (Moose) (*Alces alces*)	No Status	No Status	No Status	• Cultural and social importance. • Economic importance to local outfitters and hunting camps/guides. • Large source of protein and energy for large carnivores (e.g., wolf and black bear) and scavengers in boreal forest environments.
Gray fox (*Urocyon cinereoargenteus*)	Threatened	Threatened	Threatened	• Federally and provincially listed.
Furbearers such as: American marten (*Martes americana*); Beaver (*Castor canadensis*); and Gray wolf (*Canis lupus*)	No Status	No Status	No Status	• Cultural significance as well as economic and social implications associated with these criteria. • Gray wolf is a top predator in the study area so useful to consider predator/prey dynamics.
Little brown myotis *(Myotis lucifugus);* and northern myotis *(Myotis keenii)*	Endangered	Endangered	Endangered	• Federally and provincially listed. • Dependent on standing dead and live trees for maternity roosts in mature deciduous and mixed stands. • Hibernacula are limited. • Species that requires open forest/edge habitat in proximity to wetlands and waterbodies.
Herpetofauna: Snapping turtle (Chelydra serpentina)	Special Concern	Special Concern	Special Concern	• Cultural and social importance. • Federally and provincially listed.

Criteria	Conservation Status Species at Risk in Ontario (SARO)[(a)]	Conservation Status COSEWIC[(b)]	Conservation Status SARA[(C)]	Rationale for Selection
Herpetofauna: *Spring peeper (Pseudacris crucifer)*	No Status	No Status	No Status	• Breeding amphibian widespread in the study area.
Raptors: Bald eagle (*Haliaeetus leucocephalus*)	Special Concern	Not at Risk	No Status	• Provincially listed. • Cultural and social importance. • Sensitive to noise and human activity during nesting. • As a top avian predator can be a keystone species.
Marshbirds: Trumpeter swan (*Cygnus buccinator*)	No Status	Not at Risk	No Status	• Cultural and social importance. • Functional role in the ecosystem and food web.
Songbirds: Canada warbler (*Cardellina canadensis*)	Special Concern	Special Concern	Threatened	• Federally and provincially listed. • Threatened by habitat loss. • Indicator of coniferous, deciduous, moist mixed forest and regenerating habitats.
Songbirds: Eastern wood-pewee (*Contopus virens*)	Special Concern	Special Concern	Special Concern	• Federally and provincially listed species. • Aerial insectivore indicator that requires deciduous and mixed forest.
Songbirds: Olive-sided flycatcher (*Contopus cooperi*)	Special Concern	Special Concern	Special Concern	• Federally and provincially listed species. • Aerial insectivore indicator that requires coniferous forest, edges and openings near meadows and ponds.

Criteria	Conservation Status Species at Risk in Ontario (SARO)[a]	Conservation Status COSEWIC[b]	Conservation Status SARA[c]	Rationale for Selection
Bank swallow (*Riparia riperia*)	Threatened	Threatened	Threatened	• Federally and provincially listed. • Aerial insectivore that nests in colonies on vertical riverbanks, bluffs, and aggregate pit stockpiles.
Barn swallow (*Hirundo rustica*)	Special Concern	Special Concern	Threatened	• Federally and provincially listed. • Aerial insectivore that nests on humanmade structures such as buildings and bridges.
Chimney swift (*Chaetura pelagica*)	Threatened	Threatened	Threatened	• Federally and provincially listed. • Aerial insectivore that nests largely on humanmade structures such as the chimneys of large buildings in urban areas.
Eastern whip-poor-will (*Antrostomus vociferus*)	Threatened	Special Concern	Threatened	• Federally and provincially listed. • Important for continued ecological function of boreal ecosystems. • Threatened by habitat loss and degradation. • Aerial insectivore that requires open forest/edge habitat in drier deciduous and coniferous habitats.
Landbirds: Common nighthawk (*Chordeiles minor*)	Special Concern	Special Concern	Special Concern	• Federally and provincially listed. • Aerial insectivore that forages and nests in open habitats.

COSEWIC = Committee on the Status of Endangered Wildlife in Canada; SARA = *Species at Risk Act*; SARO = Species at Risk in Ontario;

a) Species at Risk in Ontario (Government of Ontario 2016).

b) Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2016).

c) *Species at Risk Act* (Government of Canada 2002).

Most criteria represent a broader group of species or a particular habitat type important for a variety of wildlife (i.e., provide ecological and assessment redundancy). For example, olive-sided flycatcher (*Contopus cooperi*) and eastern whip-poor-will (*Antrostomus vociferus*) represent a guild of species that forage on insects while flying through the air and require edge habitat and forest openings, but prefer different moisture regimes, and were identified as important by the MNRF and Environment and Climate Change Canada (ECCC). Bald eagles are tied closely to aquatic habitats such as fishbearing rivers, streams and lakes, and associated riparian areas and is representative of other raptors with similar life history strategies, such as osprey (*Pandion haliaetus)*. Little brown myotis (*Myotis lucifugus*) occupy forests that contain wildlife trees (e.g., dead or decaying trees that provide opportunities for refuge and nesting cavities) and this behaviour is also applicable to other cavity nesting species such as Pileated woodpecker (*Dryocopus pileatus)*. Snapping turtle share habitat requirements with other turtle species in the study area, namely western painted turtle (*Chrysemys picta bellii*). Consequently, understanding the potential effects of the Project on the selected criteria provides inferences about effects on other wildlife species or guilds with similar life history traits and habitat requirements.

Some of the wildlife criteria selected for assessment can represent conservation values that extend beyond the species itself (i.e., indicator, umbrella, or keystone species; Sergio et al. 2006, Estes et al. 2011) or are highly interactive and have a large influence on the ecosystem (Soulé et al. 2005). For example, conservation of predators, such as bald eagle, can have substantial benefits to other biodiversity elements where predators act as keystone species (Sergio et al. 2006, Estes et al. 2011). Highly interactive species such as moose have large home ranges, represent key sources of protein and energy for predators (natural and human) and scavengers in the boreal ecosystem (Popp et al. 2019; McLaren et al.2021).

During the data collection stage for NWOMC and Region 2's Traditional Knowledge and Land Use Study, participants reported harvesting or encountering habitats for the following species in the study areas (MNP 2023b). Below is a table which explains how these culturally significant species are considered in the assessment:

Table 6.5-3: Culturally Significant Species to NWOMC and Region 2

NWOMC and Region 2 Culturally Significant Species	Representative Criteria Species
Bear	Furbearers (Gray wolf-apex predator); Gray fox (omnivores, use of dens)
Beaver	Furbearers (Beaver)
Chicken[1]	Common Nighthawk (ground nesting bird); Raptors (year-round avian residents)
Coyote	Furbearers (Gray wolf: apex predator); Gray fox (also belongs to the canid family, habitat generalist and use of dens)
Deer	Moose (ungulate)

NWOMC and Region 2 Culturally Significant Species	Representative Criteria Species
Duck	Trumpeter swan
Fisher	Furbearer (American marten)
Fox	Furbearers (Gray wolf-predator); Gray fox (omnivores; use of dens)
Grouse	Common Nighthawk (ground nesting bird); Raptors (year-round avian residents)
Lynx	Furbearers (Gray wolf-predator; American marten)
Marten	Furbearer (American marten)
Moose	Moose
Otter	Furbearers (Beaver: also an aquatic mammal; American marten: also belongs to the weasel (mustelid) family) and aquatic criteria (e.g., benthic invertebrates and fish are food sources)
Partridge[1]	Common Nighthawk (ground nesting bird); Raptors (year-round avian residents)
Prairie Chicken[1]	Distribution of this species does not overlap the Project study areas
Rabbit	Furbearer (American marten-use of similar habitat types)
Spruce Hen[1]	Common Nighthawk (ground nesting bird); Raptors (year-round avian residents)
Squirrel	Furbearer (American marten: use of similar habitat types)
Weasel	Furbearer (American marten: also belongs to the weasel (mustelid) family)
Wolf	Furbearer (Gray wolf)
Wolverine	Distribution of this species does not overlap the Project study areas

1) Assume all these animals are referring to native ruffed grouse and/or spruce grouse and/or sharp-tailed grouse

Using indicator, umbrella, and keystone species has a number of advantages (Caro and O'Doherty 1998), but also has the potential to overlook habitat conditions or ecological processes that are important for wildlife, but not associated with an indicator species (Simberloff 1998). This potential concern is addressed in the wildlife assessment by selecting multiple species with a variety of habitat requirements and different ecological roles, including habitat specialists, predator species, prey species, wide ranging species, and seasonal migrants (Table 6.5-2).

American badger (*Taxidea taxus*) was initially considered as a criterion species but ultimately was not selected. There are no known occurrence records of American badger in the LSA or RSA for the Project. The closest known occurrences were recorded in 2000 and 1975, southwest of Thunder Bay over 50 kilometres (km) from the LSA, and west of Dryden over 30 km from the LSA, respectively. Most northwestern Ontario observations of American badger have occurred in Rainy River and Fort Frances, west of the LSA and RSA (Environment Canada 2013b). In Ontario, the majority of American badger observations have occurred in sand plains, an ecosite that is not present within the LSA or RSA (Environment Canada 2013b). In addition to sandy habitats, American badger require specific grassland and tallgrass prairies which are ecosites that are limited across the LSA and RSA. Due to lack of American badger observations and suitable habitat within the LSA and RSA, it is unlikely that there is a self-sustainable population of badger within the Project area. For these reasons, American badger was not carried forward to the assessment.

Similarly, American white pelican (*Pelecanus erythrorhynchos*), Eastern meadowlark (*sturnella magna*), lesser yellowlegs (*tringa flavipes*) least bittern (*Lxobrychus exilis*) and red-headed woodpecker (*Melanerpes erythrocephalus*) were not selected as criteria species because there are no known breeding/nesting records of these species in the LSA or RSA.

American white pelicans are regularly observed within the LSA and adjacent areas, with >50 occurrences within the Thunder Bay area alone (eBird 2022) and the species was observed incidentally near Thunder Bay during the 2022 field surveys (flyovers heading towards Lake Superior). A report provided by Lac des Mille Lacs First Nation notes pelicans have been sighted at a lake near the preliminary preferred route as well as a waterfowl migration route for pelicans (Lac des Mille Lacs First Nation 2023). However, there are no known nesting sites within 30 km of the LSA, with the nearest nesting colonies in Lake Superior, Lake of the Woods, and Lake Nipigon (Cadman et al. 2007, Birds Canada 2023a). For these reasons, American white pelican was not carried forward in the assessment.

Short-eared owls (*Asio flammeus*) are also regularly observed in the Thunder Bay area with more than 40 occurrences along Lake Superior between 1968-2022 (COSEWIC 2021; eBird 2022); however, there are only two breeding season records in the LSA from 1800 to 2023 (one historical record from 1991 near Thunder Bay and one recent record from 2020 near Sunshine; eBird 2022; Birds Canada 2023a). According to the Ontario Breeding Bird Atlas, no possible, probable or confirmed breeding evidence is tied to either of these records (Birds Canada 2023a). Furthermore, this species was not detected in the LSA during the 2022 field surveys (including breeding bird surveys, grassland bird surveys, marsh bird surveys or evening amphibian calling and eastern whip-poor-will surveys). For these reasons, short-eared owl was not carried forward in the assessment.

Background data indicate that least bittern is very rare within Thunder Bay, Rainy River, and Kenora Districts (e.g., Cadman et al. 2007, eBird 2022). A single record is known from background data within the RSA, which is >20 years old and is not linked to an element occurrence. Given their extreme rarity in northern Ontario, least bittern records observed in northern Ontario are treated as vagrants by the Ontario Bird Records Committee (Burrell et al. 2019). Least bittern was not detected within the LSA during the 2022 field surveys (including targeted least bittern surveys, marsh bird surveys and breeding bird surveys). Based on the species background data and surveys completed in 2022, there is no confirmed or known habitat for least bittern within the LSA and thus it was not carried forward as a criterion for the assessment.

Although eastern meadowlark and red-headed woodpecker breed in northwestern Ontario, they do not breed on the Canadian shield and the nearest known breeding records occur in the Lake of the Woods region more than 100 km beyond the west limits of the RSA (Birds Canada 2023a, Cadman et al. 2007; COSEWIC 2011; COSEWIC 2018a). Similarly, lesser yellowlegs is known to breed in the boreal forest within the northern portion of the northern shield, within the nearest breeding records more than 200 km north of the RSA (Birds Canada 2023a, Cadman et al. 2007; COSEWIC 2020). No eastern meadowlarks, lesser yellowlegs or red-headed woodpeckers were detected in the LSA during the 2022 field surveys (including breeding bird surveys, grassland bird surveys, least bittern surveys and marsh bird surveys). Based on the background data and survey completed in 2022, there is no confirmed or known habitat for eastern meadowlarks, lesser yellowlegs or red-headed woodpeckers within the LSA and thus these species were not carried forward in the assessment.

6.5.3.2 Measurement Indicators

Indicators represent attributes of the environment that can be used to characterize changes to the environment from the Project, anthropogenic changes to the environment, and other natural factors. The changes in indicators are used to predict overall effects to the criteria and assessment endpoints. The indicators for the wildlife criteria are defined as follows:

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

Each indicator was assessed quantitatively where sufficient information existed to support an assessment, and qualitatively where necessary, with the support of scientific literature and expert opinion. For instance, moose was assessed using the following measures to inform the indicators: habitat availability uses the supporting metrics from the Habitat Suitability Index model; habitat distribution is measured using a visual interpretation of the distribution of suitable habitats, including SWH for moose and linear feature density calculations; survival and reproduction uses the measures of population status (MNRF abundance estimates and recruitment demographics; long terms studies of moose populations in northern Minnesota) and what is known about threats to their survival from literature reviews.

The ability of a criterion species to accommodate disturbance is 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. 2015). 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 long enough that the population undergoes a fundamental change. Adaptability influences the duration and magnitude of effect required for this to happen, whereas resilience defines the ability of a species or ecosystem to recover or bounce back from disturbance. Highly resilient wildlife species have the potential to recover quickly from disturbance (e.g., after reclamation is achieved or after sensory disturbance is removed), whereas species with low resilience will recover more slowly or may not recover at all (Weaver et al. 1996).

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

6.5.4 Assessment Boundaries

6.5.4.1 Temporal Boundaries

The Project is planned to occur in three stages:

- **Construction stage:** the period from the start of construction to the start of operation (in-service date).

- **Operation and maintenance stage:** the period from the start of operation and maintenance activities through to the end of the Project life.
- **Retirement stage:** the period from the end of the Project life and start of retirement activities through to the end of final reclamation of the Project.

As described in Section 5.3.2, the Project will be operated for an indefinite period and the timing of retirement, or decommissioning, is not known at this time as it is anticipated that upgrades to reinforce or rebuild portions of the Project may occur over its lifetime to maintain its longevity. Further, potential effects and mitigation measures to be identified during the EA for the construction of the Project will likely equally apply to the potential removal of the Project at a future point in time, should it ever be required. Therefore, the construction scenario assessed as part of the EA is considered bounding and potential effects and mitigation measures for retirement are not identified separately in this EA.

The assessment of Project effects on wildlife considers effects that occur during the construction and operation and maintenance stages. This timeframe is sufficient to capture the effects of the Project.

6.5.4.2 Spatial Boundaries

The wildlife assessment used the following spatial boundaries (Table 6.5-4):

- The Project footprint;
- The LSA;
- One criterion-specific LSA; and
- Three criterion specific RSAs.

Criterion specific RSAs were necessary to capture the variation in species home range sizes, and the maximum predicted direct and indirect effects from the Project and cumulative effects from previous, existing, and RFDs on criteria populations. The RSA is the scale at which environmental significance is determined.

Table 6.5-4: Spatial Boundaries for the Assessment of the Project on Wildlife and Wildlife Habitat

Valued Component	Spatial Boundaries	Area (ha)	Description	Rationale
• Wildlife and Wildlife Habitat; and • Wildlife and Wildlife Habitat – Species at Risk.	Project Footprint	4,073	• The Project footprint includes: ◦ Typical 46 metre (m) wide transmission line right-of-way (ROW); ◦ Widened 1 km of ROW for the separation of circuits F25A and D26A; ◦ Modification of the Lakehead TS, Mackenzie TS, and Dryden TS; ◦ Access roads (improved existing roads and new); ◦ Temporary supportive infrastructure associated with construction including fly yards, construction/stringing pads, laydown areas, construction camps, and helicopter pads; ◦ Approximately 30% of access roads and trails outside of the ROW will remain in place to provide access for operation and maintenance activities; and ◦ Aggregate pits.	• Designed to capture the direct effects of the physical footprint of the Project.
• Wildlife and Wildlife Habitat; and • Wildlife and Wildlife Habitat – Species at Risk (excluding gray fox).	Local Study Area	164,787	• Includes a 1 km buffer around the Project footprint and a 1km buffer around existing access roads not requiring upgrades (e.g., secondary roads identified in the access plan) that will be used during the Project construction to account for the additional usage and risk to wildlife from road mortality, dust and noise.	• The LSA is defined as areas outside of the Project footprint where measurable changes to the environment resulting from the proposed activities from any Project phase may be anticipated. Defined to capture local effects of the Project activities, infrastructure and facilities on wildlife criteria that may extend beyond the footprints (e.g., dust and noise).
• Wildlife and Wildlife Habitat – Gray Fox.	Gray Fox Local Study Area	76,912	• Includes a 1 km buffer around the Project footprint from Thunder Bay to Atikokan. This includes a 1km buffer around existing access roads not requiring upgrades (e.g., secondary roads identified in the access plan) that will be used during the Project construction to account for the additional usage and risk to wildlife from road mortality, dust and noise.	• The current known distribution of gray fox in the vicinity of the Project extends from Thunder Bay to the Town of Atikokan and no farther north than the area surrounding Atikokan. The LSA was designed to capture this known distribution, specifically the within the LSA associated with former Alternative Routes 1, 1A, 1B-1, 1B-2, 1C, 2A, 2B, and 2C.
• Wildlife and Wildlife Habitat (excluding moose, gray wolf, and gray fox); and • Wildlife and Wildlife Habitat – Species at Risk.	Regional Study Area	548,121	• Extends 5 km from the Project footprint.	• Directly linked to land cover classification for vegetation and wetlands criteria. • Defined as an ecologically relevant scale for wildlife species with small to moderate breeding home ranges. • Provides a large enough area to assess the cumulative effects on populations of bats and birds criteria that are likely to be distributed inside but extend outside the RSA and is the scale at which significance is determined.

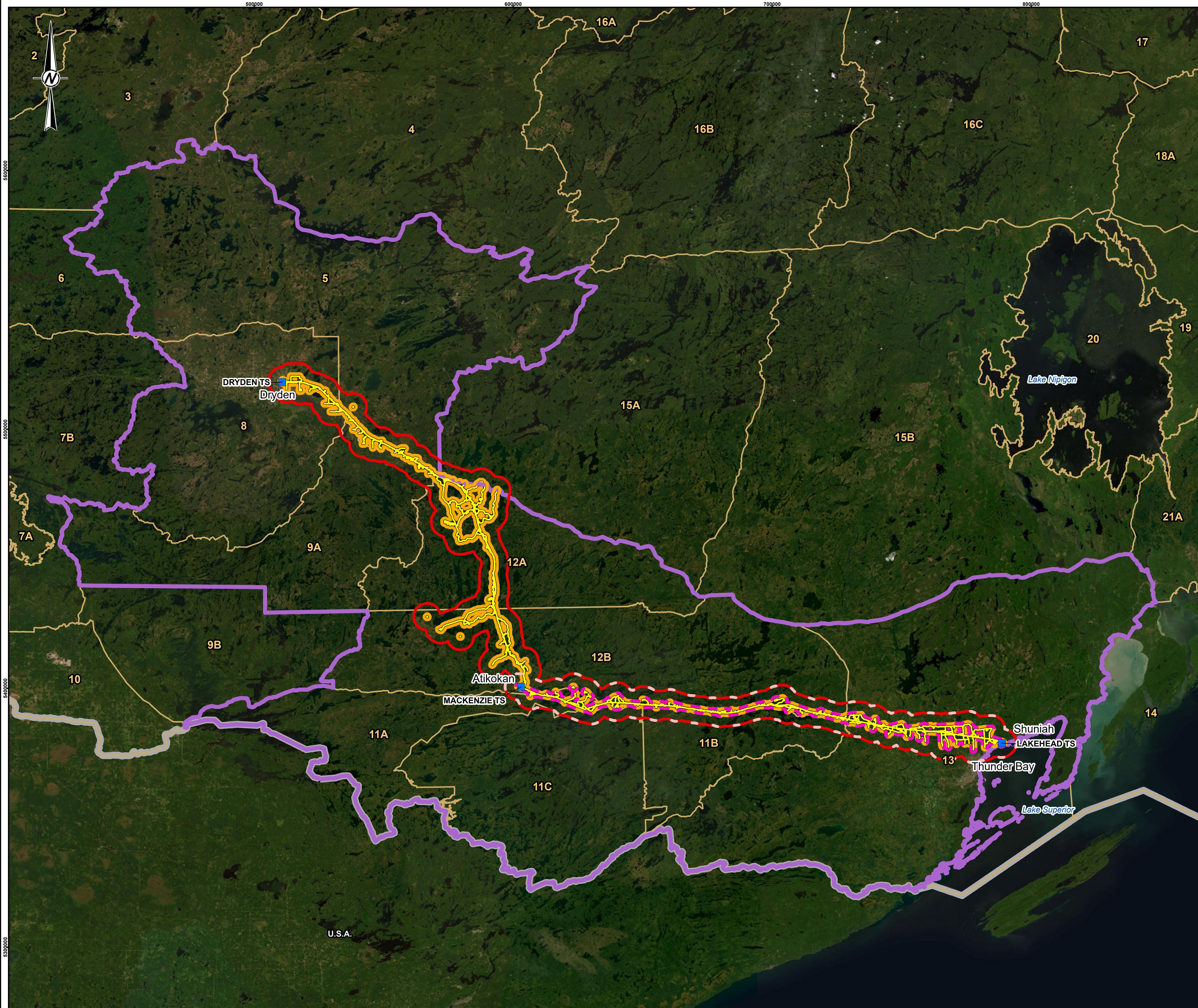
Valued Component	Spatial Boundaries	Area (ha)	Description	Rationale
• Wildlife and Wildlife Habitat – Moose and Gray Wolf.	Moose and Gray Wolf Regional Study Area	5,308,901	• WMUs 5, 8, 9A, 11B, 11C, 12A, 12B, and 13.	• Defined using regional population management boundaries established by the MNRF. • Provides broader scale context to capture and assess Project effects on species with large home ranges and predator-prey dynamics that may be influenced by the Project. • Appropriate scale for a cumulative effects assessment on moose and the scale at which significance was determined.
• Wildlife and Wildlife Habitat – Gray Fox.	Gray Fox Regional Study Area	258,424	• Extends 5 km from the Project footprint from Thunder Bay to Atikokan.	• Building upon the revised gray fox LSA as outlined above, the creation of a gray fox RSA was warranted to capture potential population effects and consider cumulative effects and significance. • Defined as an ecologically relevant scale for gray fox, a species with small to moderate sized breeding home ranges.

% = percent; ha = hectare; km = kilometre; LSA = Local Study Area; m = metre; MNRF = Ministry of Natural Resources and Forestry; RSA = Regional Study Area; TS = Transformer Station; ROW = Right-of-Way; WMU = Wildlife Management Unit.

The LSA was designed to capture the potential effects of the physical footprints of the ROW and associated infrastructure and immediate indirect effects (e.g., air emissions and fugitive dust, and noise) on wildlife. The LSA includes a 1 km buffer on the Project footprint. The LSA for wildlife is consistent with the vegetation and wetlands LSA (Figure 6.4-1 and Figure 6.5-1).

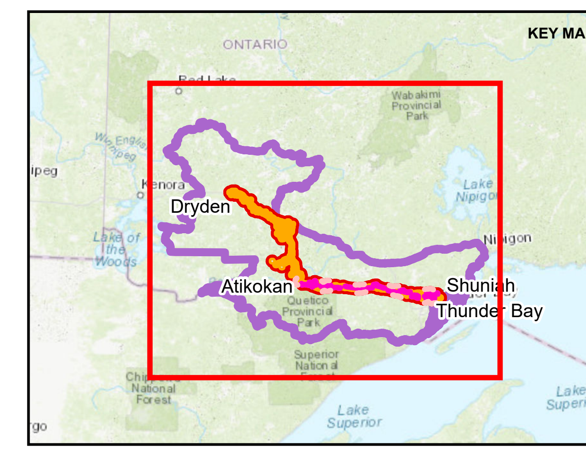
Criterion-specific RSAs for wildlife were identified as follows:

- Furbearers, raptors, songbirds, land birds, marsh birds, herpetofauna, little brown myotis, northern myotis, eastern whip-poor-will, barn swallow, bank swallow, bobolink, and chimney swift – The RSAs for these criteria is a 5 km buffer on either side of the Project footprint (Figure 6.5-1). The RSAs were selected to capture the predicted maximum spatial extent of the combined direct and indirect effects from the Project footprint on wildlife species with small to moderate breeding home ranges (e.g., bats, waterbirds, songbirds, and raptors). A recent metanalysis showed that effects from infrastructure on bird and mammal populations typically extended over distances of up to one and five kilometres, respectively (Benítez-López et al. 2010). Due to the length of the Project footprint the distribution of wildlife criteria is expected to be patchy to continuous throughout the RSAs, and for some wildlife criteria populations likely extend beyond the RSAs boundary. The RSAs are expected to capture a large enough portion of populations along the Project to make ecologically relevant predictions about the potential for the Project to contribute to negative cumulative effects.
- Moose and gray wolf – The moose and gray wolf RSA is defined as WMUs 5, 8, 9A, 11B, 11C, 12A, 12B, and 13. Moose have large home ranges, and the use of WMUs to define the RSA for moose is consistent with Ontario government management boundaries for wildlife species. This spatial boundary is also appropriate for gray wolf as wolf habitat selection is primarily dependent on the presence and abundance of prey species and moose is the main prey of gray wolf. The boundary of two other WMUs (11A, 15A) intersect the LSA, but do not intersect with the Project footprint, and thus were excluded from the moose and gray wolf RSA.



LEGEND

- 230 kV TRANSFORMER STATION (TS)
- INTERNATIONAL BORDER
- PREFERRED ROUTE FOOTPRINT
- REGIONAL STUDY AREA (GRAY FOX)
- LOCAL STUDY AREA (GRAY FOX)
- LOCAL STUDY AREA (TERRESTRIAL)
- REGIONAL STUDY AREA (TERRESTRIAL)
- REGIONAL STUDY AREA (MOOSE AND GRAY WOLF)
- WILDLIFE MANAGEMENT UNIT



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PROJECTION: CSRS UTM ZONE 15 DATUM: NAD 83

CLIENT
HYDRO ONE NETWORKS INC.

PROJECT
WAASIGAN TRANSMISSION LINE

TITLE
WILDLIFE AND WILDLIFE HABITAT CRITERIA STUDY AREAS

CONSULTANT

YYYY-MM-DD	2023-09-25
DESIGNED	EG
PREPARED	DB
REVIEWED	HK
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
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6.5.5 Description of the Existing Environment

This section provides a summary of the baseline characterization for wildlife criteria and indicators based on review of desktop and field survey information.

6.5.5.1 Baseline Data Collection Methods

For each identified wildlife criterion, the existing environment is described to provide context for the assessment. Baseline characterization for each wildlife criterion was completed using baseline field surveys, digital data provided by Hydro One Networks Inc. (Hydro One), available in-house at WSP, (including Ministry of Natural Resources and Forestry [MNRF] Land Information Ontario [LIO] and Natural Heritage Information Centre [NHIC] data), and obtained through publicly available databases, published reports and grey literature, IK (Indigenous Knowledge)/Traditional Land and Resource Use (TLRU) studies received from Indigenous communities, habitat maps, and through available literature relevant to wildlife in the criterion-specific RSAs. Baseline characterization for each criterion is described according to the habitat and the survival and reproduction indicators.

The description of baseline characterization considered each indicator for each criterion. The relevance of changes in each measurement indicator depends on how historical changes have affected the integrity of each criterion at the population level. The baseline characterization assessment therefore seeks to understand the status of each wildlife criterion population in the criterion specific RSA, which provides context for understanding the sensitivity of the criterion to future activities in the wildlife and wildlife habitat LSA. The status of each criterion population was considered using the known or inferred ability of the criteria to absorb or otherwise accommodate disturbance.

Baseline field data used to for baseline characterization for the Project were collected during 2020 through 2022 and focused on areas along all route alternatives and within the wildlife and wildlife habitat LSA. A full description of the methods and results of baseline field surveys completed for the Project between 2020 and 2022 is presented in Appendix 6.4-A.

An important part of the baseline characterization for the Project was to estimate the availability and distribution of wildlife habitat. Availability and distribution of suitable habitat for wildlife criteria was estimated according to the methods described in Appendix 6.5-A.

Existing environment conditions identified in the baseline characterization are the outcome of past and present activities in the wildlife and wildlife habitat LSA, and natural factors that cause environmental change (Appendix 6.5-A). Consequently, the baseline characterization describes the current environmental conditions of each criterion given the combined effects of past and present activities in the wildlife and wildlife habitat LSA.

6.5.5.1.1 Previous and Existing Disturbances

Linear disturbance densities were calculated by each wildlife RSA by measuring the total length of linear disturbances on the landscape (see list below) and dividing by the total area of a given RSA. Although some disturbances may not be permanent (e.g., successional regeneration of forest post-wildfire or harvest), they were assumed to be permanent to maximize effects in the assessment and reduce uncertainty. Uncertainties with projecting future habitat condition is discussed further in Section 6.3.11.

In the terrestrial LSA and in the moose, and bat and birds RSAs, total disturbance (area and percentage) was calculated using available data from the MNRF, Ministry of Mines, Ministry of Northern Development, Forest Resource Inventory (FRI), and Provincial Land Cover 2000 (MNR 2002). Disturbances were classified as either linear, polygonal, or points. To calculate the area and percentage of human disturbance, point and linear anthropogenic disturbances were buffered to create footprints for each disturbance type.

The list of linear feature types that were included in the linear density analysis are as follows:

- ORN Road Segment
- OTN Trail Segment
- Trail Segment (Restricted data layer)
- Utility Line

The list of disturbance features that were included in the total habitat disturbance analysis are as follows:

- FRI Polytype: UCL
- Aggregate Site – Authorized Active
- Intersections between ORN Highways and OHN Watercourse
- Fire Disturbance
- AR Harvest Depletions
- ORN Road Segment
- ORWN Track
- OTN Trail Segment
- Trail Segment (Restricted data layer)
- Utility Line

- Hydro One existing transmission line ROWs

The list of buffers applied to the disturbances classified as points or lines, for the purposes of the total disturbance analysis are as follows:

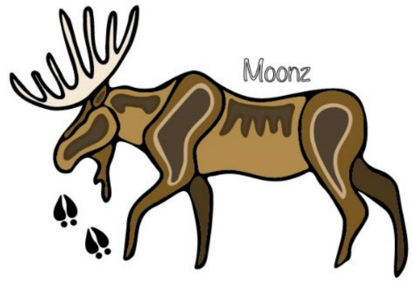
- 200 m on point intersection between ORN Highways and OHN Watercourse
- 500 m buffer on ORN Highways and Track
- 10 m buffer on ORN Roads (excluding highway)
- 1.5 m buffer on Trails
- 5 m buffer on Utility Lines

6.5.5.1.2 Habitat Models and Mapping

Habitat models were used to provide spatially explicit descriptions of habitat availability and distribution under existing environment conditions representing an estimate of available habitat as a result of past and present activities in the terrestrial LSA and criterion specific RSAs. Models were used to estimate the suitability of habitat for moose, little brown myotis and northern myotis maternity roost habitat, American marten, gray fox, bald eagle, trumpeter swan, eastern wood-pewee, Canada warbler, eastern whip-poor-will, common nighthawk, and olive-sided flycatcher.

Habitat was categorized using a two-category (i.e., suitable or unsuitable) or four-category (i.e., high suitability, moderate suitability, low suitability, or unsuitable) system, as appropriate for each wildlife criterion. Models which contain the two-category system used ecosite screenings for suitable types only. Most were based upon direction or guidance from provincial regulators (e.g., marten used an MNRF-based screening and SAR bat maternity roost habitat used direction from MECP Species at Risk Branch [SARB]). Mapping habitat suitability was completed using available data (e.g., ELC mapping), a literature review of habitat selection and species ecology, and experienced opinion. Habitat suitability models quantify assumptions about wildlife habitat quality and have been used extensively to predict the potential effects of habitat alteration on wildlife populations (Marzluff et al. 2006). Methods used to develop habitat models and the resulting structure of each model are detailed in Appendix 6.5-A.

6.5.5.2 Moose



UNGULATES (MOOSE)

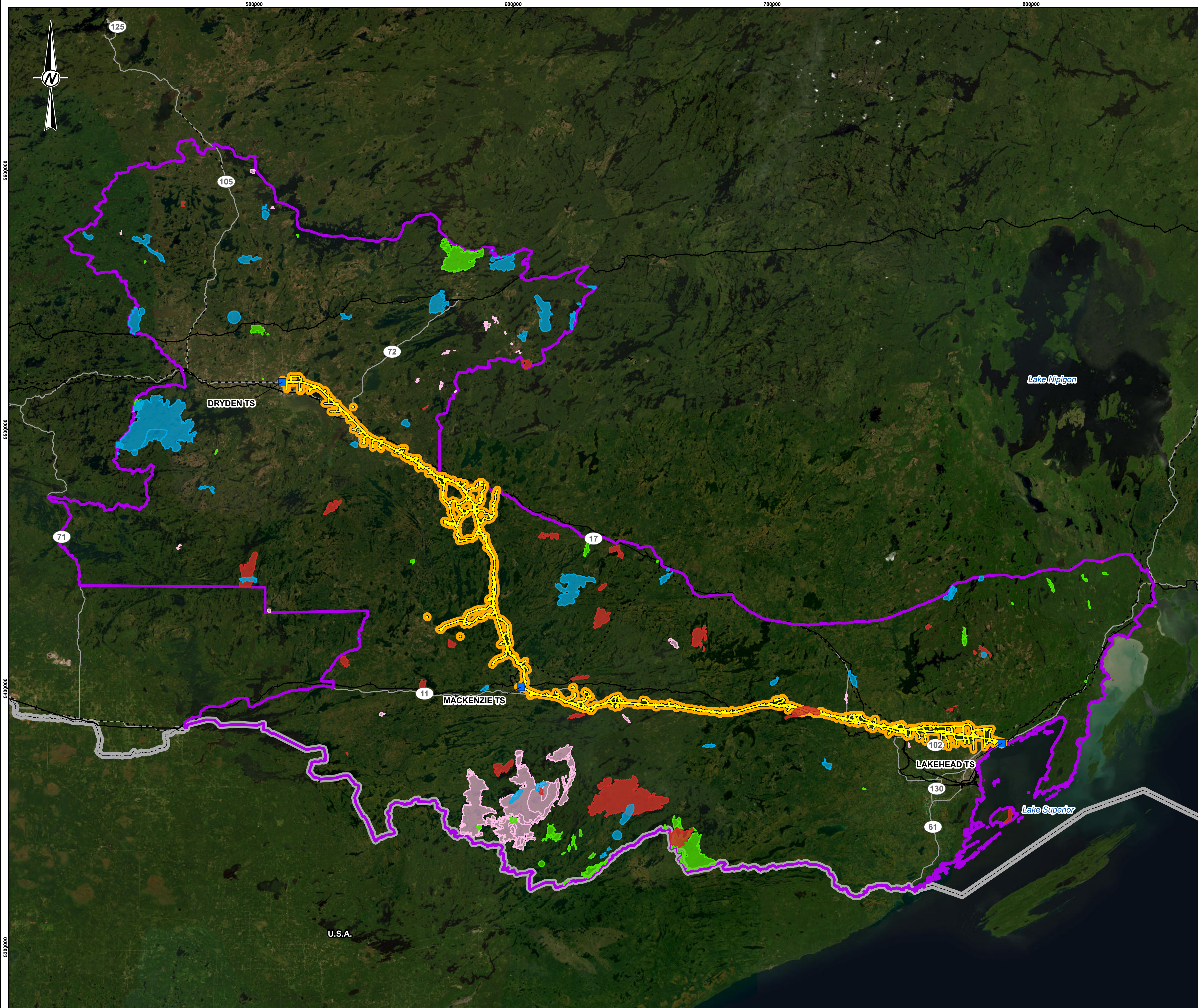
Moonz

Habitat Availability

Moose occur across Canada in boreal and mixed forests below the Arctic (Franzmann 2000). Although considered a generalist species, moose have been shown to prefer deciduous aspen, shrubland, and wetlands interspersed with trees and shrubs, particularly early successional forests (Street et al. 2015a). Optimal moose habitat consists of deciduous shrub and ground strata (i.e., layers) within deciduous, mixed, and coniferous forests that offer edge or disturbed areas of early successional vegetation (Poole and Stuart-Smith 2003, Courtois et al. 2002, Osko et al. 2004, Nelson et al. 2008, Fryxell et al. 2020). During baseline field studies conducted in 2022 in the terrestrial LSA, moose were observed incidentally along roads that were adjacent to wetlands, open marsh, conifer forest, and the existing ROW (Appendix 6.4-A). A report provided by Migisi Sahgaigan First Nation notes the presence of moose and other wildlife of cultural significance near the area of the Project footprint (Migisi Sahgaigan 2022).

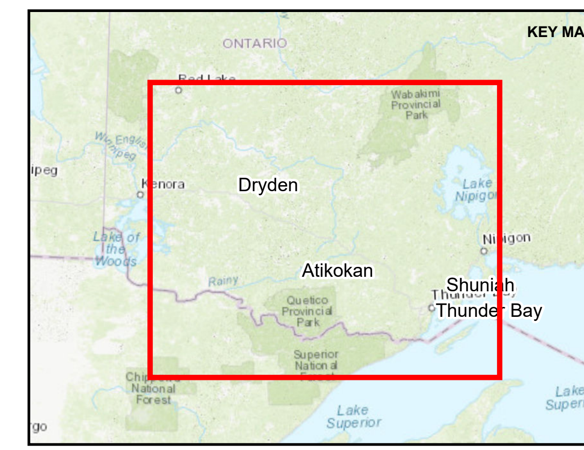
Deciduous trees and shrubs are important dietary items during winter, a critical period when forage is scarce and a limiting factor for populations. Preferred fall and winter browse includes red-osier dogwood (*Cornus sericea*), willow species (*Salix* spp.), trembling aspen, balsam poplar, bog/dwarf birch (*Betula glandulosa*), alder (*Alnus* spp.), and beaked hazelnut (*Corylus cornuta*) (Stelfox 1993). The moose diet in summer is typically made up of 74% shrubs and trees, 25% forbs, and 1% graminoids (Renecker 1987). The ideal availability of food may be when landscapes are comprised of approximately 25% to 40% primary habitat (Allen et al. 1987, Romito et al. 1999, Higgelke et al. 2000). In general, it is thought that moose respond more to food availability than cover (Stewart et al. 2010); however, moose will adjust their behaviour in the winter and move to avoid areas of deep snow (e.g., greater than 90 centimetres (cm), Peek et al. 1982) and use mature coniferous stands, which intercept snowfall (Courtois et al. 2002).

Burned areas where high densities of shrubs are available for browsing would provide attractive habitat patches for moose on the landscape. The number of years it takes before moose select a burned area varies depending on fire intensity and severity (Street et al. 2015b). In upland habitats, functional habitat for moose is expected to become available 6 to 10 years after disturbance (i.e., after the revegetation of a shrub layer; Nelson et al. 2008). Typically, shrubs are available for browsing in burned areas 6 to 20 years post-fire. There have been minimal wildfires in the moose study areas in the past 60 years. Between 1960 to 2021, 1,831 ha burned in the terrestrial LSA (1.1% of the LSA) and 249,257 ha burned in the moose and gray wolf RSA, representing 4.7% of the study area (Figure 6.5-2). A review of wildfire disturbance since 1960 determined that the most recent fire greater than 1,000 ha to affect the moose and gray wolf RSA occurred between in 2021 covering an area of 43,355 ha. Most (62.6%) of the wildfires in the moose and gray wolf RSA are greater than 40 years old. Approximately 13.7% of the wildfires since 1960 are six to 20 years old (2001 to 2017), which is the age when the most desirable regenerating vegetation for moose is expected to be most abundant.



LEGEND

- 230 kV TRANSFORMER STATION (TS)
- INTERNATIONAL BORDER
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- RAILWAY
- NATURAL GAS PIPELINE
- PREFERRED ROUTE FOOTPRINT
- LOCAL STUDY AREA
- REGIONAL STUDY AREA (MOOSE AND GRAY WOLF)
- BURNS 0-5 YEARS OLD
- BURNS 6-20 YEARS OLD; 2000; 2001
- BURNS 21-40 YEARS OLD; 1998
- BURNS >40 YEARS OLD



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PROJECTION: CSRS UTM ZONE 15 DATUM: NAD 83

CLIENT
HYDRO ONE NETWORKS INC.

PROJECT
WAASIGAN TRANSMISSION LINE

TITLE
FIRE DISTURBANCES WITHIN THE MOOSE AND GRAY WOLF REGIONAL STUDY AREA

CONSULTANT

wsp

YYYY-MM-DD	2023-09-25
DESIGNED	MB
PREPARED	DB
REVIEWED	HK
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
20137728	0041	1	6.5-2

The moose and gray wolf RSA overlaps portions of nine Forest Management Units: Lakehead Forest, Black Spruce Forest, Dog River-Matawin Forest, Boundary Waters Forest, English River Forest, Wabigoon Forest, Dryden Forest, Lac Seul Forest, and Whisky Jack Forest. Harvest within these units is managed under Sustainable Forest Licences allocated to forestry management operators who are responsible for developing strategic forest management plans (FMP) every 10 years. Within the FMPs, management of moose habitat is considered in the design and duration between cuts; for example, in the 1990s the approach of return cuts within 10 years was extended to allow for regeneration up to 2 m to provide early winter habitat and up to 6 m to provide late winter habitat for moose (Resolute FP Canada Inc. 2020).

A habitat suitability model was developed for moose, using FRI data that varied in source year depending on the region (see Section 6.4.5 for description of ecosystem mapping). The summary of age of forests classes was derived from 'Overstory of Origin' metadata from the FRI data package, using the most recent year of correction (2016). As a result of the age of FRI data, some age classes of habitat that would typically be avoided (0 to 5 years) by moose could not be calculated (Appendix 6.4-A). The categorization of habitat types into high, moderate, low, and poor suitability considered forage, movement, and cover requirements throughout the year. The model also included potential effects from sensory disturbance (noise, smells, dust, presence of people) on habitat quality by applying a 500 m zone of influence (ZOI) (Ficetola and Denoel 2009) to disturbances with expected high activity levels (i.e., highways, residential areas, industrial areas; Laurian et al. 2008, 2012; McLoughlin et al. 2011). It was assumed that within the ZOI applied to the human development feature, the habitat suitability was reduced to poor so that effects were not underestimated (Appendix 6.4-A).

In the existing environment, the terrestrial LSA contains as estimated 60,638 ha (36.8%) of high suitability habitat, 15,463 ha (9.4%) of moderate suitability habitat, and 37,645 ha (22.8%) of low suitability habitat for moose. The moose and gray wolf RSA contains as estimated 1,798,126 ha (33.9%) of high suitability habitat, 676,092 ha (12.7%) of moderate suitability habitat, and 1,644,153 ha (31.0%) of low suitability habitat for moose (Table 6.5-5). Collectively, moderate and high suitability habitat represent 76,101 ha (46.2%) and 2,474,218 ha (46.6%%) of the LSA and moose and gray wolf RSA, respectively. High and moderately suitable moose habitat in the LSA is associated with coniferous and mixed forest ecosites. Jack pine-black spruce dominated coniferous forests and aspen-birch hardwood mixed forests comprise the majority of high and moderate suitability moose habitat in both the LSA and moose and gray wolf RSA.

Significant Wildlife Habitat (SWH) include a range of habitats known to be important for sustaining wildlife and plant populations, such as seasonal concentration areas and specialized habitats that enhance species survival (MNR 2010a; OMNR 2000). SWH features for moose are present in the terrestrial LSA and moose and gray wolf RSA in the existing environment, including 1,697 ha of moose late wintering habitat and 829 ha of moose aquatic feeding areas in the LSA (Appendix 6.4-A).

A report provided by Lac des Mille Lacs First Nation notes moose travel corridors usually occur in riparian areas and tributaries. The report indicates the presence of moose travel corridors that either cross the preliminary preferred route or are nearby and identifies some moose wintering and calving sites in the region (Lac des Mille Lacs First Nation 2023).

Table 6.5-5: Moose Habitat Availability in the Local and Regional Study Areas at the Existing Environment

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	Moose and gray wolf RSA Area (ha)[2]	Moose and gray wolf RSA Percent (%)
High	60,638	36.8%	1,798,126	33.9%
Moderate	15,463	9.4%	676,092	12.7%
Low	37,645	22.8%	1,644,153	31.0%
Poor	51,329	31.1%	1,188,900	22.4
Total	**164,787**	**100.0%**	**5,308,901**	**100.0%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

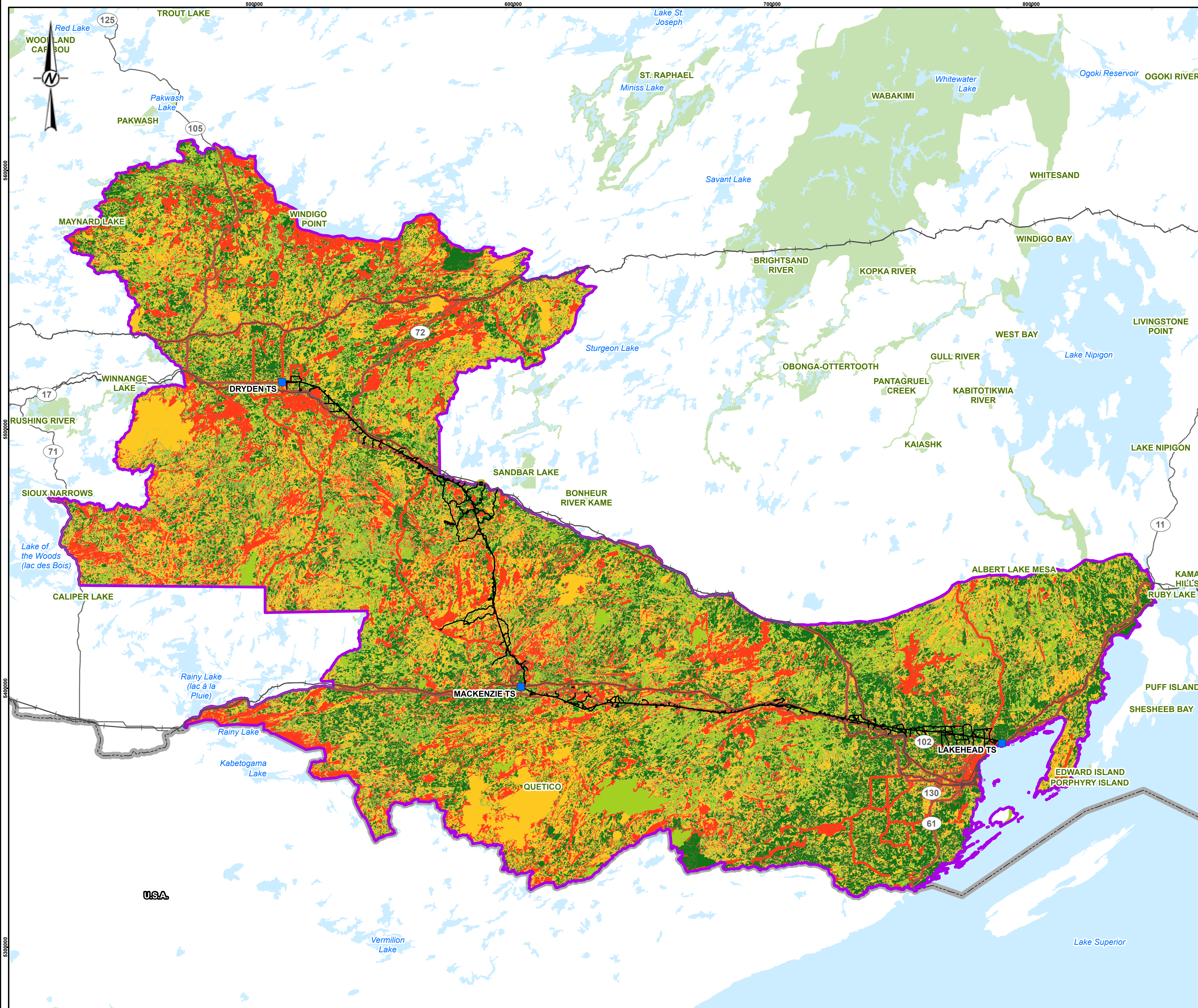
1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

2) The moose and gray wolf RSA was created using provincial WMU boundaries, excluding Lake Superior (i.e., the RSA study area clipped to the boundary of Lake Superior).

Habitat Distribution

The moose and gray wolf RSA covers a transition zone whereby the northern section is dominated by boreal coniferous species (e.g., spruce and jack pine) and the southern section is characterized by hardwood species (e.g., poplar and birch) and broad swamps. Habitat management in the northern part of the moose and gray wolf RSA and farther north is prioritized for caribou, whereas the priority for habitat management in the southern part of the moose and gray wolf RSA is moose.

Historically, regional forest composition and structure was primarily affected by wildfire, insect outbreaks, and disease, while more recently large-scale harvesting and fire suppression play key roles in forest composition and structure (Resolute FP Canada Inc. 2020). Current conditions of the forest composition and age distribution in the LSA and moose and gray wolf RSA have been impacted by harvesting activities and fire suppression. High and moderate suitability habitat is present and distributed throughout the LSA and moose and gray wolf RSA under existing environment conditions (Figure 6.5-3). High suitability habitat is concentrated in the southeast portion of the LSA and moose and gray wolf RSA, outside of Thunder Bay, and in the northwest portion of the study areas, immediately north of Dryden.

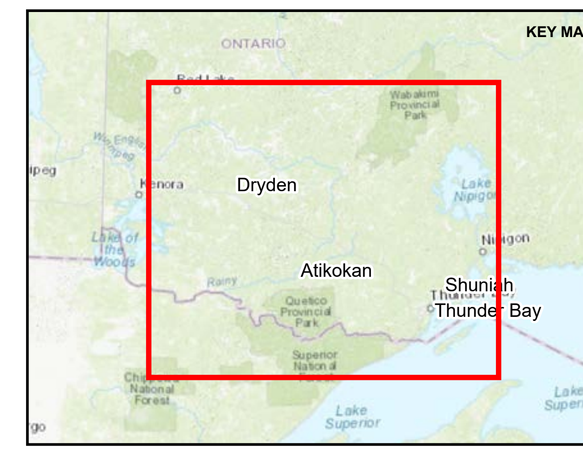


LEGEND

- 230 kV TRANSFORMER STATION (TS)
- INTERNATIONAL BORDER
- PRIMARY HIGHWAY
- SECONDARY HIGHWAY
- RAILWAY
- PREFERRED ROUTE FOOTPRINT
- REGIONAL STUDY AREA (MOOSE AND GRAY WOLF)
- WATERBODY
- PROVINCIAL PARK

MOOSE HABITAT SUITABILITY

- HIGH
- MODERATE
- LOW
- POOR



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PROJECTION: CSRS UTM ZONE 15 DATUM: NAD 83

CLIENT
HYDRO ONE NETWORKS INC.

PROJECT
WAASIGAN TRANSMISSION LINE

TITLE
MOOSE HABITAT SUITABILITY WITHIN THE MOOSE AND GRAY WOLF REGIONAL STUDY AREA

CONSULTANT
WSP

YYYY-MM-DD	2023-09-25
DESIGNED	MB
PREPARED	DB
REVIEWED	HK
APPROVED	CS

PROJECT NO.	CONTROL	REV.	FIGURE
20137728	0041	1	6.5-3

Low suitability habitat is distributed throughout the LSA and moose and gray wolf RSA and associated with meadows, low impact existing disturbances (e.g., cutlines, existing ROW, trails) and recent and old fires and cutblocks. Poor suitability habitat within the RSA is associated with open water and existing disturbances which are considered to be highly active (e.g., highways). Highways 11 and 17 bisect the moose and gray wolf RSA in an east-west direction, and secondary highways bisect in a north-south direction; these roads may hinder movement and connectivity (Figure 6.5-3). Overall, suitable moose habitat is well distributed but interspersed with low and poor suitability habitat across the LSA and RSA under existing environment conditions.

At a landscape scale, moose are more abundant in disturbed (logged) habitats with moderate road densities than in undisturbed habitat, as a result of the foraging opportunities in the post-disturbance deciduous forests (Bowman et al. 2010; Beyer et al. 2013). However, at a finer scale, moose movement, behaviour, and habitat connectivity are negatively affected by human activity and road density (Beyer et al. 2013). Moose have demonstrated avoidance of roads, with the magnitude of the effect increasing with greater traffic volumes (Mytton and Keith 1981; Laurian et al. 2008; Bartzke et al. 2015). Some studies indicate moose avoidance of roads by 100 m to 3 km (Jiang et al. 2009, Laurian et al. 2012) but this effect may be seasonal where avoidance of roads is more evident in fall or winter (McLoughlin et al. 2011, Beyer et al. 2013). It has been postulated that avoidance of roads by moose in fall and winter may be an artifact of hunter use of roads to harvest moose (McLoughlin et al. 2011; Rempel et al. 1997), as well as an increased density of predators whose movements are facilitated by linear features (Bowman et al. 2010). Transmission lines may act as a barrier to moose movement when the width of the ROW exceeds 90 m (Joyal et al. 1984), but narrower ROWs are not avoided (Bartzke et al. 2014, Bartzke et al. 2015) and may provide suitable forage as cleared vegetation regenerates and attracts moose (Bartzke et al. 2014). A report provided by Lac des Mille Lacs First Nation indicates moose hunting locations near the preliminary preferred route (Lac des Mille Lacs First Nation 2023).

Narrow or less permanent anthropogenic disturbances (e.g., the ROW for the existing transmission line, cutlines, trails) in the moose and gray wolf RSA may be attractive to moose as early successional foraging habitat (Higgelke 1994; Serrouya and D’Eon 2002; Poole and Stuart-Smith 2003) and are unlikely to affect connectivity for moose under existing environment conditions. In some studies, moose have been documented showing a preference for seismic lines, utility lines, and logging roads (Higgelke 1994; Serrouya and D’Eon 2002) and may be drawn to salt on and around highways in winter (Miller and Litvaitis 1992). In contrast, Laurian et al. (2008) found that moose showed avoidance of areas up to 500 m from highways, and that their avoidance of roads varied seasonally from 100 m to 250 m (Laurian et al. 2012).

Existing linear feature density, including roads, utilities, trails and tracks, in the LSA is 1.68 km/km^2, but reduced to 1.38 km/km^2 when streets in the built-up communities of Thunder Bay and Dryden are excluded. In the moose and gray wolf RSA, the total linear feature density is 0.49 km/km^2, but reduced to 0.40 km/km^2 when built-up communities are excluded. Under existing environment conditions, it is reasonable to assume that Highways 11 and 17 and existing resource/recreation roads may be affecting moose, particularly during periods of higher harvesting activity when there are more vehicles on the roads; however, the other linear features (including recreational trails) in the RSA are unlikely to be affecting moose movements, and the ROWs for the existing transmission line and natural gas pipeline may be an attractant for the early seral vegetation growing following regular maintenance activities.

In the existing environment, approximately 69.0% of the LSA and 77.6% of the moose and gray wolf RSA is considered high, moderate or low suitability moose habitat (Figure 6.5-3), and it is well distributed in the LSA and moose and gray wolf RSA (Appendix 6.5-A). Moderate and high suitability habitat is more contiguous in the southern quarter of the moose and gray wolf RSA.

Survival and Reproduction

Moose are not listed federally (Government of Canada 2021) or in Ontario (Government of Ontario 2022), nor under consideration by COSEWIC (2016). Moose populations are managed by the Government of Ontario primarily through harvest and forest management planning at the scale of WMUs across the province. Moose populations in the province increased from the early 1980s to the early 2000s and have since declined during the past decade (Timmermann and Rodgers 2017; MNRF 2022a). The TKLUS shared by NWOMC and Region 2 notes the presence of moose near the Project footprint (MNP 2023b).Incidental data collected during wildlife baseline surveys confirmed moose occur in the LSA (Appendix 6.4-A), but moose population estimates and density were not measured.

Aerial surveys conducted in by the Ontario Government between 1975 and 2023 indicate moose populations in the Project study areas are declining, and estimated population densities are mostly below the objectives for WMUs in Zone C1, which prioritize moderate to high densities of moose (Appendix 6.4-A). Adjacent WMUs south of the LSA (Zone D1) also prioritize moderate to high moose densities, however the 2023 population estimates in Zone D1 are similarly below the objectives (MNRF 2023). Adjacent WMUs north of the LSA are categorized as Zone B, which prioritizes low to moderate moose density in support of caribou populations (MNRF 2023).

Moose are long-lived ungulates with relatively high adult survival rates (e.g., 74.6% to 89.9% [including harvest]; Murray et al. 2012), with a life expectancy of 12 to 20 years in hunted populations (Arsenault 2000). Moose have high pregnancy rates and regularly give birth to twins (Boer 1992). An Ontario moose productivity study determined that pregnancy rates were 22% for yearling and 86.5% for adult females, with twins occurring in 17% of these pregnancies (Murray et al. 2012). These reproductive rates are within the range observed in other moose populations (Stenhouse et al. 1994, Schwartz 1998). The northeastern Minnesota moose population has been studied for a decade and the findings from this past year of study was an estimated calf: cow ratio at 0.38, which is comparable to values observed over the last ten years (Guidice 2023).

Moose are highly mobile and have large annual home ranges that often encompass thousands of hectares (Murray et al. 2012, Street et al. 2015a). Individual moose undergo seasonal movements as part of the annual lifecycle in many parts of their range (Andersen 1991; Ball et al. 2001), and winter home ranges may be larger because of increased metabolic demands and decreased availability of forage biomass in colder weather (Dussault et al. 2005, Street et al 2016).

Typically, during spring, summer, and fall moose use lowland to upland forests for eating fresh shoots and leaves from deciduous shrubs, young deciduous trees, and wetland vegetation. During the fall and winter, moose typically prefer habitats where adequate browse is available and provide denser cover from wind and snowfall (Dussault et al. 2005). These types of movement patterns are not specifically known for moose in the RSA.

Moose display life history traits (e.g., habitat generalists, large home ranges, high reproductive rates) that provide flexibility to adapt to different ecozones and levels of disturbance across North America. Their range in North American has shifted northward in response to climate change (Timmermann and Rodgers 2017; Priadka et al. 2022), and their preference for early successional vegetation allows them to exploit recently disturbed areas (Courtois et al. 2002; Ranta and Lankester 2017). However, their use of disturbed areas for foraging puts moose at an increased risk of predation and human harvest; previous research in northwest Ontario has demonstrated that in areas where disturbance occurs concurrently with hunter access, moose density decreases (Rempel et al. 1997).

Moose are primarily threatened by direct and indirect habitat loss (Street et al. 2015a), altered predator-prey relationships (Dussault et al. 2005, Street et al. 2015a), disease and parasites (Severud et al. 2022), and hunting (Timmerman et al. 2002). Their primary predators in Ontario are wolves and black bears (*Ursus americanus*), which most often kill calves, although adults can also become prey (Ballard and Van Ballenberghe 1997). Predation and snow conditions are interrelated factors that can affect moose survival and recruitment; deeper snow hinders moose movement which increases risk of predation (Franzmann 2000; MNRF 2014a,b,c,d,e,f,g,h,i,j,k). The expansion of white-tailed deer populations has negatively impacted moose populations, because of the increased abundance of predators and because deer are hosts to parasites (winter tick [*Dermacentor albipictus*] and meningeal worm [*Parelaphostrongylus tenuis*]) which cause higher mortality rates in moose (Ranta and Lankester 2017; Priadka et al. 2022; Severud et al. 2022). A report provided by Lac des Mille Lacs First Nation notes there was a higher population of deer in the 1940s and 1950s following a timber harvest; however, populations are now in decline" (Lac des Mille Lacs First Nation 2023). All of these factors are expected to affect the survival and reproduction of the moose population overlapping the RSA in the existing environment.

6.5.5.3 Gray Fox

GRAY FOX

Waagosh

Habitat Availability

Gray foxes are habitat generalists and have been known to use a variety of habitats ranging from forests to agricultural lands to urban areas. Though they are thought to use a higher proportion of wooded habitat than other fox species and are most strongly associated with deciduous forest and prefer landscapes with both wooded and open areas (COSEWIC 2015, MECP 2019). Baseline characterization found that deciduous forest cover accounted for 47% of the gray fox home range occurrence records within the gray fox LSA and RSA.

Denning features are often located in wooded or brushy areas that are close to a water source (MECP 2019). Habitat selection is strongly influenced by prey abundance and foraging availability (Temple et al. 2010), and similar to their habitat use, gray fox diets are variable and often dependent on season and geography (MECP 2019). Gray fox are omnivores, commonly feeding on mammals, fruit and seeds, birds, invertebrates, and anthropogenic food sources (Larson et al. 2015).

Availability of gray fox habitat was estimated at baseline characterization using Provincial Land Cover 2000 and FRI data (Appendix 6.4-A). At baseline characterization, there is a large amount of high suitability gray fox habitat in the RSA (Table 6.5-6), which is well distributed across the landscape, and being habitat generalists, gray fox have the ability to use many different habitat types.

A habitat suitability model was developed to predict suitable gray fox habitat as described in Appendix 6.5-A. Moderate-high suitability habitat comprised of anthropogenic, coniferous forest, deciduous forest, field, meadow, mixed forest, shrub and swamp ecosites. Low suitability habitat comprised of barren, bluff, bog, cliff, dune, fen, marsh, and shoreline ecosites. All open water and islands were considered unsuitable.

The gray fox LSA contains as estimated 68,873 ha (89.5%) of moderate-high suitability habitat, 2,282 ha (3.0%) of low suitability habitat, and 5,735 ha (7.5%) of unsuitable habitat for gray fox (Table 6.5-6; Attachment 6.5-B-1, in Appendix 6.5-B). The gray fox RSA contains as estimated 216,848 ha (83.9%) of high suitability habitat, 6,723 ha (2.6%) of low suitability habitat, and 34,803 ha (13.5%) of unsuitable habitat for gray fox (Table 6.5-6). Suitable gray fox habitat is abundant and well distributed in both the gray fox LSA and RSA.

Table 6.5-6: Gray Fox Habitat Availability in the Local and Regional Study Areas at the Existing Environment

Habitat Suitability[1]	Gray Fox LSA Area (ha)	Gray Fox LSA Percent (%)	Gray Fox RSA Area (ha)	Gray Fox RSA Percent (%)
Moderate-High	68,873	89.5%	216,848	83.9%
Low	2,282	3.0%	6,723	2.6%
Unsuitable	5,735	7.5%	34,803	13.5%
Unknown[2]	22	0.0%	50	0.0%
Total	**76,912**	**100.0%**	**258,424**	**100.00%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

2) These areas within the study area are not described by FRI ecosite polygons.

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

Habitat Distribution

Due to limiting factors like snow depth and cold temperatures, the northern extent of the gray fox range is restricted to northwestern Ontario. In recent years, occurrence records in northwestern Ontario have increased (MECP 2019), though, there are currently no published studies available on the ecology of this species in northwestern Ontario.

The response of gray fox to disturbed landscapes in boreal forests is largely unknown. Habitat loss and fragmentation is a threat to many mammalian species. Though, a study in Illinois suggest that gray fox prefer a high level of fragmentation of preferred habitat types (i.e., forests and grasslands), where open corridors are available for travel and foraging (Cooper 2012). Base Characterization indicated that preferred home range habitat consists of a combination of ecosites, including both forested and open to semi-open habitats. Forest clearing for access roads and ROW can open large forest tracts to create preferential habitat fragmentation. Furthermore, a study in Ontario found that gray fox movement within 100 m of woodlot edges was common, suggesting that edge habitat created from access roads and ROW may also be preferential (Bachmann and Lintack 1982).

Little is understood about the disturbance effects of logging practices and forest fires on gray fox populations. However, a recent study in Oregon outlined that salvage logging following a forest fire had negative effects on gray fox. Logging following forest fires alters succession and reduces biodiversity within the landscape (Green et al. 2022). Though, logging operations can increase slash piles and when not burned during the winter, are preferred gray fox denning features (MECP 2019). It has also been found that forest fires may temporarily displace individuals and temporarily reduce gray fox prey abundance (Temple et al. 2010).

A recent study in California show that gray fox omnivorous and opportunistic diets lend well to tolerating urbanization and populations can persist in areas where human activities are present (Larson et al. 2015). Another study found that gray fox are capable of living in areas with varying degrees of landscapes altered by human activities given forested areas remain accessible (Lombardi et al. 2017). As described in Base Characterization, 87% of gray fox occurrence records within the gray fox LSA and gray fox RSA were located on or near rural residential properties. Human disturbance occurs largely throughout the gray fox RSA where urbanization around Thunder Bay, Atikokan, and Dryden is present.

Climate change may contribute to a shift from conifer dominated to deciduous dominated forest (Carleton 2001). Northward expansion of United States gray fox populations has been attributed to climate change and warming temperatures, benefiting preferred gray fox habitat (i.e., deciduous forest) (COSEWIC 2015). Baseline characterization concluded that all gray fox home ranges within the gray fox LSA and RSA had a deciduous component, with 47% average deciduous cover in all home ranges. Warming temperatures, less deep snow cover and changes to forest composition as a result of climate change may support northward expansion of gray fox populations (Root and Payne 1985, Judge and Haviernick 2002).

Survival and Reproduction

The gray fox is listed as threatened under the ESA and SARA. Population data on gray fox is lacking, particularly in Canada where no population studies have been conducted (MECP 2019). In Canada, there have been approximately 160 confirmed records of gray fox since the 1940s; however, COSEWIC estimates the Canadian population to be fewer than 110 mature individuals (COSEWIC 2015, MECP 2019). Records of gray fox in Canada have steadily increased since the 1890s, with two sub-populations identified in Ontario (Pelee Island and northwestern Ontario). In 2015, the northwestern Ontario sub-population was estimated to be less than 50 mature individuals (COSEWIC 2015). However, the number of provincial occurrence records and citizen science observations in recent years has increased, indicating that populations are likely higher than 2015 estimations. Increased sightings of gray fox are also reported in recent FMPs for the Lakehead, Boundary Waters, and Dog River-Matawin forest management areas (FMAs) that overlap the gray fox RSA (Greenmantle 2019; Resolute 2020,2021a).

It is anticipated that gray fox population increases in Ontario are linked to changes in adjacent United States populations as gray fox is at the northern extent of its range in Canada (COSEWIC 2015, MECP 2019). Currently, most gray fox populations in the United States are stable or increasing, and northward expansions of populations in Wisconsin and Minnesota have been documented (COSEWIC 2015).

It has been suggested that coyote (*Canis latrans*) predation could also limit range expansion. Coyote often prey on gray fox and gray fox avoidance of coyote has been documented. In California, it has been shown that gray fox is more abundant in areas where coyote density is low (MECP 2019). Coyote predation and its impacts on gray fox at a population level is not well understood.

Within the terrestrial LSA from 2010 to 2022, 32 observations of gray fox were made, often with multiple individuals noted in each observation. Thirty-one were within the Thunder Bay area, and one observation within the Atikokan area. Within the gray fox RSA from 1982 to 2022, 17 observations of gray fox were made. Thirteen observations were within the Thunder Bay area, two observations between Thunder Bay and Atikokan, and two within the Atikokan area.

In the United States, male gray foxes have average annual home ranges of 97 to 653 ha and female home ranges vary from 75 to 626 ha (Fritzell and Haroldson 1982). Gray fox use dens for pup rearing, resting, and avoiding predators. Dens can be found in modified burrows of other animals, hollow trees, hollow logs, woodpiles, rocky outcrops, cavities under rocks, piles of brush, slab, wood or sawdust, and abandoned buildings (MECP 2019). Little is known about the effects of disturbance on gray fox denning habits, though sensory disturbance could increase the possibility of den abandonment.

The largest threat facing gray fox populations in Canada is trapping and hunting (MECP 2019). Although Ontario has a zero-quota set on trapping licences for gray foxes, they are frequently captured and killed as by-catch in traps. Due to low population densities in Canada, trap by-catch is thought to limit the establishment of breeding populations (MECP 2019). In addition to trapping, gray fox populations are also threatened by road mortality (MECP 2019). Due to their large home range size and dispersal distances, gray fox are vulnerable to roadkill mortality. A study in Louisiana found that eight of 17 radio-tracked gray fox were killed by vehicle strikes (COSEWIC 2015). However, little is known about the population-level impact of road mortality on gray fox in Canada (MECP 2019). Of the 49 observations of gray fox within the terrestrial RSA, one observation noted the cause of mortality to be roadkill. Fatal non-native diseases such as canine distemper and rabies can also affect the survival of gray fox (COSEWIC 2015). Significant numbers of gray fox in United States populations have been reported to have canine distemper and rabies (Davidson et al. 1992). In Ontario, two gray fox were noted to have rabies in 1986; however, the prevalence of such diseases in Canadian gray fox populations is unknown (COSEWIC 2015).

6.5.5.4 *Furbearers (Gray Wolf)*

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

Gray wolf is not a provincially tracked or federally listed species (Government of Canada 2021a; NHIC 2023), nor is it a species under consideration by COSEWIC (Government of Canada 2021a). Historically, gray wolves were found in greater distribution than presently, as hunting and persecution has reduced their presence in the southern extent of their Ontario range. In Ontario, the current range of the gray wolf extends from Lake Simcoe to the James and Hudson

Bay shorelines (Dobbyn 1994). Provincial biologists currently estimate the number of wolves in Ontario to be over 8,800 based on the availability of prey species and measured densities of wolves in comparable locations across the country (MNR 2005).

For gray wolf, habitat availability is described by habitat associations, anthropogenic disturbance, and habitat suitability; habitat distribution is described by habitat arrangement and connectivity, home range size and dispersal; survival and reproduction are described by vital rates and threats.

The TKLUS shared by NWOMC and Region 2 notes the presence of wolf, beaver and bear near the Project footprint (MNP 2023b).

Habitat Availability

Gray wolf is considered a habitat generalist species, capable of exploiting a variety of habitat types on the landscape as long as the animals are mostly free from human persecution and ungulate densities are sufficient to support a population (Arjo and Peltscher 2004). As such, a habitat suitability model was not developed for this species.

Gray wolf habitat preference is likely dependent on optimizing fitness by reducing travel costs, while maintaining potential for encountering prey (Alexander et al. 2005). Wolves will use cutlines and other linear disturbances for ease of movement (Paquet and Callaghan 1996; James and Stuart-Smith 2000; Gurarie et al. 2011). Wolves in the boreal forests of Quebec primarily selected open areas, conifer stands with a lichen understory, and mixedwood forest stands during the spring and summer months (Houle et al. 2010). Similar habitat selections were made during the winter months; however, wolves avoided conifer-dominated forests and areas where snow accumulation was high (Houle et al. 2010). Wolves use upland areas more often than peatlands, possibly due to a higher density of moose in upland areas (McLoughlin et al. 2005). Maternity dens are located in burrows or depressions on the ground (Reid 2006).

Wolf habitat selection can change throughout the year in response to varying prey abundance and snowpack conditions as supported by studies in Alberta and Saskatchewan. For example, gray wolves in northeast Alberta were found to select upland habitats more often during the winter when white-tailed deer, their primary prey during winter, was most abundant (Latham et al. 2013). Similarly, Boutin et al. (2015) found that wolves in northeastern Alberta were commonly located in upland forested habitat and observed in fens less frequently in the winter than during the rest of the year. During the spring and summer, wolves consumed more beaver, and habitat selection reflected this shift in target prey such that wolves were more commonly associated with wetland areas during the snow-free season (Latham et al. 2013). This is consistent with Boutin et al. (2015), who found that during summer wolves were more commonly associated with bog habitat and upland forests with an understory dominated by blueberry.

Studies have reached different conclusions regarding the effects of natural disturbance on gray wolves, and the effects may vary depending on season and level of disturbance (Houle et al. 2010; Courbin et al. 2009). Disturbance created by forest fires can contain high densities of browse for moose (Oldemeyer and Regelin 1987) and thus be exploited by wolves hunting in the area. Wolves have been shown to avoid roads and other forms of human infrastructure, particularly when the density of these disturbances is high or when human activity in the area is high (Thurber et al. 1994; Mech and Boitani 2003; Hebblewhite et al. 2005; Ehlers et al. 2014). Conversely, wolves appear to be capable of adapting to the presence of humans and may select areas closer to human activity (Mech et al. 1995; Thiel et al. 1998; Boitani 2000; Hebblewhite and Merrill 2008). A study by Hebblewhite and Merrill (2008) showed that wolves were constrained into selecting areas closer to human activity as the level of human activity increased within territories, whereas wolves in territories with lower levels of human activity appeared to ignore human activity. In areas with higher levels of human activity, wolves used areas closer to human activity more frequently during nighttime relative to daytime (Hebblewhite and Merrill 2008).

Habitat Distribution

Gray wolf is a mobile species and will regularly incorporate disturbed or regenerating habitat in the home range. With strong dispersal ability and flexibility in habitat preferences, the species is likely resilient to moderate levels of fragmentation on the landscape (Serrouya et al. 2017). Given the species' generalist habitat selection patterns, suitable habitat for gray wolf is well connected and well distributed in the LSA and moose and gray wolf RSA.

Gray wolves are considered highly mobile and maintain large home ranges. McLoughlin et al. (2019) estimated the mean annual core use of the home range (50% kernel density estimator) of resident wolves in the Boreal Shield to be 660 km^2 and the mean annual home range to be 2,865 km^2 (95% minimum convex polygon). Packs in Ontario typically average 4.6 individuals and maintain territory sizes of 106.4 km^2 (Gable et al 2022). Wolf home ranges in the moose and gray wolf RSA are likely similar in area, though variation is expected depending on prey availability.

Studies in Alberta have identified that wolves often use habitat near natural linear features, such as rivers and creeks, because these features represent areas of easier travel and higher prey density (Latham 2009; Latham et al. 2011b; Boutin et al. 2015). Wolves also select human linear features (e.g., seismic lines, trails, pipelines) for travel through the landscape, which increase daily movement rates and distance travelled compared to forested habitat, especially during winter in the presence of deep snow (Paquet and Callaghan 1996; Gurarie et al. 2011; Dickie et al. 2016; Neilson 2017).

Wolves often use areas of low road density and human activity and travel greater distances more quickly along linear features than when moving through forested habitat (Thurber et al. 1994; Bowman et al. 2010; Houle et al. 2010; Boutin et al. 2015; Dickie et al. 2017). Responses of wolves to linear features was observed to be variable over a range of linear feature densities (i.e., from <1 km/km^2 to 16 km/km^2) and corridor widths (i.e., from 2 m to 40 m; Dickie et al. 2017). Wolf movement was faster on wider, straight linear features such as railways, transmission lines, and roads; narrow and more sinuous features (e.g., trails) were less preferred and may not provide a direct path or may hinder line-of-sight (Dickie et al. 2017).

Anthropogenic linear features in the LSA and moose and gray wolf RSA, such as cutlines, logging roads, utility lines and trails are not predicted to pose a movement barrier for gray wolf in the LSA or moose and gray wolf RSA and may be preferred travel corridors, especially when snow is compacted relative to forested or more open habitats (Paquet and Callaghan 1996; Gurarie et al. 2011; Dickie et al. 2017). Major roadways, such as provincial highways, may be a partial barrier to wolf movement during periods of high traffic volume. Under existing environment conditions, the low density of roads in the LSA and moose and gray wolf RSA is not expected to be functionally affecting habitat connectivity or how wolves travel within and beyond the LSA or moose and gray wolf RSA.

Survival and Reproduction

Biologists currently estimate the number of wolves in Ontario to be over 8,800 based on the availability of prey species and measured densities of wolves in comparable locations across the country (MNR 2005). Wolf densities in Ontario currently have an average population density of 61.5 wolves per 1000 km. This is an increase from the previous population density found in 2001, of 38.6 wolves per 1000 km and is likely related to the increase in pup survival (Gable et al 2022). A report provided by Lac des Mille Lacs First Nation notes an Elder indicated an increase in the wolf population potentially due to a decrease in trapping in the area. Other participants in the study noted there is healthy wolf population in the area around the preferred preliminary route (Lac des Mille Lacs First Nation 2023).

Wolves are long-lived, with an average life expectancy of up to 10 years of age in the wild (Mech 1974). Survival can be high where prey are abundant and wolves are not intensively trapped (Mech 1974; Fuller and Keith 1981). Average annual adult survival rates for wolf packs studied in the Caribou and Columbia mountains of British Columbia was 0.8 where the majority of deaths (i.e., four out of six individuals) were attributed to hunting and trapping activity (Serrouya et al. 2017).

Gray wolves become sexually mature anytime from 22 to 34 months of age and females will typically give birth to litters of three to eight pups (most commonly five to six pups; Pattie and Fisher 1999; MNR 2005). Breeding peaks in mid to late February. Gestation lasts about 63 days; hence most pups are born in April. Most often, pups are born in dens, and on occasion born in beaver lodges, hollow logs, and rock caves. Pup survival rates in their first year range from 0.4 to 0.7 and increase considerably beyond that time (MNR 2005).

In general, wolves are considered to have a high reproductive rate and are capable of rapid population growth if the availability of prey is sufficiently high. The species is resilient and adaptable and able to accommodate many threats such as disease, parasites, injuries caused by prey, and exploitation and persecution (i.e., culls) by humans (Mech 1974). Therefore, under existing environment conditions, the wolf population overlapping the RSA is considered to be healthy, with survival and reproduction rates linked to available prey. Although there are no data on wolf survival and reproduction available for the moose and gray wolf RSA, it is reasonable to infer from other studies that the wolf population overlapping the moose and gray wolf RSA would have similar survival and reproduction rates.

The season for hunting and trapping wolves runs from September 15 to March 31 in the WMUs that overlap the RSA. As wolf hunting and trapping is regulated in Ontario, wolf abundance is not expected to be measurably influenced by hunting or trapping.

6.5.5.5 *Furbearers (American Marten)*

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

Habitat Availability

American marten is strongly associated with coniferous forests with high structural complexity. During baseline field studies conducted in 2022 in the terrestrial LSA, marten was observed infrequently (total of four observations) at only two of the 33 baited camera stations (Appendix 6.4-A).

Throughout much of their range, they are commonly associated with mature coniferous and mixed-coniferous forests with abundant coarse woody debris and a well-developed understory (Buskirk and Ruggiero 1994; Clark et al. 1987; Lyon et al. 1994; Thompson and Harestad 1994; Payer and Harrison 2000; Slauson et al. 2007; Thompson et al. 2012). However, marten may also use second growth forests and cutblocks that provide adequate structural complexity across their range (Bowman and Robitaille 1997; Mowat 2006; Thompson et al. 2008; Hearn et al. 2010). They do not regularly occur in open habitats with low canopy cover such as bogs, meadows, and burns, and recent clearcuts (Koehler and Hornocker 1977; Taylor and Abrey 1982; Godbout and Ouellet 2008; Cheveau et al. 2013; Evans and Mortelliti 2022).

A report provided by Lac des Mille Lacs First Nation indicates marten thrive in mature conifer forests and highlights the important role trapping has played in managing mammal populations. The report notes that information from trappers can be useful in measuring the health of ecosystems and highlights the importance of maintaining a balance of habitat types to keep species populations healthy (Lac des Mille Lacs First Nation 2023).

Structural complexity is important to marten because it creates quality conditions for foraging, resting, and reproduction. Marten are often considered a wildlife tree user because they use hollow trees as rest sites and reproductive dens (Bull et al. 2005). Buskirk and Ruggiero (1994) report that dens are often located in the cavities of large trees and snags, under coarse woody debris, or in rock crevices. Marten typically hunt for small mammals around coarse woody debris, stumps, and rocks, and research conducted in Ontario shows that the presence of those features increases foraging efficiency by marten independent of prey abundance (Andruskiw et al. 2008). Coarse woody debris, stumps, and rocks are also used by marten in winter as access points to enter subnivean resting sites and hunting areas (Buskirk and Ruggiero 1994).

In boreal forests of eastern Canada, marten tend to select late-seral mixedwood stands that are greater than 70 years old (Potvin et al. 2000; Cheveau et al. 2013). This could be related to the fact that mixedwood stands, compared to other habitat types on the landscape, present a complex forest structure that reduces the risk of predation and provides increased availability of prey and denning and resting sites (Cheveau et al. 2013). Boreal mixedwood stands dominated by trembling aspen produce a large amount of coarse woody debris, mainly when the stands are between 80 and 130 years old (Hély et al. 2000; Pedlar et al. 2002). Avoidance of open habitats by marten is generally inferred to be a response to predation threats and a lack of or low density of prey (Buskirk and Ruggiero 1994; Thompson and Colgan 1994). Forests 30-60 years old could support self-sustaining marten populations, although densities may be lower and there is a higher risk of population decline due to chance events compared to populations in forests greater than 60 years of age (Fryxell et al. 2008). Regenerating forests that are younger than 30 years may also be used by marten for foraging (Andruskiw et al. 2008; Mergey et al. 2011; Caryl et al. 2012).

Availability of moderate to high suitability habitat for marten was predicted at existing environment conditions using ecosite data. Estimated habitat availability for marten is summarized in Table 6.5-7, and Attachment 6.5-B-2, in Appendix 6.5-B. A total of approximately 37,387 ha (22.7%) and 121,833 ha (22.2%) of moderate to high suitable habitat is estimated to be present in the LSA and RSA, respectively, at existing environment conditions. The juxtaposition of young and late-seral stands has historically been common in the LSA and RSA, and the availability of suitable habitat has almost certainly changed over time across the study areas. Therefore, marten are expected to have the capacity to adapt and be resilient to existing natural and human-related disturbances and associated changes in habitat availability.

Table 6.5-7: American Marten Habitat Availability in the Local and Regional Study Areas

Habitat Suitability	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	37,387	22.7%	121,833	22.2%
Unsuitable	127,267	77.2%	425,207	77.6%
Unknown[1]	134	0.1%	1,081	0.2%
Total	**164,787**	**100.0%**	**548,121**	**100.0%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Using the FRI data set, islands are not described by ecosite designations (e.g., pri_eco not assigned), as such, island area has been designated as unknown. Open water (also undesignated by FRI data set) was determined unsuitable for marten habitat.

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

Habitat Distribution

American marten home ranges are variable depending on sex, location, prey availability, habitat conditions, and population density (Buskirk and McDonald 1989). Typically, male home ranges are two to three times larger than those of females (Buskirk and McDonald 1989). Martens occupy larger home ranges than would be expected for a mammal of their size (Buskirk and Ruggiero 1994), with adult males in Canada occupying ranges of 0.8 to 45 km^2, and adult females occupying ranges of 0.42 to 27 km^2 (Burnett 1981; Mech and Rogers 1977; Latour et al. 1994; Smith and Schaefer 2002). The average home range for males and females in Canada is 9.19 km^2 and 6.64 km^2, respectively (Environment and Natural Resources 2015). Home ranges vary as a function of geographic area, habitat type, and prey density (Soutiere 1979; Thompson and Colgan 1987).

Marten movements have not been rigorously studied, and reports on the dispersal period ranges from August to October (Buskirk and Ruggiero 1994). In boreal Ontario, home ranges average from 1 to 3 km^2 for females and from 3 to 5 km^2 for males (Thompson and Colgan 1987). Marten generally avoid open areas that lack overhead cover and that over 5 km of treeless land acts as an effective barrier to marten dispersal; although some studies have reported travel along edges of open areas (Buskirk and Powell 1994) and crossings of openings less than 600 m-wide (Snyder and Bissonette 1987). Some studies indicate that marten avoid linear disturbances such as seismic lines (Tigner et al. 2015) and access roads (Robitaille and Aubry 2000), while others found that marten movement is not impeded by resource roads, trails, and paved highways (Coffin et al. 2002). Overall, marten tend to respond more strongly to forest fragmentation associated with logging than to proximity to forest roads (Chapin et al. 1998). Some studies indicate that marten may compensate for fragmentation effects by increasing home range size in disturbed landscapes (Buskirk and Ruggiero 1994; Thompson and Colgan 1994; Fuller and Harrison 2005). The degree of forest fragmentation appears to be critical, with marten nearly absent from landscapes having greater than 25% non-forest cover, even with connected forest patches (Hargis et al. 1999).

Marten are known to disperse through habitat patches that are unsuitable for occupation (Wasserman et al 2010), and juveniles can travel over 80 km to establish a home range (Broquet et al. 2006). Average juvenile dispersal distances in boreal Ontario have been reported to be less than 20 km in logged and unlogged landscapes (Broquet et al. 2006; Johnson et al. 2009). Juveniles from younger, logged landscapes disperse shorter distances and experience greater mortality risk with increasing distance compared with juveniles from older unlogged landscapes (Johnson et al. 2009). Nevertheless, evidence suggests that marten genetic diversity and population structure is not particularly sensitive to habitat arrangement (Broquet et al. 2006; Koen et al. 2012). Marten have good dispersal abilities and only a few successful dispersers are required to maintain gene flow within a population (Kyle and Strobeck 2003; Broquet et al. 2006). The lack of strong genetic structure indicates that dispersal is not greatly impeded in areas where forest harvesting has caused considerable habitat change, and factors that influence marten movement at small scales are not influential enough to cause large-scale disruptions in gene flow (Kyle and Strobeck 2003; Koen et al. 2012).

The marten habitat model predicts suitable habitat to be distributed throughout the LSA and RSA in existing environment conditions (Attachment 6.5-B-2 of Appendix 6.5-C). Overall, available evidence indicates marten habitat and populations remain connected in the RSA and LSA at existing environment conditions, despite increased habitat fragmentation from anthropogenic disturbances compared to historical conditions. Habitat connectivity is not a limiting factor for this species given its ability to disperse long distances across various habitat types, and combined changes from natural and human-related disturbance should be within the resilience and adaptability limits of this species.

Survival and Reproduction

The American marten is not a provincial or federal species at risk (Government of Ontario 2007; COSEWIC 2016; SARA 2021). In Ontario, marten is considered a secure species and a “provincially featured species” by the Environmental Assessment Boards ruling on timber management on Crown lands (Watt et al. 1996; MNRF 2016b). They are common and widespread throughout central and northern Ontario but extirpated from southern Ontario (MNRF 2016b). The Lakehead FMP indicates that marten have population have recently increased in suitable habitats (Greenmantle Forest Inc.2019). Abundance in the marten RSA has presumably been influenced by multiple factors, including quality and quantity of available habitat, prey abundance, harvest, and connectivity. The primary threat to marten populations is habitat loss and fragmentation due to both anthropogenic and natural disturbance (Stone 2010).

Industrial logging is the main form of disturbance that has created non-forested openings and fragmented forested habitats used by marten in the RSA. Research shows that marten can be sensitive to habitat loss and fragmentation, especially as a result of clearcut logging. The mechanisms by which marten are impacted by clearcutting are the removal of overhead cover, the removal of large coarse woody debris, and changes in prey communities (Buskirk and Ruggiero 1994). American marten densities are generally lower in areas fragmented by clearcuts (Hargis et al. 1999), and regenerating forests tend to increase the mortality rate of dispersing juveniles relative to older forests (Johnson et al. 2009). Hargis et al. (1999) found that marten abundance declined when natural and anthropogenic openings comprise more than 25% of the landscape, despite connectivity between forested patches and the presence of prey. Reducing fragmentation in harvested landscapes is expected to help maintain resident marten populations in these areas (Chapin et al. 1998).

Fire suppression in marten habitat has likely had a positive effect on the species. Fire suppression since the 1950s has almost certainly increased the proportion of the landscape in late-successional closed-canopy conditions relative to historical conditions (MNR 1996; MNRF 2014g). Whether the benefits of fire suppression in the marten RSA has outpaced adverse effects associated with concurrent forestry activities is not known. Nevertheless, an increase in total older aged, forested habitat on the landscape since the 1950s suggests that an overall increase in marten abundance in the marten RSA at baseline characterization relative to historical conditions is plausible. As this older forest is lost due to logging or natural disturbance, a decrease in marten abundance in the marten RSA can be expected (MNR 1996).

Insect outbreaks have affected the condition of boreal forest ecosystems in Ontario by disrupting the natural trajectory of succession towards coniferous dominant stands and shifting sites back to early seral mixed deciduous forests. The incidence of insect outbreaks in the marten RSA has likely increased during the baseline characterization compared to historical conditions primarily because of forestry practices (McCullough et al. 1998). Fire suppression and logging has resulted in less tree diversity, higher tree density, and more homogeneity of forest structure, making forest stands more prone to outbreaks (McCullough et al. 1998). Insect outbreaks are beneficial to marten because they can cause the deaths of large numbers of trees, initiating stand replacement, and abruptly recruiting large numbers of snags or volumes of coarse woody debris (Chapin et al. 1997; Potvin et al. 2000). Therefore, insect outbreaks may have improved ecological function for marten in the marten RSA at baseline characterization relative to historical conditions.

American marten abundance may also be affected by changes in the abundance of their prey. American marten are opportunistic feeders with a diet that includes small and medium-sized mammals, birds and their eggs, insects, carrion, and berries (Powell et al. 2003). However, mice and voles are their primary prey species and these taxa are subject to population cycles. Prey shortages can suppress the pregnancy and ovulation rates of marten (Thompson and Colgan 1987), with negative consequences on population growth and recruitment (Fryxell et al. 1999) irrespective of habitat change. Weckwerth and Hawley (1962) reported that marten abundances in Montana declined for both adults (30% decline) and juveniles (80% decline) over a three-year period in which the abundance of small mammals dropped by 85%. The fact that habitat change and prey can both influence marten abundance in concert or independent of one another emphasizes two ecological relationships: first, that prey abundance is important to marten population dynamics, and second, that marten require structure for reproduction and foraging (Thompson et al. 2012).

American martens are one of the most economically important furbearers in Ontario, and the species is harvested for fur across the western boreal forest (Landriault et al. 2012. Trapping in Ontario is regulated by a quota system set by regional authorities based on local habitat conditions, population trends, and past trapping success. American martens are susceptible to overharvest, and trapping may adversely affect marten abundance because of their large spatial requirements and relatively low reproductive rates compared to similar sized mammals (Buskirk and Ruggiero 1994; Fryxell et al. 2008; Johnson et al. 2009). Harvest pressure may be one reason that marten appear to avoid roads (Robitaille and Aubry 2000), and their abundance can decline as road density increases (Nielsen et al. 2007). In contrast, martens are relatively long lived for their body size, both sexes reach sexual maturity by one year of age, and established females are capable of producing many litters over their lifetime (Powell et al. 2003). Thus, martens are capable of rapid population growth and are relatively resilient to harvest pressure given suitable habitat conditions (Fryxell et al. 1999; Fryxell et al. 2001; Powell et al. 2003). Banci and Proulx (1999) suggest that the combination of suitable habitat, reproductive potential, and dispersal capabilities makes marten moderately resilient to trapping pressure. Thus, mortality levels in the baseline characterization are likely within the resilience and adaptability limits for this species.

6.5.5.6 Furbearer (Beaver)

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

Beaver is not a provincially tracked or federally listed species (Government of Canada 2021; SKCDC 2021), nor is it a species under consideration by COSEWIC (Government of Canada 2021). During baseline field studies conducted in 2022, evidence of beaver was recorded within the LSA including incidental observation records, browsing and trails. In total 62 incidental beaver sightings/signs were noted during 2022 field surveys, including 48 beaver dams, 9 occurrences of beaver activity (e.g., beaver clippings, runs, fallen trees), four beaver lodges, and one beaver individual observed. (Appendix 6.4-A).

Historically, beavers were found in greater numbers and distribution than in the present due to their near extirpation from North America in the early 1900s because of over-harvesting during the fur trade (Havens et al. 2013). Current beaver populations in North America are estimated to range from 6 million to 12 million, whereas the beaver population in North America prior to the arrival of Europeans is estimated to have been between 60 million and 400 million individuals (Havens et al. 2013). A report provided by Lac des Mille Lacs First Nation indicates furbearers such as marten and beaver are trapped in the area. The report indicates trapping beaver can help keep populations healthy as overpopulation may lead to diseases such as *Tularemia* (Lac des Mille Lacs First Nation 2023).

For beaver, habitat availability is described by habitat associations, anthropogenic disturbance, and habitat suitability; habitat distribution is described by habitat arrangement and connectivity, home range size and dispersal; survival and reproduction are described by vital rates and threats.

Habitat Availability

The beaver is a semi-aquatic mammal that inhabits a variety of aquatic habitats such as lakes, ponds, and slow-flowing streams; the species is found across forested regions of Canada (Cassola 2016). Beavers build lodges out of mud, sticks, logs, and debris in areas that are near adequate food sources and building resources, and in a waterbody deep enough that the underwater lodge entrance will not freeze during winter (Boonstra 2013).

Beavers are territorial animals, and the core area of a beaver's territory is likely to include lodge sites, escape cover, and preferred feeding areas (Havens et al. 2013). During baseline studies, the highest proportion of beaver observations (lodges, dams, and sign) was concentrated around the Thunder Bay end of the Project and the lowest proportion of observations was around the Dryden area (Appendix 6.4-A).

Beavers are expected to have the capacity to adapt and be resilient to existing human-related disturbances and associated variations in habitat availability in the RSA. Beavers are not considered sensitive to anthropogenic disturbance as dams are often created at human-made structures where human activity is common (e.g., culverts under roads; Boyles and Savitzky 2008). A study completed in northeastern British Columbia found no evidence that anthropogenic linear features decreased the likelihood of occurrence or distribution of beaver (Mumma et al. 2018).

A habitat suitability model was developed to predict beaver lodge locations, forage, and cover as described in Appendix 6.5-A and shown on Attachment 6.5-B-3, in Appendix 6.5-B. A At baseline, high and moderate suitability lodge habitats total 25,591 ha (15.5%) in the LSA and 75,105 ha (13.7%) in the RSA (Table 6.5-8). Low suitability habitat represents 6248 ha (3.8%) of the LSA and 17,374 ha (3.2%) of the RSA. High, moderate, and low suitability lodge habitat represent 92,479 ha (16.9%) of the RSA. The majority of the LSA and RSA contains poor suitability habitat, which is likely related to the study area boundaries extending into the open water portion of Lake Superior.

Table 6.5-8: Beaver Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)[4]	LSA Percent (%)	RSA Area (ha)[4]	RSA Percent (%)
High	11,698	7.1%	35,052	6.4%
Moderate	13,893	8.4%	40,053	7.3%
Low	6,248	3.8%	17,374	3.2%
Poor[2]	119,800	72.7%	413,037	75.4%
Unknown[3]	13,148	8.0%	42,605	7.8%
Total	**164,787**	**100.0%**	**548,121**	**100.0%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.
2) The LSA and RSA boundaries extend into Lake Superior, which is open water and classified as 'poor' habitat for beaver.
3) These areas within the study area are not described by FRI data available (e.g., pri_eco not assigned).
4) Area of suitable habitat may be over estimated due to the presence of overlaps in the FRI mapping between adjacent FMUs. See Section 6.4.11 for a description of the degree of overlap in FRI mapping among FMUs.

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

Although beavers may consume young coniferous trees, their preferred food consists of deciduous trees and shrubs that grow adjacent to waterbodies (Jenkins and Busher 1979). Optimal habitat for beavers in the RSA consists of undisturbed mature and late seral stage regenerating deciduous ecosites that contain an understory of green alder and willow (Section 6.4); however, these ecosites are uncommon in the RSA (Section 6.4). The understory in the regenerating jack pine ecosites primarily consists of young jack pine trees and undisturbed black spruce ecosites have a prevalence of spruce seedlings in the understory; these habitats are generally unsuitable for beavers.

Habitat Distribution

Home range size for beavers can vary greatly depending on many factors including age, sex, season, type of habitat and social organization of the family. A study showed that the mean home range for beavers in North America was 11.86 ha (± 5.66 ha), but when three outliers were included, the home range increased to 20.89 ha (± 26.54 ha) (Touihri et al 2018). The study also showed that a minimum of 0.8 km of stream length or 1 km^2 of lake must be available for beaver colonization to occur (Touihri et al 2018). Average home range size measured for a non-harvested population of beavers in Illinois was 6 ha (Bloomquist et al. 2012). A population in the boreal region of Manitoba had an average summer home range of 10.3 ha and an average fall home range of 3 ha (Wheatley 1994). Based on this literature, it was assumed that beaver in the RSA have an average annual home range size of 10 ha but could vary between 3 and 10 ha during the year.

Beavers will generally stay near their lodge sites but have been observed to forage up to 100 m from aquatic habitats (Boyle and Owens 2007). The beaver diet varies seasonally, and the type and abundance of food sources available in an area play an important role in determining beaver distribution (Leary 2012). Beavers have moderate to high mobility, and juveniles will disperse from their natal territories over varying distances. Beavers tend to disperse over longer distances when they have access to free-flowing water (McNew and Woolf 2005), suggesting the important role of surface water networks in enabling travel and maximizing beaver movement potential. For example, a study in Illinois found that on average, beavers dispersed over 6 km when they had access to free-flowing water, but dispersal averaged 1 km in landlocked colonies (McNew and Woolf 2005).

The prominence of water features (i.e., waterbodies, watercourses, and wetlands) in the LSA and RSA suggests that suitable beaver habitat is well connected at the local and regional scales. The main highways that bisect the study areas, namely Highway 11 and Highway 17, may adversely influence the movement and habitat connectivity of beaver during periods of high traffic volume, but movement and connectivity are unlikely constrained by forestry roads, trails, and right of ways (Mumma et al. 2018; Scrafford et al. 2020).

Survival and Reproduction

Beavers are monogamous and mate in the winter months of January and February, and kits are generally born in April through June (Hartman 1997; Boyle and Owens 2007). Beavers are strongly territorial animals that live in family groups generally consisting of an adult pair and offspring from one or more breeding seasons (Hartman 1997). Subordinate members of a colony will not become sexually active if a dominant beaver of the same sex is present in the colony (Hartman 1997). Beavers are expected to have the capacity to adapt and be resilient to changes in survival and abundance. The age at first parturition (i.e., birth) varies from two to five years in a typical population, and beavers may respond to population manipulation (i.e., trapping) by becoming sexually mature and dispersing at an earlier age (Nordstrom 1972). Prior to the birth of the new young, the eldest young are forced out of their parental colony to create their own lodge and dam (Boonstra 2021).

The main limiting factors or threats affecting beaver survival, abundance, and distribution are likely harvest pressure and the availability of suitable habitat. Further, many beaver populations across North America have recolonized most areas of their historical range since approaching near extirpation in the early 1900s as a result of over-harvesting during the fur trade (Havens 2013). The current population estimate for beavers in Ontario is 6 to 12 million individuals (Ontario Parks 2022).

6.5.5.7 Little Brown Myotis and Northern Myotis

LITTLE BROWN MYOTIS AND NORTHERN MYOTIS

Apakwanaajiinh

Habitat Availability

Availability of summer maternity roosting habitat is not likely a limiting factor for little brown myotis and northern myotis in the baseline characterization. While loss of forests from human activities has probably reduced maternity roosting habitat availability in the RSA relative to what may have been available historically, the majority of the RSA remains forested in the baseline characterization. Little brown myotis and northern myotis are not habitat specialists and have been documented in a wide variety of coniferous and deciduous forest types (COSEWIC 2013a). Moreover, little brown myotis, and to a lesser extent northern myotis, are well adapted to human disturbance and will use buildings, bat houses, and bridges for maternity roosts indicating that they are resilient to changes in summer habitat. Bats that roost in tree cavities have less fidelity to roost sites than species that roost in buildings or caves (Lewis 1995, Thorne et al. 2021, ECCC 2018, Humphrey and Fotherby 2019).

Logging has replaced fire as the main cause of loss of forest biomass in northern Ontario in large part due to fire suppression. Fire suppression has generally resulted in older, broadleaved dominated forests replacing the conifer dominated forest (Carleton 2001). Fire suppression has likely had a positive effect on little brown myotis, as this species was found to be more abundant in old versus young forest types in Alberta and central Ontario (Jung et al. 1999; COSEWIC 2013a) and has demonstrated a preference for broadleaved forest (e.g., poplar (*Populus* spp.) and birch (*Betula* spp.) species) (ECCC 2018).

Effects from forest harvesting activities on little brown myotis and northern myotis are likely negative (Patriquin and Barclay 2003, Taylor 2006, ECCC 2018). It is thought that even small-scale forestry activities can negatively affect bats by removing snags (roosting habitat) and decreasing canopy closure (Jung et al. 1999). In addition, forestry and other industrial activities in close proximity to hibernacula can degrade the habitat by altering its microclimatic characteristics (USFWS 2007). The effects of edges and corridors on little brown myotis are unclear but a number of studies suggest that forest fragmentation may be beneficial for the species (Broders and Forbes 2004, Broders et al. 2006, Ethier and Fahrig 2011, Jantzen and Fenton 2013, Segers and Broders 2014). Other studies have found that little brown myotis prefer closed and cluttered canopy areas and avoid edges (Kalcounis and Brigham 1995, Jung et al. 1999, Morris et al. 2010).

Little brown myotis often forage over open habitats including ponds, wetlands, fields, and open-canopy forests. They have also been observed foraging within forests and the riparian areas of lakes and watercourse (ECCC 2018). There is contradictory evidence regarding preferred foraging habitat for little brown myotis. Some studies suggest that this species uses edge habitat for foraging (COSEWIC 2013a), while other studies suggest that little brown myotis prefer to forage in areas with dense vegetation (i.e., cluttered canopies) (Kalcounis and Brigham 1995). The size of the clearing, as well the size of the bat, may influence the use of edge habitat for foraging. Large clearings have more wind and may inhibit efficient foraging by small bats. Large clearings also have different prey species and lower prey abundance than the forest interior (Kalcounis and Brigham 1995). Little brown myotis may prefer to forage in areas with cluttered canopies, but heavy individuals (i.e., with high wing loads) are less maneuverable than small individuals and so may be prevented from foraging in areas with dense vegetation (Kalcounis and Brigham 1995). Edges may not be used as foraging habitat and instead may be used by little brown myotis as travel corridors between roosting sites and foraging areas (KalcounisRueppell et al. 2013). Little brown myotis may opportunistically select different habitats for foraging depending on prey availability and weather conditions.

Northern myotis foraging habitat consist of forest-covered creeks, road corridors within forests, and forest edges (ECCC 2018, Humphrey and Fotherby 2019).

For both little brown myotis and northern myotis, hibernacula are likely more limiting than summer maternity roosting habitat because specific physiological requirements limit the number of sites that provide suitable overwintering habitat.

Both species hibernate in subterranean openings including caves, abandoned mines, wells, and tunnels (ECCC 2018). Suitable hibernation sites typically provide a stable temperature range between 2 degrees Celsius (ºC) and 10 ºC, and high relative humidity (>80%). Bats show a high degree of fidelity to hibernacula (ECCC 2018).

In Ontario, abandoned mines harbour the greatest concentrations of hibernating little brown myotis and northern myotis. The location of abandoned mines in the RSAs is well known, but their occupancy by bats is not well understood. Even minor hibernacula that harbour smaller concentrations of bats have the potential to play a critical role in maintaining the populations of little brown myotis and northern myotis in Ontario. A total of 233 hibernacula were identified in Canada as critical habitat required for the survival and recovery of the species, recognizing that this likely represents a small fraction of all occupied hibernacula (ECCC 2018).

Overall, the results of the field studies and general habitat model suggest a clustered distribution of winter habitat and broader distribution of summer habitat in the LSA and RSA (Attachment 6.5-B-4 and Attachment 6.5-B-5, in Appendix 6.5-B). Wildfire likely limited the amount of suitable summer in the RSA historically. Forestry and human activities have likely replaced wildlife and the main causes of maternity roost habitat removal. However, the availability of maternity roost habitat is likely not a limiting factor for these species in the LSA and RSA (ECCC 2018).

Hibernacula are likely a limiting factor for little brown myotis and northern myotis but the number of hibernacula are considered to be within resilience limits for this species as there may currently be more hibernacula present in the RSAs than under historical, natural conditions, due to abandoned underground mines. Existing disturbances in the LSAs and RSAs do not function as dispersal barriers for this species in the baseline characterization because bats are highly mobile. As such, changes to habitat distribution in the baseline characterization have not exceeded the resilience or adaptability limits of the little brown myotis and northern myotis.

Initially, a GIS analysis of ecosites was conducted to identify the potential SAR bat maternity roost habitat polygons. This was based on MECP guidance regarding suitable forest types (i.e., ecosites) using available FRI data. FRI ecosite metadata contains the forest ecosites classification data that was used in the screening. The MECP provided a list of suitable forest ecosites considered suitable for SAR bat maternity roost habitat (Buck 2015, McColm 2021). The forest ecosites have been classified according to the Ecosites of Ontario (Boreal) Operational Draft, April 2009 (Banton et al. 2009):

- B015-019 Very Shallow: Dry to Fresh: Mixedwood/hardwood;
- B023-028 Very Shallow: Humid: Conifer/Mixedwood;

- B039-043 Dry, Sandy: Hardwood/Mixedwood;
- B054-059 Dry to Fresh: Coarse: Mixedwood/Hardwood;
- B069-076 Moist, Coarse: Mixedwood/Hardwood;
- B087-092 Fresh, Clayey: Mixedwood/hardwood;
- B103-108 Fresh, Silty to Fine Loamy: Mixedwood/Hardwood;
- B118-125 Moist. Fine: Mixedwood/Hardwood; and
- B130-133: Swamps.

Based on the most recent guidance from the MECP, any plant communities listed above are considered candidate maternity roost habitat if they contain trees with a minimum diameter at breast height (DBH) of 10 cm (McColm 2021).

The resultant habitat mapping is depicted on Attachment 6.5-B-4, in Appendix 6.5-B and is being considered candidate maternity roost habitat for SAR bats.

Table 6.5-9: Little Brown Myotis and Northern Myotis Candidate Maternity Roost Habitat Availability in the Local and Regional Study Areas

Habitat Suitability	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Suitable	53,827	32.7%	165,911	30.5%
Unsuitable	110,936	67.3%	377,669	69.5%
Total	**164,763**	**100%**	**543,580**	**100%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values. Due to the use of FRI data, ecosite boundaries between FMUs overlap and do not provide an accurate representation of total area within the LSA.

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

Habitat Distribution

The little brown myotis is widely distributed across Canada. In Ontario its range extends across the province to just south of James Bay. Little brown myotis is a regional migrant and can move hundreds of kilometres between summer and winter areas (Fenton 1969, Kurta and Murray 2002, Norquay et al. 2013). Northern myotis is distributed throughout much of southern Canada and the northern United States (ECCC 2012). The northern myotis is similar to the better studies little brown myotis in terms of size, life-history characteristics, and diet. (ECCC 2012). Most of the known hibernating bats of a region are found in only a few hibernacula. In Ontario, many more little brown myotis hibernate in abandoned mines than caves (Fenton and Barclay 1980). Industrial activities in close proximity to hibernacula can degrade the habitat by altering its microclimatic characteristics (USFWS 2007). Because of the congregatory (i.e., grouping) nature of this species, disturbance of hibernacula can have a disproportionate effect on local populations.

Bats will follow linear forest features for commuting and foraging, and little brown myotis are tolerant of linear disturbance, even when associated with noise (e.g., roads) (Abbott et al. 2012). Northern myotis may be less tolerate of large open spaces than little brown myotis, due to their preference for foraging in forested habitat (ECCC 2012). The effects of edges and corridors on little brown myotis and northern myotis are unclear but a number of studies suggest that forest fragmentation may be beneficial for little brown myotis (Broders and Forbes 2004, Broders et al. 2006, Ethier and Fahrig 2011, Jantzen and Fenton 2013, Segers and Broders 2014) and potentially detrimental for northern myotis.

Linear disturbance features may act as barriers to bats because some species are reluctant to cross open ground and some species avoid areas with lights such as roads (Altringham and Berthinussen no date). Bats that forage in open space, such as little brown myotis, appear to be less sensitive to barrier effects from linear disturbances than species that glean prey from vegetation (Kerth and Melber 2009, Fensome and Mathews 2016). However, little brown myotis is a clutter-adapted, low-flying species that may experience higher barrier effects than faster, open-edge-adapted species (Fensome and Mathews 2016). Roads are thought to have greater barrier effects on bats than other linear disturbance such as rail lines and transmission lines because roads are usually wider and have more vehicle traffic (sensory disturbance) (Altringham and Berthinussen no date). Barrier effects are higher in exposed areas than in areas with vegetation alongside the ROW (Fensome and Mathews 2016).

In the RSA, abandoned mines with the potential to provide suitable hibernacula are located in the vicinity Atikokan and Thunder Bay (MNDM 2020). According to the general habitat model, potential maternity roosting habitat for little brown myotis and northern myotis is widespread and abundant throughout the LSA. Little brown myotis was recorded at 19 bat acoustic survey station in 2022. Northern myotis was recorded at one bat acoustic survey station in 2022. In addition to recordings classified to the species level, many recordings contained ambiguous call and were classified only to the genus level. Although northern myotis was only recorded at one acoustic survey station, recording classified to the myotis genus may include calls made by this species. Although northern myotis is likely more widely distributed than is indicated by the single survey station where it was confirmed to be present, the acoustic data suggest that this species is less common and less widely distributed in the LSA than little brown myotis (Appendix 6.4-A)

Survival and Reproduction

Little brown myotis and northern myotis are listed as endangered on the provincial ESA (Government of Ontario 2007), and as endangered and on Schedule 1 of the federal SARA (Government of Canada 2002) due to dramatic population declines resulting from a devastating fungal disease called white nose syndrome (WNS). Prior to the introduction of WNS, little brown myotis was probably the most common bat in Canada (Environment Canada 2015). White nose syndrome has reduced populations by more than 75% in infected hibernacula (Frick et al. 2010). Mortality rates at infected sites in eastern Ontario were 92% after two years of exposure (COSEWIC 2012). White nose syndrome has been estimated to travel at an average rate of 200 to 400 km per year (COSEWIC 2012).

White nose syndrome was confirmed in the Kenora and Red Lake districts in 2017 (whitenosesyndrome.org 2017). WNS represents a significant and ongoing threat to the populations of little brown myotis and northern myotis in northwestern Ontario and the RSA. In North America, wherever WNS has spread, it has resulted in significant declines in the populations of myotis species and tri-colored bat (*Perimyotis subflavus*). However, some little brown myotis population in some WNS affected areas have shown to be stable or slightly increasing, albeit at much lower numbers then pre-WNS populations (Kozakiewicz and Funk 2021, Auteri and Knowles 2020, Grimaudo et al. 2021). It is unknown whether populations of northern myotis and little brown myotis that overlap with the RSA are decreasing, and it should therefore be assumed that these populations are stable but vulnerable.

Little brown myotis and northern myotis are long lived but only give birth to one pup per year (Fenton and Barclay 1980; Kuntz and Reichard 2010, ECCC 2012), making their populations sensitive to increases in adult mortality and slow to recover when the population size is small. Females may be reproductively active during their first year of life and have high fecundity rates (Kunz and Reichard 2010). Little brown myotis have been recorded to live to over 30 years of age (Fenton and Barclay 1980), although the average life span is thought to be shorter (COSEWIC 2013a). Reproductive rates seem to decline with increasing latitude; a reproductive rate of greater than 96% was recorded in the eastern United States, with lower rates of 42% to 57% in British Columbia (COSEWIC 2013a). Mean annual survival of little brown myotis in Ontario was 0.82 for males and 0.71 for females (COSEWIC 2013a). Survival rates are lowest in the first year of age because juveniles often lack sufficient fat reserves needed for hibernation (COSEWIC 2013a).

Mortality of little brown myotis and northern myotis may result from collisions with or barotrauma from wind turbines, extermination on private lands, disturbance during hibernation, and declining insect populations. Little brown myotis are vulnerable to persecution because of their tendency to use anthropogenic structures (Environment Canada 2015). Extermination of large colonies can affect local populations, particularly in areas that are already affected by WNS.

Disturbance during hibernation can result from recreational or industrial activities. Tourists, spelunkers, and researchers are the main visitors to hibernacula but their effect is likely minimal because these visits typically occur in the summer (Environment Canada 2015). Noise and vibration from industrial activities have the potential to disturb hibernating bats, or to otherwise interfere with their behaviour by masking echolocation and hearing (Schaub et al. 2008, Siemers and Schaub 2011). Echolocating species may be less sensitive to sensory disturbance than passive listening species as they can adjust the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016).

6.5.5.8 Herpetofauna (Snapping Turtle, Spring Peeper)

HERPETOFAUNA (SNAPPING TURTLE)

Mikinaak

Habitat Availability

Amphibians and reptiles are often grouped together and referred to collectively as herpetofauna. Snapping Turtle and Spring Peeper are examples of herpetofauna that occupy a wide-range of aquatic habitats (i.e., lakes, ponds, streams, bogs, marshes, etc.); however, Spring Peeper also spend the majority of their lifecycle more terrestrially. They generally only rely on aquatic habitats for their breeding and larval stage. All the anurans (frogs and toads) present in the LSA and RSA depend on aquatic environments for breeding. Conversely, Snapping Turtles are highly aquatic throughout their life and generally only rely on terrestrial habitat for nesting and incubation.

Snapping Turtle can be found in a wide variety of aquatic habitats, but tend to prefer shallow, slow-moving waterbodies with soft mud or sand bottom and abundant aquatic vegetation (COSEWIC 2008). Snapping Turtles are highly aquatic; often found swimming in close proximity to the shoreline or on the bottom close to aquatic or woody debris cover (Brown et al., 1994). They do bask out of water (COSEWIC 2008), but it may occur less commonly than other species of turtles. They are dormant during the winter, overwintering in waterbodies, and increase activity in the spring and remain active throughout to late fall. Females typically nest in May or June and can travel significant distances (several km) to reach a nesting site, but more typically search out nesting sites closer to their core habitat (i.e., < 500 m).

Spring Peepers will breed in a wide variety of habitat types as long as there is water, including temporary woodland ponds (Canadian Herpetological Society 2022). Outside of breeding season, Spring Peepers spend the majority of their time in leaf litter of forested areas or treed wetlands, in close proximity to their breeding sites. Spring peepers hibernate below the frost line in a variety of underground cavities or in some cases, under logs or thick leaf litter. Adults are generalist feeders of small insects and other invertebrates (Canadian Herpetological Society 2022). Larvae eat algae, plants matter, and organic debris.

Turtle Wintering Area is a Seasonal Concentration Area SWH. For most turtles, wintering areas are in the same general area as their core habitat. The water of the permanent waterbodies has to be deep enough not to freeze completely to the bottom (MNRF 2017a). Criteria for confirmed

Turtle Wintering Area SWH is based on presence of one or more western painted turtle or snapping turtle over-wintering within a wetland (MNRF 2017a).

Turtle Nesting Area is a Specialized Habitat for Wildlife SWH. In early spring and summer, turtles lay their eggs in areas that are relatively soft substrates such as sand or fine gravel that allows turtles to easily dig their nests, and are located in open, sunny areas. Nesting sites close to water, away from roads, and sites less prone to egg predation are the highest quality (MNRF 2017a). Criteria for confirmed Turtle Nesting Area SWH is one or more nests being present (MNRF 2017a) but excludes nesting along provincial or municipal roads.

Amphibian Breeding Habitat is a Seasonal Concentration Area SWH. Based on the habitat criteria for significance, wetlands and pools need to persist until August (MNRF 2017a). Presence of shrubs and logs increase the significance for some species because of available structure for calling (MNRF 2017a). Criteria for confirmed Amphibian Breeding Habitat SWH is based on anuran presence of four or more of the listed frog or toad species including either Northern Leopard Frog, Green Frog or Mink Frog and at least 20 breeding individuals (MNRF 2017a).

Overall, habitat availability for amphibians is high in the LSA at baseline characterization and is not considered a limiting factor (Attachment 6.5-B-6, in Appendix 6.5-B). Generally, habitat availability for turtles is moderately abundant in the LSA, with the exception of high-quality turtle nesting habitat, which may be a limiting factor in the LSA (Attachment 6.5-B-7, in Appendix 6.5-B).

- The LSA contains 26,978 ha of candidate Amphibian Breeding Habitat representing 16.4% of the LSA (Table 6.5-10).
- The LSA contains 23,087 ha of candidate Turtle Wintering Area representing 14.0% of the LSA (Table 6.5-10).
- The LSA contains 954 ha of candidate Turtle Nesting Area representing <1% of the LSA (Table 6.5-10).

Table 6.5-10: Herpetofauna Candidate Significant Wildlife Habitat Availability in the Local and Regional Study Areas

Candidate Significant Wildlife Habitat	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Amphibian Breeding Habitat	26,978	16.4%	84,598	15.4%
Turtle Wintering Area	23,087	14.0%	73,677	13.4%
Turtle Nesting Area	954	0.6%	1,436	0.3%

% = percent; ha = hectare; LSA = local study area; RSA = regional study area

Habitat Distribution

Many amphibians and reptiles use different habitat types at different life stages. However, this is coupled with generally low dispersal ability and high site fidelity. As such, both Snapping Turtles or Spring Peepers are only considered local migrants as they migrate annually between winter, spring breeding, and summer habitats.

There is evidence that female Snapping Turtles can show strong nest site fidelity, moving up to 500 m overland and up to 8 km downstream to reach nesting sites (Obbard and Brooks 1980). In addition, many individuals make migrations to return annually to previously used hibernation sites (Brown and Brooks 1994). Outside of these events, Snapping Turtles generally have restricted summer home ranges (Galbraith et al. 1987). Newly hatched Snapping Turtles generally return to water quickly and are believed to bury themselves under leaf litter or debris for hibernation, however little else is known about specific habitat preferences of newly emerged and juvenile Snapping Turtles (COSEWIC 2008).

Since Spring Peepers are so flexible in their selection of breeding habitat, individuals generally breed near their core habitat. Little is known about their non-breeding home range size, but individual home ranges have been estimated to be as small as a couple metres squared (m^2) up to approximately 20 m^2 (Delzell 1958; Zampella & Bunnell 2000). Spring peepers are ‘tree frogs’ (*Hylidae*); they will occasionally climb trees but stay relatively low to the ground (MacCulloch 2002). They do not occur in urbanized areas.

Snapping Turtle distribution in northwestern Ontario is much more sporadic than its distribution throughout southern Ontario (COSEWIC 2008) and most occurrences based on only a few records each (ORAA 2022). Similarly, the distribution of Spring Peeper in northwestern Ontario is much more sporadic compared to southern Ontario, however, there are pockets with occurrences based on more numerous records around Thunder Bay and Dryden, for example (ORAA 2022).

Survival and Reproduction

Amphibians and reptiles are showing dramatic population declines globally resulting in alarmingly high prevalence of threatened and endangered species (Gibbons et al. 2000; Böhm et al. 2013; Green 2003). The trend is consistent within Canada, with a high proportion of amphibian and reptile species assessed as at-risk by COSEWIC (Lesbarrères et al. 2014). Many herpetofauna species are at or approaching their northern distribution limit in northern landscapes and may show reduced resiliency to impacts in these environments (Refs). Threats to the survival and reproduction of reptiles and amphibians in the RSA include habitat loss and fragmentation (Cushman 2006), road mortality (Hels and Buchwald 2001; Gibbs and Shiver 2005; Eigenbrod et al. 2008), exposure to environmental contamination (Hecnar 1995; Sanzo and Hecnar 2006), infectious disease (Lesbarrères et al. 2011; D’Aoust-Messier et al. 2015), and climate change (Walpole et al. 2012; Klaus and Lougheed 2013).

Snapping turtle is listed as Special Concern under the ESA and SARA (COSEWIC 2008) and is considered ‘Apparently Secure’ (S4) in Ontario (NatureServe 2022). Spring peepers are widespread and is considered stable (S5) in Ontario (NatureServe 2022).

Snapping turtle populations are generally limited by their life-history strategy. They are a very long-lived species and very slow to reach maturity. Delayed sexual maturity (est. 15-20 years; COSEWIC 2008), low reproductive success, and high mortality of embryos (nest predation) and hatchlings make populations of snapping turtle particularly vulnerable to population level declines. As such adult survivorship is critically important to maintaining sustainable populations. A long-studied population of Snapping turtles in Algonquin Park had an estimated likelihood of survival from egg to sexual maturity of < 0.1% (Brooks et al. 1991). This is due to a combination of thermal constraints in Ontario, particularly in northern Ontario, and extremely high rates of nest predation, particularly in areas of high anthropogenic disturbance coupled with road mortality and persecution (COSEWIC 2008). A report provided by Lac des Mille Lacs First Nation notes there is a snapping turtle crossing near the preliminary preferred route and recommends precautions be taken during spring and early summer months during the construction phase. The report also indicates the presence of snapping turtle nesting sites and basking locations. The report expresses concerns that increased traffic during construction may result in increased turtle mortality on roads (Lac des Mille Lacs First Nation 2023).Until recently, snapping turtle hunting was permitted in Ontario, however Ontario put an end to legal hunting in 2017. Illegal harvesting may constitute an ongoing threat to population, but its true impacts are largely unknown.

Snapping turtle mating takes place in early spring and females nest shortly after. Females dig a nest with their hind feet and lay a single clutch of eggs that can range from approximately 10-80 eggs (COSEWIC 20008). Sex determination in snapping turtle eggs is temperature dependent (Ewert 2008). Hatchlings generally emerge in mid to late September. Summers with consistently cool temperatures severely reduce the likelihood of successful incubation (COSEWIC 2008).

Spring peeper breeding season begins in early spring. They are usually the earliest frog species to begin calling in the spring. Males (often in large groups at small ponds) call from among vegetation along the edges or in standing water, or sometimes perched low in woody vegetation farther away from water (MacCulloch 2002). Each male will establish a small breeding territory and there is evidence of vocal competition for females (Woodward and Mitchell 1990). During external fertilization, females will lay between a few hundred up to a thousand eggs, depositing each on submerged vegetation or organic debris. Eggs generally hatch with a few days to a week and those larvae live aquatically in the breeding pond for two to four months (Gosner and Rossman 1960), at which point larvae metamorphose and move to moist wooded areas. They are occasionally heard calling again in the fall, but do not breed during this period. The purpose of this fall calling period is not fully understood.

6.5.5.9 Raptors (Bald Eagle)

RAPTORS *(BALD EAGLE)*

Migizi

Habitat Availability

Bald eagles are found in association with aquatic habitats (e.g., coastal areas, rivers, lakes, and reservoirs) with forested shorelines or cliffs throughout North America (Buehler 2020, Armstrong 2014). Bald eagles often use perches within approximately 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).

Bald eagles prefer to nest in mature or old growth forest with some edge, in the largest available trees, typically 20 to 60 m in height (Buehler 2020). Bald eagles prefer nesting in forests with 30% to 50% canopy cover, with large trees suitable for nests and perching (Antony and Isaacs 1989). While bald eagles have clear nest tree preferences, they are also flexible in nest site selection (Grier and Guinn 2003).

The Ministry of Natural Resources (MNR 2000) Significant Wildlife Habitat Technical Guide identifies bald eagle winter habitat as “seasonal concentration areas” and bald eagle nesting, foraging and perching habitat as “rare or specialized habitats for wildlife.” Areas identified as Significant Wildlife Habitat receive an approximate 120 m buffer (MNR 2000) in addition to recommended activity setbacks (MNR 2000).

The main disturbances in the RSA at baseline characterization are forestry, fire and fire suppression activities, and other linear disturbances. Bald eagle typically nests in areas of low human disturbance. In northwestern Ontario, lakes with bald eagle nests were farther from roads than lakes without nests (Jones 1995). 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). A report provided by Lac des Mille Lacs First Nation notes Elders indicate the presence of bald eagles in the area of the preliminary preferred route (Lac des Mille Lacs First Nation 2023).

Some changes in the baseline characterization may have favoured bald eagle nesting habitat. The forest industry has led to increased fire suppression, which has resulted in an increase in average forest age and possibly more suitable bald eagle habitat in the RSA.

Available evidence suggests that habitat availability is not a limiting factor for this species in the LSA and RSA at baseline characterization. Therefore, changes to habitat availability in the baseline characterization appear to be within the adaptability and resilience limits of bald eagle populations that overlap with the RSA.

- The LSA contains 68,388 ha (41.5%) of moderate to high suitability bald eagle habitat (Table 6.5-11).
- The RSA contains 219,104 ha (40.0%) of moderate to high suitability bald eagle habitat.

Table 6.5-11: Bald Eagle Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	68,388	41.5%	219,104	40.0%
Unsuitable	96,399	58.5%	329,017	60.0%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Bald eagles in eastern Canada are short distance migrants that breed in eastern Canada in the summer and may migrate farther south for the winter (Wright 2016). Bald eagle home range sizes vary from 7 km^2 in Saskatchewan to 22 km^2 in Oregon (Buehler 2020); assuming circular home ranges, this corresponds to home range radii of 2.0 to 2.6 km. Bald eagle breeding territories tend to be within 2 km of water near lakes greater than 1,000 ha with more than 11 km of shoreline, and average territory sizes range from 0.5 to 4 km^2 (Armstrong 2014).

In Ontario, the highest concentration of bald eagle nests is centred on Lake of the Woods, which is outside the RSA (Armstrong 2014). Moderate to high suitability habitat along the RSA is more patchily distributed with larger patches of habitat centred around Atikokan (Attachment 6.5-B-8, in Appendix 6.5-B).

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 2000). 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 2020).

Overall, habitat is well distributed and connected in the RSA and LSA. Existing disturbances in the RSA and LSA do not likely function as a dispersal barrier for this species in the baseline characterization. Bald eagle populations that overlap with the RSA are considered to be within the resilience and adaptability limits of this criterion.

Survival and Reproduction

Bald eagle populations are estimated at 400,000 individuals in North America (Buehler 2020). Bald eagles declined drastically in the early 1900s because chemicals such as dichloro-diphenyl-trichloroethane (DDT) and polychlorinated biphenyls (PCBs) accumulated through the food chain and weakened eggshells leading to low reproductive success (Armstrong 2014). Bald eagles were also historically shot as pests or trophies (Buehler 2020). Slight shifts in adult bald eagle survival, for example from illegal shooting, accidental trapping, or collisions with wind turbines, can drastically affect population trends (Armstrong 2014).

Bald eagles are long lived and slow to mature, capable of breeding at five years, but often not until they reach six or seven years of age (Armstrong 2014). Bald eagle clutch sizes are small (one to three eggs) and their incubation time is long (34 to 46 days) such that if their nest tree is blown down, the affected pair may not breed in that year (Armstrong 2014).

Bald eagle in Ontario have shown a large recent increase after recovering from historical threats (Blancher et al. 2009). However, bald eagles in Ontario still have vulnerabilities and face some threats and are designated as a species of Special Concern in Ontario (MNRF 2015a). After DDT was banned in the 1970s, bald eagles in the Great Lakes region rebounded more slowly than more inland Ontario populations because of the more contaminated fish populations in that region (Armstrong 2014). Wright (2016) also found that numbers of bald eagles breeding in the north in summer (North Carolina to eastern Canada) increased more slowly than numbers of bald eagles breeding in the south in winter (Texas to North Carolina) based on migration counts from 1991 to 2015. As top predators that feed primarily on fish, bald eagle continue to face threats from pollution, residual chemical contamination, and poisoning from lead and mercury (Armstrong 2014).

Collisions with electrical lines is recognized as contributing to avian mortality, particularly for raptors that are known to have blind areas when in flight (Martin and Shaw 2010).

Forest harvesting can have negative effects on bald eagle survival and reproduction (Isaacs et al. 2005). Road density, proximity, and level of use does not appear to affect bald eagle productivity (MNR 2010b).

The RSA likely overlaps with several distinct but interbreeding bald eagle populations. Based on the population status and trends derived for the RSA and LSA, bald eagle populations that overlap with the RSA are likely smaller relative to those historically present, but Ontario populations are experiencing positive growth rates in the baseline characterization (MNR 2010ac). Therefore, changes to survival and reproduction are predicted to be within the resilience or adaptability limits of this criterion at baseline characterization.

- The RSA is mostly contained within the Ontario Breeding Bird Atlas (OBBA) Region 40: Lake of the Woods. Data from the OBBA (Cadman et al. 2007) (Region 40) were used to estimate the number of bald eagle individuals in the RSA.
- The density estimate for Region 40 is 0.2 individuals/km². Applying this estimate to the amount of moderate to high quality habitat in the RSA (Table 6.5-11) corresponds to a predicted abundance of 329 individuals at baseline characterization.
- There were 14 known bald eagle nest records in the LSA (Appendix 6.5-B).
- There were 99 known bald eagle nest records in the RSA (Appendix 6.5-B).
- There were more than 30 recent (within the last 10 years) eBird records of bald eagle during May-July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
- Five bald eagles were observed in the LSA during fieldwork in 2022 (Appendix 6.4-A).

6.5.5.10 Marshbirds (Trumpeter Swan)

MARSHBIRDS *(TRUMPETER SWAN)*

Gichi-waabizii

Habitat Availability

Trumpeter swans are found in association with marsh habitats (e.g., freshwater marshes, ponds, beaver ponds, bogs; Mitchell and Eichholz 2020). Key parameters for nesting habitat for the species include room for take-off (~100 m), accessible forage locations, stable water levels, emergent vegetation, the presence of muskrat or beaves houses, or other structures for nest sites, and low human disturbance (Mitchell and Eichholz 2020). Shoreline urban and industrial activities have the greatest potential to limit habitat availability because it overlaps with the highest quality habitat for trumpeter swans (Mitchell and Eichholz 2020).

Trumpeter swans prefer and are more productive nesting in waters with irregular shorelines, water depths of 1 m, emergent vegetation, and the availability of multiple nest sites (Lockman et al. 1987). The MNR (2000) Significant Wildlife Habitat Technical Guide identifies trumpeter swans as a key indicator species of marsh bird breeding habitat.

The main disturbances in the RSA at baseline characterization are hunting and linear disturbances. Trumpeter swans typically nest in areas of low human disturbance; however, in southern Ontario, the species is now found in areas of higher human disturbances (Thomas et al. 2021, eBird 2022).

Available evidence suggests that habitat availability is not a limiting factor for this species in the LSA and RSA at baseline characterization. Therefore, changes to habitat availability in the baseline characterization appear to be within the adaptability and resilience limits of trumpeter swan populations that overlap with the RSA.

- The LSA contains 32,457 ha (19.7%) of moderate to high suitability trumpeter swan habitat (Table 6.5-12; Attachment 6.5-B-9, in Appendix 6.5-B).
- The RSA contains 131,618 ha (24%) of moderate to high suitability trumpeter swan habitat.

Table 6.5-12: Trumpeter Swan Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	32,457	19.7%	131,618	24.0%
Unsuitable	132,330	80.3%	416,502	76.0%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

The TKLUS shared by NWOMC and Region 2 notes the presence duck, partridge and upland birds, near the Project footprint. In addition, participants indicated changes to bird migration patterns which has made hunting more difficult (MNP 2023b).

Habitat Distribution

Historically, the species was hunted close to extinction and was extirpated from much of eastern North America (Mitchell and Eichholz 2020). A reintroduction program was initiated in the 1980s and has been highly successful, bringing back the population to Ontario and the species is now self-sustaining (Lumsden et al. 2020).

Trumpeter swans in northwestern Ontario are short to medium distance migrants that breed in the interior of the continent in the summer and migrate south for the winter, typically where open water and waste grains are present in sufficient quantities to sustain the species and individuals

(Mitchell and Eichholz 2020, Thomas et al. 2021). A report provided by Lac des Mille Lacs First notes an area near the preliminary preferred route is part of a waterfowl migration route for mallards, mergansers, fish ducks, goldeneyes, geese, swans, loons, blue-winged teal ducks, black ducks, pintails, and sandhill cranes. The report notes waterfowl species are especially found at the mouths of rivers following the spring ice break up (Lac des Mille Lacs First Nation 2023).

In Ontario, concentrations of trumpeter swans are present in four distinct regions: in northwestern Ontario in Kenora and Rainy River Districts, the Sault Ste. Marie area, southeastern Ontario, and south-central Ontario; however, the species is rapidly increasing (Cadman et al. 2007, Thomas et al. 2021). Moderate to high suitability habitat along the RSA is more patchily distributed throughout the Project (Attachment 6.5-B-9, in Appendix 6.5-B).

Overall, habitat is well distributed and connected in the RSA and LSA. Existing disturbances in the RSA and LSA do not likely function as a dispersal barrier for this species in the baseline characterization. Trumpeter swan populations that overlap with the RSA are considered to be within the resilience and adaptability limits of this criterion.

Survival and Reproduction

Trumpeter swan populations are estimated at >2,000 individuals in Ontario (Thomas et al. 2021). Trumpeter swans declined drastically in the 1800s due largely to hunting and the species was extirpated across eastern North America (Mitchell and Eichholz 2020, Thomas et al. 2021). Slight shifts in adult trumpeter swan survival, for example from illegal shooting, accidental trapping, or collisions with wind turbines, can impact population trends (Mitchell and Eichholz 2020).

Trumpeter swans are long-lived and relatively slow to mature, capable of breeding at two years; however, typically individuals do not start breeding until four to seven years of age (Mitchell and Eichholz 2020).

Trumpeter swans in Ontario have shown a large recent population increase after recovering from historical threats (Mitchell and Eichholz 2020, Thomas et al. 2021). Trumpeter swan is not listed as risk in Ontario or Canada and is not tracked by the NHIC. However, trumpeter swans in Ontario still have vulnerabilities and face some threats, particularly due to habitat loss and hunting pressure, similar to other marshbirds.

Collisions with electrical lines is recognized as contributing to avian mortality, particularly for marshbirds and waterbirds that are known to have blind areas when in flight (Mitchell and Eichholz 2020).

Hunting pressure is a known risk to the survival of the species and played the paramount factor in the species history during European settlement (Lumsden 1984). While historically, human disturbance was thought to have a negative impact on the species, the species has shown to be more tolerant to human presence and is now found commonly throughout highly dense urban centres in southern Ontario (eBird 2022).

Wetland loss, particularly in regions of the species range that conflict with agriculture is a significant factor that may impact the species population comeback (Mitchell and Eichholz 2020). However, in northwestern Ontario, habitat for the species is widely available and is not a limiting factor for the species (Thomas et al. 2021).

Based on the population status and trends derived for the RSA and LSA, trumpeter swan populations that overlap with the RSA are likely smaller relative to those historically present, but Ontario populations are experiencing positive growth rates (Thomas et al. 2021). Therefore, changes to survival and reproduction are predicted to be within the resilience or adaptability limits of this criterion at baseline characterization.

- Data from the 2015 North American Trumpeter Swan Survey (Badzinski and Earsom 2016) were used to estimate the number of trumpeter swan individuals in the RSA.
- The density estimate for northwestern Ontario is 0.01 individuals/km². Applying this estimate to the amount of moderate to high quality habitat in the RSA (Table 6.5-12) corresponds to a predicted abundance of 15 individuals at baseline characterization.
- There was one known trumpeter swan nest record in the LSA (Appendix 6.5-B).
- There were three known trumpeter swan nest records in the RSA (Appendix 6.5-B).
- There were more than 20 recent (within the last 10 years) eBird records of trumpeter swans during June and July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
- Four trumpeter swans were observed in the LSA during fieldwork in 2022 (Appendix 6.4 A).

6.5.5.11 *Songbirds (Canada Warbler, Eastern Wood-Pewee, and Olive-sided Flycatcher)*

SONGBIRDS (CANADA WARBLER, OLIVE-SIDED FLYCATCHER, EASTERN WOOD-PEWEE)

Noondaagozibineshiinyag

Habitat Availability

Canada warbler, eastern wood-pewee, and olive-sided flycatchers breed in forested areas in Canada and parts of the United States and overwinter in Central and South America. The main disturbances affecting these species and other songbird's habitat availability in the RSA at baseline characterization are forestry, fire suppression activities and linear features. Forestry can have both positive and negative effects on these species' habitats. Initially forestry activities remove suitable habitat; however, all three species are generally absent from recently disturbed areas (Norton et al. 2000, Schieck and Song 2006).

Fire suppression activities have increased the average forest age in northern Ontario by approximately 30 years, compared to 1915. Shrub density is highest in young regenerating (0 to 24 years) and mature forests (greater than [>] 100 years) because light levels are limited in closed canopy stands of 25 to 100 years (Alaback 1982, McKenzie et al. 2000). The direction of the effect on these species' habitat from fire suppression activities (i.e., positive or negative) is likely related to the density of the shrub layer in old forests and the contiguous element of these features.

It is currently unknown whether breeding habitat is limiting Canadian populations of Canada warbler, eastern wood-pewee, and olive-sided flycatcher (Environment Canada 2016a). Results of the habitat mapping in the RSA indicate that approximately 30 to 50% of the RSA has moderate to high suitability breeding habitat for each of these species. This suggests that breeding habitat is not a limiting factor for these species, as well as other songbird species, that overlap with the RSA at baseline characterization and that changes in habitat availability have not exceeded the adaptability or resilience limits of this criterion.

- Canada Warbler
    - Moderate to high suitability habitat is estimated to compose 70,451 ha (42.8%) of the LSA (Table 6.5-13, Attachment 6.5-B-10, in Appendix 6.5-B).
    - The RSA contains 212,260 ha (38.7%) of moderate to high suitability Canada warbler habitat.

Table 6.5-13: Canada Warbler Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	70,451	42.8%	212,260	38.7%
Unsuitable	94,336	57.2%	335,861	61.3%
Total	**164,787**	**100%**	**548,121**	**100%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

- Eastern wood-pewee:
    - Moderate to high suitability habitat is estimated to compose 54,375 ha (33%) of the LSA (Table 6.5-14, Attachment 6.5-B-10, in Appendix 6.5-B).

- The RSA contains 165,313 ha (30.2%) of moderate to high suitability eastern wood-pewee habitat.

Table 6.5-14: Eastern Wood-pewee Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	54,375	33.0%	165,313	30.2%
Unsuitable	110,413	67.0%	382,808	69.8%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

- Olive-sided flycatcher:
  - Moderate to high suitability habitat is estimated to compose 83,579 ha (50.7%) of the LSA (Table 6.5-15; Attachment 6.5-B-12, in Appendix 6.5-B).
  - The RSA contains 259,869 ha (47.4%) of moderate to high suitability olive-sided flycatcher habitat.

Table 6.5-15: Olive-sided Flycatcher Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	83,579	50.7%	259,869	47.4%
Unsuitable	81,208	49.3%	288,251	52.6%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Changes to forest composition have been greatly influenced by forest harvesting operations. Pre-industrialized forests were less fragmented than current forests (Elkie et al. 2013). However, since 1995, habitat management in FMUs has been focused on maintaining suitable habitat for woodland caribou. As such, forest harvesting practices have changed to harvest larger blocks of forest to emulate natural disturbances and minimize road densities (Bowater 2008; AbitibiBowater Inc. 2009; MFP 2011). This has reduced the amount of forest fragmentation in the RSA, relative to conditions that were present from the beginning of forest harvesting through 1995. Effects from habitat fragmentation on Canada warbler, eastern wood-pewee, and olive-sided flycatcher are unclear. Some studies suggest that fragmentation has negative effects on Canada warbler because they are an interior forest nesting bird that avoids edge habitat (Askins and Philbrick 1987, Hobson and Bayne 2000); conversely edge habitats may improve foraging opportunities for eastern wood-pewee and olive-sided flycatcher (Altman and Sallabanks 2020, Watt et al. 2020). Other studies suggest that Canada warbler are resilient to habitat fragmentation from logging activities as the species uses early successional habitat (Schmiegelow et al. 1997, Schmiegelow and Monkkonen 2002).

Habitat fragmentation from mineral exploration and other linear disturbances present at baseline characterization may have negatively affected these species and other songbird habitat distribution. However, habitat does not appear to be a limiting factor for these species and other songbirds at baseline characterization, and these species are highly mobile and can establish territories in areas below carrying capacity. 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. Bayne and Hobson (2001) suggest that habitat fragmentation did not constrain the movements of successful breeding male ovenbirds (*Seiurus aurocapilla*) in a boreal landscape.

At baseline characterization, moderate to high suitability habitat for Canada warbler, eastern wood-pewee, and olive-sided flycatcher is distributed throughout the RSA and LSA (Attachment 6.5-B-10, Attachment 6.5-B-11, and Attachment 6.5-B-12, in Appendix 6.5-B).

Overall, habitat is well distributed and connected across the LSA and RSA. Existing disturbance in the RSA and LSA do not likely function as dispersal barriers for this species in the baseline characterization and habitat conditions at baseline characterization are predicted to be well within the resilience and adaptive capacity limits for this criterion.

Survival and Reproduction

Abundance estimates of Canada warbler, eastern wood-pewee, and olive-sided flycatcher in Ontario suggest a population of 900,000, 300,000, and 100,000 individuals respectively (Cadman et al. 2007). Long-term breeding bird survey data show a decline of Canada warbler, eastern wood-pewee, and olive-sided flycatcher abundance of 1.5%, 1.9%, and 2% per year from 1970 to 2019, respectively (overall >50% population decline for each species) (Smith and Edwards 2020).

Despite negative population trend data, Environment Canada (2016a) states that “there are currently adequate numbers of individuals [of all three species] to sustain the species in Canada or increase its abundance with the implementation of proper conservation actions.” Along with habitat conditions in the RSA, this suggests that changes to Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction in the baseline characterization are likely within the resilience and adaptability limits of this species.

Canada warbler, eastern wood-pewee, and olive-sided flycatcher primarily feed on flying insects and spiders. Insect populations are declining worldwide and spruce budworm (*Choristoneura*) outbreaks in eastern forests have decreased since 1970; both factors may be contributing to these species' declines (Environment Canada 2016a). Many aerial foraging insectivorous birds, such as these species, have experienced large declines since the 1980s (Blancher et al. 2009, NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and non forest aerial foraging birds are declining (Blancher et al. 2009, Nebel et al. 2010, Nocera et al. 2012, and Paquette et al. 2014). Insect and bird populations that are distributed within and also likely beyond the RSA have likely been affected by these factors at baseline characterization. These species may be susceptible to these factors because their residency on breeding grounds is brief compared to other species.

Canada warbler, eastern wood-pewee, and olive-sided flycatchers are nocturnal migrants and vulnerable to accidental mortality from collisions with infrastructure such as communication towers, buildings, transmission lines, and wind turbines (Reitsma et al. 2009, Environment Canada 2016a).

Changes to forest habitat from forest harvesting may have positive and negative effects on these species' survival and reproduction. All three species have been found to tolerate a degree of forest harvesting, especially in the eastern portion of their ranges (Hagan et al. 1997, Environment Canada 2016a).

- Canada Warbler:
  - Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for Canada warbler.
  - The density estimate for Canada warbler in the Northern Shield is 1 individual/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-13) corresponds to a predicted abundance 2,109 individuals in the RSA at baseline characterization.
  - There were no Element Occurrences of Canada warbler within the LSA (NHIC 2022).
  - There were 11 recent (within the last 10 years) eBird records of Canada warbler during June and July (peak breeding season) within the LSA between 2016 and 2022; including one near Atikokan, two near Kashabowie and eight near Thunder Bay (eBird 2022).
  - Field surveys in 2022 documented 11 individuals at 10 locations within the LSA.
- Eastern Wood-Pewee:
  - Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for eastern wood-pewee.

- The density estimate for eastern wood-pewee in the Northern Shield is 0.1 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-14) corresponds to a predicted abundance 110 individuals in the RSA at baseline characterization.
- There were no Element Occurrences of eastern wood-pewee within the LSA (NHIC 2022).
- There were 13 recent (within the last 10 years) eBird records of eastern wood-pewee during June and July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
- Field surveys in 2022 documented five individuals at separate locations within the LSA.

- Olive-Sided Flycatcher:
  - Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for olive-sided flycatcher.
  - The density estimate for olive-sided flycatcher in the Northern Shield is 0.1 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-15) corresponds to a predicted abundance 301 individuals in the RSA at baseline characterization.
  - There were no Element Occurrences of olive-sided flycatcher within the LSA (NHIC 2022).
  - There were >15 recent (within the last 10 years) eBird records of olive-sided flycatcher during June and July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
  - Field surveys in 2022 documented seven individuals at separate locations within the LSA.

6.5.5.12 Bank Swallow

BANK SWALLOW

Animikiibineshiinh

Habitat Availability

Historically, bank swallows nested exclusively in soft substrates along the exposed banks of watercourse edges, typically that of along major rivers and lakeshore edges (COSEWIC 2013b). In Ontario, the largest concentration of suitable nesting locations was along the major rivers and lakes, primarily throughout the lower Great Lakes (Cadman et al. 2007, COSEWIC 2013b).

Overall, habitat availability for bank swallow is low in the RSA at baseline characterization and is considered a limiting factor for this species. Suitable breeding habitat for bank swallows in Ontario is mostly confined to areas south of the Canadian Shield and the Hudson Bay Lowlands. Suitable habitat in the vicinity of the RSA is scattered throughout and is tied almost exclusively to aggregate pits, where habitat for this species has been created.

- Bank Swallow:
    - Moderate to high suitability habitat is estimated to compose 7,867 ha (4.8%) of the LSA (Table 6.5-16; Attachment 6.5-B-13, in Appendix 6.5-B).
    - The RSA contains 16,220 ha (3.0%) of moderate to high suitability bank swallow habitat.
    - There is 99 ha of protected habitat in the LSA (0.03 ha in Category 1, 1 ha in Category 2, and 97 ha in Category 3 habitat) in accordance with the provincial general habitat description.

Table 6.5-16: Bank Swallow Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	7,867	4.8%	16,220	3.0%
Unsuitable	156,920	95.2%	531,901	97.0%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Suitable habitat in the vicinity of the RSA is scattered throughout and is tied almost exclusively to aggregate pits. Habitat suitability modelling confirms that suitable habitat occurs primarily as small, isolated patches concentrated in proximity to the urban centres in the RSA (refer to Appendix 6.5-A), which is consistent with available information on the occurrence of bank swallow in northern Ontario (Cadman et al. 2007). However, the fragmented and isolated distribution of the habitat patches likely limits their suitability for the species.

The habitat mapping results, occurrence data and an understanding of this species' biology indicate a concentrated distribution of suitable bank swallow breeding habitat in the RSA and LSA that results from a natural lack of suitable habitat in this predominantly forested region of the province. Existing disturbances in the RSA and LSA do not likely function as dispersal barriers for this highly mobile species in the baseline characterization, and some industrial disturbances have likely had positive effects on habitat distribution.

Bank swallows have adapted well to anthropogenic habitats (e.g., aggregate pits, soil stockpiles, etc.) and, as a result, are adaptable to some types of habitat modification and are likely more abundant in the RSA than they were historically. Therefore, although bank swallow is rare in the RSA, the positive and negative changes to the amount of suitable habitat available in the baseline characterization are predicted to be within the adaptability or resilience limits of populations that overlap with the RSA.

Survival and Reproduction

Bank swallows are declining in Ontario, where they have been designated as "Threatened" under the ESA. The current estimated total population in Ontario is 200,000 individuals (COSEWIC 2013b). However, breeding bird survey data indicate the relative abundance of bank swallow within the RSA is low (Cadman et al. 2007). A comparison between the results of the first (1981 to 1985) and second (2001 to 2005) atlas of the breeding birds of Ontario identified a 45% decline in the probability of observation of bank swallow (Cadman et al. 2007).

Bank swallows were likely never abundant in the RSA due to the lack of naturally available suitable habitat. Abundance may have been higher at the peak of agricultural expansion in the region, but current abundance is likely higher than it was before European settlement in northwestern Ontario, when the species was likely uncommon in the region (Cadman et al. 2007).

There is no information on the reproductive success or survival of bank swallows specific to the populations in northwestern Ontario. Studies from other parts of the species' range indicate bank swallow reproduce successfully in various land cover types, though nesting success rates vary significantly at natural and anthropogenic nest sites (COSEWIC 2013b). Reported nest success at anthropogenic nest sites has been found to be significantly higher than natural sites, with anthropogenic sites found to have about 50% of nest burrows lost due to excavation, erosion, predators, and indirect damage (COSEWIC 2013b). Naturally located nest sites in contrast were found to have 21% of nest burrows lost due to erosion and natural predation (COSEWIC 2013b).

Many aerial-foraging insectivorous birds, such as the bank swallow, have experienced large declines since the 1980s (Blancher et al. 2009, NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and non-forest aerial-foraging birds are declining (Blancher et al. 2009, Nebel et al. 2010, Nocera et al. 2012, and Paquette et al. 2014). Insect and bird populations that are distributed within and also likely beyond the RSA have likely been affected by these factors at baseline characterization. Bank swallows may be susceptible to these factors because their residency on breeding grounds is brief compared to other species.

Changes to industrial activities may have positive and negative effects on this species survival and reproduction. However, this species has been found to tolerate a degree of industrial activity, (Cadman et al. 2007, COSEWIC 2013b, Garrison and Turner 2020).

- Data from the OBBA (Cadman et al. 2007) (Region 40) were used to estimate the number of individuals in the RSA for bank swallow.
- The density estimate for bank swallow in Region 40 is 0.07 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-16) corresponds to a predicted abundance 11 individuals in the RSA at baseline characterization.
- There were three Element Occurrences of bank swallow within the LSA(NHIC 2022).
- There were two recent (within the last 10 years) eBird records of bank swallow during June and July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
- Field surveys in 2022 documented 15 individuals at one nesting colony within the LSA (near Ignace, in an existing aggregate pit).

6.5.5.13 Barn Swallow and Chimney Swift

CHIMNEY SWIFT

Daabida Animikiibineshiinh

BARN SWALLOW

Waakaa'iganibineshiinh

Habitat Availability

Historically, barn swallows nested exclusively in caves and cliffs (Brown and Brown 2020); however, with human settlement, the species has changed and now nests almost exclusively around human settlements and major road networks (Brown and Brown 2020). Like the barn swallow, the chimney swift historically, pre-European settlement, nested in natural settings like caves, cliffs, and the hollows of large trees (Steeves et al. 2020). With human settlement, chimney swift is now known to nest largely in association with human settlements (Steeves et al. 2020).

With European settlement, barn swallow and chimney swift expanded nesting locations tied to human settlements for nesting locations (Brown and Brown 2020, Steeves et al. 2020). In Ontario, the largest areas of concentration for either species is south of the Canadian Shield (Cadman et al. 2007). In northwestern Ontario, barn swallow is found in pockets surrounding Thunder Bay and Lake of the Woods, as well as scattered locations around urban centres, and in proximity to major transportation networks (Cadman et al. 2007). Chimney swift is known from fewer locations in northwestern Ontario, albeit all in association with urban centres and is largely at the species geographical northern extent of its global breeding range (Cadman et al. 2007, eBird 2022).

Overall, habitat availability for barn swallow and chimney swift is low in the RSA at baseline characterization and is considered a limiting factor for these species. Suitable breeding habitat for these species in Ontario is mostly confined to areas south of the Canadian Shield. Suitable habitat in the vicinity of the RSA is scattered throughout and is tied almost exclusively to urban settlements, where habitat for this species has been created.

- Barn Swallow:
  - Moderate to high suitability habitat is estimated to compose 2,830 ha (1.7%) of the LSA (Table 6.5-17; Attachment 6.5-B-14, in Appendix 6.5-B).
  - The RSA contains 4,724 ha (0.9%) of moderate to high suitability barn swallow habitat.

Table 6.5-17: Barn Swallow Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	2,830	1.7%	4,724	0.9%
Unsuitable	161,957	98.3%	543,396	99.1%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

- Chimney Swift:
  - Moderate to high suitability habitat is estimated to compose 2,570 ha (1.6%) of the LSA (Table 6.5-18; Attachment 6.5-B-15, in Appendix 6.5-B).
  - The RSA contains 9,158 ha (1.7%) of moderate to high suitability chimney swift habitat.

Table 6.5-18: Chimney Swift Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	2,570	1.6%	9,158	1.7%
Unsuitable	162,218	98.4%	538,963	98.3%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Suitable habitat for both barn swallow and chimney swift in the vicinity of the RSA is scattered throughout and is tied almost exclusively to human settlements. Habitat suitability modelling confirms that that suitable habitat occurs primarily as small, isolated patches concentrated in proximity to the urban centres in the RSA (refer to Appendix 6.5-A). However, the fragmented and isolated distribution of the habitat patches likely limits their suitability for the species.

These conclusions about barn swallow and chimney swift habitat in the RSA are consistent with available information on the occurrence of these species in northern Ontario (Cadman et al. 2007, eBird 2022). eBird (2022) data indicate these species are known across northern Ontario, albeit in small, isolated patches throughout the region, in direct proximity to human settlements within northern Ontario that are within the road network; however, the RSA is at the extreme northern edge of the chimney swifts geographical breeding range in Ontario.

The habitat mapping results, occurrence data and an understanding of this species' biology indicate a concentrated distribution of suitable barn swallow and chimney swift breeding habitat in the RSA and LSA that results from a natural lack of suitable habitat in this predominantly forested region of the province. Existing disturbances in the RSA and LSA do not likely function as dispersal barriers for these highly mobile species in the baseline characterization, and industrial disturbances have likely had positive effects on habitat distribution.

Barn swallows and chimney swifts have adapted well to anthropogenic habitats (e.g., human settlements, road networks, etc.) and, as a result, are adaptable to some types of habitat modification and are likely more abundant in the RSA than they were historically. Therefore, although barn swallow and chimney swift are rare in the RSA, the positive and negative changes to the amount of suitable habitat available in the baseline characterization are predicted to be within the adaptability or resilience limits of populations that overlap with the RSA.

Survival and Reproduction

Barn swallows and chimney swifts are declining in Ontario, where they have both been designated as "Threatened" under the ESA; however, barn swallow was reclassified as "Special Concern" provincially in January 2023. The current estimated total population in Ontario of barn swallow and chimney swift is 400,000 and 8,000 individuals, respectively (Cadman et al. 2007). However, breeding bird survey data indicate the relative abundance of barn swallow and chimney swift within the RSA is very low (Cadman et al. 2007). A comparison between the results of the first (1981 to 1985) and second (2001 to 2005) atlas of the breeding birds of Ontario for barn swallow and chimney swift identified a 59% and 46% decline in the probability of observation, respectively (Cadman et al. 2007). A report provided by Lac des Mille Lacs First Nation notes the number of barn swallows has been in decline (Lac des Mille Lacs First Nation 2023).

Barn swallows and chimney swifts were likely never abundant in the RSA due to the lack of naturally available suitable habitat. Abundances may have been higher at the peak of agricultural expansion in the region, but current abundances are likely higher than before European settlement in northwestern Ontario, when these species were likely uncommon in the region (Cadman et al. 2007).

Many aerial foraging insectivorous birds, such as the barn swallow and chimney swift, have experienced large declines since the 1980s (Blancher et al. 2009, NABCIC 2012). The declines suggest a single cause related to insect abundance as both forest and nonforest aerial foraging birds are declining (Blancher et al. 2009, Nebel et al. 2010, Nocera et al. 2012, and Paquette et al. 2014). Insect and bird populations that are distributed within and likely beyond the RSA have likely been affected by these factors at baseline characterization. Barn swallow and chimney swift may be susceptible to these factors because their residency on breeding grounds is brief compared to other species.

Changes to industrial activities may have positive and negative effects on this species survival and reproduction. However, this species has been found to tolerate a degree industrial activity, (Cadman et al. 2007, Brown and Brown 2020, Steeves et al. 2020).

- Barn Swallow:
  - Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for barn swallow.
  - The density estimate for barn swallow in the Northern Shield is 0.02 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-17) corresponds to a predicted abundance 1.2 individuals in the RSA at baseline characterization.
  - There were three Element Occurrences of barn swallow within the LSA (NHIC 2022).
  - There were at least nine recent (within the last 10 years) eBird records of barn swallow during June and July (peak breeding season) within the LSA between 2012 and 2022 (eBird 2022).
  - Field surveys in 2022 did not document the species within the LSA.
- Chimney Swift:
  - Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for chimney swift.
  - The density estimate for chimney swift in the Northern Shield is 0.001 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-18) corresponds to a predicted abundance <0.057 individuals in the RSA at baseline characterization.
  - There were no Element Occurrences of chimney swift within the LSA (NHIC 2022).

- There were six recent (within the last 10 years) eBird records of chimney swift during June and July (peak breeding season) within the LSA between 2012 and 2022; all of the records were centred within the Town of Atikokan (eBird 2022).
- Field surveys in 2022 did not document the species within the LSA.

6.5.5.14 Bobolink

BOBOLINK

Ozaawitigwanesiginaak

Habitat Availability

Historically, bobolinks (*Dolichonyx oryzivorus*) bred in native tall-grass prairie and, to a lesser extent, native mixed-grass prairie. In Ontario, the largest concentration of suitable tall-grass prairie habitat would have been in the southern region of the province, south of the Canadian Shield. However, habitat availability was nevertheless likely limited in the province before the arrival of European settlers (COSEWIC 2010).

Overall, habitat availability for bobolinks is low in the RSA at baseline characterization and is considered a limiting factor for this species. Suitable breeding habitat for bobolinks in Ontario is mostly confined to areas south of the Canadian Shield, where most of the agricultural land in the province is located (Cadman et al. 2007). Suitable habitat in the vicinity of the RSA is located primarily west of the City of Thunder Bay and the areas surrounding Dryden where agricultural activities have created habitat for this species. However, the fragmented and isolated distribution of the habitat patches likely limits their suitability for bobolinks.

- Bobolink:
  - Moderate to high suitability habitat is estimated to compose 777 ha (0.5%) of the LSA (Table 6.5-19; Attachment 6.5-B-16, in Appendix 6.5-B).
  - The RSA contains 2,360 ha (0.4%) of moderate to high suitability bobolink habitat.

Table 6.5-19: Bobolink Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	777	0.5%	2,306	0.4%
Unsuitable	164,010	99.5%	545,815	99.6%
Total	**164,787**	**100%**	**548,121**	**100%**

Notes: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Suitable habitat in the vicinity of the RSA is located primarily west of the City of Thunder Bay and Dryden where agricultural activities have created habitat for this species. Habitat suitability modelling indicates that suitable habitat occurs primarily as small patches concentrated immediately west of the City of Thunder Bay and directly west and north of Dryden (refer to Appendix 6.5-A). However, the fragmented and isolated distribution of the habitat patches likely limits their suitability for the species.

These conclusions about bobolink habitat in the RSA are consistent with available information on the occurrence of bobolink in northern Ontario (Cadman et al. 2007). eBird (2022) data indicate the species is known across northern Ontario, albeit in small, isolated patches throughout the region, in direct proximity to agricultural areas.

The habitat mapping results, occurrence data and an understanding of this species' biology indicate a concentrated distribution of suitable bobolink breeding habitat in the RSA and LSA that results from a natural lack of suitable habitat in this predominantly forested region of the province. Existing disturbances in the RSA and LSA do not likely function as dispersal barriers for this highly mobile species in the baseline characterization, and some agricultural disturbances have had positive effects on habitat distribution.

Bobolinks have adapted well to anthropogenic habitats (e.g., pastures, hayfields) and, as a result, are adaptable to some types of habitat modification and are likely more abundant in the RSA than they were historically. Therefore, although bobolink is rare in the RSA, the positive and negative changes to the amount of suitable habitat available in the baseline characterization are predicted to be within the adaptability or resilience limits of populations that overlap with the RSA.

Survival and Reproduction

Bobolinks are declining in Ontario, where they have been designated as "Threatened" under the ESA; however, some experts contend that population declines for this species in parts of its range that were historically forested may represent a return to historical numbers (Brennan and Kuvlesky 2005). The provincial recovery strategy recognizes that the abundance of bobolink in

Ontario likely increased substantially during the agricultural expansion period and has identified a provincial population target that is 10% lower than the current estimated total population in the province, but probably much higher than the historical population in the province (McCracken et al. 2013).

The current estimated total population in Ontario is 800,000 individuals (Blancher and Couturier 2007). However, breeding bird survey data indicate the relative abundance of bobolink in the City of Thunder Bay area is low (COSEWIC 2010). A comparison between the results of the first (1981 to 1985) and second (2001 to 2005) atlas of the breeding birds of Ontario identified a 68% decline in the probability of observation of bobolink in the Northern Shield region, which encompasses the Project (Cadman et al. 2007).

Bobolinks were likely never abundant in the RSA due to the lack of naturally available suitable habitat. Abundance may have been higher at the peak of agricultural expansion in the region, but current abundance is likely higher than it was before European settlement in northwestern Ontario, when the species was likely uncommon in the region, or possibly absent (COSEWIC 2010).

There is no information on the reproductive success or survival of bobolinks specific to the populations in northwestern Ontario. Studies from other parts of the species' range indicate bobolink reproduce successfully in various agricultural land cover types, though nesting success rates vary by specific land cover type and land management approach (e.g., frequency and timing of mowing, grazing intensity) (Perlut et al. 2006). Reported breeding densities are higher in hayfields than in native prairies (Renfrew et al. 2015) but mowing early in the season can result in high rates of nest failure (Perlut et al. 2006). Given the general lack of naturally available suitable habitat in the region, the population(s) of bobolink overlapping the RSA are likely breeding predominantly if not entirely in agricultural land cover types.

Brown-headed cowbirds (*Molothrus ater*) have been reported to parasitize bobolink nests although the degree that nest parasitism contributes to bobolink survival and reproduction is not known (Renfrew et al. 2015). Parasitism rates of bobolink nests are lower in eastern parts of the species' range than in the Midwest (Renfrew et al. 2015). Brown-headed cowbirds prefer edge habitat (Lowther 1993) and the density of brown-headed cowbirds may increase with an increase in edge habitat.

Bobolinks exhibit high fidelity to breeding sites (Renfrew et al. 2015); therefore, the population(s) that overlap the RSA may be relatively isolated and experience low rates of immigration from populations in other regions within the species' range. This may make the population(s) more vulnerable to extirpation. Population modelling results from one study suggest survivorship of adults outside of the breeding season may be a greater factor contributing to population viability than reproductive success (Fletcher et al. 2006).

Poisoning and human persecution in the winter range, where bobolinks are perceived as crop pests, have been identified as major threats to the species (McCracken et al. 2013). Bobolinks are also trapped on wintering grounds and sold in the pet trade, but this is unlikely to be a major threat to population viability (McCracken et al. 2013; Renfrew et al. 2015).

- Overall, populations that overlap with the bobolink RSA are likely larger than those historically present and the provincial population target identified in the provincial recovery strategy for this species is 10% lower than the current estimated total population in the province. Therefore, changes to survival and reproduction are expected to be within the resilience and adaptability limits of this species at baseline characterization.
- Data from the OBBA (Cadman et al. 2007) (Northern Shield) were used to estimate the number of individuals in the RSA for bobolink.
- The density estimate for bobolink in Northern Shield is 0.07 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-19) corresponds to a predicted abundance 1.5 individuals in the RSA at baseline characterization.
- There were two Element Occurrences of bobolink within the LSA (NHIC 2022).
- There were four and one (within the last 10 years) eBird records of bobolink in the Thunder Bay and Dryden areas, respectively, during the peak breeding bird season within the LSA between 2012 and 2022 (eBird 2022).
- Field surveys in 2022 documented one individual incidentally within the LSA.

6.5.5.15 *Eastern Whip-poor-will*

EASTERN WHIP POOR WILL

Biigakokwe'owesi

Habitat Availability

In Ontario, eastern whip-poor-will are found from the Manitoba border, east to Lake Nipigon, with a northern limit roughly following the northern shore of Lake Superior, south to the United States border, and lower Great Lakes (COSEWIC 2009). Eastern whip-poor-will were found infrequently in several isolated locations near Dryden and Atikokan during the second Ontario

Breeding Bird Atlas survey from 2001 to 2005 (Cadman et al. 2007) and recently by citizen scientists (eBird 2022).

The main disturbances in the RSA at baseline characterization include forestry, fire and fire suppression activities, and linear disturbances. Disturbances have likely resulted in positive changes to eastern whip-poor-will habitat as road ROWs and utility corridors can create habitat for this species (Cink 2002, COSEWIC 2009). Larger disturbance areas, such as temporary laydown areas, may provide suitable foraging habitat, especially areas surrounded by suitable nesting habitat (e.g., semi-open mixedwood forest) (MNR 2013b).

Forestry activities are common throughout the RSA and have likely had positive and negative changes on habitat in the baseline characterization. Microclimate and vegetation features near the nest are important, and disturbance within 20 m of the nest may disrupt these parameters, making the area unsuitable for nesting (MNR 2013b). Timber harvesting practices that occur at a small scale and selectively remove individual trees likely increase eastern whip-poor-will habitat (MNR 2013b). Activities that result in large-scale alteration or clearing of vegetation are not compatible with eastern whip-poor-will habitat requirements (MNR 2013b). Smaller clear cuts that are scattered throughout the forest have been favoured forest management policies in recent years and have therefore likely increased suitable eastern whip-poor-will habitat relative to historical conditions. Post-harvest areas may be suitable for eastern whip-poor-will within 0 to 15 years following disturbance (i.e., while the areas have sparse to moderate shrub and herbaceous vegetation cover) (Environment Canada 2015b).

Habitat that is currently present in the RSA is likely an increase in suitable habitat relative to what was historically available for this species because post-harvest areas of 0 to 15 years can provide suitable habitat for eastern whip-poorwill (COSEWIC 2008-, Environment Canada 2015b) and forest management policies have favoured the creation of smaller clear cuts, which may increase Eastern whip-poor-will habitat (MNR 2013b). Overall, eastern whip-poor-will habitat availability remains high in the RSA at baseline characterization and is not considered a limiting factor for this species (Table 6.5-20). The positive and negative changes to the amount of suitable habitat available in the baseline characterization are predicted to be within the adaptability and resilience limits of the eastern whip-poor-will populations that may overlap with the RSA.

- Eastern Whip-Poor-Will:
  - There is estimated to be 97,203 ha (59.0%) of moderate to high suitability habitat in the LSA (; Attachment 6.5-B-17, in Appendix 6.5-B).
  - The RSA contains 298,974 ha (54.5%) of moderate to high suitability habitat for eastern whip-poor-will (Attachment 6.5-B-17, in Appendix 6.5-B).
  - There is 127 ha of protected habitat in the LSA (11 ha in Category 2 and 116 ha in Category 3) in accordance with the provincial general habitat description.

Table 6.5-20: Eastern Whip-poor-will Habitat Availability in the Local and Regional Study Areas

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	97,203	59.0%	298,974	54.5%
Unsuitable	67,584	41.0%	249,147	45.5%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Studies suggest eastern whip-poor-will may avoid small, isolated woodlands and distance from forest tracts may be an important factor influencing the presence of eastern whip-poor-will (Bushman and Therres 1988, COSEWIC 2009). Eastern whip-poor-will abundance in southern Ontario was found to be positively correlated with anthropogenic linear disturbance density (English et al. 2016). Since 1995, habitat management in FMUs has been focused on maintaining suitable habitat for woodland caribou. As such, forest harvesting practices have changed to harvest larger blocks of forest to emulate natural disturbances and minimize road densities (Bowater 2008; AbitibiBowater Inc. 2009; MFP 2011). This has reduced the amount of forest fragmentation in the RSA, relative to conditions that were present from the beginning of forest harvesting through 1995. These practices may have decreased eastern whip-poor-will habitat availability and consequently habitat distribution relative to historical conditions (MNR 2013b).

Eastern whip-poor-will habitat distribution in the LSA and RSA at baseline characterization is shown in Appendix 6.4-A. Based on habitat modelling, moderate to high suitability habitat occurs throughout the central portion of the RSA and is largely contiguous.

The occurrence map developed by the MNRF for this species indicates eastern whip-poor-will is distributed sporadically in northern Ontario. However, sampling coverage for this species in northern Ontario is low (Cadman et al. 2007). Eastern whip-poor-will was reported in five squares in OBBA Region 38: Thunder Bay, in 12 squares in the OBBA Region 39: English River and 16 squares in the OBBA Region 40: Lake of the Woods (Cadman et al. 2007). This species has high mobility and existing disturbances in the RSA and LSA do not likely function as movement barriers in the baseline characterization.

Survival and Reproduction

Canada is estimated to contain 6% of the global eastern whip-poor-will population (120,000 individuals) (Environment Canada 2015b). Data from breeding bird surveys indicated a Canada-wide population decline of 0.883% per year from 1970 to 2019, or 35% loss of the population over this time period (Smith and Edwards 2020). Between the first (1981 to 1985) and second (2001 to 2005) Ontario Breeding Bird Atlas periods, eastern whip-poor-will declined by 37% (Cadman et al. 2007, Environment Canada 2015b).

The eastern whip-poor-will was designated as "Threatened" by COSEWIC in 2008 and was listed on Schedule 1 of SARA as a threatened species in 2011. It is also listed as "Threatened" on the provincial ESA. Despite concerning population trend data, Environment Canada (2015) states that individuals that are capable of reproduction are available to sustain the population and improve its abundance. Therefore, changes to eastern whip-poor-will survival and reproduction in the baseline characterization are expected to be within the resilience and adaptability limits of individuals that may occupy the RSA.

The population objectives for Canada as identified in the final federal recovery strategy are to halt the national decline by 2025, with no more than a 10% population decline during this time, maintain an area of occupancy at 3,000 km² or more, and make sure a 10-year positive population trend thereafter, while gradually recolonizing areas in the southern portion of the breeding distribution (Environment Canada 2015b).

The primary threats to eastern whip-poor-will include reduced availability of insect prey, habitat conversion for agriculture on breeding and wintering ranges, and predation (Environment Canada 2015b). Eastern whip-poor-will feed on many types of flying insects (Cink 2002). Insect populations are declining worldwide and these declines may be contributing to eastern whip-poor-will population decline (COSEWIC 2009, Environment Canada 2015b).

Insect and bird populations that are distributed within and likely extend outside the RSA have likely been affected by all of these factors at baseline characterization. Eastern whip-poor-will may be susceptible to these factors because they are primarily aerial insectivores and they have low annual productivity (average of two eggs per brood, with two broods per year reported for some pairs; Cink 2002).

Forest harvesting can result in positive and negative changes to whip-poor-will habitat, and ultimately affected survival and reproduction in the baseline characterization (Bushman and Therres 1988; Wilson and Watts 2008, Environment Canada 2015b). Forest harvesting is not likely the leading cause of eastern whip-poor-will declines (Environment Canada 2015b). Early successional habitats are preferred by this species, but high shrub density at 10 to 15 years post-harvest reduces habitat suitability (Environment Canada 2015b). Regenerating areas were found to have high densities of foraging individuals (Wilson and Watts 2008). Clearcuts may increase the occupancy and abundance of breeding eastern whip-poor-wills (Tozer et al. 2014).

Fire suppression has likely had negative effects on eastern whip-poor-will in the baseline characterization. Fire suppression may keep forest stands at a more mature stage, which is less suitable for eastern whip-poor-will. In Ontario, fire suppression has been identified as a cause of eastern whip-poor-will population decline, especially in northern Ontario (Cadman et al. 2007, Tozer et al. 2014).

Nest parasitism by brown-headed cowbirds (*Molothrus ater*) has not been reported for eastern whip-poor-will; an increase in edge density is not likely to decrease eastern whip-poor-will survival and reproduction. An increase in edge density may decrease eastern whip-poor-will survival and reproduction by increasing predation risk, as eastern whip-poor-will are ground-nesters and are therefore especially vulnerable to nest predators (Cink 2002).

- Data from the OBBA (Cadman et al. 2007) (Region 40) were used to estimate the number of individuals in the RSA for eastern whip-poor-will.
- The density estimate for eastern whip-poor-will in Region 40 is 0.01 individuals/km². Applying this estimate to the amount of moderate to high suitability habitat in the RSA (Table 6.5-20) corresponds to a predicted abundance of 30 individuals in the RSA at baseline characterization.
- There were no Element Occurrences of eastern whip-poor-will within the LSA (NHIC 2022).
- There was one recent (within the last 10 years) eBird record of eastern whip-poor-will during June (peak breeding season) within the LSA near Thunder Bay in 2018 (eBird 2022).
- Field surveys in 2022 documented 15 individuals at 10 locations within the LSA.

6.5.5.16 Landbirds (Common Nighthawk)

LANDBIRDS
(COMMON NIGHTHAWK)

Peshk

Habitat Availability

Common nighthawks are associated with a variety of open or semi-open habitats, including forest clearings, burned areas, grassy meadows, rocky outcrops, sandy areas, grasslands, pastures, peat bogs, marshes, lakeshores, quarries, mines, and urban areas (Peck and James 1983, COSEWIC 2007a, Brigham et al. 2011). Wetlands and open water are often used as foraging locations (Brigham et al. 2011). Forested areas with low canopy closure may also provide habitat for the common nighthawk (COSEWIC 2007a). 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). Common nighthawks eat a wide variety of insects but most commonly consume beetles (*Coleoptera*), caddisflies (*Trichoptera*), moths (*Lepidoptera*), and true bugs (*Hemiptera*) (Brigham et al. 2011). Common nighthawks are generally crepuscular, foraging under low light conditions at dusk and dawn, and often forage in large groups at particular times of the year (Brigham et al. 2011).

Although little is known about habitat trends for common nighthawk in Canada, it is thought that the extensive deforestation that followed European settlement increased suitable habitat for this species (COSEWIC 2007a). Since 1995 forest harvesting practices have changed to harvest larger blocks of forest and limit habitat fragmentation; this may have increased the amount of suitable habitat on the landscape. Fire suppression activities are thought to have contributed to the decline in suitable habitat for common nighthawk by limiting the number of open habitats (COSEWIC 2007a).

It is currently unknown whether breeding habitat is limiting Canadian populations of common nighthawk (Environment Canada 2016b). Disturbances can have both positive and negative effects on common nighthawk habitat availability. Forest harvesting, for example, creates openings that may actually benefit common nighthawk through increased habitat available for nesting (Environment Canada 2016b).

- Common Nighthawk:
    - There is estimated to be 6,737 ha (4.1%) of moderate to high suitability habitat for common nighthawk in the LSA (; Attachment 6.5-B-18, in Appendix 6.5-B).
    - The RSA contains 18,900 ha (3.4%) of moderate to high suitability habitat for common nighthawk (Attachment 6.5-B-18, in Appendix 6.5-B).

Table 6.5-21: Common Nighthawk Habitat Availability in the Local and Regional Study Area

Habitat Suitability[1]	LSA Area (ha)	LSA Percent (%)	RSA Area (ha)	RSA Percent (%)
Moderate to High	6,737	4.1%	18,900	3.4%
Unsuitable	158,051	95.9%	529,220	96.6%
Total	**164,787**	**100%**	**548,121**	**100%**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

Effects from habitat fragmentation related to changes in forestry practices, as discussed above, on common nighthawk are unclear.

Based on habitat modelling, moderate to high suitability habitat occurs in numerous discrete patches that are well distributed throughout LSA and RSA (refer to Appendix 6.5-A).

Habitat fragmentation from mineral exploration and other linear disturbances present at baseline characterization is not likely to have negatively affected common nighthawk habitat distribution because this species uses recently disturbed, open areas for nesting. Nest fidelity of common nighthawk has been documented in urban habitats (Dexter 1961). However, this species is highly mobile and can nest in a variety of different types of habitats; therefore, it is expected that breeding habitat is not limiting.

Survival and Reproduction

The common nighthawk is listed as “Special Concern” under the federal SARA (Government of Canada 2002). The population status of the common nighthawk is relatively unknown due to strong variations in local abundance (FAN 2007) and the difficulty of observing the species. However, long-term data collected in Canada from 1970 to 2019 document an annual population decline of 1.9% (Smith and Edwards 2020).

Reasons for the apparent decline of common nighthawk populations are not well understood but may be due in part to diminishing populations of insects (COSEWIC 2007a; Brigham et al. 2011). A report provided by Lac des Mille Lacs First Nation notes the number of nighthawks has been in decline (Lac des Mille Lacs First Nation 2023 concerns regarding an increase in the number of ticks in the area and well as decrease in the number of other insects including mosquitoes, bees, butterflies and caterpillars (Lac des Mille Lacs First Nation 2023). The main threat to common nighthawk populations in North America is suggested to be the loss and alteration of suitable breeding habitat (COSEWIC 2007a).

Although information on the age of first breeding is unknown, it is assumed that nighthawks breed at one year of age and every year thereafter (Brigham et al. 2011). Common nighthawks typically lay two eggs and have one clutch per year (Brigham et al. 2011). When nesting, eggs are laid directly on bare dry ground, which may be soil, gravel, sand or rock (COSEWIC 2007a, Brigham et al. 2011). Nests are generally in exposed locations, but occasionally under bushes and trees or near logs, boulders, or clumps of grass or ferns (Campbell et al. 1990; Fowle 1946). Logging practices and fire may open up new nesting habitat for a number of years, but habitat suitability diminishes again with regrowth (Campbell et al. 1990).

- Data from the OBBA (Cadman et al. 2007) (Region 40) were used to estimate the number of individuals in the RSA for common nighthawk.
- The density estimate for common nighthawks in OBBA Region 40 is <0.1 individuals/km^2. Applying this estimate to the amount of moderate to high suitability habitat available in the RSA at baseline characterization (Table 6.5-21) generates a predicted abundance of 5.7 individuals in the RSA.
- There were no Element Occurrences of common nighthawk within the LSA (NHIC 2022).
- Field surveys in 2022 documented nine individuals at seven locations within the LSA.

- In the Wabigoon FMP, there was one reported observation from 1961 to 1985, and 24 reported locations from 2001 to 2005 (DPP 2008).

6.5.6 Potential Project-Environment Interactions

Potential Project-environment interactions were identified through a review of the Project Description and the baseline characterizations. The linkages between Project components and activities and potential effects to wildlife criteria are identified in Table 6.5-22. For several Project interactions, the changes to indicators are predicted to be similar among wildlife criteria.

Table 6.5-22: Potential Project-Environment Interactions for Wildlife

Criteria	Indicator(s)	Project Stage Construction[a]	Project Stage Operation and Maintenance	Retirement[a]	Description of Potential Project-Environment Interaction
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability; • Habitat distribution; and • Survival and reproduction.	✓	✓	✓	**Habitat loss** – the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution.
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability; and • Survival and reproduction.	✓	✓	✓	**Sensory disturbance** – (e.g., lights, smells, noise, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution and adversely affect survival and reproduction.
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability; and • Habitat distribution.	✓	–	✓	**Changes to hydrology** – alteration of drainage patterns and increased/decreased drainage flows and surface water levels that can cause changes to soils and vegetation, which can affect wildlife habitat availability.
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability.	✓	✓	✓	**Dust, air emissions, and depositions** – can change soil quality and vegetation, which can affect wildlife habitat availability.

Criteria	Indicator(s)	Project Stage Construction[a]	Project Stage Operation and Maintenance	Retirement[a]	Description of Potential Project-Environment Interaction
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability.	✓	✓	✓	**Introduction and spread of noxious and invasive plant species** – can affect plant community composition, which can affect wildlife habitat availability and distribution.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	✓	✓	✓	**Collision with Project vehicles and equipment** – Project vehicles or heavy equipment use may cause injury or mortality to individual animals.
Wildlife and Wildlife Habitat – All Criteria (except little brown myotis and northern myotis)	• Survival and reproduction.	✓	✓	✓	**Attraction of wildlife to the Project** – (e.g., food waste, petroleum-based products, salt) may increase human wildlife interactions and change predator prey relationships, which can affect wildlife survival and reproduction.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	✓	–	–	**Fly rock from blasting** – may result in injury or mortality to wildlife.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	✓	✓	✓	**Increase in public access** – could affect wildlife survival and reproduction through vehicle strikes, and/or legal and illegal hunting.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	✓	–	✓	**Chemical or hazardous material stored on the Project site, or spills** – (e.g., petroleum products, ammonium nitrate) on site or along access or haul roads can affect wildlife survival and reproduction.

Criteria	Indicator(s)	Project Stage Construction[a]	Project Stage Operation and Maintenance	Retirement[a]	Description of Potential Project-Environment Interaction
Moose	• Survival and reproduction.	✓	✓	✓	**Use of linear corridors and converted habitat** – (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of moose.
Little Brown Myotis and Northern Myotis	• Survival and reproduction.	✓	-	-	**Incidental Take** – Site preparation and construction (including drilling and blasting) may result in the destruction of roosting and hibernating bats (incidental take).
Wildlife and Wildlife Habitat – All Bird Criteria	• Survival and reproduction.	-	✓	-	**Collisions with the transmission line** – injury or mortality to birds. **Electrocution** – injury or mortality to birds.
Songbirds (Canada warbler, olive-sided flycatcher, eastern wood pewee)	• Survival and reproduction.	✓	-	-	**Increase in edge habitat** – vegetation removal will result in an increase in edge habitat, which could increase nest predation or parasitism risk for forest breeding birds.
Wildlife and Wildlife Habitat – All Bird Criteria	• Survival and reproduction.	✓	✓	✓	**Incidental take** – Site preparation, construction and maintenance may result in the destruction of nests, eggs, and individuals of migratory birds (incidental take).

Criteria	Indicator(s)	Project Stage Construction[(a)]	Project Stage Operation and Maintenance	Retirement[(a)]	Description of Potential Project-Environment Interaction
Furbearers (American marten, beaver, gray wolf) and Gray Fox	• Survival and reproduction.	✓	✓	✓	**Incidental take** – Site preparation, construction and maintenance may result in the destruction of furbearer den sites and denning individuals (incidental take).
Herpetofauna (spring peeper and snapping turtle)	• Survival and reproduction.	✓	✓	✓	**Incidental take** – Site preparation, construction and maintenance may result in the harm or mortality of reptiles and amphibians (incidental take).

Notes:

✓ = A potential Project-environment interaction could result in an environmental or socio-economic effect.

_ = No plausible interaction was identified.

a) As described in Section 6.5.4.1, the construction scenario assessed as part of the EA is considered bounding and potential effects and mitigation measures for retirement are not identified separately in this EA.

6.5.7 Potential Effect, Mitigation Measures and Net Effects Assessment

This section presents the potential effects, appropriate mitigation measures, and predicted net Project effects for wildlife. Unless otherwise noted, the discussion of potential effects, mitigation measures and net effects apply to all corridors. A summary of the potential effects, mitigation measures and net effects are presented in Table 6.5-22.

Concerns regarding the displacement of wildlife, bird electrocutions and deaths, changes to predator-prey relationships and the loss of wildlife habitat were concerns raised in a report provided by Mitaanjigamiing First Nation (2022).

While Hydro One always strives to avoid and mitigate potential effects to the natural environment, and restore areas that are affected by the Project, Hydro One acknowledges that there may be adverse effects to natural habitats that cannot be avoided, or that occur even when appropriate mitigation and restoration measures are employed. Because these net effects cannot be further avoided or mitigated, they are typically compensated for by undertaking positive environmental activities (e.g., the creation of new naturalized habitats or enhancement of existing habitats outside of the Project footprint). For more information on how Hydro One will be offsetting net effects, see Section 11.0 of the draft EA.

6.5.7.1 All Wildlife and Wildlife Habitat Criteria

The following Project interactions and associated potential effects are common to all Wildlife and Wildlife Habitat criteria. These effects will be sufficiently mitigated such that they are not expected to cause net effects to these criteria and thus were not carried forward in the assessment.

6.5.7.1.1 Changes to Hydrology

Potential Effects

Habitat Availability and Distribution

Project activities such as watercourse crossings or clearing of vegetation can cause changes in drainage patterns and increases/decreases in drainage flows and surface water levels beyond the natural range of variation could lead to a loss of soils through increased erosion, affect vegetation, and alter wildlife habitat through localized changes in ecosystem composition.

A change in local water flows could alter the distribution of wetland, riparian, and upland areas in relation to the changes in soil moisture (Nilsson and Svedmark 2002; Odland and del Moral 2002; Shafroth et al. 2002; Leyer 2005). As soil moisture levels change because of changes in surface flows and water levels, plant species that thrive in drier soil moisture regimes can out compete riparian species that rely on fluctuations in soil moisture (Shafroth et al. 2002; Leyer 2005). Changes in soil moisture levels as a result of hydrological changes have the potential to reduce or degrade wildlife habitat, particularly wetland and riparian areas.

Mitigation Measures

Mitigation measures to reduce changes to hydrology and drainage patterns are provided in Section 6.2. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effect

With the effective implementation of the mitigation measures in Section 6.2, net effects to surface water quantity were assessed as negligible magnitude. These negligible net effects are not expected to result in changes to wildlife habitat availability and distribution. Therefore, this potential effect (reduced or degraded wildlife habitat from changes to hydrology) is not carried forward to the net effects characterization for any wildlife and wildlife habitat criterion.

6.5.7.1.2 Dust, Air Emissions, and Depositions

Potential Effects

Habitat Availability

The potential sources of air and fugitive dust emissions are from equipment, vehicles and activities associated with construction of the Project. Specifically, construction activities have the potential to temporarily affect local air quality in the immediate vicinity of the Project. Emissions from construction are primarily comprised of fugitive dust (i.e., particulate matter that is suspended in air by wind action and human activity) and tailpipe emissions (i.e., Criteria Air Contaminant [CAC]) from the movement and operation of construction equipment and vehicles.

Air and dust emissions, and subsequent deposition, can change soil quality and alter vegetation and wetlands, which can adversely influence wildlife habitat. Sulphur dioxide and NOx from combustion of fossil fuels and dust deposition can affect soil pH and nutrient content and soil fauna composition (Section 6.4). Changes in soil quality (physical, chemical, and biological properties) can affect plant community composition, structure, and diversity. Dust that falls directly on plants also can have a physical effect by smothering plant leaves or blocking stomata openings. Plant species have different levels of tolerance to dust deposition, which can result in changes to above-ground biomass and species composition. For example, bryophyte (*Bryophyta*) and lichens (*Mycophycophyta*) can be sensitive to the chemical effects of dust because they obtain moisture and nutrients from the atmosphere and immediate surroundings, including substances that are trapped or deposited directly on the surface of the bryophyte leaf or lichen thalli. Bryophytes and lichens may experience the largest effects close to roads where the greatest amount of deposition frequently occurs. Rates of dust deposition and accumulation are dependent on the rate of supply from the source, wind speed, precipitation events, topography, and vegetation cover (Section 6.7).

Potential effects associated with construction are anticipated to be minimal due to their short duration and intermittent frequency. Construction activities are not static and will only occur at one location for a short period before they progress along the ROW. Some activities may occur simultaneously at the same location for a short period, but typically different activities will occur at different locations (e.g., land clearing and stringing). Although minimal and short term, dust and air emissions have the potential to degrade wildlife habitat immediately adjacent to construction areas.

Mitigation Measures

The risk of air and dust emissions and subsequent deposition causing chemical changes to the environment and affecting wildlife habitat will be minimized by the implementation of mitigation measures including maintenance of vehicles and equipment, coordination of worker transportation, and compliance with regulatory approvals and permits.

Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Effective implementation of the mitigation measures is expected to result in no net effect to wildlife habitat availability. While dust and air emissions are predicted to degrade vegetation immediately adjacent to construction areas (within 100 m) the effect should return to baseline conditions into early operation as site preparation and clearing is no longer required and the volume of heavy equipment and lighter vehicles needed is substantially reduced. So, the effect on vegetation will be very localized and short term. The degree to which vegetation is degraded will vary depending on the season with no to little dust generation in winter and the greatest potential for dust generation in summer. Therefore, not all vegetation communities adjacent to the footprint will be influenced by dust. As the net effects to vegetation communities will be negligible magnitude, short term, reversible, localized (within 100 m) and only occur under certain environmental/climatic conditions, there is no predicted net effect on wildlife habitat. Therefore, this potential effect (reduced or degraded wildlife habitat from dust and air emissions) is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.1.3 Introduction and Spread of Noxious and Invasive Plant Species

Potential Effects

Habitat Availability

Introduction and spread of noxious and invasive plant species can affect ecosystems, which can reduce or degrade wildlife habitat in areas adjacent to new disturbance (i.e., edge habitats), particularly where the edge to interior ratio (i.e., the quantity of edge habitat compared to the area of interior forest) is high (Honnay et al. 2002). Construction and operation activities have the potential to introduce non-native invasive plant species into new areas, especially when entering areas with known populations of non-native invasive plant species. Construction equipment and personnel have the potential to introduce non-native invasive plant species into new areas by transporting seed or plant parts on equipment or clothing. The introduction of these species can disrupt plant communities and decrease wildlife habitat quality by affecting plant community structure and species diversity directly through competition, and indirectly through alterations to soil microorganisms, nutrients, and soil moisture (Mack et al. 2000; Carlson and Shepherd 2007; Truscott et al. 2008).

The majority of non-native invasive plant species introductions arise from human transport (Mack et al. 2000; Reichard and White 2001). The ground disturbance associated with construction and operation of the transmission line and access roads can create the type of habitat favoured by invasive plant species. Newly cleared areas, including roads, provide dispersal avenues for non-native and invasive species, and vehicles and equipment can serve as dispersal mechanisms for plant seeds and vegetative parts that can get lodged in tires, the undercarriage, or mud on the surface of the vehicle (Parendes and Jones 2000; Trombulak and Frissell 2000). Many non-native invasive plant species are able to spread more easily in landscapes that have been fragmented, and often become established along edge habitats, such as disturbed road edges associated with transportation corridors (Lafortezza et al. 2010). Preventing noxious and invasive species from entering an area is often more efficient and cost effective than dealing with their removal once established (Clark 2003; Polster 2005; Carlson and Shepard 2007).

Mitigation Measures

The introduction and spread of noxious and invasive plant species will be prevented or minimized through the implementation of an Invasive Species and Biosecurity Management Plan.

Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Invasive or noxious species may be occasionally introduced within the Project footprint at site-specific locations, particularly during construction. The incidence of introduced invasive or noxious species is predicted to be unlikely during operations and maintenance as the need for soil moving activities and large numbers of equipment is minimal.

Effective implementation of the mitigation measures is expected to avoid and minimize the introduction and spread of noxious and invasive species so that changes to native vegetation may occur but are predicted to be negligible. Mitigation for controlling the introduction and spread of noxious and invasive plants is well understood and the methods have been demonstrated to be effective. Should noxious or invasive plants be introduced the plants would be contained and removed quickly resulting in a small, localized effect over a short duration, and therefore the effect is not predicted to reduce or degrade wildlife habitat.

There is no net effect predicted related to the reduction or degradation of wildlife habitat after implementation of the mitigation described above. Therefore, this potential effect (introduction and spread of noxious and invasive plant species can affect plant community composition and reduce or degrade wildlife habitat) is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.1.4 Attraction of Wildlife to the Project

Potential Effects

Survival and Reproduction

Food smells and other aromatic compounds, such as petroleum-based chemicals, gray water and sewage, can attract wildlife to human developments (Benn and Herrero 2002; Peirce and Van Daele 2006; Canadian Wildlife Service 2007; Beckmann and Lackey 2008). In addition, infrastructure, such as buildings at temporary work camps, may also attract wildlife as it can serve as a refuge to escape extreme heat or cold (Canadian Wildlife Service 2007). Attraction of carnivores to the Project may increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009). Additionally, wildlife can become habituated to humans, particularly around food sources.

Mitigation Measures

Proper storage of food and disposal of waste reduces the likelihood that carnivores will be attracted to areas of human activity. Informing all personnel associated with the Project of the hazards of feeding wildlife and the prohibition of such activity, could reduce nuisance wildlife in and around work and camp sites. The implementation of effective waste management mitigation measures is anticipated to limit the attraction of wildlife to the site.

Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Carnivores are not anticipated to be attracted to the work sites should the mitigation measures as outlined, be implemented and checked for integrity (e.g., bear proof garbage disposal bins) and there is no net effect to wildlife survival and reproduction. Therefore, this potential effect (reduced wildlife survival and/or reproduction from attraction of wildlife to the Project) is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.1.5 Fly Rock from Blasting

Potential Effects

Survival and Reproduction

Ammonium nitrate explosives may be used to remove bedrock for the placement of new access roads and structures. Use of explosives produces fly rock, which has potential to cause wildlife injury and mortality, particularly with slow moving animals with limited home ranges, and lead to reduced survival and reproduction.

Mitigation Measures

Minimizing the use of explosives is expected to minimize risk of injury or mortality to wildlife. Use of explosives for foundation excavations and access roads will be limited to conditions that do not allow for typical or standard drilling methods. Ripping is preferred over blasting where rock is encountered. If blasting is required, the Blasting and Communication Management Plan to be developed by the contractor(s) will be adhered to and will include mitigation measures such as using blast mats or controlled blasting techniques to minimize fly rock. The Blasting and Communication Management Plan includes measures to address the following items:

- Stakeholder notification;
- Storage, Transportation and Use;
- Security;
- Environmentally Sensitive Areas (e.g., raptor stick nests); and
- Waterbodies.

Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation measures will be evaluated during construction and mitigation measures will be modified or enhanced as necessary through adaptive management.

Net Effects

Effective implementation of the mitigation measures is expected to avoid injury or mortality to wildlife. In addition, blasting would occur infrequently and over a short duration in small, localized areas, and considering the high level of activity that would be occurring in the area prior to the blast, animals are expected to avoid the immediate area. Blasting should result in no net effects to wildlife survival due to mortality from fly rock after implementation of the mitigation measures described above. Therefore, this potential effect (fly rock from blasting can result in injury or mortality to wildlife) is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.1.6 Chemical or Hazardous Material Stored on the Project Site, or Spills

Potential Effects

Survival and Reproduction

Chemical or hazardous material spills (e.g., petroleum products, ammonium nitrate) on the Project footprint or along access can affect soil quality, ecosystems and ultimately the health of wildlife. Spills that occur in high enough concentrations could contaminate soils and cause effects on aquatic organisms, soil organisms, vegetation, and wildlife. Chemical spills can also affect wildlife survival and reproduction through direct exposure to the chemical (e.g., ingestion).

Mitigation Measures

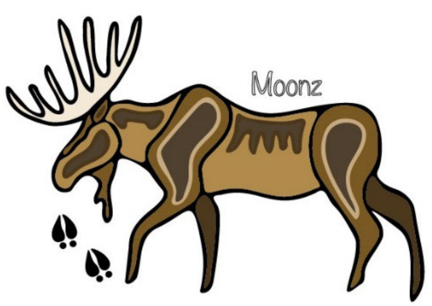
Transport and handling of hazardous materials will be carefully managed by Hydro One. Training of personnel will be provided in relation to safe handling of chemicals and hazardous materials. Adverse effects to wildlife survival from spills will be avoided by appropriate handling and transportation of chemicals, fuel, and hazardous materials, secondary containment of fuel tanks, inspection of equipment for leaks and accordance with the *Clean Equipment Protocol for Industry* (Halloran et al. 2013). Hydro One and their contractor(s) will prepare and implement an Environmental Protection Plan (EPP) and Spill and Emergency Preparedness and Response Plan that will include procedures to decrease the risk of an accidental spill occurrence and timely clean-up if a spill were to occur.

Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Effective implementation of the mitigation measures described above are anticipated to minimize the frequency, spatial extent, and severity of spills. Spills in the Project footprint are anticipated to be unlikely and are not expected to result in measurable environmental changes and were determined to have no net effect on wildlife survival and reproduction. Therefore, this potential effect (chemical or hazardous material stored on the Project footprint, or spills can adversely affect wildlife survival and reproduction) is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.2 Moose



UNGULATES (MOOSE)

Moonz

6.5.7.2.1 Habitat Loss

Potential Effects

Habitat Availability

Site preparation and activities associated with construction of the Project would reduce the availability of suitable moose habitat. The Project is predicted to temporarily remove 1,795 ha of moderate and high suitability moose habitat. This represents 4.2% of the moderate and high suitability habitat available in the terrestrial LSA in the existing environment, and 0.1% of the moderate and high suitability habitat available in the moose and gray wolf RSA in the existing environment (Table 6.5-23). In addition, a temporary loss of approximately 1,101 ha of low suitability moose habitat is expected (Table 6.5-23). Overall, the Project would disturb 4,072 ha of moose habitat (high, moderate, low, and poor) relative to the existing environment, which represents approximately 2.5% of the terrestrial LSA and 0.1% of the moose and gray wolf RSA (Table 6.5-23).

The disturbance associated with the Project is primarily associated with the initial removal of vegetation for the ROW. Some forms of disturbance can be beneficial for moose once the shrub layer begins to regenerate (typically in six to 10 years after a disturbance; Nelson et al. 2008). Although moose may use the ROW for foraging, a conservative assessment was completed and it was assumed that the direct loss of habitat from the ROW would be continuous from construction through decommissioning.

Table 6.5-23: Changes to Habitat Availability for Moose in the Net Effects Assessment

Habitat Suitability[1]	Moose LSA Baseline Characterization (ha)	Moose LSA Net Effects (ha)	Moose LSA Change in Area (ha)[(2)]	Moose LSA Percent Change (%)	Moose and Gray Wolf RSA Baseline Characterization (ha)	Moose and Gray Wolf RSA Net Effects (ha)	Moose and gray wolf RSA Change in Area (ha)[(2)]	Moose and gray wolf RSA Percent Change (%)
High	60,638	59,108	-1,530	-2.5%	1,798,126	1,796,597	-1,530	-0.1%
Moderate	15,463	15,199	-265	-1.7%	676,092	675,828	-264	-<0.1%
Low	37,645	36,544	-1,101	-2.9%	1,644,153	1,643,062	-1,091	-0.1%
Poor	51,329	50,146	-1,183	-2.3%	1,188,900	1,187,730	-1,170	-0.1%

Notes: Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

2) The moose and gray wolf RSA was created using provincial WMU boundaries, excluding Lake Superior (i.e., the RSA study area clipped to the boundary of Lake Superior). Change in area in the LSA and RSA are a result of the Project footprint (i.e., direct impact to habitats)

< = less than; - negative; ha = hectare; LSA = local study area; RSA = regional study area.

Sensitive ecological features, including wetlands and significant wildlife habitats, will be avoided when possible. Moose late wintering habitat and aquatic feeding areas are expected to be reduced by approximately 39.0 ha and 3.1 ha, respectively, compared to the existing environment. For the assessment, losses to wetland habitat are conservatively assumed to be permanent and irreversible.

Reclamation of temporary access roads and infrastructure at the end of construction is predicted to reverse the effects on disturbed habitat. However, vegetation ecosystems would most likely differ to some degree from those not affected by the Project. Functional habitat for moose on reclaimed temporary access roads and infrastructure (not the ROW) is likely to become available six to 10 years after construction is complete.

Habitat Distribution

Linear features, such as roads and transmission lines, may alter movements by moose due to habitat fragmentation effects. Moose may seasonally avoid roads by 100 m to 3 km (Jiang et al. 2009, Laurian et al. 2012) or interact with roads during periods of low vehicle activity (Neumann et al. 2009). At a landscape scale in northwestern Ontario, moose have been shown to favour areas of moderate road density because of the conversion to deciduous forests (Bowman et al. 2010).

Transmission lines may act as a partial barrier to moose when the width of the ROW exceeds 90 m (Joyal et al. 1984), but narrower ROWs were not avoided (reviewed by Bartzke et al. 2014, Bartzke et al. 2015). During the construction stage, the transmission line ROW will be removed of vegetation, which could temporarily reduce movement of moose until suitable vegetation cover regenerates. Mitigation measures such as retaining compatible vegetation where possible and reclamation of access roads will limit local fragmentation that may inhibit movements of moose with home ranges intersected by the Project. Despite some additional fragmentation from the transmission line and access roads as well as facilities such as temporary laydown areas, and temporary construction camps, moderate and high suitability moose habitat will be reduced by 4.2% within the LSA compared to the existing environment (Table 6.5-23). Furthermore, the ROW will parallel the existing transmission line ROW for approximately 97% of the route (approximately 347 km out of 360 km; Section 3.1). The density of linear disturbance is predicted to increase by less than 0.2% in the terrestrial LSA and less than 0.1% in the moose and gray wolf RSA. Moose are strong dispersers and population connectivity in the RSA is not predicted to be measurably reduced due to the Project.

Survival and Reproduction

The Project is predicted to temporarily remove 1,795 ha of moderate to high suitability habitat in the terrestrial LSA, which is equivalent to two to four moose home ranges. This effect will be spread out within the LSA (i.e., the Project will not remove two to four home ranges, but instead impacts will be spread amongst several home ranges that overlap the LSA).

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Aquatic feeding areas and winter habitat areas are the most important habitat features for moose as they are critical for foraging and protection. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation measures where needed. Mitigation measures will include:

- Limit the Project footprint to the extent possible by using existing access roads.
- Project components will be sited to provide a 120 m avoidance buffer of upland area to minimize impacts to aquatic feeding areas where possible. In aquatic feeding areas where the buffer cannot be maintained, vegetation removal will be completed between December and March when moose are less likely to be using the aquatic feeding areas.
- Implement progressive reclamation and revegetation of disturbed areas no longer required.
- Reclaim temporary access roads, construction camps, waterbody crossings and laydown areas at the end of construction.

These mitigation measures are expected to minimize the potential effects on moose habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effect

There is a predicted net effect of habitat loss after implementation of the mitigation measures described above. Direct loss of approximately 1,795 ha of moderate to high suitability moose habitat is predicted to result from the Project. Although moose may use the ROW once vegetation has regenerated post-construction, a conservative assessment was completed, and it was assumed that the direct loss of habitat from the ROW would be continuous from construction through decommissioning. This effect (reduced or degraded moose habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual moose with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced moose survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.2.2 Sensory Disturbance

Potential Effects

Habitat Availability

Moose habitat suitability around the Project footprint may be reduced if moose avoid areas due to sensory disturbance. Benítez López et al. (2010) indicate that the spatial impacts of industrial disturbance on wide ranging mammals can extend up to 5 km. Loud noises, lights, smells, dust, and human activity could potentially cause displacement of individuals, loss of foraging and resting habitat, and changes in predator-prey relationships. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause moose to avoid the ROW and thus temporarily reduce habitat availability. A report provided by Lac des Mille Lacs First Nation notes the presence of large mammals near the preferred preliminary route including moose and deer. The report indicated an increase in noise during the construction phase of the project may affect large game in the area around the transmission line (Lac des Mille Lacs First Nation 2023). However, individuals with home ranges that overlap the Project footprint may currently be habituated to sensory disturbance due to the presence of the Highway 11 and Highway 17 and the existing transmission lines, which parallel a large portion of the Project ROW.

Corona noise from the transmission line is not anticipated to cause moose to avoid the ROW and so is not anticipated to reduce moose habitat availability. A study completed in northern Idaho concluded that noise levels at a transmission line of 55 to 60 A-weighted decibels (dBA) did not result in avoidance of the ROW by deer and elk (Goodwin 1975). Similarly, a winter track count analysis indicated that only 2% of all deer and elk tracks did not cross the transmission line ROW (Goodwin 1975). Anecdotal evidence suggests that corona noise from transmission lines does not deter moose for feeding on transmission line ROWs (Manitoba Hydro 2010). Rather, moose may be attracted to the transmission line ROW because of increase food availability in the ROW.

Survival and Reproduction

Sensory disturbance is not expected to influence moose survival and reproduction because increases in moose movement rates caused by avoidance of humans are unlikely to have a measurable effect on the overall energy budget of moose that are in good condition (Neumann et al. 2011).

Mitigation Measures

Sensory disturbance will be minimized during construction by enforcing speed limits for vehicles and by prohibiting the recreational use of all terrain vehicles by Project personnel on the Project footprint. Noise abatement equipment on machinery will be properly maintained and in good working order. Where practicable, vehicles and equipment will be turned off when not in use. In addition, construction activities will typically occur during one 10-hour shift per day, with normal working hours of 07:00 to 19:00.

These mitigation measures are expected to minimize the potential effects on moose habitat. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effect

There is a predicted net effect of sensory disturbance after implementation of the mitigation measures described above. Sensory disturbance is predicted to reduce the quality of remaining moose habitat by causing avoidance and increased movements by moose. This effect (reduced or degraded moose habitat from sensory disturbance and adverse effects on survival and reproduction) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.2.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

The creation of new and upgrading of existing access roads for the Project can adversely affect moose in the long term through collisions with Project vehicles (Jalkotzy et al. 1997; Trombulak and Frissell 2000). The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angold 2000). Traffic volumes associated with the Project will be highest during construction.

The ability of wildlife species to avoid or move away from construction activities may be constrained during certain life-history periods or stages. Although moose are extremely mobile, they may be adversely influenced immediately prior to and for a short period after calving when their movements are constrained. An increase in vehicles and traffic can increase the risk of injury or mortality to adults and their young.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on moose survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced moose survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.2.4 Increase in Public Access

Potential Effects

Survival and Reproduction

The creation of new access roads and upgrading of existing access roads for the Project provides increased opportunities for humans to use an area, which can result in increased moose mortality from hunters and poachers. However, traffic along the access roads may cause avoidance by moose, which could decrease the potential for increased hunting and human access due to road upgrades. Laurian et al. (2008) found that moose showed avoidance of areas up to 500 m from highways, and that highway and forest road crossing frequencies were 16 and 10 times lower than expected by chance, respectively. In a subsequent study, moose avoidance of roads was found to vary seasonally from 100 m to 250 m (Laurian et al. 2012).

New access created for the Project has the potential to increase risk of mortality to moose through hunting and illegal take more than upgraded roads because new roads will attract public seeking new areas in which to hunt or poach.

Mitigation Measures

Limiting public access will minimize risk of injury or mortality to moose due to hunting. Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. Temporary disturbance, such as temporary access roads and laydown areas, will be reclaimed progressively. During operations, vegetation that is compatible (i.e., does not grow too tall) with the clearance distance required to conductors will be retained.

These mitigation measures are expected to minimize the potential effects on moose survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Overall, the Project is anticipated to result in no measurable change in access for hunters and poachers in the LSA relative to existing environment conditions (e.g., being located next to an existing transmission line ROW). The increase in the number of people in the area during the Project lifespan could result in a minor increase in illegal harvesting of animals. As such, Project-related access and activities are predicted to have a small negative effect on the abundance of moose.

6.5.7.2.5 Use of Linear Corridors and Converted Habitat

Potential Effects

Survival and Reproduction

Moose survival and reproduction may be decreased in the terrestrial LSA from the increase in linear corridors and associated change in encounter rates with predators. Linear features facilitate movement of natural predators, such as wolves, which leads to increased encounter rates with their prey (Ehlers 2016). Linear features also facilitate predators by providing access into areas that may have been previously inaccessible.

Mitigation Measures

Permanent habitat loss and the creation of early seral habitat has been minimized during the planning stage by using existing roads and trails to the extent practicable and minimizing the creation of new access. The Project is predicted to result in a small increase in linear disturbance relative to the existing environment (less than 0.2% in the terrestrial LSA). Compatible vegetation will be retained in the ROW during operation to limit unauthorized access. Other slash and debris resulting from mechanical clearing operations will be spread to ensure depths do not exceed 0.3 m. In areas that are hand felled only, trees will be bucked and delimbed to lie close to the ground. Temporary disturbance will be reclaimed, and vegetation is expected to regenerate naturally over time. During operations, vegetation that is compatible (i.e., does not grow too tall) with the clearance distance required to conductors will be retained.

Hydro One will use vegetation management practices to maintain vegetation within the transmission line ROW. For example, implementation of a “wire zone – border zone” approach to vegetation management (Ballard et al. 2007) where appropriate in the ROW. This method manages vegetation in the two zones, where herb/grass/forb species are promoted in the wire zone, and shrub/short tree species are promoted in the border zone. This approach allows for the safe delivery of electricity while also fostering wildlife habitat and biodiversity, and simultaneously developing overall aesthetics and decreased long-term vegetation management costs.

These mitigation measures are expected to minimize the potential effects on moose survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in moose mortality is predicted to occur as a result of increased predation risk after implementation of the mitigation measures above. This net effect (reduced moose survival and/or reproduction from predation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.3 Gray Fox

GRAY FOX

Waagosh

6.5.7.3.1 Habitat Loss

Potential Effects

Habitat Availability

Site preparation and activities associated with construction of the Project would reduce the availability of suitable gray fox habitat. The Project is predicted to remove 2,345 ha of moderate to high suitability gray fox habitat, representing a 3.4% change in the LSA and 1.1% change in the RSA. During the construction stage, the ROW will be removed of vegetation, which may temporarily alter gray fox use of suitable habitat until suitable ecosite cover regenerates (grasslands and meadows). Although gray fox may use the ROW once vegetation regenerates post-construction, a conservative assumption is that moderate and high suitability habitat within the Project ROW will be degraded to low suitability habitat starting at the construction phase through operation.

Table 6.5-24: Changes to Habitat Availability for Gray Fox in the Net Effects Assessment

Habitat Suitability	Gray Fox LSA Baseline Characterization (ha)	Gray Fox LSA Net Effects (ha)	Gray Fox LSA Change in Area (ha)[1]	Gray Fox LSA Percent Change (%)	Gray Fox RSA Baseline Characterization (ha)	Gray Fox RSA Net Effects (ha)	Gray Fox RSA Change in Area (ha)[1]	Gray Fox RSA Percent Change (%)
Moderate-High	68,873	66,528	-2,345	-3.4%	216,848	214,503	2,345	-1.1%
Low	2,282	4,627	2,345	102.7%	6,723	9,068	-2,345	34.9%
Unsuitable	5,735	5,735	n/a	n/a	34,803	34,803	n/a	n/a

Notes: Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Changes in habitat area result from a conversion of moderate to high suitability habitat to low suitability habitats.

The change in area in the LSA and RSA are a result of the Project footprint (i.e., direct impact to habitats)

% = percent; - = negative; ha = hectare; LSA = local study area; n/a = not applicable; RSA = regional study area.

Habitat Distribution

The response of gray fox to disturbed landscapes in boreal forests is largely unknown, particularly linear disturbance from transmission line ROWs. Existing transmission line ROWs and roads are present within the home ranges of observed gray fox within the gray fox RSA.

Studies indicate that gray fox are commonly found in habitats that are highly fragmented (Crooks 2002; Cooper 2012). It was found that gray fox movement within 100 m of woodlot edges was common, suggesting that edge habitat created from the Project and access roads are likely not to have measurable negative effects on gray fox movements and population connectivity (Bachmann and Lintack 1982).

The Project will be routed along existing disturbances as much as possible, and the ROW intersects areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing corridors). Forest clearing for the Project and access roads can fragment preferred habitats (i.e., forest and grasslands) but these impacts are not predicted to have measurable negative effects on local gray fox movements or connectivity in the RSA because foxes are highly mobile and prefer fragmented landscapes (Cooper 2012; Bachmann and Lintack 1982).

Survival and Reproduction

Habitat loss due to the Project is not expected to influence survival and reproduction of gray foxes. Gray foxes have average home ranges of 200 ha (Fritzell and Haroldson 1982) and, as such, the Project will remove the equivalent of seven home ranges. However, habitat loss will be spread out within the LSA and will not directly remove seven home ranges. As such, changes to carrying capacity in the LSA associated with habitat loss from the Project are expected to be small.

Mitigation Measures

Mitigation measures outlined in Table 6.5-40 should be implemented. Gray Fox is a species protected under Ontario’s ESA and as such Hydro One’s permitting process for this species may include further mitigation and avoidance measures as approved by MECP SARB.

These mitigation measures are expected to minimize the potential effects on gray fox habitat, and survival and reproduction. 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.

Net Effect

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 2,345 ha of high-moderate suitability gray fox habitat (3.0% of the gray fox total LSA and 0.8% of the terrestrial RSA) is predicted to result from the Project. This effect (reduced or degraded gray fox habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8.3). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual gray fox with home ranges overlapping the wildlife and gray fox LSA. This effect (reduced gray fox survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.3.2 Sensory Disturbance

Potential Effects

Habitat Availability

Gray fox habitat suitability around the Project footprint may be reduced if gray foxes avoid areas due to sensory disturbance. No specific research exists on the effects of sensory disturbances on gray fox; however, loud noises, lights, smells, dust, and human activity could potentially cause displacement of individuals, loss of foraging and resting habitat, and changes in predator-prey relationships. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause gray fox to avoid the ROW and thus temporarily reduce habitat availability. Benítez-López et al. (2010) indicate that the spatial impacts of industrial disturbance on wide-ranging mammals can extend up to 5 km, although gray fox have shown a tolerance to urbanization (Larson et al. 2015). Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to sensory disturbance due to the presence of existing roads and residential areas.

The affects of corona noise on gray fox are unknown; however, studies on other mammals have shown that noise levels at transmissions lines do not deter wildlife (Goodwin 1975; Manitoba Hydro 2010). Corona noise from the transmission line is not anticipated to cause gray fox to avoid the ROW and so it is not anticipated to reduce gray fox habitat availability. Gray fox may be attracted to the ROW because of increased habitat fragmentation of preferred habitat (i.e., forest and open to semi-open habitats). Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Survival and Reproduction

Changes to habitat abundance from sensory disturbance associated with the Project are not expected to influence survival and reproduction of gray fox. Gray foxes have been found in urban areas and increases in energy expenditure from avoidance of humans is not expected to result in changes to gray fox survival and reproduction for healthy individuals. As such, changes to carrying capacity associated with habitat loss from the Project are expected to be small.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.3.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on gray fox habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual gray fox with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced gray fox survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.3.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

The creation of new and upgrading of existing access roads for the Project can adversely affect gray fox in the long term through collisions with Project vehicles (Jalkotzy et al. 1997; Trombulak and Frissell 2000). The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angold 2000). Traffic volumes associated with the Project will be highest during construction.

The ability of wildlife species to avoid or move away from construction activities may be constrained during certain life-history periods or stages. Although gray foxes are extremely mobile, they may be adversely influenced immediately prior to and for a short period after their young are born, when their movements are constrained. An increase in vehicles and traffic can increase the risk of injury or mortality to adults and their young.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public) and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on gray fox survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced gray fox survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.3.4 Increase in Public Access

Potential Effects

Survival and Reproduction

The creation of new access roads and upgrading of existing access roads for the Project provides increased opportunities for humans to use an area, which can result in increased gray fox mortality from trappers and poachers. New access created for the Project has the potential to increase risk of mortality to gray fox through trapping and illegal take more than upgraded roads because new roads will attract public seeking new areas in which to trap or poach.

Mitigation Measures

Limiting public access will minimize risk of injury or mortality to gray fox due to trapping. Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. Temporary disturbance, such as temporary access roads and laydown areas, will be reclaimed progressively. During operations, vegetation that is compatible (i.e., does not grow too tall) with the clearance distance required to conductors will be retained.

These mitigation measures are expected to minimize the potential effects on gray fox survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Overall, the Project is anticipated to result in no measurable change in access for trappers and poachers in the LSA relative to existing environment conditions (e.g., being located next to an existing transmission line ROW). The increase in the number of people in the area during the Project lifespan could result in a minor increase in illegal harvesting of animals. As such, Project-related access and activities are predicted to have a small negative effect on the abundance of gray fox.

6.5.7.3.5 Incidental Take

Potential Effects

Survival and Reproduction

Gray fox dens could be disturbed or destroyed during construction of access roads and ROW, and maintenance of the ROW during operations. The denning period for gray fox occurs from mid-February to mid-July. Gray fox is listed as threatened on the provincial ESA and the federal SARA. The ESA prohibits the killing or harming of species identified as endangered or threatened in the various schedules to the Act. The ESA also provides habitat protection to all species listed as threatened or endangered.

Mitigation Measures

Mitigation measures are outlined in Table 6.5-40.

Dens are one of the most important habitats for gray fox as they are critical for parturition, pup rearing, and predator avoidance. As such, the area within 100 m of a gray fox den are likely to be particularly sensitive to anthropogenic disturbances, including sensory disturbances. Therefore, all Project activities will be avoided within these denning areas during the period from February 15 to July 15. This avoidance period will help to maintain and protect the physical and biological characteristics, structure and function of the den and surrounding habitat.

Mitigation measures to limit potential effects on gray fox habitat, and survival and reproduction include:

- Environmental training for workers, including information on den identification and procedures to follow if a den is identified.
- Surveys to identify den sites within home ranges of known gray fox occurrence records.
- If an active den is identified during active construction, including during vegetation removal, work will stop and local MECP SARB offices will be contacted immediately. The den will be clearly marked with a GPS waypoint , a 100 m buffer surrounding the den will be established by flagging the buffer and no vegetation removal will proceed within that buffer until MECP is contacted for next steps.

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.

Net Effects

The implementation of the mitigation measures and the ESA permitting process are expected to limit incidental take of denning gray fox; however, this interaction cannot be entirely removed. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced gray fox survival and/or reproduction from destruction during denning) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.4 *Furbearers (Gray Wolf)*

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

6.5.7.4.1 Habitat Loss

Potential Effects

Habitat Availability

Construction of the Project is not likely to reduce the availability of suitable gray wolf habitat. The Project is predicted to remove approximately 4,072 ha of habitat for the ROW and access roads as well as temporary disturbances. As wolves are habitat generalists, are known to use linear clearings for travel in their territories and have been shown to be adaptable to human presence, it is not anticipated that any significant negative effects from the proposed clearing of vegetation on wolf habitat availability in the moose and gray wolf RSA or LSA. The ROW may become less suitable as a movement corridor for wolves as the vegetation begins to regrow and hinder wolf movement.

Reclamation of temporary access roads and infrastructure at the end of construction is predicted to reverse the effects on disturbed habitat. However, vegetation ecosystems would most likely differ to some degree from those not affected by the Project. Functional habitat for gray wolf on reclaimed temporary access roads and infrastructure (not the ROW) is likely to be reduced in the short-term as the dense, regenerating vegetation will not function as a clear movement path (as in the newly cut state), but in the longer term, as the habitat matures, it is likely to represent suitable habitat for hunting and other life processes.

Habitat Distribution

Linear features such as roads and transmission lines may alter movements by wolf, who may be attracted to the newly created open habitats which function as efficient movement corridors for this species within their home ranges (Paquet and Callaghan 1996; Neilson 2017). Gray wolf is a mobile species and will regularly incorporate disturbed or regenerating habitat in the home range. With strong dispersal ability and flexibility in habitat preferences, the species is likely resilient to moderate levels of fragmentation on the landscape (Serrouya et al. 2017). It is expected that wolf habitat connectivity will not be measurably reduced as a result of the proposed Project across the LSA and moose and gray wolf RSA.

Survival and Reproduction

Habitat loss due to the Project is not expected to influence survival and reproduction of gray wolves. Changes to gray wolf carrying capacity in the LSA associated with habitat loss from the Project are expected to be small.

Mitigation Measures

Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effect

There is a predicted neutral effect of habitat loss for gray wolf after implementation of the mitigation described in Table 6.5-40. This is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.4.2 Sensory Disturbance

Potential Effects

Habitat Availability

Habitat suitability for gray wolf around the Project footprint may be reduced if sensory disturbance is high enough. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause gray wolf to avoid the ROW and thus temporarily reduce habitat availability. While research does not identify any specific thresholds for sensory disturbance on gray wolves, it is known that they avoid areas of high human activity (Thurber et al. 1994; Mech and Boitani 2003; Hebblewhite et al. 2005; Ehlers et al. 2014); however, wolves are highly adaptable and in territories with higher human activity they appear to be relatively tolerant of it (Mech et al. 1995; Thiel et al. 1998; Boitani 2000; Hebblewhite and Merrill 2008). Additionally, packs with home ranges that overlap the Project footprint may currently be habituated to sensory disturbance due to the presence of existing roads and human activity (such as logging).

The effects of corona noise on gray wolf are unknown; however, studies on other mammals have shown that noise levels at transmissions lines do not deter wildlife (Goodwin 1975; Manitoba Hydro 2010). NWOMC and Region 2 have reported concerns and experiences with corona noise causing disturbance to harvesters, land users, and wildlife.

While there is uncertainty as to whether wolves are affected by corona noise, there is evidence that wolves use linear corridors for traveling, and these movements are key to gaining access to resources throughout their territories (Gurarie et al. 2011). In the vicinity of the Project, wolves range over large distances, and wolf packs occupying large territories and so are likely to encounter transmission lines. Therefore, if gray wolves are affected by corona noise, this temporary avoidance of transmission lines is not likely to have a measurable change to wolf survival or the maintenance of healthy wolf populations.

It is uncertain if corona noise from the transmission line causes gray wolves to avoid the ROW and so is not anticipated to reduce habitat availability. Additionally, packs with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of the existing ROW.

Survival and Reproduction

Changes to habitat abundance from sensory disturbance associated with the Project are not expected to influence survival and reproduction of gray wolf. Increases in energy expenditure from avoidance of humans is not expected to result in changes to gray wolf survival and reproduction for healthy individuals. As such, changes to carrying capacity associated with habitat loss from the Project are expected to be small.

Mitigation

The mitigation measures presented in Table 6.5-40 for habitat loss are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on gray wolf habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted neutral effect of habitat loss for gray wolf after implementation of the mitigation described in Table 6.5-40. This is not carried forward to the net effects characterization (Section 6.5.8).

6.5.7.4.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

The ability of wildlife species to avoid or move away from construction activities can be constrained during certain life-history periods or stages. Although gray wolves are extremely mobile, they may be adversely influenced during the denning season (March through June) when their movements are constrained. An increase in vehicles and traffic can increase the risk of injury or mortality to adults and their young.

There is potential for an increase in the risk of injury or death to gray wolf through collisions with Project vehicles and equipment. The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angold 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads.

In general, wolves are more likely to be killed at higher road densities, although most gray wolves spend little time in areas with higher road densities (Kohn et. Al. 2001). Wolves are also known to take advantage of road-killed prey, which they can access without expending significant effort. The largest risk to gray wolf from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

The creation of new and upgrading of existing access roads for the Project can adversely affect gray wolf in the long term through collisions with public vehicles (Jalkotzy et al. 1997; Trombulak and Frissell 2000). Upgrades to existing roads could increase both traffic volume and speed; two factors that increase collision risk for wildlife (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). New access created for the Project has the potential to increase collision risk for gray wolf more than upgraded roads because new roads will attract public seeking new areas in which to hunt or recreate.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will limit unauthorized access to provincial parks, post speed limits for the Project footprint, conduct environmental and safety orientation for Project personnel, and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on gray wolf survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above, but the magnitude will be negligible. This effect (reduced gray wolf survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.4.4 Increase in Public Access

Potential Effects

Survival and Reproduction

The creation of new access roads and upgrading of existing access roads for the Project provides increased opportunities for humans to use an area, which can result in increased gray wolf mortality from trappers and poachers. New access created for the Project has the potential to increase risk of mortality to gray wolf through trapping and illegal take more than upgraded roads because new roads will attract public seeking new areas in which to trap or poach.

Mitigation Measures

Limiting public access will minimize risk of injury or mortality to gray wolf due to trapping. Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. Temporary disturbance, such as temporary access roads and laydown areas, will be reclaimed progressively.

These mitigation measures are expected to minimize the potential effects on gray wolf survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Overall, the Project is anticipated to result in no measurable change in access for trappers and poachers in the LSA relative to existing environment conditions (e.g., being located next to an existing transmission line ROW). The increase in the number of people in the area during the Project lifespan could result in a minor increase in illegal harvesting of animals. As such, Project-related access and activities are predicted to have a small negative effect on the abundance of gray wolf. This is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.4.5 Incidental Take

Potential Effects

Survival and Reproduction

Gray wolf dens could be disturbed or destroyed during construction of access roads and the ROW. Section 8(2) of the Ontario *Fish and Wildlife Conservation Act, 1997* (Government of Ontario 2002) prohibits the intentional damage or destruction of a den or habitual dwelling of a furbearing mammal other than a fox (*Vulpes vulpes*) or skunk (*Mephitidea* species), unless the person holds a licence to trap furbearing mammals or approval is received under Section 62 of the Act. Gray wolf is listed as a furbearing mammal under the Ontario *Fish and Wildlife Conservation Act, 1997*.

Mitigation Measures

In addition to the mitigation described in Table 6.5-40, to minimize habitat loss and alteration environmental training for workers will include information on den identification and procedures to follow if a den is identified. If an active den is identified during active construction, including during vegetation removal, work will stop and local MNRF offices will be contacted immediately. The den will be clearly marked, a 100 m buffer surrounding the den will be established and no vegetation removal will proceed within that buffer until MNRF is engaged.

These mitigation measures are expected to minimize the potential effects on the survival and reproduction of the gray wolf. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation measures is expected to limit incidental take of denning gray wolf; however, this interaction cannot be entirely removed because clearing may take place during the denning period. There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced gray wolf survival and/or reproduction from destruction during denning) is carried forward to the net effects characterization (Section 6.5.8).

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

6.5.7.5 Furbearers (American Marten)

6.5.7.5.1 Habitat Loss

Potential Effects

Habitat Availability

Site preparation and activities associated with the construction stage of the Project are predicted to contribute to a loss of moderate and high suitability American marten habitat in the net effects assessment. In the wildlife and wildlife habitat LSA, approximately 858 ha (2.3%)of moderate to high suitability marten habitat would be removed by the Project footprint. In the marten RSA, these changes represent a less than 1% loss of moderate and high suitability marten habitat (Table 6.5-25). Habitat changes result from a conversion of moderate to high suitability American marten habitat to unsuitable habitats.

Table 6.5-25: Changes to Habitat Availability for Marten in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)[2]	LSA Change in Area (ha)[1]	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)[1]	Terrestrial RSA Percent Change (%)
Moderate to high	37,387	36,530	-858	-2.3%	121,833	120,976	-858	-0.7%
Unsuitable	127,267	128,124	858	0.5%	425,207	426,064	858	0.2%

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Changes in habitat area result from a conversion suitable habitat to unsuitable habitat.

2) The net effects in the LSA and RSA are a result of the Project footprint (i.e., direct impact to habitats).

% = percent; - = negative; ha = hectare; LSA = local study area; n/a = not applicable; RSA = regional study area.

Habitat Distribution

Linear features such as roads and transmission lines may alter movements by marten due to the effects of habitat fragmentation. A large portion of the ROW will generally parallel existing transmission lines. Where sections of the lines are adjacent, the effective ROW may be approximately 100 m wide and may limit local movements of marten.

During the construction stage, the ROW will be removed of vegetation, which may permanently alter marten use of moderate and high suitability habitat, except in areas where forest cover is allowed to regenerate (i.e., temporary access, construction camps, and laydown yards). The ROW will parallel Highway 11 roughly between Shebandowan and Atikokan, and several existing transmission lines, which all exist at baseline characterization. Connectivity of marten habitat and populations is likely already limited by the existing highway and transmission lines and may be further reduced with the Project. However, marten are strong dispersers and habitat connectivity in the marten RSA is not predicted to be measurably decreased compared to baseline characterization.

Survival and Reproduction

The Project may influence survival and reproduction of marten by changing habitat availability and connectivity for breeding and denning. During the construction stage, the ROW will be removed of vegetation and regenerate to grasslands/meadow vegetation cover. This will permanently alter marten habitat availability and distribution. The removal of 858 ha of moderate to high suitability marten habitat is predicted to affect the equivalent of one marten home range based on average home range estimates in Canada (i.e., 9.19 km^2 and 6.64 km^2 for males and females, respectively; Environment and Natural Resources 2015). Additionally, as this habitat loss will be dispersed within the LSA, not all impacts will be within one home range. As such, effects to martens within home ranges that overlap the Project are anticipated to be negligible.

Mitigation Measures

Habitat loss or alteration due to the Project has been minimized during the planning stage by using existing roads to the extent practicable, minimizing new access, building construction camps and laydown yards in areas with existing disturbance and near highways and existing transmission lines where possible. Additional mitigation focuses on minimizing habitat degradation, incidental disturbance and reclaiming temporary disturbance. During operations, compatible vegetation in the ROW will be allowed to grow back to provide some cover and reduce line-of-sight for predators. These mitigation measures are expected to minimize the potential effects on American marten habitat and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effect

There is a predicted net effect after implementation of the mitigation measures described above and in Table 6.5-40. Direct loss of approximately 858 ha of moderate to high suitability marten habitat is predicted to result from the Project. This effect (reduced or degraded marten habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual marten with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced marten survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.5.2 Sensory Disturbance

Potential Effects

Habitat Availability

American marten habitat suitability around the Project footprint may be reduced if marten avoid areas due to sensory disturbance. Collins et al. recently investigated the use of road crossing structures and found that marten avoided crossings likely due to the noise and other sensory disturbances from vehicles. It is likely that loud noises, lights, smells, dust, and human activity could potentially cause displacement of individuals, loss of foraging and resting habitat, and changes in predator-prey relationships. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause marten to avoid the ROW and thus temporarily reduce habitat availability. Benítez-López et al. (2010) indicate that the spatial impacts of industrial disturbance on wide-ranging mammals can extend up to 5 km, although marten have been shown to tolerate noise disturbance due to recreational vehicle traffic exceeding 60 A-weighted decibels (dBA) in areas of suitable habitat (Zielinski et al. 2008). In addition, individuals with home ranges that overlap the Project footprint may currently be habituated to sensory disturbance due to the presence of the Highway 11 and Highway 17, local forestry operations and the maintenance of existing transmission lines, which parallel a large portion of the Project ROW.

The effects of corona noise on marten are unknown; however, studies on other mammals have shown that noise levels at transmissions lines do not deter wildlife (Goodwin 1975; Manitoba Hydro 2010). Corona noise from the transmission line is not anticipated to further deter marten from using suitable habitats adjacent to the ROW as individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing transmission lines.

Survival and Reproduction

The Project may influence survival and reproduction of marten by changing habitat availability by causing martens to avoid the Project ROW. However, martens have been found to tolerate human activities and, as such, effects to martens within home ranges that overlap the Project are anticipated to be negligible.

Mitigation Measures

Sensory disturbance will be minimized during construction by enforcing speed limits for vehicles and by prohibiting the recreational use of off road vehicles by Project personnel on the Project footprint. Noise abatement equipment on machinery will be properly maintained and in good working order. Where practicable, vehicles and equipment will be turned off when not in use. In addition, construction activities will typically occur during one 10-hour- shift per day, with normal working hours of 07:00 to 19:00. These mitigation measures are expected to minimize the potential effects on American marten habitat. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above and in Table 6.5-40. Sensory disturbance is predicted to reduce the quality of marten habitat remaining in the wildlife and wildlife habitat LSA such that moderate or high-quality habitat may be avoided by marten. This effect (reduced or degraded American marten habitat from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

A small increase in mortality or reduced reproductive capacity is possible among affected individual marten with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced marten survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.5.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to American marten through collisions with Project vehicles and equipment. The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008). These factors directly reduce the probability of an animal crossing safely (Underhill and Angold 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads.

The largest risk to American marten from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations. The development creation of new and upgrading of existing access roads for the Project can adversely affect American marten in the long term through collisions with public vehicles (Jalkotzy et al. 1997; Trombulak and Frissell 2000). Upgrades to existing roads could increase both traffic volume and speed; two factors that increase collision risk for wildlife (EBA 2001;

Jaarsma et al. 2006; Litvaitis and Tash 2008). New access created for the Project is predicted to increase collision risk for American marten more than upgraded roads because new roads will attract public seeking new areas in which to hunt or recreate.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will limit unauthorized access to provincial parks, post speed limits for the Project footprint, conduct environmental and safety orientation for Project personnel, and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on American marten survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above, but the magnitude will be negligible. This effect (reduced American marten survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.5.4 Increase in Public Access

Potential Effects

Survival and Reproduction

The creation of new access roads and upgrading of existing access roads for the Project provides increased opportunities for humans to use an area, which can result in increased American marten mortality from trappers and poachers. New access created for the Project is predicted to increase risk of mortality to American marten through trapping and illegal take more than upgraded roads because new roads will attract public seeking new areas in which to trap or poach.

Mitigation Measures

Limiting public access will minimize risk of injury or mortality to American marten due to trapping. Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. Temporary disturbance, such as temporary access roads and laydown areas, will be reclaimed progressively.

These mitigation measures are expected to minimize the potential effects on American marten survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Overall, the Project is anticipated to result in no measurable change in access for trappers and poachers in the LSA relative to existing environment conditions (e.g., being located next to an existing transmission line ROW). The increase in the number of people in the area during the Project lifespan could result in a minor increase in illegal harvesting of animals. As such, Project-related access and activities are predicted to have a small negative effect on the abundance of American marten.

6.5.7.5.5 Incidental Take

Potential Effects

Survival and Reproduction

American marten dens could be disturbed or destroyed during construction of access roads and the ROW. Section 8(2) of the *Ontario Fish and Wildlife Conservation Act, 1997* (Government of Ontario 2002) prohibits the intentional damage or destruction of a den or habitual dwelling of a furbearing mammal other than a fox (*Vulpes vulpes*) or skunk (*Mephitidea* species), unless the person holds a licence to trap furbearing mammals or approval is received under Section 62 of the Act. American marten is listed in Schedule 1 of the *Ontario Fish and Wildlife Conservation Act, 1997* as a furbearing mammal.

Mitigation Measures

In addition to the mitigation described in Table 6.5-40 to minimize habitat loss and alteration, environmental training for workers will include information on den identification and procedures to follow if a den is identified.

Dens are one of the most important habitat features for American marten as they are critical for parturition and pup rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation measures where needed. Mitigation measures will include environmental training for workers, including information on den identification and procedures to follow if a den is identified.

If an active den is identified during active construction, including during vegetation removal, work will stop and local MNRF offices will be contacted immediately. The den will be clearly marked, a 100 m buffer surrounding the den will be established and no vegetation removal will proceed within that buffer until MNRF is engaged.

These mitigation measures are expected to minimize the potential effects on the survival and reproduction of the American marten. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation measures is expected to limit incidental take of denning American marten; however, this interaction cannot be entirely removed because clearing may take place during the denning period. There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced American marten survival and/or reproduction from destruction during denning) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.6 *Furbearers (Beaver)*

FURBEARERS *(AMERICAN MARTEN, BEAVER, GRAY WOLF)*

Miishijii Awesiinyag

6.5.7.6.1 Habitat Loss

Potential Effects

Habitat Availability

Site preparation and construction of Project infrastructure would reduce the availability of suitable beaver habitat. A loss of 469 ha of moderate to high suitability habitat is predicted, representing a change of 3.6% at the scale of the LSA (Table 6.5-26). A loss of 81 ha (1.3%) of low suitability would occur as a result of the Project. The predicted habitat losses are reflected in the corresponding increase in the amount of poor suitability habitat. As described under existing environment conditions, beavers do not appear to avoid areas near anthropogenic disturbance (e.g., Boyles and Savitzky 2008; Mumma et al. 2018; Scrafford et al. 2020). Consequently, no further loss of habitat is expected because of beaver avoidance behaviour in proximity to the maximum disturbance area, which includes the Project footprint. Overall, 91,929 ha of suitable beaver habitat (rated as high, moderate, and low suitability) would remain in the RSA. In the RSA, these changes represent a 1.2% loss of moderate and high suitability beaver habitat (Table 6.5-26).

Table 6.5-26: Changes to Beaver Habitat Availability in the Net Effects Assessment

Habitat Suitability	LSA Baseline Area (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)[1]	LSA Percent Change (%)	RSA Baseline Area (ha)	RSA Net Effects (ha)	RSA Change in Area (ha)[1]	RSA Percent (%)
High	11,698	11,511	-187	-1.6%	35,052	34,865	-187	-0.5%
Moderate	13,893	13,611	-281	-2.0%	40,053	39,772	-281	-0.7%
Low	6,248	6,168	-81	-1.3%	17,374	17,293	-81	-0.5%
Poor[1]	119,800	120,350	550	0.3%	413,037	413,587	550	0.1%

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Changes in habitat area result from a conversion high, moderate and low habitat to poor habitat.

% = percent; - = negative; ha = hectare; LSA = local study area; n/a = not applicable; RSA = regional study area.

While temporary infrastructure of the Project (e.g., camps and laydown areas) would be reclaimed, vegetation communities anticipated to establish on these features would likely not be representative of the upland deciduous forest ecosites not influenced by the Project; therefore, effects are conservatively considered permanent and irreversible. Hydro One would undertake progressive reclamation of areas no longer required for Project operations and maintenance. Reclamation is predicted to reverse effects on disturbed vegetation units and provide adequate material for the development of productive soils, which would support the establishment and succession of vegetation communities with similar function to natural ecosystems not influenced by the Project.

Beaver habitat loss is mainly associated with the alteration of open water and adjacent deciduous forest stands. Some areas of the Project footprint may return to moderately suitable beaver habitat after construction because shrubby willow habitats near water features can establish relatively quickly. Moderate and high suitability habitats for beaver include early regenerating ecosites, so functional upland foraging habitat is expected to return in 6 to 20 years following the end of construction in temporary disturbance areas. At least 40 years from the end of the Construction Stage would be required for mature forest trees to be established for use in lodges and dams.

Habitat Distribution

Anthropogenic linear features have not been found to decrease the likelihood of occurrence or distribution of beaver (Mumma et al. 2018), and the Project would not change the density of linear features in the LSA and RSA.

Beaver sign in the LSA was highest around the Thunder Bay area, followed by moderate amounts of sign around the Atikokan area and low amounts of sign around Dryden. Considering the information on beaver activity in the LSA, the mobility of beaver, the extensive network of available waterbodies and watercourses, and the small magnitude and site-specific nature of beaver habitat loss, it is unlikely that the Project would cause a measurable change in beaver movement patterns at the local or regional scales. The Project is not expected to introduce movement barriers that would impede dispersal within or across the LSA or RSA.

Survival and Reproduction

Changes to beaver survival, reproduction, and abundance because of alterations to the amount, quality, distribution, and connectivity of habitats are expected to be small and reversible because:

- There is limited disturbance to high suitability habitat in the LSA and RSA.
- Changes to the local and regional distribution of habitats would be small and highly localized.
- Beaver habitat should remain well connected, and no measurable alterations to beaver movement patterns are predicted.

Habitat is not considered limiting for beavers as they can exploit different types of landscapes by modifying the environment. Specifically, beavers can build dams to increase the suitability of their habitats. Habitat loss is unlikely to have a measurable effect on the beaver population in the RSA (probability of effect is not expected but is not impossible).

Mitigation Measures

Habitat loss or alteration due to the Project has been minimized during the planning stage by using existing roads and trails to the extent practicable, minimizing new access, construction camps and laydown yards in areas with existing disturbance and near highways and existing transmission lines where possible. Additional mitigation focuses on minimizing habitat degradation, incidental disturbance and reclaiming temporary disturbance. During operations, compatible vegetation in the ROW will be allowed to grow back to provide some cover and reduce line-of-sight for predators. These mitigation measures are expected to minimize the potential effects on beaver habitat and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effect

There is a predicted net effect after implementation of the mitigation measures described above and in Table 6.5-40. Direct loss of 405 ha of moderate to high suitability beaver habitat is predicted to result from the Project. This effect (reduced or degraded beaver habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

A change in survival and/or reproductive capacity is possible among affected individual beavers with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced beaver survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.6.2 Sensory Disturbance

Potential Effects

Habitat Availability

Sensory disturbance (e.g., presence of people, lights, dust, smells, noise) can alter beaver movement and behaviour and adversely affect beaver habitat availability and beaver abundance and distribution. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause sensory disturbance; however, beaver have limited sensitivity to sensory disturbance and are not expected to experience additional decreases in functional habitat due to the presence of humans, Project infrastructure, and the associated noise and lights.

Survival and Reproduction

Beavers are relatively tolerant of sensory disturbance associated with human and infrastructure presence and so changes to beaver survival, reproduction, and abundance because of alterations to the amount, quality, distribution, and connectivity of habitats are expected to be small and reversible.

Mitigation Measures

Sensory disturbance will be minimized during construction by enforcing speed limits for vehicles and by prohibiting the use of recreational use of offroad vehicles by Project personnel on the Project footprint. Noise abatement equipment on machinery will be properly maintained and in good working order. Where practicable, vehicles and equipment will be turned off when not in use. In addition, construction activities will typically occur during one 10-hour shift per day, with normal working hours of 07:00 to 19:00. These mitigation measures are expected to minimize the potential effects on American marten habitat. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

As beavers are tolerant of sensory disturbance, the changes to beaver habitat quality during construction are anticipated to be negligible. This effect (reduced or degraded beaver habitat from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

The implementation of mitigation is anticipated to avoid and reduce changes to the survival and reproduction of beavers that may be denning in the LSA. A small increase in mortality or reduced reproductive capacity is possible among affected individual beaver in the LSA. This effect (reduced beaver survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.6.3 Increase in Public Access

Potential Effects

Survival and Reproduction

The creation of new access roads and upgrading of existing access roads for the Project provides increased opportunities for humans to use an area, which can result in increased beaver mortality from trappers and poachers. New access created for the Project is predicted to increase risk of mortality to beaver through trapping and illegal take more than upgraded roads because new roads will attract public seeking new areas in which to trap or poach.

Mitigation Measures

Limiting public access will minimize risk of injury or mortality to beaver due to trapping. Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. Temporary disturbance, such as temporary access roads and laydown areas, will be reclaimed progressively.

These mitigation measures are expected to minimize the potential effects on beaver survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Overall, the Project is anticipated to result in no measurable change in access for trappers and poachers in the LSA relative to existing environment conditions (e.g., being located next to an existing transmission line ROW). The increase in the number of people in the area during the Project lifespan could result in a minor increase in illegal harvesting of animals. As such, Project-related access and activities are predicted to have a small negative effect on the abundance of beaver.

6.5.7.6.4 Incidental Take

Potential Effects

Survival and Reproduction

Beaver lodges and dams could be disturbed or destroyed during construction of access roads and the ROW. Section 8(2) of the Ontario *Fish and Wildlife Conservation Act, 1997* (Government of Ontario 2002) prohibits the intentional damage or destruction of a den or habitual dwelling of a furbearing mammal other than a fox (*Vulpes vulpes*) or skunk (*Mephitidea* species), unless the person holds a licence to trap furbearing mammals or approval is received under Section 62 of the Act. Beaver is listed as a furbearing mammal under the Ontario *Fish and Wildlife Conservation Act, 1997*.

Mitigation Measures

In addition to the mitigation described in Table 6.5-40 to minimize habitat loss and alteration, environmental training for workers will include information on lodge identification and procedures to follow if a lodge is identified.

Lodges are one of the most important habitat features for beaver as they are critical for parturition and kit rearing. Mitigation measures will include environmental training for workers, including information on lodge identification and procedures to follow if a lodge is identified.

If an active lodge is identified during active construction, including during vegetation removal, work will stop and local MNRF offices will be contacted immediately. If a beaver lodge or dam requires removal then an *Application to Interfere with/Destroy a Black Bear or Furbearing Mammal Den, Beaver Dam, Black Bear in Den* will be submitted to the MNRF. If beaver removal is required, the head trapper for the impacted trapline will be contacted (within a trapline area) and the required MNRF permits (e.g., Term Agent Authorizations) will be acquired as necessary.

These mitigation measures are expected to minimize the potential effects on the survival and reproduction of the beaver. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation measures is expected to limit incidental take of beaver denning in lodges; however, this interaction cannot be entirely removed. There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced beaver survival and/or reproduction from destruction during denning) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.7 Little Brown Myotis and Northern Myotis

LITTLE BROWN MYOTIS AND NORTHERN MYOTIS

Apakwanaajiinh

6.5.7.7.1 Habitat Loss

Potential Effects

Habitat Availability

Vegetation removal for the Project Footprint will result in a loss of potential maternity roosting habitat for little brown myotis, and northern myotis, and may result in the loss of potential hibernation habitat for these species. Vegetation removal may also result in the loss of foraging habitat for these species.

The Project is predicted to remove 1,433 ha of potential maternity roost habitat for little brown myotis and northern myotis. Vegetation removal will occur between 200 m and 500 m of three likely or possible hibernaculum. This activity will not negatively impact hibernation habitat availability. Any Project activities that could cause loud noise and vibrations will not be conducted within 500 m of a hibernaculum during the hibernation period (August 1-May 31) and noise and vibration created at the site will be restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment). Project activities causing loud noises and vibrations will not negatively impact hibernation habitat availability. No Project activities are planned within 200 m of a hibernaculum (Table 6.5-27).

Table 6.5-27: Changes to Maternity Roost Habitat Availability Little Brown Myotis and Northern Myotis in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)[1]	LSA Percent Change (%)	RSA Baseline Characterization (ha)	RSA Net Effects (ha)	RSA Change in Area (ha)[1]	RSA Percent Change (%)
Suitable	53,827	52,394	-1,433	-2.7%	165,911	164,478	-1,433	-0.9%
Unsuitable	110,936	112,369	1,433	1.3%	377,669	379,102	1,433	0.4%

Notes: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

1) Changes in habitat area result from a conversion of suitable to unsuitable.

% = percent; - = negative; ha = hectare; LSA = local study area; RSA = regional study area.

Wetland ecosystems were evaluated in the Vegetation Assessment and are predicted to decrease by approximately 2.8%. This partially represents the loss of foraging habitat for little brown myotis in the Net Effects Assessment. Other habitats that provide foraging habitat, such as open water, would not be disturbed by Project activities. Additionally, the open habitat created by the Project may provide foraging habitat for little brown myotis. Changes from forest clearing for the Project Footprint may have positive or negative effects on little brown myotis and northern myotis foraging habitat.

- Within the LSA, approximately 32.6% (54,221 ha) of the mapped area from desktop ecosite mapping and field surveys was identified as potential suitable bat maternity habitat.

The general habitat model predicted that the Project is predicted to remove 1,433 ha of potential maternity habitat, which is 2.7% and 0.9% of maternity roost habitat that is present in the LSA and RSA, respectively, at baseline characterization. Vegetation removal will occur between 200 m and 500 m of three likely or possible hibernaculum. This activity will not negatively impact hibernation habitat availability. Any Project activities that could cause loud noise and vibrations will not be conducted within 500 m of a hibernaculum during the hibernation period (August 1 to May 31). Project activities causing loud noises and vibrations will not negatively impact hibernation habitat availability. No Project activities are planned within 200 m of a hibernaculum (Table 6.5-27).

Habitat Distribution

The Project footprint is not anticipated to result in a change in the distribution of potential hibernacula habitat after the implementation of mitigation measures. No tree removal or other construction activities will be completed within 200 m of hibernacula. Furthermore, no construction activities that produce loud noises and vibrations (e.g., drilling, blasting, and implosion splicing) will be completed within 500 m of a hibernacula during the hibernation period (August 1 to May 31). These restrictions on activities are expected to limit effects on hibernating bats because the Project is not predicted to result in the removal or alteration of potential hibernation habitat. The main concern during the construction stage is the effect that sensory disturbance (e.g., noise and vibration) may have on hibernating bats.

Similarly, clearing of potential maternity roost habitat will be completed outside of the maternity roost season. If potential maternity roost habitat is to be cleared during the maternity roost season in limited areas, mitigation measures will be developed in consultation with the MECP and will be implemented so occupied habitat will not be removed.

Occupied habitat is not predicted to be lost after mitigation measures and the loss of unoccupied habitat is predicted to not have any effect on connectivity among populations that overlap with the RSA because bats are highly mobile. Little brown myotis and northern myotis are predicted to fly directly over or along the Project footprint when dispersing or searching for food and water (Kalcounis-Ruepell et al. 2013). Edge habitat created by the Project footprint may facilitate movement and foraging behaviour of little brown myotis but there is uncertainty with this prediction because some studies suggest that this species prefers closed canopy habitat for foraging (Kalcounis and Brigham 1995, Jung et al. 1999, Morris et al. 2010).

Bats (*Chiroptera*) that roost in tree cavities have less fidelity to roost sites, than species that roost in buildings or caves (Lewis 1995). As such, the removal of potential maternity roost trees during the construction stage is not anticipated to result in a measurable change to little brown myotis maternity habitat distribution.

- Although positive changes in movement patterns of little brown myotis and northern myotis at local scales are possible during operation, the overall net effect of the Project on habitat distribution is considered negative because of uncertainty in how little brown myotis and northern myotis responds to habitat fragmentation and linear disturbance features. The Project footprint is not expected to reduce the extent of occurrence of little brown myotis and is therefore compliant with the objectives outlined in the federal recovery strategy (ECCC 2018). The desktop and field habitat assessment identified that bat maternity roost habitat is abundant and widely distributed throughout the LSA and RSA.
- Maternity roost habitat remains distributed similarly to baseline characterization after the construction of the Project, according to the general habitat model (Attachment 6.5-B-4, in Appendix 6.5-B).

Survival and Reproduction

Site clearing for the Project Footprint will result in removal of vegetation between 200 m and 500 m of three likely or possible hibernaculum. This activity will not negatively impact survival and reproduction of little brown myotis and northern myotis. Any Project activities that could cause loud noise and vibrations will not be conducted within 500 m of a hibernaculum during the hibernation period (August 1 to May 31). Project activities causing loud noises and vibrations will not negatively impact survival and reproduction of little brown myotis and northern myotis. No Project activities are planned within 200 m of a hibernaculum.

Overall, the small negative changes in habitat availability and distribution are predicted to have no detectable effects on population survival and reproductive rates.

Mitigation Measures

Mitigation measures are expected to avoid and limit changes to bat habitat availability. Mitigation measures will include:

- Limit the Project footprint to the extent feasible such as use of existing access roads.
- Retain compatible species (e.g., shrub vegetation, compatible trees, and coarse woody debris) where practicable and where safe to do so.
- No tree removal or other construction activities will be completed within 200 m of bat hibernacula without engagement and approval of regulatory agencies.

- Clearing will be conducted with in the 200 - 500 m distance from hibernation habitat outside of the maternity season for bats (May 1 – August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment).
- Avoid clearing maternity roost habitat during the bat maternity roosting period (May 1 to August 31). If potential maternity roost habitat is to be removed during the roosting period, it will be subject to ESA permitting requirements and site-specific mitigation measures that would be developed in consultation with the MECP SARB. Hydro One will work with the MECP SARB to acquire all appropriate permits for this work.
- Temporary access roads and trails, construction camps, turnaround areas, waterbody crossings and temporary laydown areas will be reclaimed at the end of construction.
- Hydro One and their contractor(s) will prepare and implement an EPP and a Cleanup and Reclamation Plan. Natural recovery is the preferred method of reclamation. Where necessary, seeding will occur to improve reclamation success. Effectiveness of reclamation efforts will be monitored and managed post-construction, including confirmation that vegetation communities that naturally regenerate (or were planted) are similar to adjacent vegetation communities. If required, adaptive management will be employed to modify or enhance any reclamation efforts.
- Erosion control practices would limit wind and water erosion on cover soil and overburden stockpiles (e.g., vegetation, erosion mats).

If significant changes to the construction schedule are experienced and any of the measures above cannot be achieved, Hydro One will engage with the MECP SARB to understand, and acquire as necessary, any potential authorization requirements under the ESA.

Net Effects

There is a predicted net effect of habitat loss after implementation of the mitigation measures described above. Direct loss of approximately 1,433 ha of maternity roost habitat is predicted to result from the Project. This effect (reduced or degraded maternity roost habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.7.2 Sensory Disturbance

Potential Effects

Habitat Availability

Sensory disturbance may temporarily result in avoidance of maternity roosting habitat by little brown myotis and northern myotis during construction and reclamation activities. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause bats to avoid the ROW and thus temporarily reduce habitat availability. The effects of noise on little brown myotis and northern myotis will likely depend on the frequencies generated by the Project. Noise frequencies that overlap with the little brown myotis and northern myotis frequency ranges (i.e., approximately 35 to 70 kilohertz [kHz] and 35 to 110 kHz, respectively) are expected to have the greatest effect on this species. A study by Luo et al. (2014) found that bats were more sensitive to noise when it occurred closer to sunset as opposed to earlier in the daily roosting period and responded least to traffic noise and most to vegetation noise (e.g., rustling of leaves), possibly because traffic noise was at a lower frequency than their core hearing range. Bats may rapidly become habituated to repeated and prolonged noise exposure (e.g., bats roosting under bridges) (Luo et al. 2014).

Survival and Reproduction

Noise has been found to negatively affect foraging by passive-listening bat species, especially when noise frequencies occur at the same frequency as prey noises (Jones 2008, Schaub et al. 2008, Siemers and Schaub 2011). Consequently, passive-listening bats have been found to avoid areas with high noise levels (e.g., adjacent to highways) (Schaub et al. 2008). However, echo-locating species, such as little brown myotis and northern myotis, can adapt the amplitude and duration of their calls to the ambient noise level of an environment (Luo and Wiegrebe 2016).

A study completed by the West Virginia Department of Environmental Protection (2006) to monitor effects of surface mine blasting on hibernating bats concluded that hibernating bats can withstand vibration levels of 0.06 to 0.20 inches per second (ips) (1.52 to 5.08 millimetres per second [mm/s]) without negative effects. This study also found that surface blasting using a maximum of 100 pounds per delay, caused a roof vibration of 0.016 ips at 959 feet (0.4 mm/s at 292 m) from the blast. It is likely that blasting required for the Project will require less than 100 pounds per delay and so roof vibrations created by the Project will be less than that reported in this study.

Sensory disturbance that results in rousing hibernating bats out of torpor may result in increased winter mortality.

Mitigation Measures

Mitigation measures, such as restricting construction activities that cause loud noise and vibration within 500 m of potential hibernacula during the hibernation season, is expected to avoid and limit sensory disturbance effects on hibernating bats. Mitigation measures will include:

- No Project-related disturbance will occur within 200 m of a bat hibernaculum without engagement and approval of regulatory agencies.
- Project activities causing loud noise or vibrations (e.g., drilling, blasting, implosion splicing) will not be undertaken within 500 m of a bat hibernaculum during the hibernation period (August 1 to May 31).

- Clearing will be conducted with in the 200 - 500 m distance from some hibernacula outside of the maternity season for bats (May 1 – August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment).

- Mitigation measures such as restricting tree clearing within bat maternity roost habitat during the maternity roost season (May 1 to August 31) is expected to avoid and limit sensory disturbance on maternity colonies. If potential maternity roost habitat is to be removed during the roosting period, it will be subject to ESA permitting and site-specific mitigation measures to be developed in consultation with the MECP. Hydro One will work with the MECP SARB to acquire all appropriate permits for this work.

If significant changes to the construction schedule are experienced and any of the measures above cannot be achieved, Hydro One will engage with the MECP SARB to understand, and acquire as necessary, any potential authorization requirements under the ESA.

Net Effects

Based on the results presented above, it is anticipated that the 500m buffer activity restriction buffer around bat hibernacula during the hibernation period (August 1 to May 30) is sufficient to limit the effects of blasting related sensory disturbance (i.e., noise and vibration) on hibernating bats.

Due to the potential effects on roosting and foraging bats there is a predicted net effect after implementation of the mitigation described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual little brown myotis an northern myotis with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced little brown myotis and northern myotis survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.7.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to little brown myotis and northern myotis through collisions with Project vehicles and equipment. The predominant factors that contribute to road related wildlife deaths are traffic volume, and the proximity of roads to areas of higher bat activity (Medinas et al. 2013, Ramalho et at. 2021, ECCC 2018). For little brown myotis and northern myotis, mortality rates are highest near roosts and foraging areas (ECCC 2018). Juvenile bats are at a higher risk of mortality from collisions with vehicles than adult (ECCC 2018). The largest risk to little brown myotis and northern myotis from collisions with vehicles would occur when traffic volumes are highest during construction, and it predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on little brown myotis and northern myotis survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced little brown myotis and northern myotis survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.7.4 Incidental Take

Potential Effects

Survival and Reproduction

Little brown myotis and northern myotis are listed as endangered on the provincial ESA, and as endangered and on Schedule 1 of the federal SARA due to dramatic population declines resulting from WNS.

Occupied maternity roosts or hibernacula could be disturbed or destroyed during construction of access roads and the ROW. Because little brown myotis is a congregatory species, loss of these habitat features has the potential to result in the mortality of many individuals.

Mitigation Measures

Clearing maternity roost habitat during the maternal roosting period (May 1 to August 31) will be avoided. Should this timing not be able to be maintained as identified, MECP SARB will be engaged. Hydro One will work with the MECP SARB to acquire all appropriate permits for this work.

In areas within 500 m of a known or suspected hibernacula, construction activities causing sensory disturbance (e.g., drilling, blasting, implosion splicing) will be completed outside the hibernation period (August 1 to May 31). Clearing will be conducted with in the 200 - 500 m distance from hibernation habitat outside of the maternity season for bats (May 1 – August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment).

If significant changes to the construction schedule are experienced and any of the measures above cannot be achieved, Hydro One will engage with the MECP SARB to understand, and acquire as necessary, any potential authorization requirements under the ESA.

Net Effect

Mitigation measures, policies and practices for construction activities are expected to avoid and limit incidental take of roosting or hibernating bats relative to baseline characterization conditions. There are net effects predicted after implementation of the mitigation measures described above and in Table 6.5-40.

6.5.7.8 Herpetofauna (Snapping Turtle and Spring Peeper)

HERPETOFAUNA (SNAPPING TURTLE)

Mikinaak

6.5.7.8.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove and/or disturb the following herpetofauna candidate SWH: amphibian breeding habitat (471 ha or 1.7% and 0.6% of the LSA and terrestrial RSA, respectively), turtle nesting area (75 ha or 7.9% and 5.2% of the LSA and terrestrial RSA, respectively), and turtle wintering area (338 ha or 1.5% and 0.5% of the LSA and terrestrial RSA, respectively; Table 6.5-28). Vegetation removal and the temporary and permanent footprint associated with the Project Footprint is expected to directly alter and/or remove suitable herpetofauna habitat.

The loss of breeding ponds is a primary threat to spring peeper through its range. They do not thrive in areas subject to increased disturbance from activities that remove forested habitat in proximity to breeding pools (Ontario Nature 2022).

Table 6.5-28: Changes to Habitat Availability for Herpetofauna in the Net Effects Assessment

Significant Wildlife Habitat	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)[1]	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)[1]	Terrestrial RSA Percent Change (%)
Amphibian Breeding Habitat	26,978	26,507	-471	-1.7%	84,598	84,127	-471	-0.6%
Turtle Wintering Area	23,087	22,749	-338	-1.5%	73,677	73,339	-338	-0.5%
Turtle Nesting Area	954	879	-75	-7.9%	1,435	1360	-75	-5.2%

Habitat Distribution

For herpetofauna, vegetation removal and construction in the ROW may compound habitat fragmentation and impact connectivity, particularly where the ROW bisects a migratory corridor between breeding and non-breeding habitat. However, the Project traverses landscapes that are already fragmented by large linear infrastructures such as highways and ROWs.

Spring peeper (*Pseudacris crucifer*) are non-migratory and have rather small home ranges such that extensive habitat loss could foreseeably lead to localized extirpation or populations if no suitable habitat is locally available for individuals to disperse to. Spring peeper are not expected to travel greater than 1 km between breeding and non-breeding habitat (Freda and Morin 1984; Freda and Gonzalez 1986; Kay 1989).

Survival and Reproduction

Alteration to herpetofauna habitat due to the Project footprint is predicted to reduce the abundance of amphibian breeding habitat, turtle (*Testudines*) wintering area habitat, and turtle nesting area habitat, which could negative affect snapping turtle and spring peeper survival and reproduction.

Mitigation Measures

Amphibian breeding habitat and turtle nesting areas can be the most important habitat features for herpetofauna as they are critical for species in embryonic and larval stages of life, and activities such as mating and egg deposition. Mitigation measures will include:

- Limit the Project footprint to the extent feasible, such as use of existing access roads.
- Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified.
- Install temporary reptile and amphibian exclusion fencing where practicable and appropriate at a distance 30 m around wetlands with high potential as habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity. Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing.
- To address work in wetlands during the winter period and the risk to overwintering turtles, exclusion fencing to prevent turtles from entering overwintering areas will be implemented where practicable and appropriate. Isolating and dewatering the aquatic work area prior to September 1 is an alternate mitigation measure that could be implemented where practicable and appropriate. This mitigation measure may not be appropriate in many instances given the ripple effects to other environmental discipline

(i.e., surface water and fish and fish habitat).and the scale of the Project; however, this mitigation measure will be considered as applicable.

- Temporary access roads, construction camps, waterbody crossings and laydown areas will be reclaimed at the end of construction.

If evidence of an active turtle nest is identified during active construction, including vegetation removal, work will stop and MECP and other appropriate agencies will be contacted immediately to discuss mitigation measures. Appropriate Indigenous communities will be notified, where requested.

These mitigation measures are expected to minimize the potential effects on herpetofauna habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effect

There is a predicted net effect of habitat loss after implementation of the mitigation measures described above. Direct removal and/or disturbance of the following candidate SWH: 471 ha of amphibian breeding habitat, 75 ha of turtle nesting area, and 338 ha of turtle wintering area is predicted to result from the Project. This effect (reduced or degraded specialized and seasonal concentration habitat) from the removal and/or alteration of vegetation is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual herpetofauna with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced herpetofauna survival and/or reproduction from the removal and/or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.8.2 Sensory Disturbance

Potential Effects

Habitat Availability

Sensory disturbance associated with the construction of the Project and maintenance activities during operation is predicted to temporarily reduce the availability of amphibian breeding habitat if spring peepers actively avoid breeding habitat due to the disturbances. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause herpetofauna to avoid the ROW and thus temporarily reduce habitat availability.

The effects of corona noise on herpetofauna is largely unknown; however, studies on other wildlife have shown that noise levels at transmissions lines do not deter wildlife (Goodwin 1975; Manitoba Hydro 2010). Corona noise from the transmission line is not anticipated to cause herpetofauna to avoid the ROW or adjacent habitat and so is not anticipated to reduce herpetofauna habitat availability.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) from the Project is predicted to affect herpetofauna survival and reproduction through habitat avoidance and decreased reproductive success. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on herpetofauna is plausible if it elicits a stress response. Chronic stress has been shown to reduce growth, survival, and reproduction in wildlife (Wingfield and Sapolsky 2003), and in some species, it has the potential to result in population-level effects (Dantzer et al. 2014. Additionally, sensory disturbance could result in decreased mating success for spring peepers if calling is reduced or degraded by noise disturbance. Masking of acoustic communication from construction activities could lead to missed mating opportunities or reduced quality from mate selection.

Mitigation Measures

Amphibian Breeding Habitat and Turtle Nesting Areas can be the most important habitat features for herpetofauna as they are critical for species in the embryonic and larval development stages of life and activities such as mating and egg deposition. Sensory disturbance during construction may be partially mitigated because most of the construction activities will typically occur during one 10-hour shift per day (from 07:00 to 17:00), although night-time work may be occasionally required. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation measures where needed. Mitigation measures include:

- Limit the Project footprint to the extent feasible such as use of existing access roads.
- Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified.
- Install temporary reptile and amphibian exclusion fencing where practicable and appropriate at a distance 30 m around wetlands with high potential as habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity. Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing.
- Temporary access roads, construction camps, waterbody crossings and laydown areas will be reclaimed and revegetated with native species at the end of construction.

If evidence of an active turtle nest is identified during active construction, including during vegetation removal, work will stop and MECP and other appropriate agencies will be contacted immediately to discuss mitigation measures. Appropriate Indigenous communities will be notified, where requested.

These mitigation measures are expected to minimize the potential effects on herpetofauna habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effect

There is a predicted net effect after implementation of the mitigation measures described above. Reduced reproductive capacity is possible among effected herpetofauna with breeding habitat within the wildlife and wildlife habitat LSA. This effect (reduced herpetofauna reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.8.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to herpetofauna through collisions with Project vehicles and equipment. The predominant factors that contribute to road-related wildlife deaths are traffic volume, vehicle speed, and animal crossing speed (EBA 2001; Jaarsma et al. 2006; Farmer 2007; Litvaitis and Tash 2008). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angold 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that a species that occurs in high density and does not exhibit behavioural avoidance of roads is at relatively higher risk than species that are rare on the landscape and avoid roads. Herpetofauna do not exhibit behavioural avoidance of roads, though, they generally do not occur in high densities; however, their density is often increased during the reproductive seasons near suitable breeding and/or nesting habitat. The largest risk to herpetofauna from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Significant annual mortality of most turtle species occurs as a result of traffic mortality, especially on roads located through or adjacent to wetlands. Snapping turtles are most vulnerable to mortality from vehicular collisions during the reproductive season as females cross roadways frequently in search of nesting sites, but also because soft gravel roads and/or road shoulders make attractive nesting sites (Haxton 2000, Aresco 2005).

Traffic mortality is also significant for spring peepers and other anuran species present in the Project RSA (Fahrig 1995; Ashley and Robinson 1996; Hels and Buchwald 2001). However, there is evidence that lower traffic (Fahrig 1995) and lower speed (Hels and Buchwald 2001) roadways reduce traffic mortality, and that low traffic forestry roads have no effect (deMaynadier and Hunter 2000). The largest risk to herpetofauna from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on herpetofauna survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced herpetofauna survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8)

6.5.7.8.4 Incidental Take

Potential Effects

Survival and Reproduction

Construction activities within areas occupied by amphibians and reptiles have the potential to result in incidental take (harm or mortality) of individuals. Clearing of habitat during the active period for amphibians and reptiles, carries the risk of accidental harm or mortality to herpetofauna.

Although female snapping turtles do exhibit nest site fidelity, clearing activities in the ROW may open up suitable turtle nesting areas. This which could attract opportunistic snapping turtles to nest within the Project footprint as the clearing activities are anticipated to open up access to exposed areas with soft substrates, which are often selected as nesting locations by turtles (Aresco 2005). Further, the construction of new temporary or permanent Project components, such as access roads, laydown areas, and construction camps, can also be expected to create areas that may be selected by turtles to build their nest and lay eggs. Further, if females do complete a nest in these active construction areas, the ongoing construction and maintenance activities such as gravelling and grading often cause the eggs to fail and/or the hatchlings to be killed (Ashley and Robinson 1996).

Temporary depressions, ditches, and ponds created during construction activities may attract spring peepers and other frogs and toads (anurans) to breed in these features, particularly since they would be fishless features. This could increase the availability of breeding habitat; however, the quality may not be sufficient. For example, should these features be selected for egg deposition, and if these permanent or temporary features do not hold water for enough time for deposited eggs to hatch and metamorphose, it would lead to wasted reproductive output, acting as an ecological trap for these individuals.

Mitigation Measures

Work in wetlands identified as turtle overwintering habitat will be avoided during the winter months when herpetofauna are in hibernation (approximately October to May) to the extent practicable. Should this timing not be able to be maintained as identified, additional mitigation measures will be employed as follows:

- Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified.
- Safe handling practices will be used to move turtles, snakes and other herpetofauna to areas away from the construction (e.g., Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders).
- Construction personnel will traverse the path of construction equipment, to induce frogs, toads, and snakes to be scared away from the path of oncoming machinery.
- Limit the Project footprint to the extent feasible, such as use of existing access roads.
- Installation of temporary reptile and amphibian exclusion fencing where practicable and appropriate for 30 m around wetlands with high potential habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity.
- To address work in wetlands during the winter period and the risk to overwintering turtles, exclusion fencing to prevent turtles from entering overwintering areas will be implemented where practicable and appropriate. Isolating and dewatering the aquatic work area prior to September 1 is an alternate mitigation measure that could be implemented where practicable and appropriate. This mitigation measure may not be appropriate in many instances given the ripple effects to other environmental discipline (i.e., surface water and fish and fish habitat).and the scale of the Project; however, this mitigation measure will be considered as applicable.

- Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing.
- Conduct worker awareness training for machine operators to help alert them to the possibility of turtles, snakes and amphibians in active areas of construction.

Net Effect

Mitigation measures, policies and practices for construction activities are expected to avoid and limit incidental take of herpetofauna relative to baseline characterization conditions. There are net effects predicted after implementation of the mitigation measures described above. This effect (incidental take) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9 Raptors (Bald Eagle)

RAPTORS *(BALD EAGLE)*

Migizi

6.5.7.9.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 1,835 ha (2.68% of the LSA and 0.84% of the terrestrial RSA) of moderate to high suitability bald eagle habitat (Table 6.5-29). During the construction stage, the ROW will be removed of vegetation, which may permanently alter bald eagle use of suitable habitat where mature forest is removed.

Habitat Distribution

The distribution of bald eagle habitat in the Net Effects Assessment is depicted on Attachment 6.5-B-8, in Appendix 6.5-B. Habitat fragmentation due to vegetation removal and construction activities associated with the Project would result in minimal changes to the existing distribution of bald eagle habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of bald eagle populations that overlap the RSA.

Table 6.5-29: Changes to Habitat Availability for Bald Eagle in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)(2)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)(2)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	68,388	66,553	-1,835	-2.68%	219,104	217,269	-1,835	-0.84%
Unsuitable	96,399	98,234	1,835	1.90%	329,017	330,852	1,835	0.56%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

2) Changes in area in the LSA and RSA are a result of the Project footprint (i.e., direct impact to habitats).

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect bald eagle survival and reproduction. Bald eagles have been found to be highly adaptive to the presence of humans, with nests being placed <500 m of areas where active agricultural and/or commercial activities take place in Ontario (Buehler 2022).

Reduced predicted abundance due to habitat loss are likely to have a small, but measurable negative effect on bald eagle populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution and should have no measurable influence on population abundance. The proximity of existing disturbance (e.g., Highway 11, Highway 17, Highway 622) may limit habitat loss from the Project for bald eagle (Hall 1998).

The loss of suitable breeding habitat due to the construction of the Project is expected to result in a small reduction in the predicted abundance of the RSA. Applying a density estimate of 0.15 individuals/km^2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-29) results in a predicted abundance of 326 individuals in the RSA. This is a reduction in predicted abundance by three individuals relative to the Baseline Characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for bald eagle as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation measures where needed. To avoid impacts to nests during construction/operation/maintenance, a 400 m buffer has been mapped for known bald eagle nest sites and other known raptor nest sites see Attachment 6.5-B-19, in Appendix 6.5-B). The bald eagle and other raptor nest sites will be added to the content of the EPP. Mitigation measures will include:

- Managing tree clearing activities to the extent possible so that removal will occur outside of the bald eagle critical breeding period (March 1 to August 31).
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) to the extent possible within 400 m of an active bald eagle (or other raptor) nest during the critical breeding period (March 1 to August 31).

- If tree removals or other activities cannot be avoided within the 400 m buffer around bald eagle nests during the critical breeding period (March 1 to August 31) Hydro One will engage with MNRF to discuss if additional mitigation measures are required. If removal of a bald eagle (or other raptor) nest is required, Hydro One will engage with the MNRF and MECP SARB to acquire all appropriate permits for this work.
- Surveys at identified active nest sites of known bald eagle (or other raptor) occurrence records. Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If a raptor nest is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MNRF and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on bald eagle habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 1,835 ha of moderate to high suitability bald eagle habitat is predicted to result from the Project. This effect (reduced or degraded bald eagle habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual bald eagle with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bald eagle survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9.2 Sensory Disturbance

Potential Effects

Habitat Availability

Bald eagle habitat suitability around the Project footprint may be reduced if bald eagles avoid areas due to sensory disturbance. Sensory disturbance from humans can take on many forms, including recreational activities, research, forestry operations, construction, agricultural activities and noise from various sources (Buehler 2022). In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause bald eagles and other raptors to avoid the ROW and thus temporarily reduce habitat availability. Bald eagles, particularly those not habituated to human disturbance, tend to avoid areas with high human activity (Andrew and Mosher 1982) and have been shown to abandon nests in close proximity to forest clearing activities (MNR 2010a) and adults can be disturbed by aircraft, especially helicopters within less than 1000 m for a duration of greater than 60 seconds (Buehler 2022). However, bald eagles have been shown recently to utilize nests within close proximity to active agricultural and commercial operations (Buehler 2022).

Corona noise from the transmission line is not anticipated to cause bald eagles to avoid the ROW and so is not anticipated to reduce bald eagle habitat availability. Furthermore, bald eagles may be attracted to the ROW because of increased perching opportunities. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on bald eagle have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause this species to increase their territory size or shift their territory or home range away from areas of human disturbance (Fraser et al. 1985, Anthony and Isaacs 1989). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for bald eagle. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of bald eagle populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect bald eagle survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on bald eagle is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.9.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on bald eagle habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual bald eagle with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bald eagle survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to bald eagle through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to bald eagle from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Bald Eagle in particular may also be at risk of collisions with helicopters (Washburn et al. 2015), which will be used for the Project during the construction stage to transport structures from fly yards to the ROW, where they will be erected.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on bald eagle survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced bald eagle survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Raptors are vulnerable to collisions and electrocution from transmission lines and guy-wires because of their large wingspan and perching behaviour, as well as their use of transmission structures for nesting (Bevanger 1998, Manville 2005, APLIC 2006, Dwyer and Mannon 2007, Lehman et al. 2010).

Electrocutions and collisions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season (such as moving nests to alternate structures, and removing unoccupied nests), can minimize the risk of avian mortality from electrocution (APLIC 2006). Removal of bald eagle (or other raptor) nests will require authorization (see Section 6.5.7.9.6 below for further details) and methods for removal will be determined in consultation with the MNRF. Installing bird deterrents or visibility enhancements (e.g., spinning reflectors) on the transmission line in certain locations may also minimize the risk of raptor collisions with the transmission line and guy-wires.

These mitigation measures are expected to minimize the potential effects on bald eagle survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced bald eagle survival and/or reproduction from electrocution and collisions with transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation risk for some forest nesting birds, including bald eagles, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on bald eagle.

These mitigation measures are expected to minimize the potential effects on bald eagle habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. This effect (reduced bald eagle survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.9.6 Incidental Take

Potential Effects

Survival and Reproduction

Although bald eagle is not subject to the provisions of the federal *Migratory Birds Convention Act, 1994* (MBCA; Government of Canada 1994), it is considered a 'specially protected raptor' under Schedule 7 of the Ontario *Fish and Wildlife Conservation Act, 1997* (FWCA; Government of Ontario 1997) and its nests and eggs are protected under the FWCA as a wild species not subject to the MBCA. Its nests are also protected as SWH under the Provincial Policy Statement (PPS) of the Ontario *Planning Act, 1990* (PA; Government of Ontario 1990).

Bald eagle nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations. Removal of a bird nest belonging to a species that is not protected under the MBCA, such as bald eagle, requires a FWCA Authorization to Destroy/Take/Possess Nests or Eggs.

Mitigation Effects

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation will be implemented.

Nests are one of the most important habitat features for bald eagles as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. To avoid impacts to nests during construction/operation/maintenance, a 400 m buffer has been mapped for known bald eagle nest sites (see Attachment 6.5-B-19, in Appendix 6.5-B) and other known raptor nest sites. The bald eagle and other raptor nest sites will be added to the content of the EPP. Mitigation measures will include:

- Avoiding moderate to high impact operations that may result in incidental take (including tree clearing and blasting) to the extent possible within 400 m of an active bald eagle (or other raptor) nest during the critical breeding period (March 1 to August 31).
- Surveys at identified active nest sites of known bald eagle (or other raptor) occurrence records.
- If activities cannot be avoided within the 400 m buffer around bald eagle nests during the critical breeding period (March 1 to August 31) Hydro One will engage with MNRF to discuss if additional mitigation measures are required. If removal of a bald eagle (or other raptor) nest is required, Hydro One will engage with the MNRF and MECP SARB to acquire all appropriate permits for this work.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If a raptor nest is identified during pre-construction or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MNRF and other appropriate agencies to discuss next steps and appropriate Indigenous communities will be contacted, as requested.

These mitigation measures are expected to minimize the potential effects on bald eagle habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of bald eagles. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced bald eagle survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10 *Marshbirds (Trumpeter Swan)*

MARSHBIRDS *(TRUMPETER SWAN)*

Gichi-waabizii

6.5.7.10.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 373 ha (1.15% of the LSA and 0.28% of the terrestrial RSA) of moderate to high suitability trumpeter swan habitat (Table 6.5-30). During the construction stage, the ROW will be removed of vegetation, which may permanently alter trumpeter swan use of suitable habitat where wetland riparian vegetation is removed.

Habitat Distribution

The distribution of trumpeter swan habitat in the Net Effects Assessment is depicted in Appendix 6.4-A. Habitat fragmentation due to vegetation removal and construction activities associated with the Project would result in minimal changes to the existing distribution of trumpeter swan habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of trumpeter swan populations that overlap the RSA.

Table 6.5-30: Changes to Habitat Availability for Trumpeter Swan in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	32,457	32,083	-375	-1.15%	131,618	131,244	-375	-0.28%
Unsuitable	132,330	132,705	375	0.28%	416,502	416,877	375	0.09%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect trumpeter swan survival and reproduction.

Reduced predicted abundance due to habitat loss are likely to have a small, but measurable negative effect on trumpeter swan populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution and should have no measurable influence on population abundance. The proximity of existing disturbance (e.g., Highway 11, Highway 17, Highway 622) may limit habitat loss from the Project for trumpeter swan (Mitchell and Eichholz 2020).

The loss of suitable breeding habitat due to the construction of the Project is expected to result in a small reduction in the predicted abundance of the RSA. Applying a density estimate of 0.01 individuals/km^2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-30) results in a predicted abundance of 15.2individuals in the RSA. This is a reduction in predicted abundance by less than 0.1 individual relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for trumpeter swan as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation where needed. To avoid impacts to nests during construction/operation/maintenance, a 50 m buffer has been mapped for known trumpeter swan nest sites and other known swan nest sites (see Attachment 6.5-B-19, in Appendix 6.5-B). The trumpeter swan nest sites will be added to the content of the EPP. Mitigation measures will include:

- Managing vegetation removal activities to the extent possible so that removal will occur outside of the trumpeter swan nesting period (April 15 to August 31).
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) to the extent possible within 50 m of an active trumpeter swan (or other swan) nest during the trumpeter swan nesting period (April 15 to August 31).
- Surveys at identified active nest sites of known trumpeter swan occurrence records.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active trumpeter swan nest is identified during pre-construction or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact ECCC and other appropriate agencies to discuss next steps, and appropriate Indigenous communities will be contacted, as requested.

These mitigation measures are expected to minimize the potential effects on trumpeter swan habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 375 ha of moderate to high suitability trumpeter swan habitat is predicted to result from the Project. This effect (reduced or degraded trumpeter swan habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected individual trumpeter swans with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced trumpeter swan survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10.2 Sensory Disturbance

Potential Effects

Habitat Availability

Trumpeter swan habitat suitability around the Project footprint may be reduced if swans avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause swans and other marshbirds to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause trumpeter swans to abandon nests; however, response to human disturbance varies widely and under some conditions, swans do habituate to human presence, similar to other marshbirds (Mitchell and Eichholz 2020).

Corona noise from the transmission line is not anticipated to cause trumpeter swan to avoid the ROW and so is not anticipated to reduce trumpeter swan habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on trumpeter swan have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause this species to increase their territory size or shift their territory or home range away from areas of human disturbance (Mitchell and Eichholz 2020). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for trumpeter swan and other marshbirds. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of trumpeter swan populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect trumpeter swan survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on trumpeter swan is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.10.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on trumpeter swan habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual trumpeter swans with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced trumpeter swan survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to trumpeter swan through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to trumpeter swan from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on trumpeter swan survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced trumpeter swan survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Swans are vulnerable to collisions and electrocution from transmission lines and guy-wires because of their large wingspan (Bevanger 1998, Manville 2005, APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines and guy-wires (Harron 2003).

Trumpeter swan collisions with transmission lines and guy-wires are predicted to increase particularly along areas of the ROW that span open habitat and are within 1 km of waterbody shorelines (Watts et al. 2009).

Mitigation Measures

Installing bird deterrents or visibility enhancements (e.g., spinning reflectors) on the transmission line in certain areas may also minimize the risk of trumpeter swan collisions with the transmission line and supporting guy-wires.

These mitigation measures are expected to minimize the potential effects on trumpeter swan survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced trumpeter swan survival and/or reproduction from electrocution and collisions with transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation risk for trumpeter swan by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on trumpeter swan.

These mitigation measures are expected to minimize the potential effects on trumpeter swan habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. This effect (reduced trumpeter swan survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.10.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 (MBR) (Government of Canada 2022) in July 2022, nest protection has been limited to active nests for most migratory bird species, including trumpeter swan. The nests must also be registered at the start of the defined period.

Trumpeter swan nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for trumpeter swan as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. To avoid impacts to nests during construction/operation/maintenance, a 50 m buffer has been mapped for known trumpeter swan nest sites (and other known swan nest sites see Attachment 6.5-B-19, in Appendix 6.5-B). The trumpeter swan nest sites will be added to the content of the EPP. Mitigation measures will include:

- Avoiding moderate to high impact operations that may result in incidental take (including vegetation removal and blasting) to the extent possible within 50 m of an active trumpeter swan (or other swan) nest during the trumpeter swan nesting period (April 15 to August 31).
- Surveys at identified active nest sites of known trumpeter swan occurrence records.

Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified. If an active trumpeter swan nest is identified during pre-construction or during active construction, including vegetation removal, the contractor will stop work immediately, leave the area and contact ECCC and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on trumpeter swan habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of trumpeter swan. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced trumpeter swan survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11 Songbirds (Canada Warbler, Eastern Wood-Pewee, Olive-sided Flycatcher)

SONGBIRDS (CANADA WARBLER, OLIVE-SIDED FLYCATCHER, EASTERN WOOD-PEWEE)

Noondaagozibineshiinyag

6.5.7.11.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 1,716 ha (2.44% of the LSA and 0.81% of the terrestrial RSA) of moderate to high suitability Canada warbler habitat (Table 6.5-31). During the construction stage, the ROW will be removed of vegetation, which may permanently alter Canada warbler use of suitable habitat where forest is removed.

The Project is predicted to remove 1,385 ha (2.55% of the LSA and 0.84% of the terrestrial RSA) of moderate to high suitability eastern wood-pewee habitat (Table 6.5-32). During the construction stage, the ROW will be removed of vegetation, which may permanently alter eastern wood-pewee use of suitable habitat where forest is removed. However, there is some uncertainty associated with how eastern wood-pewee will respond along sections of the ROW that open up closed canopy forest since eastern wood-pewee often use forest edge (Watt et al. 2020).

The Project is predicted to remove 2,132 ha (2.55% of the LSA and 0.82% of the terrestrial RSA) of moderate to high suitability olive-sided flycatcher habitat (Table 6.5-33). During the construction stage, the ROW will be removed of vegetation, which may permanently alter olive-sided flycatcher use of suitable habitat where forest is removed. However, there is some uncertainty associated with how olive-sided flycatchers will respond along sections of the ROW that open up closed canopy forest since numerous studies report positive responses of olive-sided flycatchers to some types of forest harvesting (Altman and Sallabanks 2020). Activities that create early successional habitat and increase forest to edge ratios can sometimes improve olive-sided flycatcher habitat; however, Haché et al. (2014) found that the density of olive-sided flycatcher was negatively affected by linear disturbances on the landscape.

Table 6.5-31: Changes to Habitat Availability for Canada Warbler in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	70,451	68,735	-1,716	-2.44%	212,260	210,544	-1,716	-0.81%
Unsuitable	94,336	96,052	1,716	1.82%	335,861	337,577	1,716	0.51%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Table 6.5-32: Changes to Habitat Availability for Eastern Wood-Pewee in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	54,375	52,990	-1,385	-2.55%	165,313	163,928	-1,385	-0.84%
Unsuitable	110,413	111,798	1,385	1.25%	382,808		1,385	0.36%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Table 6.5-33: Changes to Habitat Availability for Olive-sided Flycatcher in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	83,579	81,447	-2,132	-2.55%	259,869	257,737	-2,132	-0.82%
Unsuitable	81,208	83,340	2,132	2.63%	288,251	290,383	2,132	0.74%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

The distribution of Canada warbler habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-10, in Appendix 6.5-B, in Appendix 6.5-B. The distribution of eastern wood-pewee habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-11, in Appendix 6.5-B. The distribution of olive-sided flycatcher habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-12, in Appendix 6.5-B. Habitat is not limiting for these forest songbird species in the RSA and remains well connected and evenly distributed in the LSA and RSA in the Net Effects Assessment.

Existing (baseline characterization) disturbance in the RSA and LSA, such as existing transmission line ROWs, do not likely function as dispersal barriers for forest songbird species. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest songbird species. For example, forest bird species have been found to forage more than 150 m (up to 1 km) from their nest site (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011). 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. Furthermore, Bourque and Desrochers (n.d) reported no difference in the response to mobbing playbacks in forests or gaps by most species of boreal forest birds.

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of forest songbird habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations that overlap the RSA.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect Canada warbler, eastern wood-pewee and olive-sided flycatcher survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have a small, but measurable negative effect on Canada warbler, eastern wood-pewee and olive-sided flycatcher populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to result in a small reduction in the predicted abundances of Canada warbler, eastern wood-pewee, and olive-sided flycatcher in the RSA.

- Canada warbler: Applying a density estimate of 0.1 individuals/km^2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-31) results in a predicted abundance of 2,092 individuals in the RSA. This is a reduction in predicted abundance by 17 individuals relative to the baseline characterization.

- Eastern wood-pewee: Applying a density estimate of 0.1 individuals/km^2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-32) results in a predicted abundance of 109 individuals in the RSA. This is a reduction in predicted abundance by 0.9 individuals relative to the baseline characterization.
- Olive-sided flycatcher: Applying a density estimate of 0.1 individuals/km^2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-33) results in a predicted abundance of 299 individuals in the RSA. This is a reduction in predicted abundance by two individuals relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for forest songbirds as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. These pre-construction activities will include:

- Managing vegetation removal activities so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent reasonably possible.
- If vegetation removal cannot be avoided within Canada warbler, eastern wood-pewee and olive-sided flycatcher habitat during the migratory bird nesting period (i.e., April 15 to August 31), pre-clearing nest searches will be completed. If any areas are found to have birds exhibiting agitated breeding behaviour, these areas, in addition to any active nests found, will be flagged and protected from clearance until the current breeding season has passed.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active nest of a SAR songbird (e.g., Canada warbler, eastern wood-pewee or olive-sided flycatcher) or non-SAR songbird is identified during pre-construction or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact ECCC and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on Canada warbler, eastern wood-pewee and olive-sided flycatcher habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. Direct loss of approximately 1,300 ha to 2,200 ha of moderate to high suitability habitat for Canada warbler, eastern wood-pewee and olive-sided flycatcher is predicted to result from the Project. This effect (reduced or degraded forest songbird habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected Canada warbler, eastern wood-pewee, and olive-sided flycatcher individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced forest songbird survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11.2 Sensory Disturbance

Potential Effects

Habitat Availability

Forest songbird habitat suitability around the Project footprint may be reduced if songbirds avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause forest songbirds to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause Canada warbler, eastern wood-pewee, and olive-sided flycatcher to abandon nests. Sensory disturbance may result in localized avoidance by forest songbirds that occupy habitats near Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas.

Corona noise from the transmission line is not anticipated to cause forest songbirds to avoid the ROW and so is not anticipated to reduce forest songbird habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on Canada warbler, eastern wood pewee and olive sided flycatcher have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause forest songbirds to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, these species are highly mobile and the ROW is not expected to function as a movement barrier for forest songbirds. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on Canada warbler, eastern wood-pewee, and olive-sided flycatcher is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.11.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on forest songbird habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual Canada warblers, eastern wood-pewees and olive-sided flycatchers with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced forest songbird survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to forest songbird through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to forest songbird from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on forest songbird survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced forest songbird survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006).

These mitigation measures are expected to minimize the potential effects on forest songbird survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced forest songbird survival and/or reproduction from electrocution and collisions with transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation and nest parasitism risk for some forest nesting birds, including Canada warbler, eastern wood-pewee or olive-sided flycatcher, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009). Fragmentation of forests in eastern North America has increased accessibility for brown-headed cowbirds, which prefer more open habitats (Lowther 1993). Canada warbler is considered to be particularly susceptible to parasitism by brown-headed cowbirds, but little information is available (Reitsma et al. 2009). Canada warblers can be susceptible to nest parasitism in areas with high cowbird densities. For example, 20% of Canada warbler nests were found to be parasitized in southern Ontario where cowbird densities are around 10 birds per km^2 (Peck and James 1983, Cadman et al. 2007). However, cowbird densities in northern Ontario are much lower; brown-headed cowbird density in the Northern Shield region is 0.07 individuals/km^2 (Cadman et al. 2007). Canada warbler is also an interior forest breeder and not commonly found nesting in edge habitat (Lambert and Faccio 2005). As such, nest parasitism related to the Project is unlikely to generate a measurable effect to Canada warbler reproductive success in the LSA. Furthermore, reproductive success for eastern wood-pewee and olive-sided flycatcher populations within the LSA are unlikely to be measurably impacted by increased nest parasitism due to the Project given that these species are only moderately regular to rare cowbird hosts (Altman and Sallabanks 2020; Watt et al. 2020).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation or nest parasitism risk on Canada warbler, eastern wood-pewee, and olive-sided flycatcher.

These mitigation measures are expected to minimize the potential effects on forest songbird habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced forest songbird survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.11.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines [*Passeriformes*] and waterfowl [*Anatidae*]) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 (Government of Canada 2022) in July 2022, nest protection has been limited to active nests for most migratory bird species, including songbirds.

Canada warbler and olive-sided flycatcher and their nests are also protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands.

Canada warbler, eastern wood-pewee, and olive-sided flycatcher and other songbird nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for Canada warbler, eastern wood-pewee, olive-sided flycatcher, and other songbirds as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. These pre-construction activities will include:

- Managing vegetation removal activities so that removal does not occur within the migratory bird nesting period to the extent possible.

- If vegetation removal cannot be avoided within Canada warbler, eastern wood-pewee and olive-sided flycatcher habitat during the migratory bird nesting period (i.e., April 15 to August 31), pre-clearing nest searches will be completed. If any areas are found to have birds exhibiting agitated breeding behaviour, these areas, in addition to any active nests found, will be flagged and protected from clearance until the current breeding season has passed.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active nest of a SAR songbird (e.g., Canada warbler, eastern wood-pewee or olive-sided flycatcher) or non-SAR songbird is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact ECCC and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on forest songbird habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of Canada warbler, eastern wood-pewee or olive-sided flycatcher. There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced forest songbird survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12 Bank Swallow

BANK SWALLOW

Animikiibineshiinh

6.5.7.12.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 218 ha (2.77% of the LSA and 1.34% of the terrestrial RSA) of moderate to high suitability bank swallow habitat (Table 6.5-34), including 7.0 ha of Category 3 protected habitat. Category 3 habitat for bank swallow consists of suitable foraging habitat within 500 m of the outer edge of a colony. During the construction stage, the ROW will be removed of vegetation, which may temporarily alter bank swallow use of suitable habitat until suitable ecosite cover regenerates (open meadow foraging habitat).

Habitat Distribution

The distribution of bank swallow habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-13, in Appendix 6.5-B. Habitat is not limiting for bank swallow in the RSA and remains well connected and evenly distributed in the LSA and RSA in the Net Effects Assessment.

Existing (baseline characterization) disturbance in the RSA and LSA do not likely function as dispersal barriers for aerial insectivore species. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of songbird species (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011) and swallow species have been found to forage regularly more than 1 km from their nest site (Garrison and Turner 2020).

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of bank swallow habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of bank swallow populations that overlap the RSA.

Table 6.5-34: Changes to Habitat Availability for Bank Swallow in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	7,867	7,649	-218	-2.77%	16,220	16,002	-218	-1.34%
Unsuitable	156,920	157,138	218	0.14%	531,901	532,119	218	0.04%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect bank swallow survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have no measurable effect on bank swallow populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to have no measurable effect in the predicted abundances of bank swallow in the RSA.

- Applying a density estimate of 0.1 individuals/km2 to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-34) results in a predicted abundance of 11 individuals in the RSA. This is a reduction in predicted abundance by less than 0.1 individual relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for bank swallow as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures will include:

- Managing vegetation removal activities within Confirmed bank swallow habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided within bank swallow habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at identified active nest sites of known bank swallow colony occurrence records.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.
- Implementing best management practices for the protection of bank swallow habitat (per MNRF 2017) where stock piling of aggregate materials is required.

If an active/inactive bank swallow nesting colony is identified during pre-construction or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on bank swallow habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 218 ha of moderate to high suitability habitat for bank swallow is predicted to result from the Project. This effect (reduced or degraded bank swallow habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8.12). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected bank swallow individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bank swallow survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12.2 Sensory Disturbance

Potential Effects

Habitat Availability

Bank swallow habitat suitability around the Project footprint may be reduced if individuals avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause bank swallows to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause bank swallows to abandon nests. Sensory disturbance may result in localized avoidance by bank swallows that occupy habitats near the Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas. Bank swallows are not highly sensitive to sensory disturbance from human activities; this species commonly nests along watercourses and in sand and gravel quarries, road and railway cuttings and other artificial sites (Garrison and Turner 2020).

Corona noise from the transmission line is not anticipated to cause bank swallows to avoid the ROW and so is not anticipated to reduce bank swallow habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on bank swallow have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause bank swallows to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for bank swallow. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of bank swallow populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect bank swallow survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on bank swallow is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The General Habitat Description for the Bank Swallow (MNRF 2015b) provides information on the area of habitat protected by the ESA. The protected habitat for this species includes the area of suitable foraging habitat within 500 m of the outer edge of the breeding colony (Category 3 habitat). Moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) within 500 m of an active bank swallow colony during the migratory bird nesting period (April 15 to August 31) should be avoided where feasible. If these activities cannot be avoided within bank swallow habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.

The mitigation measures presented in Section 6.5.7.12.1 are also applicable to minimizing sensory disturbance.

These mitigation measures are expected to minimize the potential effects on bank swallow habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual bank swallows with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bank swallow survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to bank swallow through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to bank swallow from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on bank swallow survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced bank swallow survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12.4 Electrocution and Collisions with the Transmission Lines

Potential Effects

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006).

These mitigation measures are expected to minimize the potential effects on bank swallow survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced bank swallow survival and/or reproduction from electrocution and collisions from transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation for bank swallow, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on bank swallow.

These mitigation measures are expected to minimize the potential effects on bank swallow habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. This effect (reduced bank swallow survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.12.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 (Government of Canada 2022) in July 2022, nest protection has been limited to active nests for most migratory bird species, including bank swallow.

Bank swallow and its nests are also protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. Bank swallow and its nests are also protected under the Ontario ESA (Government of Ontario 2007) which prohibits the harming of a species that is listed as extirpated, endangered, or threatened.

Bank swallow nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for bank swallow as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures will include:

- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 50 m of an active bank swallow colony during the migratory bird nesting period (April 15 to August 31).
- Managing vegetation removal activities within Confirmed Bank Swallow habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided within bank swallow habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at identified active nest sites of known bank swallow colony occurrence records.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

Implementing best management practices for the protection of bank swallow habitat (per MNRF 2017) where stock piling of aggregate materials is required. If an active/inactive bank swallow nesting colony is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on bank swallow habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of bank swallow. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced bank swallow survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13 *Barn Swallow and Chimney Swift*

CHIMNEY SWIFT

Daabida Animikiibineshiinh

BARN SWALLOW

Waakaa'iganibineshiinh

6.5.7.13.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 108 ha (3.81% of the LSA and 2.29% of the terrestrial RSA) of moderate to high suitability barn swallow habitat (Table 6.5-35). During the construction stage, the ROW will be removed of vegetation, which may temporarily alter barn swallow use of suitable habitat until suitable ecosite cover regenerates (open meadow foraging habitat).

The Project is predicted to remove 50 ha (1.94% of the LSA and 0.55% of the terrestrial RSA) of moderate to high suitability chimney swift habitat (Table 6.5-36). During the construction stage, the ROW will be removed of vegetation, which may temporarily alter chimney swift use of suitable habitat until activities are complete.

Table 6.5-35: Changes to Habitat Availability for Barn Swallow in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	2,830	2,722	-108	-3.81%	4,724	4,616	-108	-2.29%
Unsuitable	161,957	162,065	108	0.06%	543,396	543,504	108	0.02%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Table 6.5-36: Changes to Habitat Availability for Chimney Swift in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	2,570	2,520	-50	-1.94%	9,158	9,108	-50	-0.55%
Unsuitable	162,218	162,268	50	0.03%	538,963	539,013	50	0.01%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

The distribution of barn swallow habitat in the Net Effects Assessment is depicted on Attachment 6.5-B-14, in Appendix 6.5-B. The distribution of chimney swift habitat in the Net Effects Assessment is depicted on Attachment 6.5-B-15, in Appendix 6.5-B. Habitat is limiting for barn swallow and chimney swift in the RSA in the Net Effects Assessment.

Existing (baseline characterization) disturbance in the RSA and LSA do not likely function as dispersal barriers for aerial insectivore species. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of songbird species (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011) and swallow species have been found to forage regularly more than 1 km from their nest site (Garrison and Turner 2020).

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of barn swallow and chimney swift habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of barn swallow and chimney swift populations that overlap the RSA.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect barn swallow and chimney swift survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have no measurable effect on barn swallow and chimney swift populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to have no measurable effect in the predicted abundances of barn swallow and chimney swift in the RSA.

- Barn swallow: Applying a density estimate of <0.1 individuals/km² to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-35) results in a predicted abundance of 1.1 individual in the RSA. This is a reduction in predicted abundance by <0.1 individual relative to the baseline characterization.
- Chimney swift: Applying a density estimate of <0.1 individuals/km² to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-36) results in a predicted abundance of <0.06 individual in the RSA. This does not represent a change in abundance relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for barn swallow and chimney swift as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures will include:

- If a chimney swift nesting/roosting tree is identified, a 90 m buffer will be applied during the chimney swift active season (May 15 to August 31) as noted on eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023),
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed chimney swift habitat during the migratory bird nesting period (April 15 to August 31).
- Managing structure removals so that removal does not occur during the chimney swift active season (May 15 to August 31) if the structure is Confirmed chimney swift habitat.
- Managing vegetation removal activities within Confirmed barn swallow and chimney swift habitat so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent possible.
- If vegetation removal or other activities cannot be avoided within chimney swift habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at anthropogenic structures to be disturbed (i.e., buildings, culverts, bridges) to search for barn swallow and chimney swift nests or roosting individuals prior to disturbance at the structure. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b) and occur between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023).
- Surveys at identified active nest sites of known barn swallow and chimney swift colony occurrence records to confirm presence of nesting and/or roosting individuals. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b).
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.
- If an active/inactive barn swallow or chimney swift nesting colony is identified during pre-construction surveys or during active construction, including during structure and vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps. Structures with barn swallow nests can be removed outside of the breeding season (April 15 to August 31). Structures that support roosting chimney swifts or chimney swift nests can be removed outside the chimney swift active season (between May 15 to August 31 as

determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023)) after the MECP is notified of this activity by submitting a notice of activity to the Registry using the “Chimney Swift – Activities in Built Structures that are Habitat” form.

These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. The effectiveness of mitigation will be evaluated during construction and post-construction, and measures will be modified or enhanced as necessary through adaptive management.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. Direct loss of approximately 50 to 100 ha of moderate to high suitability habitat for barn swallow and chimney swift is predicted to result from the Project. This effect (reduced or degraded barn swallow and chimney swift habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8.13). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected barn swallow and chimney swift individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced barn swallow and chimney swift survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13.2 Sensory Disturbance

Potential Effects

Habitat Availability

Barn swallow and chimney swift habitat suitability around the Project footprint may be reduced if individuals avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause barn swallows and chimney swifts to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause barn swallows and chimney swifts to abandon nests. Sensory disturbance may result in localized avoidance by barn swallows and chimney swifts that occupy habitats near Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas. Barn swallows and chimney swifts are not highly sensitive to sensory disturbance from human activities; these species commonly nest on anthropogenic structures in urban areas.

Corona noise from the transmission line is not anticipated to cause barn swallows and chimney swifts to avoid the ROW and so is not anticipated to reduce barn swallow and chimney swift habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on barn swallow and chimney swift have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause barn swallows and chimney swifts to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, these species are highly mobile and the ROW is not expected to function as a movement barrier for barn swallow and chimney swift. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of barn swallow and chimney swift populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect barn swallow and chimney swift survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on barn swallow and chimney swift is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

Mitigation measures are summarized in Table 6.5-40. These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift habitat, and survival and reproduction. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual barn swallows and chimney swifts with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced barn swallow and chimney swift survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13.3 Collision with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to barn swallow and chimney swift through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to barn swallow and chimney swift from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced barn swallow and chimney swift survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006).

These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced barn swallow and chimney swift survival and/or reproduction from collisions and electrocution from transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation for barn swallow and chimney swift, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on barn swallow and chimney swift. These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. This effect (reduced barn swallow and chimney swift survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.13.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 (Government of Canada 2022) in July 2022, nest protection has been limited to active nests for most migratory bird species, including barn swallow and chimney swift.

Barn swallow and chimney swift and their nests are also protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. Furthermore, the Federal chimney swift residence description protects nesting and roosting structures year-round and until the species has not used them for three consecutive years (Government of Canada 2023). Chimney swift and their nests are also protected under the Ontario ESA (Government of Ontario 2007) which prohibits the harming of a species that is listed as extirpated, endangered, or threatened.

Barn swallow and chimney swift nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for barn swallow and chimney swift as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures will include:

- If a chimney swift nesting/roosting tree is identified, a 90 m buffer will be applied during the chimney swift active season (between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023)).
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed chimney swift habitat during the migratory bird nesting period (April 15 to August 31).
- Managing structure removals so that removal does not occur during the chimney swift active season between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023).

- Managing vegetation removal activities within Confirmed barn swallow and chimney swift habitat so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent possible.
- If structure/vegetation removal or other activities cannot be avoided within chimney swift habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at anthropogenic structures (i.e., buildings, culverts, bridges) to search for barn swallow and chimney swift nests or roosting individuals prior to disturbance at the structure. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b) and occur between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023).
- Surveys at identified active nest sites of known barn swallow and chimney swift colony occurrence records to confirm presence of nesting and/or roosting individuals. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b).
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active/inactive barn swallow or chimney swift nesting colony is identified during pre-construction surveys or during active construction, including during structure and vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps. Structures with barn swallow nests can be removed outside of the breeding season (April 15 to August 31). Structures that support roosting chimney swifts or chimney swift nests can be removed outside the chimney swift active season (April to October) after the MECP is notified of this activity by submitting a notice of activity to the Registry using the “Chimney Swift – Activities in Built Structures that are Habitat” form.

These mitigation measures are expected to minimize the potential effects on barn swallow and chimney swift habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of barn swallow and chimney swift. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced barn swallow and chimney swift survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14 Bobolink

BOBOLINK

Ozaawitigwanesiginaak

6.5.7.14.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 7 ha (0.94% of the LSA and 0.32% of the terrestrial RSA) of moderate to high suitability bobolink habitat (Table 6.5-37). During the construction stage, the ROW will be removed of vegetation, which may temporarily alter bobolink (*Dolichonyx oryzivorus*) use of suitable habitat until suitable ecosite cover regenerates (open meadow habitat).

Habitat Distribution

The distribution of bobolink habitat in the Net Effects Assessment is depicted on Attachment 6.5-B-16 in Appendix 6.5-B. Habitat is limiting for bobolink in the RSA and remains disconnected and unevenly distributed in the LSA and RSA in the Net Effects Assessment.

Existing (baseline characterization) disturbance in the RSA and LSA do not likely function as dispersal barriers bobolink. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of songbird species (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011).

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of bobolink habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of bobolink populations that overlap the RSA.

Table 6.5-37: Changes to Habitat Availability for Bobolink in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	777	770	-7	-0.94%	2,306	2,298	-7	-0.32%
Unsuitable	164,010	164,017	7	0.00%	545,815	545,822	7	0.00%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect bobolink survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have no measurable effect on bobolink populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to have no measurable effect in the predicted abundances of bobolink in the RSA.

- Applying a density estimate of <0.1 individuals/km² to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-37) results in a predicted abundance of 1.5 individuals in the RSA. This does not represent a change in abundance relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for bobolink as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures will include:

- If a bobolink nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31).
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed bobolink habitat during the migratory bird nesting period (April 15 to August 31).
- Managing vegetation removal activities within Confirmed Bobolink habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided within bobolink habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at known bobolink occurrence records (within the last 20 years) during the breeding season (May 24 to August 14).
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active bobolink nest is identified during pre-construction surveys or during active construction and/or vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on bobolink habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation described above. Direct loss of approximately 7 ha of moderate to high suitability habitat for bobolink is predicted to result from the Project. This effect (reduced or degraded bobolink habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected bobolink individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bobolink survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14.2 Sensory Disturbance

Potential Effects

Habitat Availability

Bobolink habitat suitability around the Project footprint may be reduced if individuals avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause bobolinks to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause bobolinks to abandon nests. Sensory disturbance may result in localized avoidance by bobolinks that occupy habitats near the Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas.

Corona noise from the transmission line is not anticipated to cause bobolinks to avoid the ROW and so is not anticipated to reduce bobolink habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on bobolink have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause bobolinks to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for bobolink. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of bobolink populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect bobolink survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on bobolink is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.14.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on bobolink habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual bobolink with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced bobolink survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to bobolink through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to bobolink from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on bobolink survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced bobolink survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006).

These mitigation measures are expected to minimize the potential effects bobolink survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced bobolink survival and/or reproduction from collisions and electrocution from transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation for bobolink, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on bobolink.

These mitigation measures are expected to minimize the potential effects on bobolink habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced bobolink survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.14.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 (Government of Canada 2022) in July 2022, nest protection has been limited to active nests for most migratory bird species, including bobolink.

Bobolink and their nests are also protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. Bobolink and their nests are also protected under the Ontario ESA (Government of

Ontario 2007) which prohibits the harming of a species that is listed as extirpated, endangered, or threatened. Bobolink nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for bobolink as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. These pre-construction activities will include:

- If a bobolink nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31).
- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed bobolink habitat during the migratory bird nesting period (April 15 to August 31).
- Managing vegetation removal activities within Confirmed Bobolink habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided within bobolink habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at known bobolink occurrence records (within the last 20 years) during the breeding season (May 24 to August 14). Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active bobolink nest is identified during pre-construction surveys or during active construction and/or vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on bobolink habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of bobolink. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced bobolink survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15 *Eastern Whip-poor-will*

EASTERN WHIP POOR WILL

Biigakokwe'owesi

6.5.7.15.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 2,754 ha (2.83% of the LSA and 0.92% of the terrestrial RSA) of moderate to high suitability eastern whip-poor-will habitat (Table 6.5-38), including 1 ha of Category 2 habitat and 5 ha of Category 3 habitat. Category 2 and 3 habitat for eastern whip-poor-will consists of the area between 20 m and 500 m of the centre of the approximated defended territory. During the construction stage, the ROW will be removed of vegetation, which may permanently alter eastern whip-poor-will use of suitable habitat where forest is removed.

Habitat Distribution

The distribution of eastern whip-poor-will habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-17, in Appendix 6.5-B. Habitat is not limiting for eastern whip-poor-will in the RSA and remains well connected and evenly distributed in the LSA and RSA in the Net Effects Assessment.

Table 6.5-38: Changes to Habitat Availability for Eastern Whip-poor-will in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	97,203	94,449	-2,754	-2.83%	298,974	296,219	-2,754	-0.92%
Unsuitable	67,584	70,338	2,754	4.07%	249,147	251,901	2,754	1.11%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Existing (baseline characterization) disturbance in the RSA and LSA do not likely function as dispersal barriers eastern whip-poor-will. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest landbird species (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011). For example, forest bird species have been found to forage more than 150 m (up to 1 km) from their nest site (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011). 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. Furthermore, Bourque and Desrochers (n.d) reported no difference in the response to mobbing playbacks in forests or gaps by most species of boreal forest birds.

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of eastern whip-poor-will habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of eastern whip-poor-will populations that overlap the RSA.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect eastern whip-poor-will survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have no measurable effect on eastern whip-poor-will populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to have no measurable effect in the predicted abundances of eastern whip-poor-will in the RSA.

- Applying a density estimate of <0.1 individuals/km² to the amount of moderate to high suitability habitat in the Net Effects Assessment (Table 6.5-38) results in a predicted abundance of 30 individuals in the RSA. This does not represent a change in abundance relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation should be implemented.

Nests are one of the most important habitat features for eastern whip-poor-will as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures include:

- If an eastern whip-poor-will nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31).

- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed eastern whip-poor-will habitat during the migratory bird nesting period (April 15 to August 31).
- Managing vegetation removal activities within Confirmed eastern whip-poor-will habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided within eastern whip-poor-will habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at known eastern whip-poor-will occurrence records.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active eastern whip-poor-will nest is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on eastern whip-poor-will habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 2,754 ha of moderate to high suitability habitat for eastern whip-poor-will is predicted to result from the Project. This effect (reduced or degraded eastern whip-poor-will habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected eastern whip-poor-will individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced eastern whip-poor-will survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15.2 Sensory Disturbance

Potential Effects

Habitat Availability

Eastern whip-poor-will habitat suitability around the Project footprint may be reduced if individuals avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause eastern whip-poor-wills to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause eastern whip-poor-will to abandon nests. Sensory disturbance may result in localized avoidance by eastern whip-poor-will that occupy habitats near the Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas.

Corona noise from the transmission line is not anticipated to cause eastern whip-poor-wills to avoid ethe ROW and so is not anticipated to reduce eastern whip-poor-will habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on eastern whip-poor-will have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause eastern whip-poor-wills to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for eastern whip-poor-wills. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of eastern whip-poor-will populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect eastern whip-poor-will survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on eastern whip-poor-will is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.8.15.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on eastern whip-poor-will habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual eastern whip-poor-will with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced eastern whip-poor-will survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to eastern whip-poor-will through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to eastern whip-poor-will from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on eastern whip-poor-will survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced eastern whip-poor-will survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15.4 Electrocution and Collisions with the Transmission Line

Potential Effect

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006). These mitigation measures are expected to minimize the potential effects eastern whip-poor-will survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced eastern whip-poor-will survival and/or reproduction from collisions and electrocution from transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15.5 Increase in Edge Habitat

Potential Effect

Survival and Reproduction

The Project may increase predation for eastern whip-poor-will, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on eastern whip-poor-will.

Mitigation measures are summarized in Table 6.5-40. These mitigation measures are expected to minimize the potential effects on eastern whip-poor-will habitat, and survival and reproduction. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced eastern whip-poor-will survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.15.6 Incidental Take

Potential Effect

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 in July 2022, nest protection has been limited to active nests for most migratory bird species, including eastern whip-poor-will.

Eastern whip-poor-will and their nests are protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. Eastern whip-poor-will and their nests are also protected under the Ontario ESA (Government of Ontario 2007) which prohibits the harming of a species that is listed as extirpated, endangered, or threatened. Eastern whip-poor-will nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation measures should be implemented.

Nests are one of the most important habitat features for eastern whip-poor-will as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures include:

- Avoiding moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed eastern whip-poor-will habitat during the migratory bird nesting period (April 15 to August 31).
- If an eastern whip-poor-will nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31).
- Managing vegetation removal activities within Confirmed eastern whip-poor-will habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31).
- If vegetation removal or other activities cannot be avoided in eastern whip-poor-will habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work.
- Surveys at known eastern whip-poor-will occurrence records.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active eastern whip-poor-will nest is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on eastern whip-poor-will habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of eastern whip-poor-will. There is a predicted net effect after implementation of the mitigation described above. This effect (reduced eastern whip-poor-will survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16 Landbirds (Common Nighthawk)

LANDBIRDS
(COMMON NIGHTHAWK)

Peshk

6.5.7.16.1 Habitat Loss

Potential Effects

Habitat Availability

The Project is predicted to remove 127 ha (1.88% of the LSA and 0.67% of the terrestrial RSA) of moderate to high suitability common nighthawk habitat (Table 6.5-39). During the construction stage, the ROW will be removed of vegetation, which may temporarily alter common nighthawk use of suitable habitat until suitable ecosite cover regenerates (open regenerating areas).

Table 6.5-39: Changes to Habitat Availability for Common Nighthawk in the Net Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Net Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Net Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	6,737	6,610	-127	-1.88%	18,900	18,774	-127	-0.67%
Unsuitable	158,051	158,178	127	0.08%	529,220	529347	127	0.02%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Habitat Distribution

The distribution of common nighthawk habitat in the Net Effects Assessment is depicted in Attachment 6.5-B-18, in Appendix 6.5-B.Habitat is not limiting for common nighthawk in the RSA and remains well connected and evenly distributed in the LSA and RSA in the Net Effects Assessment.

Existing (baseline characterization) disturbance in the RSA and LSA do not likely function as dispersal barriers common nighthawk. Although species respond differently, numerous studies have found that habitat fragmentation may not impede daily movements of forest landbird species (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011). For example, forest bird species have been found to forage more than 150 m (up to 1 km) from their nest site (Norris and Stutchbury 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011). 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. Furthermore, Bourque and Desrochers (n.d) reported no difference in the response to mobbing playbacks in forests or gaps by most species of boreal forest birds.

Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of common nighthawk habitat in the LSA. Although there may be slight shifts in territory sizes or locations, fragmentation due to the Project is not expected to affect the connectivity of common nighthawk populations that overlap the RSA.

Survival and Reproduction

Habitat loss due to the Project footprint is predicted to reduce nesting habitat abundance in the LSA and RSA, which could negatively affect common nighthawk survival and reproduction.

Reduced predicted abundances due to habitat loss are likely to have no measurable effect on common nighthawk populations that overlap with the RSA. Most of the effect is predicted to be the result of small changes in habitat availability and distribution.

The loss of suitable breeding habitat due to the construction of the Project is expected to have no measurable effect in the predicted abundances of common nighthawk in the RSA.

Applying a density estimate of <0.1 individuals/km² to the amount of moderate to high suitability 5.6 in the Net Effects Assessment (Table 6.5-39) results in a predicted abundance of five individuals in the RSA. This is a reduction in predicted abundance by <0.04 individual relative to the baseline characterization.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation measures should be implemented.

Nests are one of the most important habitat features for common nighthawk as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures include:

- Managing vegetation removal activities so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent possible.
- If vegetation removal cannot be avoided during the migratory bird nesting period (i.e., April 15 to August 31), pre-clearing nest searches will be completed.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active common nighthawk nest is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and ECCC and other appropriate agencies will be contacted to discuss next steps.

These mitigation measures are expected to minimize the potential effects on common nighthawk habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. Direct loss of approximately 127 ha of moderate to high suitability habitat for common nighthawk is predicted to result from the Project. This effect (reduced or degraded common nighthawk habitat from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8). Additionally, a small decrease in survival and/or reproductive capacity is possible among affected common nighthawk individuals with home ranges overlapping the wildlife and wildlife habitat LSA. This effect (reduced common nighthawk survival and/or reproduction from loss or alteration of vegetation) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16.2 Sensory Disturbance

Potential Effects

Habitat Availability

Common nighthawk habitat suitability around the Project footprint may be reduced if individuals avoid areas due to sensory disturbance. In particular, noise during construction of the transmission line (including blasting, drilling, grading, implosion splicing, vegetation clearing, helicopter flights and increased vehicle use of access roads) may cause common nighthawks to avoid the ROW and thus temporarily reduce habitat availability. Human disturbance in or near nesting areas may cause common nighthawk to abandon nests. Sensory disturbance may result in localized avoidance by common nighthawk that occupy habitats near Project activities as noise levels greater than 50 dB have been observed to negatively affect birds (ECCC 2016). Birds can acclimatize to sensory disturbance and the degree of tolerance is largely a function of landscape context. Birds that inhabit remote areas are likely more sensitive to disturbance than birds that inhabit developed areas.

Corona noise from the transmission line is not anticipated to cause common nighthawks to avoid the ROW and so is not anticipated to reduce common nighthawk habitat availability. Additionally, individuals with home ranges that overlap the Project footprint may currently be habituated to corona noise due to the presence of existing ROW.

Studies on mammals have shown that noise levels at transmissions lines do not deter wildlife; however, effects specifically on common nighthawk have not been studied (Goodwin 1975; Manitoba Hydro 2010).

Habitat Distribution

Sensory disturbance may cause common nighthawks to increase their territory size or shift their territory or home range away from areas of human disturbance (ECCC 2016). However, this species is highly mobile and the ROW is not expected to function as a movement barrier for common nighthawks. Therefore, although there may be slight shifts in territory sizes or locations, sensory disturbance due to the Project is not expected to affect the connectivity of common nighthawk populations that overlap the RSA.

Survival and Reproduction

Sensory disturbance (loud noises, lights, smells, dust, and human activity) due to the Project is predicted to affect common nighthawk survival and reproduction through habitat avoidance. Displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. A direct effect of sensory disturbance on common nighthawk is plausible if it elicits a stress response. Additionally, sensory disturbance could result in nest abandonment.

Mitigation Measures

The mitigation measures presented in Section 6.5.7.16.1 are also applicable to minimizing sensory disturbance. These mitigation measures are expected to minimize the potential effects on common nighthawk habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. A small increase in mortality or reduced reproductive capacity is possible among affected individual common nighthawk with home ranges overlapping the wildlife and wildlife habitat

LSA. This effect (reduced common nighthawk survival and/or reproduction from sensory disturbance) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16.3 Collisions with Project Vehicles and Equipment

Potential Effects

Survival and Reproduction

There is potential for an increase in the risk of injury or death to common nighthawk through collisions with Project vehicles and equipment. The predominant factors that contribute to road related avian deaths are traffic volume, vehicle speed, and animal crossing speed (Erickson et al. 2005; Jack et al. 2015; Husby 2016). These factors directly affect the success of an animal reaching the opposite side of the road. An increase in traffic volume or speed, or reduction in animal crossing speed, reduces the probability of an animal crossing safely (Underhill and Angola 2000). Road crossing frequency and abundance are also important factors determining relative collision risk, such that species occurring in high densities and do not exhibit behavioural avoidance of roads are at relatively higher risk than species that are rare on the landscape and avoid roads. The largest risk to common nighthawk from collisions with vehicles would occur when traffic volumes are highest during construction and is predicted to decrease during operations.

Mitigation Measures

Collision risk will be minimized by implementing effective mitigation measures to help limit and control traffic. Hydro One will enforce speed limits on access roads, conduct environmental and safety orientation for Project personnel which includes instruction to staff that wildlife always have the right of way (except in instances related to the imminent health and safety of workers and the public), and have a wildlife sighting and incident reporting procedure in place.

These mitigation measures are expected to minimize the potential effects on common nighthawk survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation described above. This effect (reduced common nighthawk survival and/or reproduction from collisions with Project vehicles) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16.4 Electrocution and Collisions with the Transmission Line

Potential Effects

Survival and Reproduction

Small birds are vulnerable to collisions and electrocution from transmission lines and guy-wires when flying around transmission lines and perching or nesting on transformer poles (APLIC 2006). Electrocutions are usually associated with municipal distribution lines, which have complicated wiring and shorter distances between phases, rather than transmission lines (Harron 2003).

Mitigation Measures

Management of nests during the non-breeding season, such as trimming nest materials, moving nests to alternate structures, and removing unoccupied nests, can minimize the risk of avian mortality from electrocution (APLIC 2006). These mitigation measures are expected to minimize the potential effects common nighthawk survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation measures described above. This effect (reduced common nighthawk survival and/or reproduction from collisions and electrocution from transmission lines) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16.5 Increase in Edge Habitat

Potential Effects

Survival and Reproduction

The Project may increase predation for common nighthawk, by increasing the amount of edge habitat in the LSA. Many predators will use habitat edges as movement corridors (Chalfoun et al. 2002). Attraction of carnivores to the Project can increase predation pressure on prey species and may alter predator-prey relationships (Monda et al. 1994; Canadian Wildlife Service 2007; Liebezeit et al. 2009).

Mitigation Measures

The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. The small increase in linear feature disturbance is not anticipated to result in a measurable change to predation risk on common nighthawk.

These mitigation measures are expected to minimize the potential effects on common nighthawk habitat, and survival and reproduction. Mitigation measures are summarized Table 6.5-40. 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.

Net Effects

There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced common nighthawk survival and/or reproduction from increased predation risk due to increased edge habitat) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.16.6 Incidental Take

Potential Effects

Survival and Reproduction

The *Migratory Birds Convention Act, 1994* (Government of Canada 1994) prohibits the disturbance or destruction of migratory bird nests (e.g., passerines and waterfowl) during the breeding season. Upon the enforcement of the Migratory Birds Regulations, 2022 in July 2022, nest protection has been limited to active nests for most migratory bird species, including common nighthawk.

Common nighthawk and their nests are also protected under the SARA (Government of Canada 2002), which prohibits the damage or destruction of the residence (e.g., nest) of individuals of a species listed in Schedule 1 as endangered, threatened, or extirpated on Federal lands. Common nighthawk nests, eggs, and/or individuals could be disturbed or destroyed during construction of access roads and the ROW, and maintenance of the ROW during operations.

Mitigation Measures

Along with the mitigation measures outlined in Table 6.5-40, the following mitigation will be implemented.

Nests are one of the most important habitat features for common nighthawk as they are critical for chick rearing. Pre-construction activities will be required to identify and confirm sensitive sites, improve understanding of others, and provide additional mitigation recommendations where needed. Mitigation measures include:

- Managing vegetation removal activities so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent possible.
- If vegetation removal cannot be avoided during the migratory bird nesting period (i.e., April 15 to August 31), pre-clearing nest searches will be completed.
- Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified.

If an active common nighthawk nest is identified during pre-construction surveys or during active construction, including during vegetation removal, the contractor will stop work immediately, leave the area and contact ECCC and other appropriate agencies to discuss next steps.

These mitigation measures are expected to minimize the potential effects on common nighthawk habitat, and survival and reproduction. Mitigation measures are summarized in Table 6.5-40. 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.

Net Effects

The implementation of the mitigation is expected to limit incidental take of common nighthawk. There is a predicted net effect after implementation of the mitigation measures described above. This effect (reduced common nighthawk survival and/or reproduction from destruction of nests) is carried forward to the net effects characterization (Section 6.5.8).

6.5.7.17 Summary of Net Effects

Table 6.5-40 provides a summary of the Project-environment interactions assessment and the mitigation measures. The project-environment interactions that result in a net effect after mitigation measures are applied will be carried forward to the Section 6.5.8 Net Effects Characterization.

Table 6.5-40: Summary of Net Effects and Mitigation Measures to Wildlife

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability; • Habitat distribution; and • Survival and reproduction.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps); • Surface water management and erosion control; • Transportation of personal, materials and equipment; • Hazardous materials, solid and liquid waste handling; and • Reclamation of decommissioned access roads, temporary laydown areas, staging areas, and temporary construction camps. **Operation and Maintenance Stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads.	• **Habitat loss** – the loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and influence wildlife abundance and distribution.	**Construction Stage:** • **Wildlife Standard Mitigation:** • Use existing roads to the extent practicable and minimize new access. • Build construction camps and laydown yards in areas with existing disturbance and near highways and existing transmission lines where possible. • If vegetation removal must be completed during the migratory bird nesting period (April 15 to August 31), implement pre-clearing nest searches (for species not protected under the ESA). Similar measures will be taken for vegetation removal during routine ROW maintenance. • In the event that a nest is found, implement Wildlife Features of Concern Discovery Contingency Plan. • Retain compatible shrub vegetation, trees, wildlife trees, and coarse woody debris in selective, environmentally sensitive areas, to the extent practicable and where safe to do so, to provide line of sight breaks. Known sensitive ecological features would be clearly marked (e.g., wetlands and significant wildlife habitat) with associated setbacks. • Engage with applicable government agency (MECP, MNRF and ECCC) if sensitive ecological features are encountered or cannot be avoided. • Salvage/rescue cut timber; disturbance to other areas; employ tree protection measures. • A Vegetation Management Plan including measures to protect rare plants and rare vegetation communities will be developed and implemented by the contractor. In the event a rare plant species or a rare vegetation community are encountered unexpectedly, or cannot be avoided, the rare plant protection measures outlined in the Vegetation Management Plan will be implemented. • Implement progressive reclamation and revegetation of disturbed areas no longer required. • Reclaim temporary access roads, construction camps, waterbody crossings and laydown areas at the end of construction. • Use of vegetation management practices to maintain vegetation within the transmission line ROW. For example, implementation of a "wire zone – border zone" approach to vegetation management (Ballard et al. 2007) where appropriate in the ROW. This method manages vegetation in the two zones, where herb/grass/forb species are promoted in the wire zone, and shrub/short tree species are promoted in the border zone. This approach allows for the safe delivery of electricity while also fostering wildlife habitat and biodiversity, and simultaneously developing overall aesthetics and decreased long-term vegetation management costs.	• Net effect – reduced or degraded habitat because of loss or alteration of vegetation and topography.
				• Hydro One and their contractor(s) will prepare and implement an EPP and a Cleanup and Reclamation Plan. Natural recovery is the preferred method of reclamation on Crown land, preferably with conifer dominated vegetation to be consistent with adjacent vegetation communities. Where necessary, seedling planting will occur to improve reclamation success. Conifer planting will occur on areas of temporary disturbance (e.g., temporary access	

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				roads, laydown areas, camps, and workspaces) where such forest types are naturally expected and/or where habitat enhancement is identified. Hydro One will confirm reclamation plans through engagement with Indigenous communities, the MNRF and local foresters. Effectiveness of reclamation efforts will be monitored and managed post-construction, including confirmation that vegetation communities that naturally regenerate (or were planted) are similar to adjacent vegetation communities. If required, adaptive management will be employed to modify or enhance any reclamation efforts. Erosion control practices would limit wind and water erosion on cover soil and overburden stockpiles (e.g., vegetation, erosion mats). • Hydro One and their contractor will strictly prohibit carrying recreational firearms in company vehicles and storage of recreational firearms and all-terrain vehicles for personal use at project facilities (i.e., camps). • Hydro One will minimize the total footprint of Project access roads by aligning construction and operations stage access planning to the extent possible. • Erosion control practices would limit wind and water erosion on cover soil and overburden stockpiles (e.g., vegetation, erosion mats). • Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified. • Other mitigation outlined in the vegetation and wetlands assessment (refer to Section 6.4). • **Moose Mitigation:** • Limit to the extent practicable the construction of temporary (e.g., access road, travel lane) and permanent (tower foundations) structures in wetlands or within 30 m setback from a wetland. If construction cannot avoid wetlands and 30 m setback, MNRF will be notified as soon as possible prior to work starting. Work may will not be conducted unless approval is obtained from the appropriate regulatory agencies. • Under non-frozen conditions and where regulatory approvals allow, install mats (e.g., rig mats, swamp mats or access mats) to limit effects to waterbodies and wetlands, if warranted and surface conditions require. • Proposed locations of temporary construction camps and temporary laydown areas will be field verified to avoid wetlands including bogs and fens, to the extent practicable. Where possible, schedule work activities in wet areas during frozen conditions. • Project components will be sited to provide a 120 m avoidance buffer of upland area to minimize impacts to aquatic feeding areas where possible. In areas where the buffer cannot be maintained, vegetation removal will be completed between December and March when moose are less likely to be using the aquatic feeding areas.	
				• Hydro One will prioritize avoiding sensitive or important moose areas (e.g., traditional hunting grounds, calving areas, late winter cover areas, mineral licks, etc.) when selecting alternate or preferred new access routes to minimize moose habitat loss and	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				disturbance and during the selection and delineation of fly yards, laydown areas, aggregate sites, other project components, etc. • **Gray Fox Mitigation:** ◦ Avoid vegetation removal and all construction activities that cause sensory disturbance within 100 m of gray fox den from February 15-July 15 of each year to avoid disturbing denning gray fox. ◦ If a gray fox den is identified during construction or operations, and should this timing not be able to be maintained within the buffer widths identified, local MECP SARB offices will be contacted to develop a den management plan and appropriate Indigenous communities will be notified, where requested[(b).] • **Gray Wolf Mitigation:** ◦ Avoid vegetation removal and all construction activities that cause sensory disturbance or loss of den site within 100 m of gray wolf den from March through June of each year to avoid disturbing denning gray wolf. ◦ If a gray wolf den is identified during construction or operations, and should this timing not be able to be maintained within the buffer widths identified, local MNRF offices will be contacted to develop a den management plan and appropriate Indigenous communities will be notified, where requested[(b).] • **Little Brown Myotis and Northern Myotis Mitigation:** ◦ No tree removal or other construction activities will be completed within 200 m of hibernacula. ◦ Avoid clearing maternity roost habitat during the bat maternity roosting period (May 1 to August 31). If potential maternity roost habitat is to be removed during the roosting period, it will be subject to ESA permitting requirements and site-specific mitigation measures that would be developed in consultation with the MECP SARB. Hydro One will work with the MECP SARB to acquire all appropriate permits for this work. If significant changes to the construction schedule are experienced, Hydro One will engage with the MECP SARB to understand any potential authorization requirements under the ESA. ◦ Clearing will be conducted within the 200 - 500 m distance from hibernation habitat outside of the maternity season for bats (May 1 – August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment). • **Herpetofauna (Snapping Turtle and Spring Peeper) Mitigation:** ◦ Install temporary reptile and amphibian exclusion fencing where practicable and appropriate at a distance 30 m around wetlands with high potential as habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity. Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				- To address work in wetlands during the winter period and the risk to overwintering turtles, exclusion fencing to prevent turtles from entering overwintering areas will be implemented where practicable and appropriate. Isolating and dewatering the aquatic work area prior to September 1st is an alternate mitigation measure that could be implemented where practicable and appropriate. This mitigation measure may not be appropriate in many instances given the ripple effects to other environmental discipline (i.e., surface water and fish and fish habitat).and the scale of the Project; however, this mitigation measure will be considered as applicable. • **Bank Swallow Mitigation:** - If a bank swallow colony is identified, a 50 m setback will be applied during the migratory bird nesting period (April 15 to August 31). - Where stock piling of aggregate materials is required, implement MNRF BMPs for protection of bank swallow habitat (MNRF 2017). - Avoid vegetation removal within confirmed bank swallow habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, engage with MECP SARB to acquire permits for this work. - Surveys at identified active nest sites of known bank swallow colony occurrence records. • **Bald Eagle Mitigation:** - Managing tree clearing activities to the extent possible so that removal will occur outside of the bald eagle critical breeding period (March 1 to August 31). - Surveys at identified active nest sites of known bald eagle (or other raptor) occurrence records. - Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) to the extent practicable within 400 m of an active bald eagle (or other raptor) nest during the critical breeding period (March 1 to August 31). - If tree removals or other activities cannot be avoided within the 400 m buffer around bald eagle nests during the critical breeding period (March 1 to August 31) Hydro One will engage with MNRF to discuss if additional mitigation measures are required. If removal of a bald eagle (or other raptor) nest is required, Hydro One will engage with the MNRF and MECP SARB to acquire all appropriate permits for this work. - Install nest platforms to replace or enhance habitat during reclamation if a tree with an existing nest is cut down or the 400 m setback cannot be achieved. • **Bobolink Mitigation:** - If a bobolink nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31). - Avoid vegetation removal within confirmed bobolink habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, engage with MECP to acquire permits for this work. - Surveys at known bobolink occurrence records (within the last 20 years) during the breeding season (May 24 to August 14).	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				• **Chimney Swift Mitigation:** ◦ If a chimney swift nesting/roosting tree is identified, a 90 m buffer will be applied during the chimney swift active season (May 15 to August 31) as noted on eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023). ◦ Avoid removal of structures with confirmed chimney swift use during the chimney swift active season (May 15 to August 31). These structures will be removed outside of the active season once MECP has been notified by submitting a notice of activity to the online Registry. ◦ Avoid vegetation removal within confirmed chimney swift habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, engage with MECP to acquire permits for this work. ◦ Surveys at anthropogenic structures to be disturbed (i.e., buildings, culverts, bridges) to search for barn swallow and chimney swift nests or roosting individuals prior to disturbance at the structure. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b) and occur between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023). ◦ Surveys at identified active nest sites of known barn swallow and chimney swift colony occurrence records to confirm presence of nesting and/or roosting individuals. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b). ◦ If an active/inactive barn swallow or chimney swift nesting colony is identified during pre-construction surveys or during active construction, including during structure and vegetation removal, the contractor will stop work immediately, leave the area and contact MECP and other appropriate agencies to discuss next steps. Structures with barn swallow nests can be removed outside of the breeding season (April 15 to August 31). Structures that support roosting chimney swifts or chimney swift nests can be removed outside the chimney swift active season (between May 15 to August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts [eBird 2023]) after the MECP is notified of this activity by submitting a notice of activity to the Registry using the "Chimney Swift – Activities in Built Structures that are Habitat" form.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect

				• **Eastern Whip-poor-will Mitigation:**
				  ◦ If an eastern whip-poor-will nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31).
				  ◦ Avoid vegetation removal within confirmed whip-poor-will habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, engage with MECP to acquire permits for this work.
				  ◦ Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) to the extent practicable within 500 m of confirmed eastern whip-poor-will habitat during the migratory bird nesting period (April 15 to August 31).
				  ◦ Surveys at known eastern whip-poor-will occurrence records.
				• **Trumpeter Swan Mitigation:**
				  ◦ A 50 m buffer will be applied to trumpeter swan (or other swan) nests during the during the migratory bird nesting period (April 15 to August 31).
				  ◦ Avoid vegetation removal trumpeter swan habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, conduct pre-clearing nest searches.Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) to the extent possible within 50 m of an active trumpeter swan (or other swan) nest during the trumpeter swan nesting period (April 15 to August 31).
				  ◦ Surveys at identified active nest sites of known trumpeter swan occurrence records.
				
				Operation and Maintenance Stage:
				• Wildlife Standard Mitigation:
				  ◦ If vegetation removal must be completed during the migratory bird nesting period (April 15 to August 31), implement nest sweeps. Similar measures will be taken for vegetation removal during routine ROW maintenance.
				  ◦ In the event that a nest is found, implement Wildlife Features of Concern Discovery Contingency Plan.
				  ◦ Retain snags (i.e., standing or partially fallen dead trees) to provide wildlife habitat, where practicable.
				  ◦ Specific plant and/or material harvesting sites, such as blueberry patches identified by Indigenous communities, will be allowed to naturally revegetate in the ROW.
				  ◦ Prepare and implement a Vegetation Management Plan to keep vegetation from interfering with the safe and reliable operation and maintenance of the transmission line.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect

				• **Gray Fox Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Gray Wolf Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Furbearers (American Marten, Beaver) Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Bank Swallow Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Bald Eagle Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Bobolink Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Chimney Swift Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Eastern Whip-poor-will Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Trumpeter Swan Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.
				• **Common Nighthawk Mitigation:**
				  ◦ Follow Construction Stage mitigation measures above.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability; and • Survival and reproduction.	**Construction Stage:** • Creation of site access points, site preparation, and soil salvage; • Surface water management and erosion control; • Helicopter flights; • Hauling of materials; • Domestic waste (solid and liquid) management; • Maintenance of site services; and • Reclamation of decommissioned temporary workspaces, access roads and waterbody crossing structures. **Operation and Maintenance Stage:** • Maintenance of access roads, transmission line, transformer stations and ROW.	• **Sensory disturbance** – can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	**Construction Stage:** • **Wildlife Standard Mitigation:** ◦ Obtain necessary environmental permits and approvals prior to the construction in environmentally sensitive areas. ◦ The Contractor will follow all environmental permitting approval conditions. ◦ Refine Project footprint in the planning stage to avoid known species of concern and/or their habitat, if required. ◦ The Contractor will adhere to the recommended construction timing windows and restrictions. ◦ If adherence to the timing windows and restrictions is not possible, the Contractor will develop site specific mitigation and monitoring in consultation with appropriate regulatory agencies (e.g., MNRF, LRCA). ◦ Appropriate resource specialist will assess sensitive features and inspect or monitor Project activities at or near sensitive areas, as required. ◦ Construction will be completed as quickly and efficiently as possible near environmentally sensitive features to minimize the disturbance to fish and wildlife. ◦ Hunting and fishing on the Project site by Project personnel is prohibited. ◦ Wildlife will not be fed or harassed. ◦ Recreational use of off-road vehicles by Project personnel will be prohibited in the Project footprint. Vehicles, including offroad vehicles, are to be driven in a responsible and environmentally respectful manner. ◦ Vehicles will not exceed speed limits and will lower speeds in specific conditions such as areas of high erosion hazard and blind corners. Clearly mark speed limits along the access roads. ◦ Construction activities will typically occur during one 10 hour shift per day (from 07:00 to 17:00), although night-time work may be occasionally required. ◦ Limit the Project footprint to the extent feasible such as use of existing access roads. ◦ Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified. ◦ Temporary access roads, construction camps, waterbody crossings and laydown areas will be reclaimed and revegetated with native species at the end of construction.	• Net effect – reduced or degraded habitat because of sensory disturbance. • Net effect – reduced survival and reproductive success due to sensory disturbance.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				• **Little Brown Myotis and Northern Myotis Mitigation:** ◦ No Project-related disturbance will occur within 200 m of a bat hibernaculum without engagement and approval of regulatory agencies. ◦ Project activities causing loud noise or vibrations (e.g., drilling, blasting, implosion splicing) will not be undertaken within 500 m of a bat hibernaculum during the hibernation period (August 1 to May 31). ◦ Clearing will be conducted with in the 200 - 500 m distance from some hibernacula outside of the maternity season for bats (May 1 to August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment). ◦ Mitigation measures such as restricting tree clearing within bat maternity roost habitat during the maternity roost season (May 1 to August 31) is expected to avoid and limit sensory disturbance on maternity colonies. If potential maternity roost habitat is to be removed during the roosting period, it will be subject to ESA permitting and site-specific mitigation measures to be developed in consultation with the MECP. Hydro One will work with the MECP SARB to acquire all appropriate permits for this work. • **Snapping Turtle and Spring Peeper Mitigation** ◦ Install temporary reptile and amphibian exclusion fencing where practicable and appropriate at a distance 30 m around wetlands with high potential as habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity. Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing. • **Bald Eagle Mitigation:** ◦ Avoid moderate to high impact operations causing sensory disturbance (including tree removal, helicopter flights, blasting, drilling and implosion splicing) to the extent practicable within 400 m of an active bald eagle (or other raptor) nest during the critical breeding period (March 1 to August 31). If activities are required within the protective nest buffer zone during the critical breeding period, engage with MNRF to acquire appropriate permits for this work. ◦ Appropriate resource specialist will assess sensitive features and inspect or monitor Project activities at or near sensitive areas, as required. • **Bank Swallow Mitigation:** ◦ If a bank swallow nesting colony is identified, a 50 m setback will be applied between April 15 to August 31 for all construction activities causing sensory disturbance. ◦ Avoid moderate to high impact operations causing sensory disturbance (including vegetation removal, helicopter flights, blasting, drilling and implosion splicing) to the extent practicable within 500 m of bank swallow habitat during the breeding period (April 15 to August 31), where feasible.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				• If activities are required within the buffer zone during this period, engage with MECP to acquire permits for this work. • **Bobolink Mitigation:** ◦ If a bobolink nest is identified, a 500 m setback will be applied to between April 15 to August 31 for all construction activities causing sensory disturbance. ◦ Avoid moderate to high impact operations causing sensory disturbance (including vegetation removal, helicopter flights, blasting, drilling and implosion splicing) to the extent practicable within 500 m of bobolink habitat during the breeding period (April 15 to August 31). ◦ If activities are required within the buffer zone during this period, engage with MECP to acquire permits for this work. • **Chimney Swift Mitigation:** ◦ If a chimney swift nesting/roosting tree is identified, a 90 m setback will be applied to between the chimney swift active season (May 15 to August 31) for all construction activities causing sensory disturbance. ◦ Avoid moderate to high impact operations causing sensory disturbance (including vegetation removal, helicopter flights, blasting, drilling and implosion splicing) to the extent practicable within 500 m of chimney swift habitat during the breeding period (April 15 to August 31) ◦ If activities are required within the buffer zone during this period, engage with MECP to acquire permits for this work. • **Eastern Whip-poor-will Mitigation:** ◦ If an eastern whip-poor-will nest is identified, a 500 m setback will be applied between April 15 to August 31 for all construction activities causing sensory disturbance. ◦ Avoid moderate to high impact operations causing sensory disturbance (including vegetation removal, helicopter flights, blasting, drilling and implosion splicing) to the extent practicable within 500 m of whip-poor-will habitat during the breeding period (April 15 to August 31). ◦ If activities are required within the buffer zone during this period, engage with MECP to acquire permits for this work. • **Trumpeter Swan Mitigation:** ◦ If a trumpeter swan nest is identified, a 50 m setback will be applied between April 15 to August 31 for all construction activities causing sensory disturbance. ◦ Avoid moderate to high impact operations (including vegetation removal, helicopter flights, drilling, blasting and implosion splicing) to the extent practicable within 50 m of an active trumpeter swan (or other swan) nest during the trumpeter swan nesting period (April 15 to August 31). ◦ If activities are required within the buffer zone during this period, conduct pre-clearing nest searches. • **Noise Mitigation:** ◦ Comply with local municipal noise bylaws or Environmental Noise Guideline Publication NPC300 (MOECC 2013) and the MOECC NPC115 (MOECC 1978). ◦ Construction activities will typically occur during one 10hour shift per day, with normal working hours of 07:00 to 19:00. In the event construction will occur beyond the daytime period, Hydro	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				One/contractors will reevaluate the potential Project related effects and if required, review mitigation requirements. • Noise abatement, emission and pollution control equipment on machinery will be in place, properly maintained and in good working order. • Turn off vehicles and equipment when not in use and minimize idling, unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. **Operation and Maintenance Stage:** • **Noise Mitigation:** • Comply with local municipal noise bylaws and the MOECC NPC115 (MOECC 1978). • Maintenance activities will typically occur during the daytime period from 07:00 to 19:00. In the event maintenance will occur beyond the daytime period, Hydro One will reevaluate the potential Project related effects and if required, review mitigation requirements. • Noise abatement, emission and pollution control equipment on machinery will be in place, properly maintained and in good working order. • Turn off vehicles and equipment when not in use and minimize idling, unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. • Transmission lines will be designed, constructed, and maintained so that during dry conditions they will minimize corona related sound.	
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps); • Surface water management and erosion control; and • Reclamation of temporary access roads, laydown areas, staging areas, and construction camps.	• Changes to hydrology may alter drainage patterns and increase/decrease drainage flows and surface water levels that can cause changes to soils and vegetation, which can affect wildlife habitat availability and distribution.	**Construction Stage:** • **General Mitigation Measures** • Postpone instream construction if elevated flows (i.e., typically those resulting from precipitation events of 5 mm or more) or flood conditions are present or anticipated outside of already identified in water works timing restrictions. Resume activities when water levels have subsided or equipment/techniques suitable for conditions are deployed. • Limit the duration of disturbance from construction as practicable. • Where new water crossing structures are proposed, the primary preferred structures will avoid in water work (e.g., preferential use of clear-span bridges, and ice bridges/snow fills). • Install equipment waterbody crossing structures using best management practices and following environmental approval conditions. • Follow best management practices for the installation, maintenance, removal, and reclamation of water crossing structures. • **Infrastructure Placement:** • Use existing roads and trails to the extent possible and comply with conditions outlined in road use agreements. • Unless approved by the appropriate regulatory agency, all access roads will be set back 30 m from all water bodies, except at waterbody crossing locations as identified in the crossing lists (i.e., access roads will not cross into the 30 m waterbody buffer).	• No net effect.

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				• Locate temporary workspaces outside the 30 m waterbody buffer, wherever practicable. If Project activities require equipment within the 30 m waterbody buffer (e.g., line stringing), appropriate regulatory approvals will be obtained. • **General Waterbody Crossing Structure Installation and Removal Mitigation:** • Construct waterbody crossing structures following the mitigation measures outline in Sections 6.2 and 6.6 and in accordance with regulatory approvals. • Implement erosion and sedimentation mitigation measures as outlined in Sections 6.2 and Section 6.6. • Erosion and sedimentation controls will remain in place until the construction activities are completed and the disturbed area has been stabilized, restored, and revegetated. • Where vegetation has established, or risk for erosion and sedimentation has been mitigated, remove temporary erosion and sediment control measures. • Implement reclamation procedures and mitigation measures as outlined in Sections 6.2 and Section 6.6.	
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps); transportation of personal, materials and equipment. **Operation and Maintenance Stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer stations and permanent access roads; and • Reclamation of temporary access roads, laydown areas, staging areas, and construction camps.	• Dust and air emissions, and subsequent deposition can change soil quality and vegetation, which can affect wildlife habitat availability.	**Construction, Operation, and Maintenance Stage:** • **General Mitigation Measures:** • Turn off vehicles and equipment when not in use and minimize idling unless weather and/or safety conditions dictate the need for them to remain turned on and in a safe operating condition. • Noise abatement, emission and pollution control equipment on machinery will be in place, properly maintained and in good working order. • Keep equipment well maintained. • Burning of slash will be in accordance with regulatory approvals and permits and subject to agreements with landowners, Sustainable Forest Licence (SFL) holders (e.g., overlapping agreements). • Implement dust control measures (e.g., spray dust control solution that holds moisture for a long period of time causing dust to settle). • To minimize drifting soils and loss of topsoil in areas prone to wind or water erosion stabilize the disturbed area as soon as practicable by: – Spreading wood chips or straw crimping (weed-free straw); sowing a fast-growing ground cover (expend or postpone topsoil handling) during high wind or wet conditions, where practicable. If it is not possible to suspend or postpone the construction activities, a site-specific Erosion and Sedimentation Control Plan will be implemented. • Retain compatible vegetation where practicable on areas prone to wind erosion, steep slopes, drainage ways or next to a waterbody. • Tackify, cover, seed, apply water or pack the topsoil stockpiles and windrows with approved equipment, if soils prone to wind erosion. • Use multi-passenger vehicles to transport workers to site when practicable.	• No net effect.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Wildlife and Wildlife Habitat – All Criteria	• Habitat availability.	**Construction stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps); • Transportation of personal, materials and equipment; and • Reclamation of temporary access roads, laydown areas, turnaround areas, staging areas, and construction camps. **Operation and Maintenance Stage:** • Operation and maintenance of new ROW, fencing, transmission line, transformer stations, conductors, tower foundations and permanent access roads.	• Introduction and spread of noxious and invasive plant species can affect plant community composition, which can affect wildlife habitat availability and distribution.	• Implement mitigation measures as outlined in Section 6.4 to limit the introduction and spread of noxious and invasive plants during construction and operation and maintenance as a result of the Project. • Implement an Invasive Species and Biosecurity Management Plan.	• No net effect.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	**Construction Stage:** • Creation of site access points; • Helicopter flights; • Hauling of materials; • Decommissioning of temporary access roads and workspaces; and • Clean up and reclamation. **Operation and Maintenance Stage:** • Maintenance of access roads, transmission line, transformer stations and ROW.	• Collisions with Project vehicles during construction and operation may cause injury or mortality to individual animals.	**Construction Stage:** • Speed limits will be enforced on access roads. • Conduct environmental and safety orientation for Project personnel. • Wildlife will always have the right of way, except in instances related to the imminent health and safety of workers and the public. • Drivers have standard safety training and will be provided with environmental awareness and sensitivity training. • Employees in vehicles encountering large mammals (e.g., caribou, moose, black bear, and wolf) on roads will be required to communicate the presence of wildlife on and near roads to other employees working in the area. • Recreational use of offroad vehicles by employees and contractors will be prohibited. • Avoid helicopter flights within 400 m of a bald eagle (or other raptor) nest during the critical breeding period (March 1 to August 31). • Implement a wildlife sighting and incident reporting procedure. **Operation and Maintenance Stage:** • Wildlife-vehicle collisions will be reported, which provides feedback for adaptive management.	• No net effect.
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	**Construction Stage:** • Hazardous materials, solid, and liquid waste handling.	• Attraction of wildlife to the Project (e.g., food waste, petroleum-based products, salt) during construction may increase human-wildlife interactions and change predator-prey relationships, which can affect wildlife survival and reproduction.	**Construction Stage:** • Littering will be strictly prohibited. • Collect, segregate, store and dispose of food waste and domestic garbage on a regular basis, or as needed to reduce potential human/wildlife encounters. • Implement a recycling program at the construction camps to reduce the amount of waste generated. • Retain food wastes (e.g., lunch wastes, wrappers) and return to appropriate onsite waste containers.	• No net effect.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				• Ensure food waste and domestic garbage is stored in designated areas within appropriate wildlife proof containment to avoid attracting nuisance wildlife. • Collect waste material on a regular basis, or as needed to maintain a neat and clean Project footprint. • Dumping or burying of garbage, non wood construction wastes, food wrappings, bottles/cans, sanitary wastes or other non wood materials is strictly prohibited. • Dispose of waste material on a regular basis at appropriate and approved waste disposal facility.	

Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	**Construction Stage:**
		• Use of explosives and blasting to create level areas for transmission structures, roads, and for foundation excavations.
			• Fly rock from blasting may result in injury or mortality to wildlife.	**Construction Stage:**
				• Ripping is preferred over blasting where rock is encountered.
				• Use of explosives for foundation excavations and access roads will be limited to conditions that do not allow for typical or standard drilling methods.
				• In the event that blasting is required, adhere to the Blasting and Communication Management Plan to be developed by the Contractor, and include mitigation measures such as use of blast mats or controlled blasting techniques to minimize fly rock.
				• The Blasting and Communication Management Plan will include measures to address the following items:
				  ◦ Stakeholder notification;
				  ◦ Storage, Transportation and Use;
				  ◦ Security;
				  ◦ Environmentally Sensitive Areas (e.g., nests and den sites); and
				  ◦ Waterbodies.
				• Check the blast zone for large wildlife species before a blast as described in the Blasting and Communication Management Plan to be developed by the Contractor.
				• Avoid blasting within 500 m of protected habitat for endangered and threatened SAR (i.e., bank swallow, bobolink, chimney swift, eastern whip-poor-will), during the migratory bird nesting period (April 15 to August 31).
				• Avoid blasting within 400 m of a bald eagle (or other raptor) during the critical breeding period (March 1 to August 31).
				• Avoid blasting within 50 m of a trumpeter swan nest (or other swan nest) during the migratory bird nesting period (April 15 to August 31).
					• No net effect.

Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	**Construction Stage:** • Creation of site access points. **Operation and Maintenance Stage:** • Maintenance of access roads, transmission line, transformer stations and ROW	• Increase in public access could affect wildlife survival and reproduction through vehicle strikes, and/or legal and illegal hunting.	**Construction, Operation, and Maintenance Stages:** • During construction and operation and maintenance, existing access roads will be used as much as possible to limit disturbance resulting from construction of new access roads and trails. • Temporary access roads, aggregate pits, fly yards, construction camps, waterbody crossings, and laydown areas will be reclaimed at the end of construction. Selective clearing and retention of shrub vegetation, trees, wildlife trees, and coarse woody debris in areas where safe operation practices can still be achieved to limit access or hunting. • Slash and debris resulting from mechanical clearing operations will be spread to ensure depths do not exceed 0.3 m.	• No net effect.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				• In areas that are hand felled only, trees will be bucked and delimbed to lie close to the ground. • Hydro One will limit unauthorized access to provincial parks by installing signage on access roads where permissible by MNRF. • During operations, vegetation that is compatible (i.e., does not grow too tall) with the clearance distance required to conductors will be retained.	
Wildlife and Wildlife Habitat – All Criteria	• Survival and reproduction.	**Construction, Operation, and Maintenance Stage:** • Transportation of personal, materials and equipment; • Hazardous materials, solid and liquid waste handling; and • Refuelling, service and maintenance of vehicles and construction equipment.	• Chemical or hazardous material stored on the Project site, or spills (e.g., petroleum products, ammonium nitrate) on site or along access or haul roads can affect wildlife survival and reproduction.	**Construction, Operation, and Maintenance Stages:** • Train individuals working on-site and handling hazardous materials about best practices for the transportation of dangerous goods to avoid negatively affecting wildlife by introducing hazardous materials into the environment. • Have equipment for containing spills on-site. Spill response kits will be provided in fuel and hazardous materials storage and handling facilities at temporary construction camps and temporary laydown areas, in on-site work areas and/or in vehicles and equipment, and personnel will be trained in spill response practices and procedures. Spills and leaks will be contained and cleaned up as soon as possible following incidents. • Refueling, service, and maintenance of vehicles and equipment will generally be carried out in designated areas at temporary construction camps and temporary laydown areas located a minimum of 120 from waterbodies to the extent possible. These areas will be designed and constructed to collect and contain minor leaks and spills. If refueling within 120 of a waterbody cannot be avoided, enhanced spill containment measures will be used. In the event that refuelling, servicing and maintenance is required in the field, 120 m buffer will be respected to the extent possible. There may be locations where this is not possible due to the prevalence of wetlands; however, in these locations enhanced spill containment measures will be used. • Machinery and equipment are to arrive on site in a clean condition and will be inspected and maintained routinely to avoid fluid leaks. • Spills will be contained locally and disposed of at an approved industrial waste disposal facility. • Storage facilities for hazardous materials and waste will meet regulatory requirements and would be designed to protect the environment and workers from exposure. • Hydro One with its contractor(s) will prepare and implement an Environmental Protection Plan, Spill Prevention and Emergency Response Plan and Soil Handling Management Plan to avoid exposure of wildlife to harmful substances.	• No net effect.
Moose	• Survival and reproduction.	**Construction Stage:** • Creation of site access points; • Hauling of materials; • Decommissioning of temporary access roads and workspaces; and • Clean up and reclamation.	• Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of moose.	**Construction Stage:** • Temporary access roads, aggregate pits, fly yards, construction camps, waterbody crossings, and laydown areas will be reclaimed at the end of construction. • Use of existing access roads to minimize additional linear disturbances and habitat conversion. **Operation and Maintenance Stage:** • Allow compatible vegetation in the ROW to grow back to provide cover and reduce line-of-sight for predators.	• Net effect – reduced moose survival and/or reproduction from use of linear corridors and converted habitat by prey and predators.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
		Operation and Maintenance Stage: • Maintenance of access roads, transmission line, transformer stations and ROW.		• Other slash and debris resulting from mechanical clearing operations will be spread to ensure depths do not exceed 0.3 m or will be piled and burned. In areas that are hand felled only, trees will be bucked and delimbed to lie close to the ground. • Temporary access roads, construction camps, waterbody crossings, and laydown areas will be reclaimed at the end of construction. • Hydro One will use vegetation management practices to maintain vegetation within the transmission line ROW. For example, implementation of a “wire zone – border zone” approach to vegetation management (Ballard et al. 2007) where appropriate in the ROW. This method manages vegetation in the two zones, where herb/grass/forb species are promoted in the wire zone, and shrub/short tree species are promoted in the border zone. This approach allows for the safe delivery of electricity while also fostering wildlife habitat and biodiversity, and simultaneously developing overall aesthetics and decreased long-term vegetation management costs.	
Songbirds (Canada warbler, olive-sided flycatcher, eastern wood pewee)	• Survival and reproduction.	**Construction and Maintenance Stage:** • Creation of site access points; • Hauling of materials; • Decommissioning of temporary access roads and workspaces; and • Clean up and reclamation. **Operation and Maintenance Stage:** • Maintenance of access roads, transmission line, transformer stations and ROW	• Increase in edge habitat – vegetation removal will result in an increase in edge habitat, which could increase nest predation or parasitism risk for forest breeding songbirds.	**Construction Stage:** • Temporary access roads, aggregate pits, fly yards, construction camps, waterbody crossings, and laydown areas will be reclaimed at the end of construction. • Use of existing access roads to minimize additional linear disturbances and habitat conversion. **Operation and Maintenance Stage:** • Allow compatible vegetation in the ROW to grow back to provide cover and reduce line of sight for predators.	• Net effect – reduced songbird, survival and/or reproduction from increased risk of nest predation and parasitism due to edge habitat creation.
Wildlife and Wildlife Habitat – All Bird Criteria	• Survival and reproduction.	**Construction Stage:** • Conductor stringing and tensioning. **Operation and Maintenance Stage:** • Electricity transmission.	• Collisions with the transmission line and guy-wires causing injury or mortality to birds criteria.	**Construction, Operation, and Maintenance Stage:** • The risk of collisions with the transmission line will be greatly minimized or eliminated by using a Project design that adheres to the Standards for Overhead Systems (CSA-C22.3, CSA 2015). • Bird diverters or visibility enhancements (e.g., spinning reflectors) will be installed on the transmission line in certain locations.	• Net effect – reduced bird survival from collision with the transmission line and guy-wires.
Wildlife and Wildlife Habitat – All Bird Criteria	• Survival and reproduction.	**Construction Stage:** • Creation of site access points, site preparation, and soil salvage **Operation and Maintenance Stage:** • Maintenance of access roads, transmission line, transformer stations and ROW.	• **Incidental Take** – Site preparation, construction and maintenance may result in the destruction of nests, eggs, and individuals of birds (incidental take).	**Construction, Operation, and Maintenance Stages:** • **Wildlife Standard Mitigation:** ◦ Manage vegetation removal activities so that removal does not occur within the migratory bird nesting period (April 15 to August 31) to the extent reasonably possible. ◦ If vegetation removal during construction and operation and maintenance activities cannot be avoided during the migratory bird nesting period (April 15 to August 31), pre-clearing nest searches will be completed. If any areas are found to have birds exhibiting agitated breeding behaviour, these areas, in addition to any active nests found, will be flagged and protected from clearance until the current breeding season has passed. ◦ If vegetation removal will impact SAR or SCC habitat, Hydro One will engage with MECP, MNRF and/or ECCC to discuss permitting requirements and next steps, and appropriate Indigenous communities will be notified, where requested. ◦ If nests are discovered during construction or operation and maintenance, the contractor will stop work immediately, leave	• Net effect – Reduced bird, survival and/or reproduction from increased risk of incidental take.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				the area, and the MECP, MNRF and/or ECCC will be contacted to discuss permitting requirements and/or next steps, and appropriate Indigenous communities will be contacted, as requested. • Environmental training for workers, including information on active nest identification and procedures to follow if an active nest is identified. • **Raptor Mitigation:** • Bald eagle and other raptor, swan nest sites will be added to the content of the EPP. • Surveys at identified active nest sites of known bald eagle (or other raptor) occurrence records. • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) within 400 m of a bald eagle (or other raptor) nest, during the critical breeding period (March 1 to August 31). • **Trumpeter Swan Mitigation:** • Surveys at identified active nest sites of known trumpeter swan occurrence records. • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) within 50 m of an active trumpeter swan (or other swan) nest during the trumpeter swan nesting period (April 15 to August 31). • Trumpeter wan nest sites will be added to the content of the EPP. • **Bank Swallow Mitigation:** • Implement best management practices for the protection of bank swallow habitat (per MNRF 2017) where stock piling of aggregate materials is required. • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion splicing) within 50 m of an active bank swallow colony during the migratory bird nesting period (April 15 to August 31). • Avoid vegetation removal within confirmed bank swallow habitat during the migratory bird nesting period (April 15 to August 31). If vegetation removal or other activities are required during this period, engage with MECP to acquire permits for this work. • Surveys at identified active nest sites of known bank swallow colony occurrence records. • Bank swallow nesting colony sites will be added to the content of the EPP. • **Chimney Swift and Barn Swallow Mitigation:** • If structure/vegetation removal or other activities cannot be avoided within chimney swift habitat during the migratory bird nesting period (i.e., April 15 to August 31), Hydro One will engage with MECP SARB to acquire appropriate permits for this work. • If a chimney swift nesting/roosting tree is identified, a 90 m buffer will be applied during the chimney swift active season (May 15 – August 31) as noted on eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023). • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) within 500 m of	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				confirmed chimney swift habitat during the migratory bird nesting period (April 15 to August 31). • Manage structure removals so that removal does not occur during the chimney swift active season (May 15-August 31) if the structure is Confirmed chimney swift habitat. • Manage vegetation removal activities so that removal does not occur within Confirmed barn swallow and chimney swift habitat within the migratory bird nesting period (April 15 to August 31) to the extent possible. • Surveys at anthropogenic structures (i.e., buildings, culverts, bridges) to search for barn swallow and chimney swift nests or roosting individuals prior to disturbance at the structure. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b) and occur between May 15 – August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay .Districts (eBird 2023). • Surveys at identified active nest sites of known barn swallow and chimney swift colony occurrence records to confirm presence of nesting and/or roosting individuals. Chimney swift surveys will be conducted in accordance with the Ontario SwiftWatch protocol (Birds Canada 2023b). • Structures with barn swallow nests can be removed outside of the breeding season (April 15 to August 31). Structures that support roosting chimney swifts or chimney swift nests can be removed outside the chimney swift active season (between May 15 – August 31 as determined through eBird data for this species, specific to Rainy River and Thunder Bay Districts (eBird 2023)) after the MECP is notified of this activity by submitting a notice of activity to the Registry using the "Chimney Swift – Activities in Built Structures that are Habitat" form. ● **Bobolink Mitigation:** • If a bobolink nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31). • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) within 500 m of confirmed bobolink habitat during the migratory bird nesting period (April 15 to August 31). • Managing vegetation removal activities so that within Confirmed Bobolink habitats, removal does not occur within the migratory bird nesting period (April 15 to August 31). ● **Eastern Whip-poor-will Mitigation:** • If an eastern whip-poor-will nest is identified, a 500 m buffer will be applied during the migratory bird nesting period (April 15 to August 31). • Avoid moderate to high impact operations (including helicopter flights, drilling, blasting and implosion slicing) within 500 m of confirmed eastern whip-poor-will habitat during the migratory bird nesting period (April 15 to August 31). • Manage vegetation removal activities within Confirmed eastern whip-poor-will habitats, so that removal does not occur within the migratory bird nesting period (April 15 to August 31). • Surveys at known eastern whip-poor-will occurrence records.	

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
Furbearers (American marten, gray wolf, Beaver) and Gray Fox	• Survival and reproduction.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps); surface water management and erosion control. **Operation and Maintenance Stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations transformer stations and permanent access roads; and • Reclamation of temporary access roads, laydown areas, staging areas, and construction camps.	• **Incidental Take** – Site preparation, construction and maintenance may result in the destruction of furbearer den sites and denning individuals (incidental take).	**Construction, Operation, and Maintenance Stage:** • **Wildlife Standard Mitigation:** ◦ Implement the Wildlife Standard Mitigation listed for the potential effect on the loss or alteration of vegetation and topography can reduce or degrade wildlife habitat, and adversely affect their survival and reproduction potential' above. In addition, implement the following measures: – Environmental training for workers will include information on den/beaver lodge identification and procedures to follow if a den/lodge is identified. ◦ Revegetate with plant species that will maintain habitat quality to feature of concern (i.e., maintain the location as a feeding area) as appropriate. ◦ If an active den/beaver lodge is identified during active construction, including during vegetation removal, work will stop and local MNRF/MECP SARB offices (as appropriate) will be contacted immediately. The den/lodge will be clearly marked, an 100m buffer surrounding the den will be established and no vegetation removal will proceed within that buffer until MNRF/MECP SARB is engaged. ◦ If a beaver lodge or dam requires removal then an Application to Interfere with/Destroy a Black Bear or Furbearing Mammal Den, Beaver Dam, Black Bear in Den will be submitted to the MNRF. ◦ If a beaver requires removal, the head trapper of the trapline (if within a trapline area) will be contacted and the required MNRF permits will be acquired as necessary. • **Gray Fox Mitigation:** ◦ Surveys to identify den sites within home ranges of known gray fox occurrence records. ◦ Avoid vegetation removal and all construction activities that cause sensory disturbance within 100 m of gray fox den from February 15-July 15 of each year to avoid disturbing denning gray fox. ◦ If an active den is identified during active construction, including during vegetation removal, work will stop and local MECP SARB offices will be contacted immediately. The den will be clearly marked with a GPS waypoint, a 100 m buffer surrounding the den will be established by flagging the buffer and no vegetation removal will proceed within that buffer until MECP is contacted for next steps. ◦ If a gray fox den is identified during construction or operations, and should the February 15 to July 15 period not be able to be maintained within the buffer widths identified, local MECP SARB offices will be contacted to develop a den management plan and appropriate Indigenous communities will be notified, where requested(b).	• Net effect – reduced furbearer and gray fox survival and/or reproduction from destruction of furbearer den sites and denning individuals.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect

Little Brown Myotis and Northern Myotis	• Survival and reproduction.	**Construction Stage:**
		• Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps)
		• Creation of site access points, site preparation, and soil salvage; and
		• Use of explosives to remove rock for new permanent access roads or transmission structure installation.
			• **Incidental Take** – Site preparation and construction (including drilling and blasting) may result in the destruction of roosting and hibernating bats (incidental take).	**Construction Stage:**
				• Avoid clearing maternity roost habitat from May 1 to August 31. Should this timing not be able to be maintained as identified, MECP SARB will be contacted for further discussion and appropriate Indigenous communities notified, where requested.
				• Project activities causing loud noise or vibrations (e.g., drilling, blasting, implosion splicing) will not be undertaken within 500 m of a bat hibernaculum during the hibernation period (August 1 to May 31).
				• Clearing will be conducted with in the 200 - 500 m distance from hibernation habitat outside of the maternity season for bats (May 1 to August 31) providing noise and vibration created at the site is restricted to that associated with logging (e.g., chain saw, skidder, or mechanical harvesting equipment)
				• Avoid physical disturbance to existing anthropogenic structures located off of the Project ROW and access roads that could be roosts for bats (e.g., sheds, barns, houses, buildings, and bridges).
				• Continue to engage with the MECP regarding permitting requirements for little brown myotis and, northern myotis.
				• If a previously unidentified occupied bat roost or a hibernaculum is encountered during construction:
				  • Contractor will immediately halt work in that location, clearly flag the areas around the wildlife feature to protect the feature, document the location and photograph the feature (if safe to do so), notify the Hydro One and report the incidence to the appropriate regulatory agencies, as needed.
				  • Suspend activity at that location until the resource specialist has assessed the feature and determined a suitable course of action in consultation with appropriate regulatory agencies.
				  • Hydro One/its contractor will report successes or challenges to the appropriate regulatory agencies to keep them informed of the situation in regards to species of concern.
				  • Work may be suspended or revised due to the discovery of a feature of concern.
				• Revegetate with plant species that will maintain habitat quality to feature of concern (i.e., bat maternity roost habitat) as appropriate.
					• Net effect – reduced little brown myotis and northern myotis survival and/or reproduction from destruction during roosting and hibernation.

Herpetofauna (Snapping Turtle and Spring Peeper)	• Survival and reproduction.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas and temporary construction camps) • Creation of site access points, site preparation, and soil salvage; and • Use of explosives to remove rock for new permanent access roads or transmission structure installation.	• **Incidental Take** – Site preparation, construction and maintenance may result in the destruction of hibernating or breeding herptiles (incidental take).	• Install temporary reptile and amphibian exclusion fencing where practicable and appropriate 30 m around wetlands with high potential as habitat for reptiles and amphibians prior to emergence from hibernation in areas of active construction. These high potential wetland habitats will be included in the EPP mapping and the associated mitigation measures will be followed. In areas with a extensive amounts of high potential wetland habitat, exclusion fencing will consider eco-passages in order to maintain habitat connectivity. Design and installation of exclusion fencing will follow the principles and techniques described online at https://www.ontario.ca/page/reptile-and-amphibian-exclusion-fencing. • Implement exclusion fencing to prevent turtles from entering overwintering areas where practicable and appropriate. Isolating and dewatering the aquatic work area prior to September 1 is an alternate mitigation measure that could be implemented where practicable and appropriate (Note: these mitigation measures may not be appropriate in many instances given the ripple effects to	• Net effect – reduced herptile survival and/or reproduction from destruction of hibernation sites and hibernating or breeding individuals.

Criteria	Indicators	Project Component or Activity	Potential Effect	Mitigation Measures	Net Effect
				other environmental discipline [i.e., surface water and fish and fish habitat].and the scale of the Project; however, this mitigation measure will be considered as applicable). • Safe handling practices will be used to move turtles, snakes and other herpetofauna to areas away from the construction (e.g., Ontario Species at Risk Handling Manual: For Endangered Species Act Authorization Holders). • Construction personnel will traverse the path of construction equipment, to induce frogs, toads, and snakes to be scared away from the path of oncoming machinery. • Environmental training for workers, including information on turtle nest identification and procedures to follow if an active nest is identified. • Conduct worker awareness training for machine operators to help alert them to the possibility of turtles, snakes and amphibians in active areas of construction.	
Wildlife and Wildlife Habitat – All Bird Criteria	• Survival and reproduction.	**Construction Stage:** • Clearing, grading, earth moving, grubbing of vegetation, and stockpiling of materials along the ROW and other access and construction areas, and construction of infrastructure (e.g., access roads, bridges, temporary laydown areas, turnaround areas, and temporary construction camps). **Operation and Maintenance Stage:** • Operation and maintenance of new ROW, fencing, transmission line, conductors, tower foundations, transformer station and permanent access roads; and • Electricity transmission.	• Electrocution causing injury or mortality to birds.	**Construction, Operation, and Maintenance Stage:** • Industry standards to avoid electrocutions have been incorporated in structure design (CSAC22.3, CSA 2015b). • Lattice transmission structures will be used where possible. Management of nests such as moving nests to alternate structures, and removing unoccupied nests, will occur during the non-breeding season. • Bird deterrents or visibility enhancements (e.g., spinning reflectors) will be installed on the transmission line in certain locations. • Removal of bald eagle (or other raptor) nests will require authorization and methods for removal will be determined in consultation with the MNRF.	• No net effect.

ECCC = Environment and Climate Change Canada; EPP = Environmental Protection Plan; LRCA = Lakehead Region Conservation Authority; m = metres; MECP = Ministry of the Environment, Conservation and Parks; MNRF = Ministry of Natural Resources and Forestry; MOECC = Ministry of the Environment and Climate Change; ROW = Right-of-Way; SARB = Species at Risk Branch; SFL = Sustainable Forest License.

6.5.8 Net Effects Characterization

6.5.8.1 Net Effects Characterization Approach

A summary of the characterization of net effects (Table 6.5-40) of the Project on wildlife is provided in the following sections. Net effects are described after the implementation of effective mitigation measures, and summarized according to significance factors direction, magnitude, geographic extent, duration/reversibility, frequency, and likelihood of the effect occurring following the methods described in Section 4. The definition for magnitude is provided in Table 6.5-41, while general definitions for other significance factors are provided in Section 5. Effective implementation of mitigation measures summarized in Table 6.5-40 are expected to reduce the magnitude and duration of net effects on wildlife.

Changes in indicators for each wildlife criterion were estimated relative to the baseline characterization to describe and classify net effects, as follows:

- Changes in habitat availability and animal use were estimated quantitatively by calculating differences in the amount of different types of suitable habitat for each criterion, and qualitatively considering potential changes in habitat use (e.g., avoidance due to sensory disturbance).
- Changes in habitat distribution, including the effects on wildlife movement and habitat connectivity, were estimated by qualitatively by examining changes to the distribution of habitat patches within the relevant criterion specific RSA and the LSA, and considering potential barriers to movement.
- Changes in survival and reproduction (abundance) were identified qualitatively and quantitatively using the results from changes in habitat, and knowledge of potential changes in abundance from other Project components and activities (e.g., bald eagle strikes with conductors). Predictions of changes were made using data collected in the relevant criterion specific RSA and LSA, where possible, and supported by scientific literature.

Table 6.5-41: Magnitude Effect Levels for Wildlife

Effects Characteristic	Definition	Description
Magnitude	Magnitude is the intensity of the effect or a measure of the degree of change from existing (baseline) conditions expected to occur in the criterion.	• Magnitude was defined for each net effect using a narrative or numeric quantification (e.g., number of hectares, number of individuals), except where the intensity or degree of change was negligible. • Negligible magnitude effects are detectable changes to indicators that are predicted to result in no measurable effects to a criterion or where changes are well within the adaptive capacity of the criterion (e.g., introduction of invasive species reduces the quality of habitat immediately adjacent to the Project footprint during operation but has no measurable effect on wildlife populations).

After implementation of mitigation measures, these Project interactions (e.g., changes in hydrology, air quality, potential invasive plant species, and collisions with vehicles) result in similar changes to indicators (habitat availability, habitat distribution, and/or survival and reproduction) of wildlife criteria. Similarly, negligible net effects assessed for collisions with the transmission line by bats and birds (Section 6.5.8) also applies to other bird criteria, where applicable, as does the assessment of nest predation/parasitism, incidental take, and electrocution for bald eagle (Section 6.5.7.9).

Therefore, the net effects (and cumulative effects) characterized for all wildlife focuses on site preparation, construction and operation activities and sensory disturbance as the changes in indicators from these Project interactions are predicted to be different for wildlife criteria, and the Project.

In addition, the net effects (and cumulative effects) characterization for moose also includes the effect of the use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators. The effect from collisions with transmission lines is included in the net and cumulative effects assessment for bald eagle. The effect of edge habitat created from vegetation removal is included in the net and cumulative effects assessment for Canada warbler.

6.5.8.2 Moose

6.5.8.2.1 Habitat Availability

Habitat Loss

Effects on moose habitat availability from direct habitat loss of moderate to high suitability habitat are certain (Table 6.5-42). Mitigation is expected to reduce effects on moose habitat availability; however, direct loss of approximately 1,794 ha of moderate to high suitability moose habitat is predicted to result from the Project. A total of 39.0 ha and 3.1 ha of moose late wintering habitat and aquatic feeding areas, respectively, are also predicted to be affected by the Project. Effects from changes to habitat are expected to be restricted to the terrestrial LSA and will occur continuously throughout operations. For the purposes of this analysis, the direct loss of moose habitat was conservatively assumed to be permanent and irreversible, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on moose habitat availability caused by the Project. The effects of habitat loss are predicted to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and, moose have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features.

The net effect is predicted to be low in magnitude, permanent in duration, reversible on the ROW but irreversible in areas that do not regenerate to suitable habitat, and certain to occur. This interaction (reduced moose habitat availability) is carried forward to the cumulative effects assessment.

Sensory Disturbance

Effects on moose habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable during construction when sensory disturbance will be greatest (Table 6.5-42). Inspection and maintenance of the ROW during operation phase may also result in sensory disturbance, but such events are expected to be infrequent, isolated, temporary and within the range of natural variation at baseline where the line parallels existing disturbance, resulting in a negligible net effect on moose habitat during operations. Individual moose that avoid suitable habitat during construction due to temporary sensory disturbance are expected to reoccupy the habitat once the disturbance is removed. Therefore, the effect of sensory disturbance was characterized as reversible at the end of construction and reclamation activities (medium term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, nighttime work may be required to make up for delays.

The net effect is predicted to be low in magnitude, medium-term in duration, reversible, and probable. This interaction (reduced quality of moose habitat from sensory disturbance during construction) is carried forward to the cumulative effects assessment.

6.5.8.2.2 Habitat Distribution

Habitat Loss

Effects on moose habitat availability from direct habitat loss of moderate to high suitability habitat are certain (Table 6.5-42). Mitigation is expected to reduce effects on moose habitat distribution; however, direct loss of approximately 1,794 ha of moderate to high suitability moose habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation, which may temporarily alter moose use of suitable habitat until suitable ecosite cover regenerates. However, areas that do not regenerate back to suitable ecosites will result in the changes to habitat distribution and is conservatively assumed to be continuous and permanent at the local scale.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forest and grasslands). The effects of habitat loss on local moose movements or connectivity among populations within or adjacent to Ontario are considered to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and moose have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features.

The net effect is predicted to be low in magnitude, permanent in duration, reversible on the ROW but irreversible in areas that do not regenerate to suitable habitat, and possible to occur. This interaction (reduction in moose movements as a result of changes in moose habitat distribution) is carried forward to the cumulative effects assessment.

6.5.8.2.3 Survival and Reproduction

Habitat Loss

Direct effects on moose survival and reproduction from habitat loss are unlikely. The removal of 1,794 ha of moderate to high suitability habitat in the terrestrial LSA is equivalent to two to four moose home ranges and will be spread out within the LSA amongst several home ranges that overlap the LSA (Table 6.5-42). There will be a negligible increase in mortality or reduced reproductive capacity from habitat loss due to the Project will be permanent and irreversible and occur continuously in the LSA. As habitat loss is expected to have negligible effect on moose survival and reproduction, this interaction is not carried forward to the cumulative effects assessment.

Sensory Disturbance

Indirect effects from sensory disturbance from the Project on moose survival and reproduction are unlikely as increases in moose movement rates caused by avoidance of humans were found to have a negligible effect on the overall energy budget of moose that are in good condition (Neumann et al. 2011). Effects of sensory disturbance are predicted to be reversible at the end of construction and reclamation activities (medium term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night time work may be required to make up for delays (Table 6.5-42). As sensory disturbance from the Project is expected to have negligible effect on moose survival and reproduction, this interaction is not carried forward to the cumulative effects assessment.

Collisions with Project Vehicles and Equipment

Effects on moose survival and reproduction from collisions with vehicles and equipment are unlikely (Table 6.5-42). Mitigation implemented for the Project is predicted to limit direct mortality of moose from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered reversible over the medium-term because the largest risk to moose from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality to moose is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

The net effect is predicted to be negligible in magnitude and possible; therefore, this interaction (reduced moose survival and/or reproduction from collisions with Project vehicles and equipment) is not carried forward to the cumulative effects assessment.

Increase in Public Access

Effects on moose survival and reproduction from increase in public access are unlikely (Table 6.5-42). Mitigation implemented for the Project are predicted to limit mortality of moose from collision with public vehicles and increased hunting relative to baseline characterization; however, mortality risk cannot be eliminated because public access is predicted to increase as a result of the Project. The effect was considered permanent (for the life of the Project), infrequent, and probable because the increased human presence should be low with effective mitigation. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation but is not predicted to have population level effects.

As this net effect is predicted to be negligible in magnitude, this interaction (reduced moose survival and/or reproduction from increase in public access) is not carried forward to the cumulative effects assessment.

Use of Linear Corridors and Converted Habitat

Effects on moose survival and reproduction from use of linear corridors and converted habitat is probable (Table 6.5-42). Although mitigation is expected to limit potential adverse changes to moose survival and reproduction due to increased road access, effects from increased predation cannot be completely removed. Regeneration of vegetation on temporary components of the Project footprint will help minimize the effect during operations. The use of linear corridors and converted habitat by moose and wolves was expected to be restricted to the terrestrial LSA, and therefore the effect was considered local. Changes in moose survival and reproduction may occur continuously and indefinitely during Project operation and were therefore considered permanent/irreversible. The effect was characterized as likely to occur (i.e., probable) after mitigation because an increase in linear disturbance due to the Project is certain and the effects of linear corridors and converted habitat on predator prey dynamics is well understood (Dussault et al. 2005; Street et al. 2015a).

The net effect is predicted to be low in magnitude, permanent and irreversible, and probable. This interaction (reduced moose survival and/or reproduction from use of linear corridors and converted habitat) is carried forward to the cumulative effects assessment.

Table 6.5-42 Characterization of Predicted Net Effects for Moose

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.1)
Habitat Availability	Habitat loss	Direct	Negative	Direct loss of 1,794 ha of moderate to high suitability moose habitat, 39.0 ha of moose late wintering habitat, and 3.1 ha of aquatic feeding areas.	Local	Permanent/Irreversible or Medium-term/Reversible (for reclaimed areas)	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Reduced quality of habitat and possible avoidance in the LSA from sensory disturbance during construction.	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Small reduction in movements among habitat patches due to fragmentation of suitable habitat.	Local	Permanent/Irreversible	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible.	Local	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible.	Local	Medium-term/Reversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Collisions with project vehicles and equipment	Direct	Negative	Small increase in mortality after implementation of mitigation measures.	Local	Medium-term/Reversible	Infrequent	Possible	Not significant
Survival and Reproduction	Increase in public access	Direct	Negative	Negligible.	Local	Permanent/Irreversible	Infrequent	Unlikely	Not significant
Survival and Reproduction	Use of linear corridors and converted habitat	Direct	Negative	Small increase in mortality after implementation of mitigation measures.	Local	Permanent/Irreversible	Continuous	Probable	Not significant

ha = hectare; LSA = local study area.

6.5.8.3 Gray Fox

6.5.8.3.1 Habitat Availability

Habitat Loss

Effects on gray fox habitat availability from direct habitat loss of moderate to high suitability habitat are certain (Table 6.5-43). Mitigation is expected to reduce effects on gray fox habitat availability; however, direct loss of approximately 2,345 ha (3.0% of the gray fox LSA and 0.9% of the terrestrial RSA) of moderate to high suitability gray fox habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of gray fox habitat availability until suitable vegetation communities regenerate (grasslands and meadows). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of gray fox habitat availability and is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on gray fox habitat availability caused by the Project. The effects of habitat loss are predicted to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and, gray fox have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features.

Sensory Disturbance

Effects on gray fox habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-43). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on gray fox habitat availability are predicted to be small, as gray fox have been shown to be tolerant of anthropogenic disturbance.

6.5.8.3.2 Habitat Distribution

Habitat Loss

Effects on gray fox habitat distribution from direct habitat loss of moderate to high suitability gray fox habitat are probable, not certain (Table 6.5-43). The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing corridors). The effects of habitat loss on local gray fox movements or connectivity in the RSA are considered to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and, gray fox have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features. Mitigation is expected to reduce effects on gray fox habitat distribution; however, a small reduction in movements among habitat patches may occur. Effects would occur continuously and permanently at the local scale.

6.5.8.3.3 Survival and Reproduction

Habitat Loss

Effects on gray fox survival and reproduction from direct habitat loss of moderate to high suitability gray fox habitat are unlikely (Table 6.5-43). Although the Project will remove 2,345 ha of moderate to high suitability habitat in the LSA this is unlikely to have a measurable effect on gray fox survival and reproduction as this is the equivalent of approximately seven home ranges, but impacts will be spread out along the LSA. The effect is determined to be of negligible magnitude and is not carried forward to the cumulative effects section. Effects would occur continuously at the local scale and would be permanent and irreversible.

Sensory Disturbance

Indirect effects from sensory disturbance from the Project on gray fox survival and reproduction are unlikely as increases in gray fox movement rates caused by avoidance of humans are unlikely to have a measurable effect on the overall energy budget of foxes that are in good condition (Table 6.5-43). Any effect of sensory disturbance on gray fox survival and reproduction is predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. Effects would occur at the local scale.

Collisions with Project Vehicles and Equipment

Effects on gray fox survival and reproduction from collisions with vehicles and equipment are unlikely (Table 6.5-43). Mitigation implemented for the Project is predicted to limit direct mortality of gray fox from collision with Project vehicles relative to baseline characterization, however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered reversible over the medium-term because the largest risk to gray fox from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality to gray fox is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

The net effect is predicted to be negligible in magnitude and unlikely to occur; therefore, this interaction (reduced gray fox survival and/or reproduction from collisions with Project vehicles and equipment) is not carried forward to the cumulative effects assessment.

Incidental Take

Effects on gray fox survival and reproduction from incidental take are unlikely (Table 6.5-43). Mitigation implemented for the Project is predicted to limit direct mortality of denning gray fox during site preparation and construction of the Project. If construction activities were to take place in suitable gray fox habitat during the denning period (mid-February to mid July), then some incidental take may occur, but the effect is considered unlikely after mitigation. Incidental take of denning gray foxes from direct habitat loss would be restricted to the Project footprint but potential effects from disturbance to a den could occur at the local scale. This effect was considered to be infrequent because the mitigation is expected to be effective. Effects would be reversible after construction of the Project is completed (i.e., in the medium-term).

The net effect is predicted to be negligible in magnitude and unlikely to occur; therefore, this interaction (reduced gray fox survival and/or reproduction from collisions with Project vehicles and equipment) is not carried forward to the cumulative effects assessment.

Table 6.5-43: Characterization of Predicted Net Effects for Gray Fox

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.2)
Habitat Availability	Habitat loss	Direct	Negative	Direct loss of approximately 2,345 ha of moderate and high suitability habitat.	Local	Permanent/Irreversible	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Reduced quality of habitat and possible avoidance in the gray fox LSA from sensory disturbance during construction.	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Small reduction in movements among habitat patches.	Local	Permanent/Irreversible	Continuous	Certain	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible.	Local	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible.	Local	Medium-term/Reversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Collisions with Project Vehicles and Equipment	Direct	Negative	Negligible.	Project Footprint	Medium-term/Reversible	Infrequent	Unlikely	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Negligible.	Local	Medium-term/Reversible	Infrequent	Unlikely	Not significant

ha = hectare; LSA = local study area.

6.5.8.4 Furbearers (Gray Wolf)

6.5.8.4.1 Habitat Availability

Habitat Loss

Effects on gray wolf habitat availability from direct habitat loss due the Project are unlikely as this species is a habitat generalist. Any effect would occur continuously at the local scale and would be irreversible, even though some habitat may be restored if the Project were retired in the future.

The net effect is predicted to be negligible in magnitude and unlikely to occur; therefore, this interaction (reduced gray wolf habitat availability from direct habitat loss) is not carried forward to the cumulative effects assessment.

Sensory Disturbance

Effects on gray wolf habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some packs and individuals may adapt or already be adapted to sensory disturbance (Table 6.5-44). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on gray wolf habitat availability are predicted to be small, as gray wolf have been shown to be somewhat tolerant of anthropogenic disturbance.

6.5.8.4.2 Habitat Distribution

Habitat Loss

Effects on gray wolf habitat availability from direct habitat loss are not expected, as this species is highly mobile and the Project is not expected to act as barrier to gray wolf movements. The net effect is predicted to be negligible in magnitude and unlikely to occur; therefore, this interaction (changes to gray wolf habitat distribution from direct habitat loss) is not carried forward to the cumulative effects assessment.

6.5.8.4.3 Survival and Reproduction

Habitat Loss

Effects on gray wolf survival and reproduction from direct habitat loss of habitat are unlikely (Table 6.5-44). Wolves are habitat generalists and the small amount of vegetation removal by the Project is unlikely to have a measurable effect on gray wolf survival and reproduction. The effect is determined to be of negligible magnitude and is not carried forward to the cumulative effects section. Effects would occur continuously at the local scale and would be permanent and irreversible.

Sensory Disturbance

Indirect effects from sensory disturbance from the Project on gray wolf survival and reproduction are unlikely as increases in gray wolf movement rates caused by avoidance of humans are unlikely to have a measurable effect on the overall energy budget of wolves that are in good condition (Table 6.5-44). Any effect of sensory disturbance on gray wolf survival and reproduction is predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. Effects would occur at the local scale.

Collisions with Project Vehicles and Equipment

Mitigation implemented for the Project was predicted to limit direct mortality of wolf from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur and therefore the magnitude of the effect on wolf populations was predicted to be negligible. The effect was considered to be reversible over the short-term because the largest risk to wolf from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation phase were considered unlikely because the frequency, speed and number of vehicles will be low. Injury or mortality to gray wolf was predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Overall, collision with Project vehicles was predicted to have a net effect of negligible magnitude on gray wolf survival and would be rare and unlikely to occur. Therefore, this effect (reduced gray wolf survival and/or reproduction from collisions with Project vehicles) is not carried forward to the cumulative effects assessment.

Incidental Take

Mitigation implemented for the Project was predicted to limit direct mortality of denning wolves during site preparation and construction of the Project. Adverse effects of incidental take can be completely avoided if site preparation occurs outside the gray wolf denning period from May to July. If construction activities were to take place in suitable gray wolf denning habitat during the denning period, then some incidental take may occur but the effect was considered unlikely (i.e., possible likelihood of occurrence), after mitigation. Incidental take of denning gray wolves from direct habitat loss would be restricted to the Project footprint but potential effects from disturbance to a den could occur at the local scale. This effect was considered to be infrequent because the mitigation is expected to be effective.

Overall, incidental take is predicted to have a net effect of negligible magnitude on gray wolf survival and reproduction. Because the effect is predicted to be of negligible magnitude, rare, and unlikely to occur, this interaction (reduced gray wolf survival and/or reproduction from destruction during denning) is not carried forward to the cumulative effects assessment.

Table 6.5-44: Characterization of Predicted Net Effects for Gray Wolf

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.3)
Habitat Availability	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Unlikely	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low magnitude - Reduced quality of habitat and possible avoidance.	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Unlikely	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term/Reversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Vehicle collisions	Direct	Negative	Negligible	Project footprint	Medium-term/Reversible	Infrequent	Unlikely	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Negligible	Local	Medium-term/Reversible	Infrequent	Unlikely	Not significant

6.5.8.5 Furbearers (American Marten)

6.5.8.5.1 Habitat Availability

Habitat Loss

Effects on marten habitat availability from direct habitat loss of moderate to high suitability habitat are certain (Table 6.5-45). Mitigation is expected to reduce effects on marten habitat availability; however, direct loss of approximately 858 ha (2.53% change) of moderate to high suitability marten habitat is predicted to result from the Project. Direct loss of marten habitat is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Linear features such as roads and transmission lines may alter movements by marten due to the effects of habitat fragmentation. The extent to which forest openings affect marten movement and connectivity is largely unknown. It is generally accepted that marten avoid travelling through large expanses of open habitat and that over 5 km of treeless land acts as an effective barrier to marten dispersal (Buskirk and Ruggiero 1994). Some studies indicate that marten avoid linear disturbances such as seismic lines (Tigner et al. 2015) and access roads (Robitaille and Aubry 2000), while others found that marten movement is not impeded by resource roads, trails, and paved highways (Coffin et al. 2002). The ROW will be typically 46 m wide, however, a large portion of the ROW will generally parallel existing transmission lines. Where sections of the lines are adjacent, the effective ROW may be over 100 m wide and may limit local movements of marten.

Sensory Disturbance

Direct effects of sensory disturbance were predicted to reduce the quality of marten habitat in the wildlife and wildlife habitat LSA such that moderate or high-quality habitat may be avoided by marten. This effect was assessed as probable during construction when sensory disturbance will be greatest. Inspection and maintenance of the ROW during the operation phase may also result in sensory disturbance, but such events are expected to be infrequent, isolated, temporary and within the range of natural variation at baseline characterization where the ROW parallels existing disturbance, resulting in no predicted net effect on marten habitat during the operation phase. Individual marten that avoid suitable habitat during construction due to temporary sensory disturbance were predicted to reoccupy the habitat once the disturbance is removed. Therefore, the effects of sensory disturbance were characterized as reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, nighttime work may be required to make up for delays.

The effects of sensory disturbance on marten habitat availability are predicted to be small, as individuals with home ranges that overlap the Project footprint may currently be habituated to sensory disturbance due to the presence of Highway 11 and Highway 17 which parallel a large portion of the Project footprint.

6.5.8.5.2 Habitat Distribution

Habitat Loss

During the construction phase, the ROW will be removed of vegetation, which may permanently alter marten use of moderate and high suitability habitat, except in areas where forest cover is allowed to regenerate (i.e., temporary access, construction camps and laydown yards). Connectivity of marten habitat and populations is likely already limited by the existing highways and may be further reduced with the Project. However, marten are strong dispersers and habitat connectivity in the marten RSA is not predicted to be measurably decreased compared to baseline characterization.

6.5.8.5.3 Survival and Reproduction

Habitat Loss

Effects on American marten survival and reproduction from direct habitat loss of habitat are unlikely (Table 6.5-45). Wolves are habitat generalists and the small amount of vegetation removal by the Project is unlikely to have a measurable effect on marten survival and reproduction. The effect is determined to be of negligible magnitude and is not carried forward to the cumulative effects section. Effects would occur continuously at the local scale and would be permanent and irreversible.

Sensory Disturbance

Indirect effects from sensory disturbance from the Project on marten survival and reproduction are unlikely as increases in marten movement rates caused by avoidance of humans are unlikely to have a measurable effect on the overall energy budget of marten that are in good condition (Table 6.5-45). Any effect of sensory disturbance on gray wolf survival and reproduction is predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, nighttime work may be required to make up for delays. Effects would occur at the local scale.

Collisions with Project Vehicles and Equipment

Mitigation implemented for the Project was predicted to limit direct mortality of marten from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur and therefore the magnitude of the effect on marten populations was predicted to be negligible. The effect was considered to be reversible over the short-term because the largest risk to marten from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation phase were considered unlikely because the frequency, speed and number of vehicles will be low. Injury or mortality to marten was predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Overall, collision with Project vehicles was predicted to have a net effect of negligible magnitude on marten survival and would be rare and unlikely to occur. Therefore, this effect (reduced American marten survival and/or reproduction from collisions with Project vehicles) is not carried forward to the cumulative effects assessment.

Incidental Take

Mitigation implemented for the Project was predicted to limit direct mortality of denning marten during site preparation and construction of the Project. Adverse effects of incidental take can be completely avoided if site preparation occurs outside the marten denning period from May to July. If construction activities were to take place in suitable marten habitat during the denning period, then some incidental take may occur but the effect was considered unlikely, after mitigation. Incidental take of denning American marten from direct habitat loss would be restricted to the Project footprint but potential effects from disturbance to a den could occur at the local scale. This effect is considered to be infrequent because the mitigation is expected to be effective.

Overall, incidental take is predicted to have a net effect of negligible magnitude on marten survival and reproduction. Because the effect is predicted to be of negligible magnitude, rare, and unlikely to occur, this interaction (reduced American marten survival and/or reproduction from destruction during denning) is not carried forward to the cumulative effects assessment.

Table 6.5-45: Characterization of Predicted Net Effects for American Marten

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.4)
Habitat Availability	Habitat loss	Direct	Negative	Direct loss of approximately 858 ha of moderate and high suitability habitat (2.3% of the wildlife and wildlife habitat LSA baseline characterization; 0.7% of the marten RSA baseline characterization).	Local	Permanent/Irreversible	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Reduced quality of habitat and possible avoidance in the wildlife and wildlife habitat LSA from sensory disturbance during construction	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Small reduction in movements among habitat patches due to increased linear disturbance.	Local	Permanent/Irreversible	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Project Footprint	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term/Reversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Vehicle collisions	Direct	Negative	Negligible	Project Footprint	Medium-term/Reversible	Infrequent	Unlikely	Not significant
Survival and Reproduction	Incidental Take	Direct	Negative	Negligible	Local	Medium-term/Reversible	Infrequent	Unlikely	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.8.6 Furbearers (Beaver)

6.5.8.6.1 Habitat Availability

Habitat Loss

Effects on beaver habitat availability from direct loss of suitable habitat are certain (Table 6.5-46). Beaver habitat loss is mainly associated with the alteration of open water and adjacent predominantly deciduous forest stands. Some areas of the Project footprint may return to moderately suitable beaver habitat after construction because shrubby willow habitats near water features can establish relatively quickly. Moderate and high suitability habitats for beaver include early regenerating ecosites, so functional upland foraging habitat is expected to return in 6 to 20 years following the end of the construction phase for temporarily disturbed areas (i.e., minimum duration of habitat loss is approximately 39 years following the start of construction). At least 40 years from the end of the Construction Stage would be required for mature forest trees to be established for use in lodges and dams.

While temporary infrastructure of the Project (e.g., laydown areas) would be reclaimed, vegetation communities anticipated to establish in these areas would likely not be representative of the upland forest ecosites not influenced by the Project; therefore, effects are conservatively considered permanent and irreversible. The project is not anticipated to extensively disturb wetland ecosystems (Section 6.4, Wetland Ecosystem Availability) in particular the open water areas of < 8 ha and the wetlands with more than 1% water cover. Hydro One would undertake progressive reclamation of areas no longer required for Project activities. Reclamation is predicted to reverse effects on disturbed ecosites and provide adequate material for the creation of productive soils, which would support the establishment and succession of vegetation communities with similar function to natural ecosystems not influenced by the Project.

Sensory Disturbance

Beaver have limited sensitivity to sensory disturbance and are not expected to experience additional decreases in functional habitat due to the presence of humans, Project infrastructure, and the associated noise and lights. This effect is predicted to be negligible and is not carried forward to the cumulative effects assessment.

6.5.8.6.2 Habitat Distribution

Habitat Loss

The distribution of high and moderate suitability habitat in the LSA and RSA remains largely unchanged as a result of the Project because areas of concentrated high and moderate suitability beaver habitat are not affected by the Project footprint (Attachment 6.5-B-3, in Appendix 6.5-B). Low suitability habitat is also largely unchanged relative to existing environment conditions. Anthropogenic linear features have not been found to decrease the likelihood of occurrence or distribution of beaver (Mumma et al. 2018).

Considering the information on beaver activity in the LSA and RSA, the mobility of beaver, the extensive network of available waterbodies and watercourses, and the small magnitude and site-specific nature of beaver habitat loss, it is unlikely that the Project would cause a measurable change in beaver movement patterns at the local or regional scales. The Project is not expected to introduce movement barriers that would impede dispersal within or across the LSA or RSA. This interaction is considered negligible and is not carried forward to the cumulative effects assessment.

6.5.8.6.3 Survival and Reproduction

Habitat Loss

Changes to beaver survival and reproduction, due to alterations to the amount, quality, distribution, and connectivity of habitats are expected to be small and reversible. Habitat is not considered limiting for beavers as they can exploit different types of landscapes by modifying the environment. Specifically, beavers can build dams to increase the suitability of their habitats. Habitat loss from the Project is unlikely to have a measurable effect on the beaver population in the RSA. This interaction is considered negligible and is not carried forward to the cumulative effects assessment.

Sensory Disturbance

Beaver have limited sensitivity to sensory disturbance and are not expected to experience survival and reproduction due to the presence of humans, Project infrastructure, and the associated noise and lights. This interaction is considered negligible and is not carried forward to the cumulative effects assessment.

Increase in Public Access

Effects on beaver survival and reproduction from increase in public access particularly trappers, are possible (Table 6.5-46). Mitigation implemented for the Project are predicted to limit mortality of beaver from trapping relative to baseline characterization; however, the risk cannot be eliminated because public access is predicted to increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. Injury or mortality of beaver will be restricted to the LSA. The effect was considered permanent (for the life of the Project) and infrequent with the implementation of effective mitigation. This interaction is considered negligible and is not carried forward to the cumulative effects assessment.

Table 6.5-46: Characterization of Predicted Net Effects for Beaver

Indicators	Net Effect	Direct / Indirect	Direction	Magnitude	Geographic Extent	Duration/Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.6)
Habitat Availability	Habitat loss	Direct	Negative	Direct loss of 469 ha of moderate and high suitability habitat (3.6% of the LSA and 1.2% of the RSA Baseline Characterization).	Local	Permanent/Irreversible	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Negligible	Local	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent/Irreversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term/Reversible	Continuous	Unlikely	Not significant
Survival and Reproduction	Increase in public access	Direct	Negative	Negligible	Local	Permanent/Irreversible	Infrequent	Possible	Not significant

% = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.8.7 Little Brown Myotis and Northern Myotis

6.5.8.7.1 Habitat Availability

Habitat Loss

Effects on little brown myotis and northern myotis habitat availability from direct loss of maternity roost habitat are certain (Table 6.5-47). Mitigation (such as the reclamation of temporary access roads and laydown areas) is expected to reduce effects on little brown myotis and northern myotis habitat availability; however, direct loss of approximately 1,433 ha of maternity roost habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of little brown myotis and northern myotis habitat availability. The loss of maternity roost habitat is assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on little brown myotis and northern myotis habitat availability caused by the Project. Suitable maternity roost habitat for these species is abundant and widespread in the region and is not considered a limiting factor for the sustainability of their populations. Additionally, little brown myotis and northern myotis have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features. The effects of habitat loss are predicted to be small.

Sensory Disturbance

Effects on little brown myotis and northern myotis habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather then certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-47). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), nighttime work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on little brown myotis and northern myotis habitat availability are predicted to be small, as these species have been shown to be tolerant of anthropogenic disturbance.

6.5.8.7.2 Habitat Distribution

Habitat Loss

Effects on little brown myotis and northern myotis habitat distribution from direct habitat loss of maternity roost habitat are certain (Table 6.5-47). Mitigation is expected to reduce effects on little brown myotis and northern myotis habitat distribution; however, a reduction in the spatial extent of maternity roost habitat patches due to loss of approximately 1,433 ha of suitability habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation, which will permanently alter little brown myotis and northern myotis use of suitable habitat. Areas that do not regenerate back to suitable ecosites will result in the changes to habitat distribution and is assumed to be continuous and permanent at the local scale.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forest and grasslands). The effects of habitat loss on local little brown myotis and northern myotis movements or connectivity among populations within or adjacent to Ontario are considered to be low as little brown myotis and northern myotis are highly mobile, volant species, and have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features.

6.5.8.7.3 Survival and Reproduction

Habitat Loss

After mitigation measures, the Project is expected to have a neutral effect on the survival and reproduction of little brown myotis and northern myotis populations that overlap with the RSA due to direct maternity roost habitat loss (i.e., small changes in habitat availability and distribution are predicted to not influence population demographic rates). The likelihood of this effect is possible because there is some uncertainty in the effectiveness of mitigation measures if clearing of candidate maternity roost habitat is not completed entirely outside of the maternity roost period (May 1 to August 31).

Effects on little brown myotis and northern myotis survival and reproduction from direct loss of hibernation habitat are not expected to occur after mitigation measures are implemented.

Sensory Disturbance

Effects on little brown myotis and northern myotis survival and reproduction from sensory disturbance are considered to be probable (Table 6.5-47).

Sensory disturbance (lights, smells, noise, dust, human activity, corona related noise, implosion splicing, view scape) from the Project is expected to degrade little brown myotis and northern myotis maternity roosting habitat; however, the degree to which habitat would be avoided by little brown myotis and northern myotis is unknown and so the effect is considered to be probable to occur. Sensory disturbance could also result in roost abandonment. Any direct effect of sensory disturbance on little brown myotis and northern myotis survival and reproduction through an increase in chronic stress or roost abandonment is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect would be continuous over the medium term (reversible soon after end of construction and reclamation).

Collisions with Project Vehicles and Equipment

Effects on little brown myotis and northern myotis survival and reproduction from collisions with vehicles and equipment are possible (Table 6.5-47). Mitigation implemented for the Project is predicted to limit direct mortality of little brown myotis and northern myotis collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to little brown myotis and northern myotis from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed and number of vehicles will be low. Injury or mortality to little brown myotis and northern myotis is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on little brown myotis and northern myotis survival and reproduction from incidental take are possible. Mitigation implemented for the Project is predicted to eliminate direct mortality of these species during site preparation and construction of the Project. If tree clearing activities were to take place in suitable little brown myotis and northern myotis maternity roosting habitat during the maternity roosting period (May 1 to August 31), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of roosting little brown myotis and northern myotis will be restricted to the Project footprint and is considered to be infrequent because the mitigation is expected to be effective. No incidental take related to disturbance of hibernating bats is expected to occur because the mitigation is expected to be effective.

These mitigation policies and practices for construction activities are expected to avoid and limit incidental take of roosting or hibernating bats and result in negligible net effects to bats (Table 6.5-47).

Table 6.5-47: Characterization of Predicted Net Effects for Little Brown Myotis and Northern Myotis

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.6)
Habitat Availability	Habitat loss	Direct	Negative	Direct loss of approximately 1,433 ha of candidate maternity roost habitat.	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Reduced quality of roosting habitat and possible avoidance in the LSA from sensory disturbance during construction.	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Small reduction in the spatial distribution of habitat due to loss of approximately 1,433 ha of maternity roost habitat	Local	Permanent	Continuous	Certain	Not significant
Survival and Reproduction	Habitat loss	Direct	Neutral	Negligible	Local	Permanent	Continuous	Certain	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term/Reversible	Continuous	Probable	Not significant
Survival and Reproduction	Vehicle collisions	Direct	Negative	Negligible	Local	Medium-term/Reversible (Construction Stage) Long-term/Irreversible (Operation Stage)	Infrequent	Possible (Construction Stage) Unlikely (Operations Stage)	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Negligible	Project Footprint	Permanent/Irreversible	Infrequent	Unlikely (if all maternity roost habitat is cleared outside of the bat roosting period) Possible (if maternity roosting is cleared during the roosting period and site specific mitigation is not effective)	Not significant

ha = hectare; LSA = local study area.

6.5.8.8 Herpetofauna (Snapping Turtle and Spring Peeper)

6.5.8.8.1 Habitat Availability

Habitat Loss

Negative effects on herpetofauna habitat availability are certain from direct habitat loss and/or alteration to habitat are expected for the following candidate Significant Wildlife Habitat (SWH): 471 ha of Amphibian Breeding Habitat, 75 ha of Turtle Nesting Area, and 338 ha of Turtle Wintering Area. Areas that do not regenerate back to pre-construction conditions will result in the direct loss of herpetofauna habitat availability and is conservatively assumed to be continuous and permanent at the Project Footprint scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce and/or reverse the net effects on herpetofauna habitat availability caused by the Project. The effects of habitat loss are predicted to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and, herpetofauna are not habitat limited in the LSA.

Sensory Disturbance

Negative effects on herpetofauna habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered possible because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-48). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., Local Study Area). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (short-term). Sensory disturbance effects during construction are assumed to be frequent because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night-time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on herpetofauna habitat availability are predicted to be small, as herpetofauna have been shown to be tolerant of moderate levels anthropogenic disturbance.

6.5.8.8.2 Habitat Distribution

Habitat Loss

Negative effects from changes to herpetofauna habitat distribution due to direct habitat loss are expected to be possible, continuous, and permanent (Table 6.5-48). Mitigation is expected to reduce effects on herpetofauna habitat distribution; however, slight shifts in home range sizes and a small reduction in movements among habitat patches are predicted due to loss habitat from the Project. The effects from changes to habitat distribution would be small because herpetofauna are primarily local migrants.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, roads and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forested wetlands). Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of herpetofauna habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of herpetofauna populations that overlap the RSA.

Sensory Disturbance

Negative effects from changes to herpetofauna habitat distribution due to sensory disturbance are expected to be possible, frequent, and medium-term (Table 6.5-48). Only small shifts in herpetofauna home range sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of herpetofauna populations that overlap the RSA.

6.5.8.8.3 Survival and Reproduction

Habitat Loss

Negative effects on herpetofauna survival and reproduction from direct habitat loss and/or alteration to specialized habitat (i.e., amphibian breeding habitat, turtle nesting area, and turtle wintering habitat) are probable (Table 6.5-48). A small increase in mortality and/or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect herpetofauna survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, habitat clearing near active breeding, nesting, and/or wintering areas could result in abandonment and/or direct mortality. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on herpetofauna survival and reproduction resulting from habitat loss due to the Project (Table 6.5-48).

Sensory Disturbance

Negative effects on herpetofauna survival and reproduction from sensory disturbance are possible (Table 6.5-48). Sensory disturbance from the Project is expected to degrade specialized herpetofauna habitat. Consequently, herpetofauna are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Any direct effect of sensory disturbance on herpetofauna survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (short-term). Sensory disturbance effects during construction were assumed to be frequent because, although construction activities will typically occur during one 10-hour shift per day during daylight, nighttime work may be required to make up for delays. The effect was assessed as probable during construction though some individuals may adapt to the sensory disturbance.

Incidental Take

Effects on herpetofauna survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-48). Mitigation implemented for the Project is predicted to limit direct mortality of herpetofauna during site preparation and construction of the Project. If construction activities were to take place in suitable herpetofauna habitat during the active or overwintering periods, then some incidental take may occur, but the effect is considered unlikely after mitigation. Incidental take of herpetofauna will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Collisions with Project Vehicles and Equipment

Negative effects on herpetofauna survival and reproduction from collisions with vehicles and equipment are expected to be certain (Table 6.5-48). Mitigation implemented for the Project is predicted to limit direct mortality of herpetofauna from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of individuals over the life of the Project is likely to occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to herpetofauna from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality to herpetofauna is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be reasonably effective.

Table 6.5-48: Characterization of Net Effects for Herpetofauna

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.7)
Habitat Availability	Habitat loss	Direct	Negative	Low. Direct loss of 523 ha of Amphibian Breeding Habitat , 71 ha of Turtle Nesting Area , and 367 ha of Turtle Wintering Area).	Project Footprint	Permanent, but reversible if areas regenerate with suitable habitat	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Behavioural avoidance of habitat avoidance due to increased sensory disturbance.	Local Study Area	Short-term, and reversible	Frequent	Possible (construction phase)	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Negligible	Local Study Area	Permanent, but reversible if areas regenerate with suitable habitat	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Negligible.	Local Study Area	Medium-term, and reversible	Frequent	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local Study Area	Permanent, but reversible if areas regenerate with suitable habitat	Continuous	Probable	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Low. Reduced reproductive output due to increased sensory disturbance.	Local Study Area	Short-term, and reversible	Frequent	Possible	Not significant
Survival and Reproduction	Incidental Take	Direct	Negative	Negligible	Project Footprint	Permanent, but reduced after construction phase	Infrequent	Possible	Not significant
Survival and Reproduction	Vehicle collisions	Direct	Negative	Low. Increased mortality of individuals over the life of the Project.	Project Footprint	Permanent, but reduced after construction phase	Frequent	Certain (construction phase) and possible (operation phase	Not significant

% = percent; < = less than; ha = hectare; LSA = local study area.

6.5.8.9 Raptors (Bald Eagle)

6.5.8.9.1 Habitat Availability

Habitat Loss

Effects on bald eagle habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-49). Mitigation is expected to reduce effects on bald eagle habitat availability; however, direct loss of approximately 1,835 ha of moderate to high suitability bald eagle habitat is predicted to result from the Project (2.7% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of bald eagle habitat availability.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on bald eagle habitat availability caused by the Project.

Sensory Disturbance

Effects on bald eagle habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-49). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent and temporary. The effects of sensory disturbance on bald eagle habitat availability are predicted to be small, as some bald eagles have been shown to adapt to anthropogenic disturbance.

6.5.8.9.2 Habitat Distribution

Habitat Loss

Effects from changes to bald eagle habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-49). Mitigation is expected to reduce effects on bald eagle habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of approximately 1,835 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because bald eagles are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forest). Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of bald eagle habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of bald eagle populations that overlap the RSA.

Sensory Disturbance

Effects from changes to bald eagle habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-49). Only small shifts in bald eagle territory sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of bald eagle populations that overlap the RSA.

6.5.8.9.3 Survival and Reproduction

Habitat Loss

Effects from changes to bald eagle survival and reproduction due to habitat loss would be possible, continuous, and permanent (Table 6.5-49). Direct effects of habitat loss on bald eagle survival and reproduction were predicted to be negative because 1,835 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect bald eagle survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the bald eagle LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on bald eagle survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of forest clearing on productivity of bald eagles with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundance (i.e., an estimated change of three individuals in the RSA).

Sensory Disturbance

Effects on bald eagle survival and reproduction from sensory disturbance are possible, continuous, and medium-term (Table 6.5-49). Sensory disturbance from the Project is expected to degrade moderate and high suitability bald eagle habitat. Consequently, bald eagles are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on bald eagle survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, nighttime work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-49).

Collisions with Project Vehicles and Equipment

Effects on bald eagle survival and reproduction from collisions with helicopters, vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-49). Mitigation implemented for the Project is predicted to limit direct mortality of bald eagles from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to bald eagle from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of bald eagles is predicted to be restricted to flight paths and roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on bald eagle survival and reproduction from electrocution and collisions with transmission lines and guy-wires are probable, continuous, and permanent (Table 6.5-49). Mitigation implemented for the Project is predicted to limit direct mortality of bald eagle from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because raptors are vulnerable due to their large wingspan and behaviour of perching and nesting on transmission structures. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on bald eagle survival and reproduction from increased predation risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-49). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on bald eagle survival and reproduction during site preparation and construction of the Project. Increased predation of bald eagle nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective (Table 6.5-49).

Incidental Take

Effects on bald eagle survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-49). Mitigation implemented for the Project is predicted to limit direct mortality of nesting bald eagles during site preparation and construction of the Project. If construction activities were to take place in suitable bald eagle habitat during the critical breeding period (March 1 to August 31), then some incidental take may occur, but the effect is considered unlikely after mitigation. Incidental take of nesting bald eagles will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective. Furthermore, the locations of 14 bald eagle nests in the LSA are known and can be avoided (see Attachment 6.5-B-19 in Appendix 6.5-B), and in general, large stick nests are predicted to have a lower risk of incidental take given that they are more easily observed (compared to small songbird nests). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-49).

Table 6.5-49: Characterization of Predicted Net Effects for Bald Eagle

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.8)
Habitat Availability	Habitat loss	Direct	Negative	Low. Direct loss of 1,835 ha of moderate to high suitability habitat (2.7% of available habitat within the LSA).	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting and roosting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes or locations due to loss of 1,835 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Low. Reduction in predicted abundance by three individuals compared to baseline characterization.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible (construction phase)	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Probable	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat.	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Negligible	Local	Permanent	Infrequent	Possible	Not significant

~ = approximately; % = percent; ha = hectare; LSA = local study area.

6.5.8.10 Marshbirds (Trumpeter Swan)

6.5.8.10.1 Habitat Availability

Habitat Loss

Effects on trumpeter swan habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-50). Mitigation is expected to reduce effects on trumpeter swan habitat availability; however, direct loss of approximately 375 ha of moderate to high suitability trumpeter swan habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of trumpeter swan habitat availability, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on trumpeter swan habitat availability caused by the Project.

Overall, the loss of approximately 375 ha of moderate to high suitability trumpeter swan habitat is predicted to have minimal influence on habitat availability (i.e., an estimated loss of 1.2% within the LSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-50).

Sensory Disturbance

Effects on trumpeter swan habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-50). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on trumpeter swan habitat availability are predicted to be small, as some trumpeter swans have been shown to adapt to anthropogenic disturbance.

Dust, Air Emissions, and Depositions

Effects on trumpeter swan habitat availability from dust, air emissions, and depositions are considered possible, frequent, and short-term (Table 6.5-50). Construction activities associated with the Project have the potential to have a direct negative effect that will temporarily affect local air quality in the immediate vicinity of the Project. Air and dust emissions, and subsequent deposition can change soil quality and alter vegetation and wetlands, which can negatively influence wildlife habitat availability. With effective implementation of mitigation, deposition of dust, and air emissions are predicted to result in small but measurable changes in ecosystems immediately adjacent to construction areas. Therefore, dust and air emissions were likewise predicted to have a negative net effect of negligible magnitude on trumpeter swan habitat in the wildlife and wildlife habitat LSA relative to baseline characterization. The effect is assessed as indirect and frequent during construction, and reversible during operation (short-term) when site preparation and clearing, and large numbers of heavy equipment and light vehicles are no longer required. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-50).

6.5.8.10.2 Habitat Distribution

Habitat Loss

Effects from changes to trumpeter swan habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-50). Mitigation is expected to reduce effects on trumpeter swan habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of approximately 375 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because trumpeter swans are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing transmission line ROWs). Vegetation removal for the Project and access roads can generate habitat fragmentation of preferred habitats (i.e., wetlands). Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of trumpeter swan habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of trumpeter swan populations that overlap the RSA.

Given the minimal loss of available habitat (1.2%) within the LSA, fragmentation due to the Project is not expected to affect the connectivity of trumpeter swan populations that overlap the RSA. Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-50).

Sensory Disturbance

Effects from changes to trumpeter swan habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-50). Only small shifts in trumpeter swan territory sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of trumpeter swan populations that overlap the RSA.

6.5.8.10.3 Survival and Reproduction

Habitat Loss

Effects from changes to trumpeter swan survival and reproduction due to habitat loss would be possible, continuous, and permanent (Table 6.5-50). Direct effects of habitat loss on trumpeter swan survival and reproduction were predicted to be negative because 375 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect trumpeter swan survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the trumpeter swan LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on trumpeter swan survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of trumpeter swan with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundance (i.e., an estimated change of <0.05 individual in the RSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-50).

Sensory Disturbance

Effects on trumpeter swan survival and reproduction from sensory disturbance are possible, continuous, and medium-term (Table 6.5-50). Sensory disturbance from the Project is expected to degrade moderate and high suitability trumpeter swan habitat. Consequently, trumpeter swans are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on trumpeter swan survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-50).

Collisions with Project Vehicles and Equipment

Effects on trumpeter swan survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-50). Mitigation implemented for the Project is predicted to limit direct mortality of trumpeter swans from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term- because the largest risk to trumpeter swan from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of trumpeter swans is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on trumpeter swan survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous, and permanent (Table 6.5-50). Mitigation implemented for the Project is predicted to limit direct mortality of trumpeter swan from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because swans are vulnerable due to their large wingspan. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on trumpeter swan survival and reproduction from increased predation risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-50). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on trumpeter swan survival and reproduction during site preparation and construction of the Project. Increased predation of trumpeter swan nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on trumpeter swan survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-50). Mitigation implemented for the Project is predicted to limit direct mortality of nesting trumpeter swans during site preparation and construction of the Project. If construction activities were to take place in suitable trumpeter swan habitat during the nesting period (mid-April to late August), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of nesting trumpeter swans will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective. Furthermore, the location of one trumpeter swan nest in the LSA is known and can be avoided (see Attachment 6.5-B-19 in Appendix 6.5-B).

Table 6.5-50: Characterization of Predicted Net Effects for Marshbirds (Trumpeter Swan)

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.9)
Habitat Availability	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat.	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Low. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Infrequent	Possible	Not significant

6.5.8.11 Songbirds (Canada Warbler, Eastern Wood-Pewee, Olive-sided Flycatcher)

6.5.8.11.1 Habitat Availability

Habitat Loss

Effects on Canada warbler habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-51). Mitigation is expected to reduce effects on Canada warbler habitat availability; however, direct loss of approximately 1,716 ha of moderate to high suitability Canada warbler habitat is predicted to result from the Project (i.e., an estimated loss of 2.4% within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of eastern wood-pewee habitat availability, even though some habitat may be restored if the Project were retired in the future.

Effects on eastern wood-pewee habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-51). Mitigation is expected to reduce effects on eastern wood-pewee habitat availability; however, direct loss of approximately 1,385 ha of moderate to high suitability eastern wood-pewee habitat is predicted to result from the Project (i.e., an estimated loss of 2.5% within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of eastern wood-pewee habitat availability.

Effects on olive-sided flycatcher habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-51). Mitigation is expected to reduce effects on olive-sided flycatcher habitat availability; however, direct loss of approximately 2,132 ha of moderate to high suitability olive-sided flycatcher habitat is predicted to result from the Project. (i.e., an estimated loss of 2.6% within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of eastern wood-pewee habitat availability.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on forest songbird habitat availability caused by the Project. Furthermore, habitat fragmentation may reduce the net effects on eastern wood-pewee and olive-sided flycatcher habitat availability (since these species use forest edge).

Sensory Disturbance

Effects on forest songbird habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-51). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on forest songbird habitat availability are predicted to be small, as some forest songbirds have been shown to adapt to anthropogenic disturbance.

6.5.8.11.2 Habitat Distribution

Habitat Loss

Effects from changes to forest songbird habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-51). Mitigation is expected to reduce effects on forest songbird habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of approximately 1,400 ha to 2,100 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because Canada warbler, eastern wood-pewee, and olive-sided flycatcher are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forest). Although some forest birds are reluctant to cross gaps, species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes.
Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of forest songbird habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations that overlap the RSA.

Sensory Disturbance

Effects from changes to forest songbird habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-51). Only small shifts in Canada warbler, eastern wood-pewee, and olive-sided flycatcher territory sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations that overlap the RSA.

6.5.8.11.3 Survival and Reproduction

Habitat Loss

Effects from changes to Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction due to habitat loss would be probable, continuous, and permanent (Table 6.5-51). Direct effects of habitat loss on Canada warbler, eastern wood-pewee and olive-sided flycatcher survival and reproduction were predicted to be negative because approximately

1,400 ha to 2,100 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect forest songbird survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the Canada warbler, eastern wood-pewee and olive-sided flycatcher LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on forest songbird survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of Canada warbler, eastern wood-pewee and olive-sided flycatcher with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of 17 Canada warblers, one eastern wood-pewee, and three olive-sided flycatchers in the RSA).

Sensory Disturbance

Effects on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction from sensory disturbance are probable, continuous, and medium-term (Table 6.5-51). Sensory disturbance from the Project is expected to degrade moderate and high suitability forest songbird habitat. Consequently, forest songbirds are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-51).

Collisions with Project Vehicles and Equipment

Effects on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-51). Mitigation implemented for the Project is predicted to limit direct mortality of forest songbirds from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to forest songbirds from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of forest songbirds is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous, and permanent (Table 6.5-51). Mitigation implemented for the Project is predicted to limit direct mortality of forest songbirds from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction from increased predation and nest parasitism risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-51). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on forest songbird survival and reproduction during site preparation and construction of the Project. Increased predation and/or parasitism of Canada warbler, eastern wood-pewee, and olive-sided flycatcher nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction from incidental take are probable, infrequent, and permanent (Table 6.5-51). If construction activities were to take place in suitable forest songbird habitat during the nesting period (mid April to late August). Incidental take of nesting Canada warblers, eastern wood-pewees, and olive-sided flycatchers will be restricted to the Project footprint.

Table 6.5-51: Characterization of Predicted Net Effects for Forest Songbirds (Canada Warbler, Eastern Wood-pewee, Olive-sided Flycatcher)

Indicators	Net Effect	Direct/Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.10)
Habitat Availability	Habitat loss	Direct	Negative	**Canada warbler** • Low. Direct loss of 1,716 ha of moderate to high suitability habitat (2.4% of available habitat within the LSA). **Eastern wood-pewee** • Low. Direct loss of 1,385 ha of moderate to high suitability habitat (2.5% of available habitat within the LSA). **Olive-sided flycatcher** • Low. Direct loss of 2,132 ha of moderate to high suitability habitat (2.6% of available habitat within the LSA).	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes or locations due to loss of approximately 1,400 ha to 2,100 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	**Canada warbler** • Low. Reduction in predicted abundance by 17 individuals compared to baseline characterization. **Eastern wood-pewee** • Low. Reduction in predicted abundance by one individual compared to baseline characterization. **Olive-sided flycatcher** • Low. Reduction in predicted abundance by three individuals compared to baseline characterization.	Local	Permanent	Continuous	Probable	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Probable	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant

Indicators	Net Effect	Direct/Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.10)
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Moderate. Reduced survival and/or reproduction due to increased nest parasitism and/or predation risk associated with increased edge habitat.	Local	Permanent	Frequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Moderate. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Frequent	Probable	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.8.12 Bank Swallow

6.5.8.12.1 Habitat Availability

Habitat Loss

Effects on bank swallow habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-52). Mitigation is expected to reduce effects on bank swallow habitat availability; however, direct loss of approximately 218 ha of moderate to high suitability bank swallow habitat is predicted to result from the Project (2.8% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of bank swallow habitat availability until suitable ecosite cover regenerates (open meadow foraging habitat). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of bank swallow habitat availability and is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on bank swallow habitat availability caused by the Project. Furthermore, habitat fragmentation may reduce the net effects on bank swallow habitat availability (since this species forages in open areas).

Sensory Disturbance

Effects on bank swallow habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-52). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on bank swallow habitat availability are predicted to be small, as bank swallows have been shown to adapt to anthropogenic disturbance and commonly nest in artificial sites.

6.5.8.12.2 Habitat Distribution

Habitat Loss

Effects from changes to bank swallow habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-52). Mitigation is expected to reduce effects on bank swallow habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of 218 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because bank swallow is highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can generate habitat fragmentation. Although some birds are reluctant to cross gaps, some species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes and swallows often forage more than 1 km from their nest sites. Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of bank swallow habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of bank swallow populations that overlap the RSA.

Sensory Disturbance

Effects from changes to bank swallow habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-52). Only small shifts in bank swallow territory sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of bank swallow populations that overlap the RSA.

6.5.8.12.3 Survival and Reproduction

Habitat Loss

Effects from changes to bank swallow survival and reproduction due to habitat loss would be probable, continuous, and permanent (Table 6.5-52). Direct effects of habitat loss on bank swallow survival and reproduction were predicted to be negative because 218 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect bank swallow survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the bank swallow LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on bank swallow survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of bank swallow with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of <1 bank swallow in the RSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-52).

Sensory Disturbance

Effects on bank swallow survival and reproduction from sensory disturbance are probable, continuous, and medium-term (Table 6.5-52). Sensory disturbance from the Project is expected to degrade moderate and high suitability bank swallow habitat. Consequently, bank swallows are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on bank swallow survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-52).

Collisions with Project Vehicles and Equipment

Effects on bank swallow survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-52). Mitigation implemented for the Project is predicted to limit direct mortality of bank swallows from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to bank swallows from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed and number of vehicles will be low. Injury or mortality of bank swallows is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on bank swallow survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous, and permanent (Table 6.5-52). Mitigation implemented for the Project is predicted to limit direct mortality of bank swallows from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on bank swallow survival and reproduction from increased predation risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-52). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on bank swallow survival and reproduction during site preparation and construction of the Project. Increased predation of bank swallow nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on bank swallow survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-52). Mitigation implemented for the Project is predicted to limit direct mortality of nesting bank swallows during site preparation and construction of the Project. If construction activities were to take place in suitable bank swallow habitat during the nesting period (mid-April to late August), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of nesting bank swallows will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Table 6.5-52: Characterization of Predicted Net Effects for Bank Swallow

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.11)
Habitat Availability	Habitat loss	Direct	Negative	Low. Direct loss of 218 ha of moderate to high suitability habitat (2.8% of available habitat within the LSA). Including loss of 7 ha of protected habitat.	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes due to loss of 218 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Probable	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Probable	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Low. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Infrequent	Possible	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.8.13 Barn Swallow and Chimney Swift

6.5.8.13.1 Habitat Availability

Habitat Loss

Effects on barn swallow habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-53). Mitigation is expected to reduce effects on barn swallow habitat availability; however, direct loss of approximately 108 ha of moderate to high suitability barn swallow habitat is predicted to result from the Project (3.8% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of barn swallow habitat availability until suitable ecosite cover regenerates (open meadow foraging habitat). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of barn swallow habitat availability and is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Effects on chimney swift habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-53). Mitigation is expected to reduce effects on chimney swift habitat availability; however, direct loss of approximately 50 ha of moderate to high suitability chimney swift habitat is predicted to result from the Project (1.9% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of chimney swift habitat availability until suitable ecosite cover regenerates (open meadow foraging habitat). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of chimney swift habitat availability and is conservatively assumed to be continuous and permanent at the local scale.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on barn swallow and chimney swift habitat availability caused by the Project. Furthermore, habitat fragmentation may reduce the net effects on barn swallow and chimney swift habitat availability (since these species forage in open areas).

Sensory Disturbance

Effects on barn swallow and chimney swift habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered possible, rather than certain, because neither species was confirmed in the LSA and some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-53). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on barn swallow and chimney swift habitat availability are predicted to be small, as both species have been shown to adapt to anthropogenic disturbance and commonly nest in artificial sites.

6.5.8.13.2 Habitat Distribution

Habitat Loss

Effects from changes to barn swallow and chimney swift habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-53). Mitigation is expected to reduce effects on barn swallow and chimney swift habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of approximately 50 ha to 110 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because barn swallow and chimney swift are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can generate habitat fragmentation. Although some birds are reluctant to cross gaps, some species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes and swallows and swifts often forage more than 1 km from their nest sites. Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of barn swallow and chimney swift habitat in the LSA.

Sensory Disturbance

Effects from changes to barn swallow and chimney swift habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-53). Only small shifts in barn swallow and chimney swift territory sizes and locations due to sensory disturbance are predicted, given that both species have been shown to adapt to anthropogenic disturbance.

6.5.8.13.3 Survival and Reproduction

Habitat Loss

Effects from changes to barn swallow and chimney swift survival and reproduction due to habitat loss would be probable, continuous, and permanent (Table 6.5-53). Direct effects of habitat loss on barn swallow and chimney swift survival and reproduction were predicted to be negative because 50 ha to 110 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect barn swallow and chimney swift survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the barn swallow and chimney swift LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on barn swallow and chimney swift survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of barn swallow and chimney swift with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of <1 barn swallow and <1 chimney swift in the RSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-53).

Sensory Disturbance

Effects on barn swallow and chimney swift survival and reproduction from sensory disturbance are probable, continuous, and medium-term (Table 6.5-53). Sensory disturbance from the Project is expected to degrade moderate and high suitability barn swallow and chimney swift habitat. Consequently, barn swallow and chimney swift are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on barn swallow and chimney swift survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-53).

Barn swallows and chimney swifts are not highly sensitive to sensory disturbance from human activities, as they primarily nest on anthropogenic structures such as buildings, culverts, and bridges. During construction, existing access roads or trails will be used as much as possible to limit the disturbance caused by new construction. Existing culverts will be repaired or replaced as appropriate. Pre-construction nest searches will be completed at culverts that need to be replaced or repaired.

Collisions with Project Vehicles and Equipment

Effects on barn swallow and chimney swift survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-53). Mitigation implemented for the Project is predicted to limit direct mortality of barn swallows and chimney swifts from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to barn swallow and chimney swift from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of barn swallows and chimney swifts is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on barn swallow and chimney swift survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous, and permanent (Table 6.5-53). Mitigation implemented for the Project is predicted to limit direct mortality of barn swallow and chimney swift from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on barn swallow and chimney swift survival and reproduction from increased predation risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-53). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on barn swallow and chimney swift survival and reproduction during site preparation and construction of the Project. Increased predation of barn swallow and chimney swift nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Given that both species primarily nest in anthropogenic structures, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-53).

Incidental Take

Effects on barn swallow and chimney swift survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-53). Mitigation implemented for the Project is predicted to limit direct mortality of nesting barn swallows and chimney swifts during site preparation and construction of the Project. If construction activities were to take place in suitable barn swallow and chimney swift habitat during the nesting period (mid April to late August), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of nesting barn swallows and chimney swifts will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Given that both species primarily nest in anthropogenic structures and that structures will be inspected for evidence of use prior to removal, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-53).

Table 6.5-53 Characterization of Predicted Net Effects for Barn Swallow and Chimney Swift

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.12)
Habitat Availability	Habitat loss	Direct	Negative	**Barn swallow** • Low. Direct loss of 108 ha of moderate to high suitability habitat (3.8% of available habitat within the LSA). **Chimney swift** • Low. Direct loss of 50 ha of moderate to high suitability habitat (1.9% of available habitat within the LSA).	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes due to loss of approximately 50 ha to 110 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	**Barn swallow** • Negligible **Chimney swift** • Negligible	Local	Permanent	Continuous	Probable	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Probable	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Negligible	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Negligible	Local	Permanent	Infrequent	Possible	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area.

6.5.8.14 Bobolink

6.5.8.14.1 Habitat Availability

Habitat Loss

Effects on bobolink habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-54). Mitigation is expected to reduce effects on bobolink habitat availability; however, direct loss of approximately 7 ha of moderate to high suitability bobolink habitat is predicted to result from the Project. During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of bobolink habitat availability until suitable ecosite cover regenerates (open meadow habitat). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of bobolink habitat availability and is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on bobolink habitat availability caused by the Project.

Overall, the loss of approximately 7 ha of moderate to high suitability bobolink habitat is predicted to have minimal influence on habitat availability (i.e., an estimated loss of 1.6% within the LSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-54).

Sensory Disturbance

Effects on bobolink habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered possible, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-54). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on bobolink habitat availability are predicted to be small, as direct loss of moderate to high suitability habitat for bobolink is minimal.

6.5.8.14.2 Habitat Distribution

Habitat Loss

Effects from changes to bobolink habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-54). Mitigation is expected to reduce effects on bobolink habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of approximately 7 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be minimal because bobolink are highly mobile and have adapted well to anthropogenic habitats (pastures, hayfields).

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can generate habitat fragmentation. Although some birds are reluctant to cross gaps, some species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes. Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of bobolink habitat in the LSA.

Given the minimal loss of available habitat (0.9%) within the LSA, fragmentation due to the Project is not expected to affect the connectivity of bobolink populations that overlap the RSA. Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-54).

Sensory Disturbance

Effects from changes to bobolink habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-54). Only small shifts in bobolink territory sizes and locations due to sensory disturbance are predicted.

6.5.8.14.3 Survival and Reproduction

Habitat Loss

Effects from changes to bobolink survival and reproduction due to habitat loss would be probable, continuous, and permanent (Table 6.5-54). Direct effects of habitat loss on bobolink survival and reproduction were predicted to be negative because 7 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect bobolink survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the bobolink LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on bobolink survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of bobolink with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of <1 bobolink in the RSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-54).

Sensory Disturbance

Effects on bobolink survival and reproduction from sensory disturbance are probable, continuous, and medium-term (Table 6.5-54). Sensory disturbance from the Project is expected to degrade moderate and high suitability bobolink habitat. Consequently, bobolink are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on bobolink survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-54).

Collisions with Project Vehicles and Equipment

Effects on bobolink survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-54). Mitigation implemented for the Project is predicted to limit direct mortality of bobolink from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to bobolink from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of bobolinks is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on bobolink survival and reproduction from electrocution and collisions with transmission lines are possible, continuous, and permanent (Table 6.5-54). Mitigation implemented for the Project is predicted to limit direct mortality of bobolink from electrocution and collisions with transmission lines relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on bobolink survival and reproduction from increased predation risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-54). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on bobolink survival and reproduction during site preparation and construction of the Project. Increased predation of bobolink nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on bobolink survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-54). Mitigation implemented for the Project is predicted to limit direct mortality of nesting bobolink during site preparation and construction of the Project. If construction activities were to take place in suitable bobolink habitat during the nesting period (mid April to late August), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of nesting bobolink will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Table 6.5-54: Characterization of Predicted Net Effects for Bobolink

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.13)
Habitat Availability	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Probable	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Probable	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Low. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Infrequent	Possible	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.8.15 Eastern Whip-poor-will

6.5.8.15.1 Habitat Availability

Habitat Loss

Effects on eastern whip-poor-will habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-55). Mitigation is expected to reduce effects on eastern whip-poor-will habitat availability; however, direct loss of approximately 2,754 ha of moderate to high suitability eastern whip-poor-will habitat is predicted to result from the Project (2.8% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the permanent loss of eastern whip-poor-will habitat availability, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on eastern whip-poor-will habitat availability caused by the Project. Furthermore, habitat fragmentation may reduce the net effects on eastern whip-poor-will habitat availability (since this species has been found to use transmission line ROWs and roads).

Sensory Disturbance

Effects on eastern whip-poor-will habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-55). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on eastern whip-poor-will habitat availability are predicted to be small, as some eastern whip-poor-will have been shown to adapt to anthropogenic disturbance.

6.5.8.15.2 Habitat Distribution

Habitat Loss

Effects from changes to eastern whip-poor-will habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-55). Mitigation is expected to reduce effects on eastern whip-poor-will habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of 2,754 ha of moderate and high suitability habitat from the Project. The effects from changes to habitat distribution would be small because eastern whip-poor-will are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads, and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation of preferred habitats (i.e., forest). Although some forest birds are reluctant to cross gaps, species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes.
Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of eastern whip-poor-will habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of eastern whip-poor-will populations that overlap the RSA.

Sensory Disturbance

Effects from changes to eastern whip-poor-will habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-55). Only small shifts in eastern whip-poor-will territory sizes and locations due to sensory disturbance are predicted. Furthermore, this species may shift territory locations to include areas of human disturbance (English et al. 2016). Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of eastern whip-poor-will populations that overlap the RSA.

6.5.8.15.3 Survival and Reproduction

Habitat Loss

Effects from changes to eastern whip-poor-will survival and reproduction due to habitat loss would be possible, continuous, and permanent (Table 6.5-55). Direct effects of habitat loss on eastern whip-poor-will survival and reproduction were predicted to be negative because 2,754 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect eastern whip-poor-will survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the eastern whip-poor-will LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on eastern whip-poor-will survival and reproduction resulting from habitat loss due to the Project. Furthermore, eastern whip-poor-will abundance has been found to be positively correlated with linear disturbance density in southern Ontario (English et al. 2016).

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of eastern whip-poor-will with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of <1 eastern whip-poor-wills in the RSA). This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-55).

Sensory Disturbance

Effects on eastern whip-poor-will survival and reproduction from sensory disturbance are possible, continuous, and medium-term (Table 6.5-55). Sensory disturbance from the Project is expected to degrade moderate and high suitability eastern whip-poor-will habitat. Consequently, eastern whip-poor-wills are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on eastern whip-poor-will survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-55).

Collisions with Project Vehicles and Equipment

Effects on eastern whip-poor-will survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-55). Mitigation implemented for the Project is predicted to limit direct mortality of eastern whip-poor-wills from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to eastern whip-poor-will from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of eastern whip-poor-wills is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on eastern whip-poor-will survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous and permanent (Table 6.5-55). Mitigation implemented for the Project is predicted to limit direct mortality of eastern whip-poor-wills from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on eastern whip-poor-will survival and reproduction from increased predation and nest parasitism risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-55). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on eastern whip-poor-will survival and reproduction during site preparation and construction of the Project. Increased predation and/or parasitism of eastern whip-poor-will nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on eastern whip-poor-will survival and reproduction from incidental take are probable, infrequent, and permanent (Table 6.5-55). Mitigation implemented for the Project is predicted to limit direct mortality of nesting eastern whip-poor-wills during site preparation and construction of the Project. If construction activities were to take place in suitable eastern whip-poor-will habitat during the nesting period (mid April to late August), then some incidental take may occur. Incidental take of nesting eastern whip-poor-wills will be restricted to the Project footprint.

Table 6.5-55: Characterization of Predicted Net Effects for Eastern Whip-poor-will

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.14)
Habitat Availability	Habitat loss	Direct	Negative	Low. Direct loss of 2,754 ha of moderate to high suitability habitat (3% of available habitat within the LSA). Including loss of 6 ha of protected habitat.	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes due to loss of 2,754 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat.	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Low. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Infrequent	Probable	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.8.16 Landbirds (Common Nighthawk)

6.5.8.16.1 Habitat Availability

Habitat Loss

Effects on common nighthawk habitat availability from direct habitat loss of moderate to high suitability habitat are certain and will be continuous and permanent at the local scale (Table 6.5-56). Mitigation is expected to reduce effects on common nighthawk habitat availability; however, direct loss of approximately 127 ha of moderate to high suitability common nighthawk habitat is predicted to result from the Project (1.9% of available habitat within the LSA). During the construction stage, the ROW will be removed of vegetation which will result in the temporary loss of common nighthawk habitat availability until suitable ecosite cover regenerates (open regenerating areas). However, areas that do not regenerate back to suitable ecosites will result in the direct loss of common nighthawk habitat availability and is conservatively assumed to be continuous and permanent at the local scale, even though some habitat may be restored if the Project were retired in the future.

Progressive reclamation will occur during construction and operation in habitats disturbed by temporary access roads, temporary laydown areas, and temporary construction camps. Reclamation in these areas would likely reduce the net effects on common nighthawk habitat availability caused by the Project. Furthermore, habitat fragmentation may reduce the net effects on common nighthawk habitat availability (as the ROW will provide open areas which may be suitable for common nighthawk).

Sensory Disturbance

Effects on common nighthawk habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some individuals may adapt or already be adapted to sensory disturbance (Table 6.5-56). Sensory disturbance will be limited in extent to areas of specific construction activities (i.e., local scale). Habitat loss from avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction are assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day (from 07:00 to 18:00), night time work may be required in some instances. Sensory disturbance from maintenance activities during operation is expected to be isolated, infrequent, and temporary. The effects of sensory disturbance on common nighthawk habitat availability are predicted to be small, as some common nighthawk have been shown to adapt to anthropogenic disturbance.

6.5.8.16.2 Habitat Distribution

Habitat Loss

Effects from changes to common nighthawk habitat distribution due to direct habitat loss would be possible, continuous, and permanent (Table 6.5-56). Mitigation is expected to reduce effects on common nighthawk habitat distribution; however, slight shifts in territory sizes and a small reduction in movements among habitat patches are predicted due to loss of 127 ha of moderate and high suitability habitat from the Project. During the construction phase, the ROW will be removed of vegetation, which may temporarily alter common nighthawk use of suitable habitat until suitable ecosite cover regenerates (open regenerating areas). However, areas that do not regenerate back to suitable ecosites will result in the changes to habitat distribution and is conservatively assumed to be continuous and permanent at the local scale. The effects from changes to habitat distribution would be small because common nighthawk are highly mobile.

The Project will be routed along existing disturbances as much as possible, and the corridors intersect areas that are already highly modified by linear disturbances (i.e., highways, access roads and existing transmission line ROWs). Forest clearing for the Project and access roads can open large forest tracts, generating habitat fragmentation. The effects of habitat loss on local common nighthawk movements or connectivity among populations are considered to be small, as a portion of the ROW is expected to regenerate back to suitable habitat and, common nighthawk have been shown to be tolerant of fragmented landscapes and anthropogenic disturbance, including linear utility features. Although some forest birds are reluctant to cross gaps, species do not show differences in movement patterns in fragmented versus unfragmented boreal landscapes. Habitat fragmentation due to clearing and construction activities associated with the Project would result in minimal changes to the existing distribution of common nighthawk habitat in the LSA. Therefore, fragmentation due to the Project is not expected to affect the connectivity of common nighthawk populations that overlap the RSA.

Sensory Disturbance

Effects from changes to common nighthawk habitat distribution due to sensory disturbance would be possible, continuous, and medium-term (Table 6.5-56). Only small shifts in common nighthawk territory sizes and locations due to sensory disturbance are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of common nighthawk populations that overlap the RSA.

6.5.8.16.3 Survival and Reproduction

Habitat Loss

Effects from changes to common nighthawk survival and reproduction due to habitat loss would be possible, continuous, and permanent (Table 6.5-56). Direct effects of habitat loss on common nighthawk survival and reproduction were predicted to be negative because 127 ha of moderate to high suitability habitat in the wildlife and wildlife habitat LSA will be removed due to the Project. A small increase in mortality or reduced reproductive capacity was considered possible among affected individuals. Habitat loss may in turn affect common nighthawk survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Additionally, vegetation removal near active nests could result in nest abandonment. An effect from changes to survival and reproduction as a result of habitat loss is predicted to be restricted to the common nighthawk LSA and to occur continuously through operations. The operation stage of the Project is considered to be indefinite and thus, for the purposes of this analysis, reduced survival and reproduction is conservatively assumed to be permanent and irreversible. However, reclamation is expected to likely reduce the net effects on common nighthawk survival and reproduction resulting from habitat loss due to the Project.

Following mitigation measures, potential reductions in survival and reproduction resulting from site clearing are possible because of uncertainty associated with the effects of vegetation removal on productivity of common nighthawk with home ranges that overlap with the LSA. However, the small changes in habitat availability and distribution are predicted to have minimal influence on population abundances (i.e., an estimated change of <1 common nighthawk in the RSA). Therefore, this net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-56).

Sensory Disturbance

Effects on common nighthawk survival and reproduction from sensory disturbance are possible, continuous, and medium-term (Table 6.5-56). Sensory disturbance from the Project is expected to degrade moderate and high suitability common nighthawk habitat. Consequently, common nighthawks are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Sensory disturbance could also result in nest abandonment. Any direct effect of sensory disturbance on common nighthawk survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (medium-term). Sensory disturbance effects during construction were assumed to be continuous because, although construction activities will typically occur during one 10-hour shift per day during daylight, night-time work may be required to make up for delays. The effect was assessed as possible during construction as some individuals may adapt to the sensory disturbance. Inspection and maintenance of the ROW during the operation and maintenance stage may also result in sensory disturbance, but such events will be infrequent, isolated, and temporary. This net effect is not carried forward to the cumulative effects assessment because the effect is predicted to be negligible in magnitude (Table 6.5-56).

Collisions with Project Vehicles and Equipment

Effects on common nighthawk survival and reproduction from collisions with vehicles and equipment are possible, infrequent, and medium-term (Table 6.5-56). Mitigation implemented for the Project is predicted to limit direct mortality of common nighthawks from collision with Project vehicles relative to baseline characterization; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the Project. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to common nighthawk from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low. Injury or mortality of common nighthawks is predicted to be restricted to roads associated with the Project footprint and to be infrequent because the mitigation is expected to be effective.

Electrocution and Collisions with the Transmission Line

Effects on common nighthawk survival and reproduction from electrocution and collisions with transmission lines and guy-wires are possible, continuous, and permanent (Table 6.5-56). Mitigation implemented for the Project is predicted to limit direct mortality of common nighthawks from electrocution and collisions with transmission lines and guy-wires relative to baseline characterization; however, adverse effects of electrocution and collision risk cannot be completely removed because small birds are vulnerable due to their behaviour of flying around and perching on transmission lines and nesting on transformer poles. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation. The effect is predicted to occur continuously and permanently at the local scale, as operations continue into for the foreseeable future.

Increase in Edge Habitat

Effects on common nighthawk survival and reproduction from increased predation and nest parasitism risk due to an increase in edge habitat are possible, infrequent, and permanent (Table 6.5-56). The Project will be routed along existing disturbance as much as possible and is predicted to result in a small increase in linear disturbance density relative to baseline characterization. Mitigation implemented for the Project is predicted to minimize the potential effects on common nighthawk survival and reproduction during site preparation and construction of the Project. Increased predation and/or parasitism of common nighthawk nests will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Incidental Take

Effects on common nighthawk survival and reproduction from incidental take are possible, infrequent, and permanent (Table 6.5-56). Mitigation implemented for the Project is predicted to limit direct mortality of nesting common nighthawks during site preparation and construction of the Project. If construction activities were to take place in suitable common nighthawk habitat during the nesting period (mid-April to late August), then some incidental take may occur but the effect is considered unlikely after mitigation. Incidental take of nesting common nighthawks will be restricted to the Project footprint and was considered to be infrequent because the mitigation is expected to be effective.

Table 6.5-56: Characterization of Predicted Net Effects for Common Nighthawk

Indicators	Net Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance (refer to discussion in Section 6.5.9.15)
Habitat Availability	Habitat loss	Direct	Negative	Low. Direct loss of 127 ha of moderate to high suitability habitat (1.9% of available habitat within the LSA).	Local	Permanent	Continuous	Certain	Not significant
Habitat Availability	Sensory disturbance	Direct	Negative	Low. Reduced quality of nesting habitat and possible avoidance due to increased sensory disturbance.	Local	Medium-term	Continuous	Probable	Not significant
Habitat Distribution	Habitat loss	Direct	Negative	Low. Slight shifts in territory sizes due to loss of 127 ha of moderate and high suitability habitat.	Local	Permanent	Continuous	Possible	Not significant
Habitat Distribution	Sensory disturbance	Direct	Negative	Low. Slight shifts in territory sizes or locations due to increased human disturbance.	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Habitat loss	Direct	Negative	Negligible	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Sensory disturbance	Direct	Negative	Negligible	Local	Medium-term	Continuous	Possible	Not significant
Survival and Reproduction	Vehicle collisions	Indirect	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Medium-term	Infrequent	Possible	Not significant
Survival and Reproduction	Electrocution and collisions with the transmission line	Direct	Negative	Low. Mortality of a few individuals over the life of the Project may occur.	Local	Permanent	Continuous	Possible	Not significant
Survival and Reproduction	Increase in edge habitat	Direct	Negative	Low. Reduced survival and/or reproduction due to increased predation risk associated with increased edge habitat.	Local	Permanent	Infrequent	Possible	Not significant
Survival and Reproduction	Incidental take	Direct	Negative	Low. Reduced survival and/or reproduction due to destruction of nests.	Local	Permanent	Infrequent	Probable	Not significant

% = percent; ha = hectare; LSA = local study area.

6.5.9 Assessment of Significance

For each wildlife criterion, an assessment of significance was made for the Project footprint in the Net Effects Assessment (combined effects of baseline characterization plus Project) and the Cumulative Effects Assessment (baseline characterization, Project, and RFDs).

Significance was determined based on combined effects because the effects of a single project infrequently cause an ecologically significant effect on their own (McCold and Saulsbury 1996), and many environmental effects of primary concern are cumulative (Canter and Ross 2010). Therefore, whether populations of wildlife criterion would remain self-sustaining and ecologically effective was assessed by combining the effects identified in the baseline characterization with the Net Effects Assessment and the Cumulative Effects Assessment to evaluate the total predicted combined effects. If a significant effect was identified, the contribution of the Project to the cumulative effects was described.

Significance was predicted as a binary response, with effects classified as significant or not significant (Section 4.5.5). Effects identified in the Net Effects Assessment and Cumulative Effects Assessment were determined to be significant if a criterion population is expected to no longer be: (1) self-sustaining, or (2) ecologically effective. Self-sustaining populations are healthy and viable populations, which are by definition robust and capable of withstanding environmental change and accommodating stochastic population processes (Reed et al. 2003). Maintaining viable populations is a conservation target frequently applied by conservation biologists and resource managers (Fahrig 2001, Nicholson et al. 2006, Ruggiero et al. 1994, With and Crist 1995). The goal of Ontario's Cervid Ecological Framework is to make sure ecologically sustainable cervid (e.g., moose) populations and the ecosystems on which they rely, for the cultural and socioeconomic benefits of people (MNR 2009). Similarly, forestry operators apply landscape scale management practices as part of their FMPs to retain specific wildlife habitat (e.g., for moose, marten) capable of supporting healthy wildlife populations.

Achieving viable populations may not be sufficient to meet conservation objectives for other species or ecosystems that interact with the criteria being assessed (Soulé et al. 2005). For highly interactive wildlife criteria that have strong effects on ecosystem structure and function, the concept of ecologically effective populations was applied. An ecologically effective population differs from a self-sustaining population if the number of individuals needed to maintain ecological function is greater than the number required to maintain a viable population for the long term. Self-sustaining populations can also lose ecological function if animal behaviour changes. Specifically:

- A criterion population was considered to be no longer self-sustaining where cumulative net effects were expected to place the abundance of a criterion, whether an open or closed population, on a declining trajectory that is not predicted to recover or stabilize. Part of being self sustaining, in this context, was that a criterion population that stabilizes at a lower abundance is not expected to be extirpated because of unrelated stochastic events. Another part of being self sustaining was the assumption that no additional mitigation measures beyond the proposed Project mitigation measures strategies and existing management strategies in the region would be required. Effects that are not significant could result in no change, stabilization at lower abundance, stabilization at higher abundance, or a temporary decline followed by recovery. Even where populations remain stable, fragmentation effects that cause populations to become isolated or substantially disconnected (e.g., severely reducing or eliminating gene flow and/or demographic rescue within one regional or metapopulation or between two or more local populations) may also be considered significant.

- A criterion population that has lost important ecological function would also result in determination of a significant negative effect, regardless of its self-sustaining status. Loss of ecological function occurs when a population can no longer perform its ecological role, such that it might 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 criteria that have important ecological effects on other species, such as predators or species that provide abundant protein and energy for predators and scavengers (e.g., moose).

6.5.9.1 Moose

Moose are primarily threatened by direct and indirect habitat loss (Street et al. 2015a), altered predator prey relationships (Dussault et al. 2005; Street et al. 2015a), and hunting (Timmermann et al. 2002). Past and existing activities in the baseline characterization have likely negatively affected habitat availability, habitat distribution, and survival and reproduction of moose in the RSA. In addition, the abundance of water in the terrestrial LSA and moose RSA has limited the availability of habitat for moose in the baseline characterization of the study areas. As a result, moderate to high suitability moose habitat covers approximately 46% of the terrestrial LSA and 47% of the moose RSA at baseline characterization. Additionally, aerial surveys conducted in the WMUs that overlap the moose RSA indicate moose populations are declining, and estimated population densities are mostly below the MNRF’s desired population objectives. Based on the above information, moose populations that overlap the RSA may not be self-sustaining and ecologically effective at baseline characterization.

The amount of habitat loss from the Project footprint is approximately 4.2% of moderate to high suitability moose habitat in the terrestrial LSA and 0.1% of moderate to high suitability moose habitat in the moose RSA, relative to the baseline characterization. This is a precautionary estimate because it assumes complete habitat loss for ROW. In reality, ROWs may provide suitable habitat for moose within two years after construction is completed because early and mid-successional vegetation communities are maintained in the ROWs. Furthermore, progressive reclamation will be implemented at temporary access roads, laydown and staging areas, and temporary construction camps.

Access roads required for construction of the Project may provide easier access for predators. Moose predation risk may also increase because moose may be attracted to the regenerating vegetation in the ROW. Changes to moose survival and reproduction from construction of access roads and the ROW will be limited by using existing access roads as much as possible.

Moose are considered to be resilient to changes in habitat distribution because they are highly mobile, are able to eat many types of plants, and can adapt to fragmented landscapes. Moreover, effective implementation of mitigation is expected to reduce the magnitude of habitat loss from the Project. The Project parallels the existing transmission line ROW for approximately 97% of the route (approximately 347 km out of 360 km). Habitat degradation from noise, dust, and other sensory disturbances is expected to be of negligible magnitude in the operation phase because maintenance activities will be infrequent, isolated, of short duration and within the range of natural variation at baseline where the line parallels existing disturbance. Individual moose may be subject to increased mortality from hunting or predation; however, this net effect is not anticipated to influence how moose interact with other species such as wolf or white tailed deer.

With effective implementation of mitigation measures, the small changes in moose habitat availability, distribution, and survival and reproduction from the Project, relative to the baseline characterization, are not expected to have a measurable change on the current status of this criterion. Consequently, incremental (and cumulative) effects on moose populations in the Net Effects Assessment are predicted to be not significant (Table 6.5-42).

6.5.9.2 Gray Fox

Habitat is not considered a limiting factor for populations of gray fox that overlap the RSA at baseline characterization. Moderate to high suitability habitat covers 83.9% of the RSA at baseline characterization. The amount of moderate to high suitability gray fox habitat loss from the Project is 1.1% of in the gray fox RSA, relative to baseline characterization. Although gray fox may use the ROW once vegetation regenerates post-construction, a conservative assumption is that the Project RoW will degrade moderate to high suitability habitat to low suitability habitat during construction through operation. This is because the ROW may provide suitable habitat for gray fox once construction is complete because areas may regenerate to suitable habitat, such as grasslands and meadows. Furthermore, progressive reclamation will be implemented at temporary access roads, laydown and staging areas, and temporary construction camps. Base Characterization indicated that preferred home range habitat consists of a combination of ecosites, including both forested and open to semi-open habitats. Forest clearing for access roads and ROW can open large forest tracts and gray fox have shown tolerance to fragmented habitats (Cooper 2012). Changes to habitat within the gray fox RSA are expected to be within the resilience limits of gray fox.

Additional habitat may be temporarily avoided due to sensory disturbance during construction, and the Project footprint could result in slight changes in movement; however, small changes in habitat distribution are not expected to alter habitat connectivity, availability, or survival and reproduction. Gray fox within the RSA currently inhabit areas where anthropogenic disturbance is present, and it is understood that the omnivorous and opportunistic habits of gray fox lend well to tolerating human activities and urbanization (Larson et al. 2015). Therefore, sensory disturbance from the Project is expected to be within the adaptive capacity of gray fox.

The effects of vehicle collisions, increase in public access and incidental take on gray fox survival and reproduction are not considered negligible because mortality of a few individuals over the life of the Project may occur. Mitigation implemented for the Project is predicted to limit the direct mortality of gray fox, though, the risk of mortality cannot be completely removed. However, the mortality of a few gray fox individuals over the life of the Project is not anticipated to cause significant population declines or changes to their ecological function or effectiveness.

Currently, there is no indication that northwestern Ontario populations of gray fox are declining. In 2015, northwestern Ontario sub-population was estimated to be less than 50 mature individuals (COSEWIC 2015). However, the number of provincial occurrence records and citizen science observations in recent years has increased, indicating that populations are likely higher than 2015 estimations (MNRF 2022b). Gray fox populations in Ontario are limited due to it being the northern extent of their range. It is anticipated that gray fox population changes are linked to changes in adjacent United States populations, and currently most gray fox populations in the United States are stable or increasing (COSEWIC 2015, MECP 2019). Northward expansions in Wisconsin and Minnesota have been documented and been attributed to climate change and warming temperatures. Due to this, it has been noted that there is a potential for climate change to improve survival conditions for gray fox in Canada (COSEWIC 2015). Natural expansion in both population size and distribution of Canadian sub-populations is anticipated if natural dispersion into Canada continues (MECP 2019). Gray fox populations in the gray fox RSA are anticipated to remain self-sustaining and ecologically effective at net effects assessment, and the incremental and combined effects from the Project and previous and existing activities are predicted to be not significant.

6.5.9.3 Furbearers (Gray Wolf)

Habitat is not considered a limiting factor for gray wolf as this species is a habitat generalist that is more reliant on the availability of prey. Similarly, wolves appear to be capable of adapting to the presence of humans and may select areas closer to human activity. As such, changes to habitat within the moose and gray wolf RSA are expected to be within the resilience limits of gray wolf.

Due to this species' strong dispersal ability and flexibility in habitat preferences, gray wolf is likely resilient to moderate levels of fragmentation on the landscape. Anthropogenic linear features in the LSA and moose and gray wolf RSA may be preferred travel corridors. Under existing environment conditions, the low density of roads in the LSA and moose and gray wolf RSA is not expected to be functionally affecting habitat connectivity or how wolves travel within and beyond the LSA or moose and gray wolf RSA.

The gray wolf population in Ontario appears to be increasing. The density of wolves in 2021 was approximately double that recorded in 2001 and is likely related to the increase in pup survival.

In general, wolves are considered to have a high reproductive rate and are capable of rapid population growth if the availability of prey is sufficiently high. The species is resilient and adaptable and able to accommodate many threats such as disease, parasites, injuries caused by prey, and exploitation and persecution (i.e., culls) by humans.

Based on the above evidence, gray wolf populations in the moose and gray wolf RSA are anticipated to remain self-sustaining and ecologically effective at net effects assessment, and the incremental and combined effects from the Project and previous and existing activities are predicted to be not significant.

6.5.9.4 Furbearers (American Marten)

The primary threat to American marten is the loss of forested habitat, and many of the previous and existing human disturbances in the LSA and RSA have reduced marten habitat quantity and quality by removing forests. Nevertheless, most of the LSA and RSA remain forested indicating that habitat is not a limiting factor for marten in the baseline characterization. Moreover, the species is inherently resilient to habitat changes because of its high reproductive potential and strong dispersal capabilities. American marten tend to be tolerant of fragmented forests provided suitable habitat patches exist nearby. At baseline characterization marten have persisted in a naturally and anthropogenically fragmented landscape. The marten population that overlaps the marten RSA is predicted to be self-sustaining and ecologically effective at baseline characterization. This characterization provides context from the baseline characterization to which incremental changes in the net effects assessment are added.

For primary interactions influencing habitat, survival and reproduction, the net effects of the Project are predicted to be negative in direction and restricted to the LSA. The Project footprint was predicted remove approximately 858 ha (2.3%) of moderate to high suitability marten habitat during construction. Additional moderate to high suitability habitat in the wildlife and wildlife habitat LSA may be temporarily avoided due to sensory disturbance during construction. The Project would result in changes in movement patterns at local scales, but these changes are not expected to alter the extent of occurrence of the population(s) that overlap with the marten RSA because marten are highly mobile and capable of long dispersal distances. The small incremental changes in marten habitat availability, distribution, and survival and reproduction from the Project are predicted to remain within the resilience and adaptability limits of this species. Marten populations that overlap the marten RSA are anticipated to remain self-sustaining and ecologically effective at net effects assessment, and the incremental and combined effects from the Project and previous and existing activities are predicted to be not significant.

6.5.9.5 Furbearers (Beaver)

The Project net effects would induce limited, localized changes to the quantity, quality, arrangement, and distribution of beaver habitat. The Project is expected to result in a loss of 187 ha of high suitability habitat, 281 ha of moderate suitability habitat and 81 ha of low suitability habitat, which represents 1.2% (for moderate and high suitability) and 0.5% of the available low suitability habitats in the RSA at existing conditions. Reclamation is predicted to regenerate functional habitat for beaver 6 to 20 years after the end of the construction. Given the mobility of beaver, the spatial extent and location of Project-related loss of suitable habitat are unlikely to measurably affect beaver movement within the animals' territories or during juvenile dispersal events. As a result, no measurable change to the abundance or distribution of beavers are expected in the RSA.

The most important climate effects would be those associated with reductions in the size and occurrence of wetlands, which are important habitats for beavers because they support multiple functions for the species (i.e., suitable for lodges, foraging, and cover). Such changes to wetlands could reduce beaver habitat connectivity by shrinking the network of interconnected waterbodies and watercourses in the RSA. As a result, small changes to local and regional beaver movement patterns may occur. Lastly, the increased frequency and intensity of forest fires combined with potential effects of drought could negatively affect the abundance and distribution of beavers in the RSA as active lodges in burned areas are abandoned and the number of active colonies decrease.

The assessment also identified some potential positive effects of climate change for beavers. For example, fires regenerate beaver forage, such as willow and aspen, and are expected to play a role in altering the composition habitats in boreal. The transition from coniferous dominant stands (i.e., habitats not preferred by beavers) to mixed wood or deciduous dominant stands (i.e., preferred habitats) could be positive for beavers provided wetlands remain on the landscape. Given the level of uncertainty associated with climate change predictions, a precautionary approach was applied, and the assessment assumed that climate change effects would have predominantly negative effects on beaver in the RSA.

Survival and Reproduction

Beaver is not a federally listed or provincially tracked species, nor is it a species under consideration by COSEWIC. Under existing conditions, beaver population estimates are thought to be lower than long-term historical estimates. However, the current abundance and distribution of beaver represents a strong recovery from near extirpation in the early 1900s due to over-harvesting of the species. Beavers have recolonized most areas of their historical range, demonstrating their resiliency. They are also adaptable, making use of human modified landscapes and structures such as culverts and borrow pits. Further, they can engineer their environments by building dams to increase the suitability of habitat in their territory. The available information suggests that beavers in the RSA are self-sustaining and ecologically effective at existing conditions.

Other Project-wildlife interactions, such as increased access for people and predators, and higher risk of injury/mortality from wildlife-vehicle collisions, were determined to have negligible effects on the beaver population (Section 6.5.8). Effects on beaver survival and reproduction from increase in public access particularly trappers, are possible however, mitigation implemented for the Project are predicted to limit mortality of beaver from trapping relative to baseline characterization. Mortality of a few individuals over the life of the Project may occur after implementation of the mitigation.

Implementation of mitigation measures at the Project including staff, contractor, and visitor orientations, giving wildlife the right of way, identification of wildlife crossings, gaps in road berms and snowbanks, and speed limit adjustments are expected to result in a minor increase in injury or mortality to individual animals from vehicle-wildlife collisions. As such, the combined effects of these pathways are predicted to not significantly influence the abundance and distribution of the beaver population overlapping the RSA.

6.5.9.6 Little Brown Myotis and Northern Myotis

Populations of little brown myotis and northern myotis that overlap with the RSA are highly sensitive to changes in survival and reproduction because WNS has resulted in dramatic declines of this species across the eastern portions of its range and likely the RSA. Because this reduction of their populations, little brown myotis and northern myotis are highly vulnerable to additional threats including changes in habitat availability, distribution or other factors affecting the survival and reproduction of the remaining individuals. Nevertheless, habitat is not a limiting factor in the baseline characterization and these species are inherently resilient to habitat changes because it is highly mobile and well adapted to human disturbance. Little brown myotis tends to be tolerant of fragmented forested habitat and uses linear features for movement and foraging. The species' congregatory behaviour does make little brown myotis sensitive to the loss of key habitat features because the removal of such a feature can have a disproportionate effect on local populations. Northern is less congregatory than little brown myotis.

Province-wide mobile acoustic transect surveys conducted by the MNRF observed a decrease in little brown myotis detections in northwestern Ontario between 2016 and 2017 (Humphrey and Fotherby 2019). This decline is most likely due to the spread of WNS which was first detected in the Thunder Bay area in 2014. Less data is available on northern myotis population trends; however, based on the declines of this species due to WNS observed elsewhere in their range it is expected that northern myotis is likely experienced a similar population decline in northwestern Ontario.

Evidence suggests that survival rates of little brown myotis and northern myotis are increasing in areas where WNS is present. Although individuals are surviving WNS infections, this evidence does not support a positive population growth trend (ECCC 2018).

In addition to mortality associated with WNS, other sources of mortality (e.g., extermination on private lands, reduced insect populations) and changes to habitat availability and distribution have the potential to accelerate the decline of these species, hinder their recovery, or even limit the ability of populations to develop resistance to the fungus that causes WNS (Environment Canada 2015, ECCC 2018).

Incremental changes in habitat distribution and availability due to the Project footprint are predicted to not negatively affect little brown myotis and northern myotis populations that overlap with the RSA if mitigation measures are implemented.

Mitigation measures that will be implemented to limit effects on little brown myotis and northern myotis includes managing the incremental removal of vegetation within candidate maternity roost habitat so that removal occurs outside of the bat maternity roost season (May 1 to August 31), selective clearing and retention of trees and snags, and reclamation of temporary disturbance areas. Seasonal avoidance must be applied to the removal of the large majority of maternity roost habitat, and site-specific mitigation (habitat surveys and exit surveys) must be applied to the limited areas where clearing must occur during the maternity roost period.

The Project footprint would remove 0.9 % of candidate maternity roost habitat in the RSA. This habitat removal is unlikely to have a measurable effect on little brown myotis and northern myotis populations that overlap with the RSA.

Additional habitat may be temporarily avoided due to sensory disturbance during construction. The Project footprint would likely result in slight changes in roosting distribution at local scales. However, small changes in habitat distribution are not expected to alter the connectivity of this criterion in the RSA because these species are highly mobile.

Overall, the Project footprint is predicted to have minimal negative changes to habitat availability and distribution, and survival and reproduction of little brown myotis and northern myotis populations overlapping the RSA. Furthermore, the incremental changes in the Net Effects Assessment are expected to be well within the resilience and adaptability limits of this criterion. Consequently, little brown myotis and northern myotis populations are expected to remain self-sustaining and ecologically effective in the Net Effects Assessment relative to the baseline characterization. Effects from the Project footprint are predicted to be not significant.

6.5.9.7 Herpetofauna (Snapping Turtle and Spring Peeper)

Habitat is not considered a limiting factor for populations of herpetofauna in the LSA or RSA. However, the majority of herpetofauna species in the RSA are approaching their northern range limit (Boreal Chorus Frog and Wood Frog are notable exceptions). Species at the limits of their distributions commonly exist in naturally small populations and can be particularly sensitive to environmental changes (Lesbarrères et al. 2014).

Candidate Amphibian Breeding Habitat SWH covers 16.4% of the LSA and 15.4% of the RSA. Turtle Nesting Area SWH covers 0.58% of the LSA and 0.26% of the RSA. Turtle Wintering Area SWH covers 14.0% of the LSA and 13.4% of the RSA.

The amount of habitat loss and/or alteration from the project footprint is 471 ha of candidate Amphibian Breeding Habitat, 75 ha of candidate Turtle Nesting Area, and 338 ha of candidate Turtle Wintering Area.

The most significant threat to herpetofauna populations is the destruction or modification of habitat (Blaustein et al. 1994; Cushman 2006). This threat is detrimental to populations by eliminating or degrading habitats and by decreasing connectivity among remaining habitats.

Most of the herpetofauna species with distribution ranges overlapping the RSA can use a wide variety of wetland habitats. For example, snapping turtle occur in almost any freshwater habitat (e.g., lakes, rivers, swamps, etc.) and spring peepers will breed in a wide variety of habitat types as long as there is water, including temporary woodland ponds (MacCulloch 2002; Canadian Herpetological Society 2022).

As long-lived animals snapping turtles are particularly sensitive to effects on survival and reproduction (COSEWIC 2008b). Delayed sexual maturity, low reproductive success, and high mortality of embryos (nest predation) and hatchlings make populations of snapping turtle particularly vulnerable to population level declines (Congdon et al. 1987, 1994; Galbraith and Brooks 1987; Brooks et al. 1991; Browne and Hecnar 2007). Other threats include road mortality (Haxton 2000; Ashley et al. 2007; Beaudry et al. 2008; Livaitis and Tash 2008) and persecution (Ashley et al. 2007; COSEWIC 2008b).

In addition to habitat modification and loss, herpetofauna face a myriad of threats (Lesbarrères et al. 2014), including road mortality (Fahrig et al. 1995; Hels and Buchwald 2001; Gibbs and Shiver 2005; Eigenbrod et al. 2008), pollution (Hecnar 1995; Sanzo and Hecnar 2006; de Solla et al. 2008; Rowe 2008), infectious disease (Lesbarrères et al. 2011; D’Aoust-Messier et al. 2015), and climate change (Walpole et al. 2012; Klaus and Lougheed 2013).

Habitat degradation from dust, air emissions and other sensory disturbances is expected to be negligible in magnitude and generally infrequent, localized, and of short duration such that net effects on habitat availability are determined to be not significant. Individuals or local population may be subjected to minor effects on survival and reproduction because of sensory disturbances if for example the noise associated with construction activities extends into evening/nighttime and persists for a long enough period to reduce anuran breeding behaviour (i.e., calling), however, it is anticipated that this would be very infrequent occurrence. The magnitude of this effect is determined to be negligible.

New/expanded access roads and increased traffic (i.e., project vehicles) is anticipated to increase the risk of vehicle collisions. While increased road mortality could contribute to local population-level effects on spring peepers, for snapping turtles, population persistence is critically dependent on high adult survivorship. The mitigation measures to be implemented as part of this project are expected to reduce the risks and importantly, the risk will be greatly reduced after the construction phase, such that the effects of vehicle collisions are determined to be not significant.

The small changes in herpetofauna habitat availability, habitat distribution, and survival and reproduction from the Project, relative to baseline characterization, are predicted to remain within the resilience and adaptability limits for these species. With effective implementation of mitigation measures, the incremental contribution of the Project Footprint to combined effects from previous and existing activities on herpetofauna populations within the RSA are not expected to have a measurable change on the status of these populations to remain self-sustaining and ecologically effective. Consequently, incremental (and cumulative effects) on herpetofauna populations in the Net Effects Assessment are predicted to be not significant (Table 6.5-48).

6.5.9.8 Raptors (Bald Eagle)

Habitat is not considered a limiting factor for populations of bald eagle that overlap the RSA at baseline characterization. Moderate to high suitability habitat covers 41.5% to 40.0% of the LSA and RSA at baseline characterization. Bald eagles are highly mobile and demonstrate flexibility in habitat selection including some tolerance of human disturbance. As long-lived, top predators with low reproductive rates, bald eagles are most sensitive to changes in survival and reproduction. Bald eagle populations that overlap with the RSA have recovered from historical threats (e.g., chemical and heavy metal contamination of their food supply) and are likely increasing at existing environment conditions (Blancher et al. 2009, Wright 2016). Populations are currently estimated at 400,000 individuals in North America (Buehler 2020). The combined evidence indicates that bald eagle populations that overlap with the RSA are self sustaining and ecologically effective at existing environment conditions.

The Project footprint would remove 2.7% of moderate to high suitability bald eagle habitat in the LSA. The predicted abundance in the RSA is estimated to be reduced by three individuals in the Net Effects Assessment. This small change is unlikely to have a measurable effect on bald eagle populations that overlap the RSAs. Mitigation measures such as selective clearing of incompatible vegetation and retention of vegetation within the ROW where safe operation practices can still be achieved, retaining setbacks around known sensitive ecological features (e.g., wetlands), progressive reclamation of temporary disturbance areas will reduce effects on bald eagle populations from changes to habitat availability and distribution.

Additional habitat may be temporarily avoided due to sensory disturbance during construction. The Project footprint would likely result in slight changes in territory sizes and locations at local scales. However, small changes in habitat distribution are not expected to alter the connectivity of this criterion in the RSA because bald eagles are highly mobile. Mortality due to collisions with conductors is expected (probable), even with the implementation of mitigation measures, such as installing reflectors on the transmission line. In addition, productivity of individuals with breeding ranges that overlap the LSA may possibly decrease slightly because of sensory disturbance during construction.

Overall, the Project is predicted to have minimal negative changes to habitat availability and distribution, and survival and reproduction of bald eagle populations overlapping the RSA. Furthermore, the incremental changes in the Net Effects Assessment are expected to be well within the resilience and adaptability limits of this criterion. Consequently, bald eagle populations are expected to remain self-sustaining and ecologically effective in the Net Effects

Assessment relative to the baseline characterization. Effects from the Project are predicted to be not significant.

6.5.9.9 Marshbirds (Trumpeter Swan)

Habitat is not considered a limiting factor for populations of trumpeter swan that overlap the RSA at baseline characterization. Moderate to high suitability habitat covers 19.8% to 24.0% of the LSA and RSA at baseline characterization. Trumpeter swans are highly mobile and demonstrate flexibility in habitat selection including some tolerance of human disturbance (Mitchell and Eichholz 2020). As a long-lived species with a delayed age of maturity (Mitchell and Eichholz 2020), trumpeter swans are most sensitive to changes in survival and reproduction. Trumpeter swan populations that overlap with the RSA have recovered from historical threats (e.g., near extinction due to widespread hunting pressure) and are increasing in the baseline characterization (Mitchell and Eichholz 2020, Thomas et al. 2021). As of 2015, populations were estimated at 63,000 individuals globally (Mitchell and Eichholz 2020), with an estimated >2,000 individuals in Ontario (Thomas et al. 2021); however, the species was increasing in the interior portion of its population at 14.4% per year and today is likely significantly higher than the 2015 population estimate. The combined evidence indicates that trumpeter swan populations that overlap with the RSA are self-sustaining and ecologically effective in the baseline characterization.

The Project footprint would remove 1.2% of moderate to high suitability trumpeter swan habitat in the LSA. The predicted abundance in the RSA is estimated to be reduced by less than 0.05 individuals in the Net Effects Assessment. This small change is unlikely to have a measurable effect on trumpeter swan populations that overlap the RSAs. Mitigation measures such as selective clearing of incompatible vegetation and retention of vegetation within the ROW where safe operation practices can still be achieved, retaining setbacks around known sensitive ecological features (e.g., wetlands), progressive reclamation of temporary disturbance areas will reduce effects on trumpeter swan populations from changes to habitat availability and distribution.

Additional habitat may be temporarily avoided due to sensory disturbance during construction. The Project would likely result in slight changes in territory sizes and locations at local scales. However, small changes in habitat distribution are not expected to alter the connectivity of this criterion in the RSA because trumpeter swans are highly mobile. Mortality due to collisions with conductors is expected (probable), even with the implementation of mitigation measures, such as installing reflectors on the transmission line. In addition, productivity of individuals with breeding ranges that overlap the LSA may possibly decrease slightly because of sensory disturbance during construction.

Overall, the Project is predicted to have minimal negative changes to habitat availability and distribution, and survival and reproduction of trumpeter swan populations overlapping the RSA. Furthermore, the incremental changes in the Net Effects Assessment are expected to be well within the resilience and adaptability limits of this criterion. Consequently, trumpeter swan populations are expected to remain self-sustaining and ecologically effective in the Net Effects Assessment relative to the baseline characterization. Effects from the Project are predicted to be not significant.

6.5.9.10 Songbirds (Canada Warbler, Eastern Wood-Pewee, Olive-sided Flycatcher)

Past and existing activities in the baseline characterization have likely negatively affected habitat availability, habitat distribution, and survival and reproduction of forest songbirds in the RSA. However, moderate to high suitability habitat for Canada warbler, eastern wood-pewee and olive-sided flycatcher covers approximately 30% to 50% of the LSA and RSA at baseline characterization, and so habitat availability does not appear to be limiting for these species. Furthermore, these species are highly mobile and often use early successional or forest edge habitat. Therefore, changes to habitat availability and distribution in the baseline characterization are considered to be within the resilience and adaptability limits of these species, and their populations are predicted to be self-sustaining and ecologically effective at baseline characterization.

The Project is predicted to remove 2.4% to 3.6% of moderate to high suitability habitat in the LSA for Canada warbler, eastern wood-pewee, and olive-sided flycatcher, relative to baseline characterization. For Canada warbler, eastern wood-pewee, and olive-sided flycatcher, the predicted abundance in the RSA is estimated to be reduced by 17, one, and two individuals, respectively, in the Net Effects Assessment. This small reduction in predicted abundance is not anticipated to have a measurable effect on populations that overlap the RSA.

Net effects from the Project are predicted to be negative in direction and restricted to the LSA in geographic extent, which implies that at least portions of Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations are affected during any given year, but likely not entire populations every year. Selective removal of incompatible vegetation, retention of trees in the ROW, where possible, and reclamation of temporary disturbances, including access roads and the ROW travel lane, will reduce the magnitude of effects from habitat loss due to the construction of the Project.

The reduction in available habitat would be experienced continuously during construction, but some of this disturbance would be temporary and reversible in the long-term. Additional suitable habitat in the LSA may be avoided by forest songbirds due to sensory disturbance during construction. Sensory disturbance during construction is considered to be continuous, but it would be isolated and of short duration across the LSA due to construction being completed down different segments of the line. Habitat degradation from noise, dust, and other sensory disturbances would be reduced in the operation and maintenance stages because maintenance activities will be infrequent and of short duration.

The combined evidence indicates that Canada warbler, eastern wood-pewee and olive-sided flycatcher populations will continue to be self-sustaining and ecologically effective in the Net Effects Assessment, relative to the baseline characterization. Consequently, effects from the

Project and previous and existing activities on Canada warbler populations that overlap the RSA are predicted to be not significant.

6.5.9.11 Bank Swallow

Moderate to high suitability bank swallow habitat covers approximately 4.8% to 3.0% of the LSA and RSA at baseline characterization, and so habitat availability appears to be limiting for this species. However, bank swallows are highly mobile and have adapted well to anthropogenic habitats (e.g., aggregate pits) and habitat for this species in the RSA is likely higher than it was before European settlement and aggregate expansion in northwestern Ontario. Therefore, changes in habitat in the baseline characterization are expected to be within the resilience limits and adaptive capacity of bank swallow.

The Project is predicted to remove 2.8% of moderate to high suitability habitat in the LSA, relative to baseline characterization. Furthermore, one active bank swallow colony was confirmed in the LSA during the 2022 baseline surveys and although there will be no impacts to protected Category 1 or Category 2 habitat for bank swallow, 7 ha of Category 3 habitat are anticipated to be impacted for the installation of a construction camp along the Project. For bank swallow, the predicted abundance in the RSA is estimated to be reduced by 0.2 individuals in the Net Effects Assessment.

Effective implementation of mitigation measures, such as progressive reclamation of temporary disturbance areas and selective clearing of incompatible vegetation and retention of vegetation will reduce the magnitude of habitat loss. Net effects from the Project are predicted to be negative in direction and restricted to the LSA in geographic extent, which implies that at least a portion of the population is affected during any given year, but likely not the entire population every year.

Bank swallow populations overlapping the RSA are likely breeding predominantly in aggregate pits. Sensory disturbance during construction of the Project is expected to be frequent, but it would be isolated and of short duration across the wildlife and wildlife habitat LSA due to construction being completed sequentially down the line. Consequently, the incremental and combined effects from the Project and previous and existing activities on bank swallow populations that overlap the RSA are predicted to be not significant.

6.5.9.12 Barn Swallow and Chimney Swift

Past and existing activities in the baseline characterization have likely negatively affected habitat availability, habitat distribution, and survival and reproduction of barn swallow and chimney swift in the RSA. Moderate to high suitability habitat for barn swallow and chimney swift covers approximately 1% to 2% of the LSA and RSA at baseline characterization, and so habitat availability appears to be limiting for these species.

The Project is predicted to remove 1.9% and 3.8% of moderate to high suitability habitat in the LSA for chimney swift and barn swallow, respectively, relative to baseline characterization. For barn swallow and chimney swift, the predicted abundance in the RSA is estimated to be reduced by 0.03 and <0.000 individuals, respectively, in the Net Effects Assessment.

Effective implementation of mitigation measures, such as progressive reclamation of temporary disturbance areas and selective clearing of incompatible vegetation and retention of vegetation will reduce the magnitude of habitat loss. Net effects from the Project are predicted to be negative in direction and restricted to the LSA in geographic extent, which implies that at least a portion of the population is affected during any given year, but likely not the entire population every year.

Barn swallow and chimney swift populations overlapping the RSA are likely breeding predominantly, if not entirely, in anthropogenic structures (buildings, culverts, bridges). The loss of habitat would be experienced continuously during construction of the Project and would be permanent (for structure removals). Sensory disturbance during construction of the Project is expected to be frequent, but it would be isolated and of short duration across the wildlife and wildlife habitat LSA due to construction being completed sequentially down the line. Consequently, the incremental and combined effects from the Project and previous and existing activities on barn swallow and chimney swift populations that overlap the RSA are predicted to be not significant.

6.5.9.13 Bobolink

Moderate to high suitability bobolink habitat covers 0.4% of the LSA and RSA at baseline characterization. Because bobolink habitat is a limiting factor in the RSA, populations that overlap with the RSA are considered sensitive to changes in habitat.

However, bobolinks are highly mobile and have adapted well to anthropogenic habitats (e.g., pastures and hayfields) and habitat for this species in the RSA is likely higher than it was before European settlement and expansion of agriculture in northwestern Ontario. Therefore, changes in habitat in the baseline characterization are expected to be within the resilience limits and adaptive capacity of bobolink.

The Project is predicted to remove 0.9% in the LSA of moderate to high suitability habitat, relative to baseline characterization. The predicted abundance in the RSA is estimated to be reduced by 0.005 individuals in the Net Effects Assessment.

Effective implementation of mitigation measures, such as progressive reclamation of temporary disturbance areas and selective clearing of incompatible vegetation and retention of vegetation will reduce the magnitude of habitat loss. Net effects from the Project are predicted to be negative in direction and restricted to the LSA in geographic extent, which implies that at least a portion of the population is affected during any given year, but likely not the entire population every year.

Bobolink populations overlapping the RSA are anticipated to be breeding entirely in agricultural land cover types. The loss of habitat would be experienced continuously during construction of the Project, but would be temporary, and functional early successional habitat would become available in one to three years following completion of construction. Sensory disturbance during construction of the Project is expected to be frequent, but it would be isolated and of short duration across the wildlife and wildlife habitat LSA due to construction being completed sequentially down the line. Consequently, the incremental and combined effects from the Project and previous and existing activities on bobolink populations that overlap the RSA are predicted to be not significant.

6.5.9.14 Eastern Whip-poor-will

Eastern whip-poor-will were likely never abundant in the RSA due to a historical small abundance of naturally available suitable habitat. Eastern whip-poor-will were found infrequently in several isolated locations near Dryden and Atikokan, during the second Ontario Breeding Bird Atlas from 2001 to 2005 (Cadman et al. 2007). The eastern whip-poor-will is a mobile species that will use anthropogenic features (e.g., clearcuts, linear disturbances), and there has likely been an increase in suitable eastern whip-poor-will habitat in the RSA in recent years relative to historical conditions. These characteristics suggest resilience and adaptive capability to changes in habitat availability and distribution. Individual eastern whip-poor-wills distributed across their breeding range are capable of sustaining the population or improving its abundance, provided sufficient suitable habitat is available (Environment Canada 2015b). Population estimates specific are relatively low (e.g., 0.01 individuals per km^2 in Region 40 of the Ontario Breeding Bird Atlas [Cadman et al. 2007]); however, the evidence suggests that eastern whip-poor-wills occupying and adjacent to the RSA are likely self-sustaining and ecologically effective at baseline characterization.

Moderate to high suitability habitat covers approximately 59.0% to 54.5% of the LSA and RSA at baseline characterization. Moderate to high suitability habitat appears to be abundant but largely unoccupied at baseline characterization.

Net effects from changes in habitat availability, habitat distribution and survival and reproduction among the Project are restricted to the Project footprint or LSA in geographic extent, which implies that at least some individuals would be affected during any given year, but likely not all individuals every year.

The Project is predicted to remove 2.8% of moderate to high suitability habitat in the LSA of moderate to high suitability habitat, relative to baseline characterization. The predicted abundance in the RSA is estimated to be reduced by 0.3 individuals in the Net Effects Assessment. Furthermore, 15 individuals were confirmed in the LSA during the 2022 baseline surveys and 1 ha of Category 2 habitat, and 5 ha of Category 3 habitat are anticipated to be impacted by the Project.

Additional suitable habitat in the LSA may be temporarily avoided due to sensory disturbance during construction. The Project may result in changes in territory sizes and locations at local scales, but these changes are not expected to negatively alter the extent of occurrence of the eastern whip-poor-will in the RSA because the species is highly mobile and capable of using anthropogenic disturbances for breeding and foraging.

With effective implementation of mitigation measures, such as spanning areas with compatible vegetation (e.g., bedrock outcrops) the incremental changes due to the Project are not predicted to negatively influence eastern whip-poor-wills that occupy the RSA because habitat is not a limiting factor. The abundance in the RSA and LSA is predicted to remain similar to baseline characterization conditions after construction of the Project. The generation of early disturbance (succession) habitat may improve habitat conditions for this species. Consequently, effects from the Project in the Net Effects Assessment (which includes combined effects from previous and existing activities) on eastern whip-poor-will are predicted to be not significant.

6.5.9.15 Landbirds (Common Nighthawk)

Common nighthawk is primarily threatened by decreases in insect prey abundance and loss of breeding habitat by fire suppression and habitat succession (Environment Canada 2016b). The common nighthawk is a mobile species that will use anthropogenic features (e.g., gravel roads, mines) for nesting. These characteristics suggest resilience and adaptability to changes in habitat availability and distribution. Additionally, there are currently adequate numbers of individuals available to sustain the species in Canada or improve its abundance (Environment Canada 2016b). Moderate to high suitability habitat in the RSA does not appear limiting at baseline characterization. Population estimates are relatively low (e.g., 0.03 individuals per km^2 in Region 40 of the Ontario Breeding Bird Atlas (Cadman et al. 2007); however, the evidence suggests that common nighthawks occupying and adjacent to the RSA are likely self-sustaining and ecologically effective at baseline characterization.

Moderate to high suitability habitat covers approximately 4.1% to 3.5% of the LSA and RSA at baseline characterization. Moderate to high suitability habitat appears to be abundant but largely unoccupied at baseline characterization.

Net effects from changes in habitat availability, habitat distribution and survival and reproduction among the Project are restricted to the Project footprint or LSA in geographic extent, which implies that at least some individuals would be affected during any given year, but likely not all individuals every year.

The Project is predicted to remove 1.9% of moderate to high suitability habitat in the LSA of moderate to high suitability habitat, relative to baseline characterization. The predicted abundance in the RSA is estimated to be reduced by 0.04 individuals in the Net Effects Assessment.

Additional moderate to high suitability habitat in the LSA may be temporarily avoided due to sensory disturbance during construction. The Project would result in changes in movement patterns at local scales, but these changes are not expected to alter the extent of occurrence of the population(s) that overlap with the RSA because common nighthawk are highly mobile and capable of using anthropogenic disturbances for breeding.

With effective implementation of mitigation measures, the incremental changes due to the Project are not predicted to negatively affect the population(s) of common nighthawk that overlap with the RSA. The abundance in the RSA and LSA is predicted to remain similar to baseline characterization conditions after construction of the Project. Consequently, effects on common nighthawk populations that overlap the RSA from the Project in the Net Effects Assessment (which includes previous and existing activities) are predicted to be not significant.

6.5.10 Cumulative Effects Assessment

In addition to assessing the net environmental effects of the Project, which considered past and present human activities, this assessment also evaluates and assesses the significance of net effects from the Project that overlap temporally and spatially with effects from other RFDs and activities (i.e., cumulative effects).

For a criterion that has identified net effects where the magnitude was determined to be higher than negligible, it is necessary to determine if the effects from the Project interact both temporally and spatially with the effects from one or more past, present, or RFD or activities, since the combined effects may differ in nature or extent from the effects of individual Project activities. Where information is available, the cumulative effects assessment estimates or predicts the contribution of effects from the Project and other human activities on the criteria, in the context of natural changes in the environment.

For this assessment, the net effects characterized in Section 6.5.8 are carried forward to a cumulative effects assessment if they have a likelihood of occurrence of 'probable' or 'certain' and a non-negligible magnitude. Net effects with this characterization are most likely to interact with other RFD.

A list of the RFDs that were considered for this EA are presented in Section 9.0, Table 9.0-1. Out of these projects, the RFDs listed in Table 6.5-57 were identified as being probable to occur within the Wildlife and Wildlife Habitat RSA and Moose and Gray Wolf RSA. The RFDs listed in Table 6.5-58 are additional projects that occur in the Moose and Gray Wolf RSA. The RFDs listed in Table 6.5-59 are those that occur in the Gray Fox RSA. Table 6.5-57, Table 6.5-58, and Table 6.5-59 also identify if the net effects for the Project are expected to overlap spatially and temporally with the net effects of the RFDs.

The Cumulative Effects Assessment is completed at the regional scale (i.e., criterion specific RSA). The Cumulative Effects Assessment for each wildlife criterion is primarily qualitative and describes how the interacting effects of human activities and natural factors are predicted to affect indicators for each criterion (Section 4.6). The assessment is presented as a reasoned narrative describing the outcomes of cumulative effects for each wildlife criterion. For RFDs identified to have net effects that would overlap spatially and temporally, estimates of habitat loss were developed where available and are considered conservative. Potential cumulative effects from RFDs in the wildlife assessment are listed in Table 6.5-60 and described in greater detail in Sections 6.5.10.1 to 6.5.10.13.

Table 6.5-57 Reasonably Foreseeable Developments that Overlap and Interact with the Wildlife and Wildlife Habitat Regional Study Area and Moose Regional Study Area

Project ID	Project Name	Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
6	McIntyre Creek culvert rehabilitations	• Culvert rehabilitations at McIntyre Creek, 1 km west of Highway 102, Thunder Bay, and Wild Goose Creek, 6 km east of Highway 527, Shuniah.	Yes	Yes	Yes
8	Blind Creek culvert rehabilitation	• Culvert rehabilitation at Blind Creek, 7 km east of Highway 527, Shuniah.	Yes	Yes	Yes
12	Highway 17, resurfacing	• Resurfacing of Highway 17 west, west of Highway 72, Dinorwic.	Yes	Yes	Yes
13	Osaquan, Melgund, and Shoshowae Creek culverts, rehabilitation	• Rehabilitation of Osaquan Creek culver, 8 km west of Ignace, Melgund Creek culvert, 56 km west of Ignace, and Shoshowae Creek culvert, 10 km west of Dryden.	Yes	Yes	Yes
17	Highway 11B resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11B, Atikokan.	Yes	Yes	Yes
18	Highway 11 resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11, from Oliver Road, Kakabeka to Shabaqua.	Yes	Yes	Yes
19	Highway 102, resurfacing	• Resurfacing Highway 102 west of Highway 589 to Highway 11/17, Thunder Bay.	Yes	Yes	Yes
20	CPR Kaministiquia River bridge and CNR overhead bridges rehabilitation and removal	• Rehabilitation and removal of CPR overhead Kaministiquia River bridge and CNR overhead bridge, 4 km east of Highway 17, Sistonen's Corner.	Yes	Yes	Yes
21	Seine River bridge rehabilitation	• Rehabilitation of the Seine River bridge, 21 km north of Highway 11B, Atikokan.	Yes	Yes	Yes
22	Turtle and Little Turtle River bridges rehabilitation	• Rehabilitation of Turtle River bridge, 44 km south of Highway 17, Atikokan, and Little Turtle River bridge, 79 km south of Highway 17, Atikokan.	Yes	Yes	Yes
23	Revell River No. 3 bridge, rehabilitation	• Rehabilitation of the Revell River No. 3 bridge, 1 km east of Highway 622, Ignace.	Yes	Yes	Yes
24	Treasury Metals Inc. Goliath Gold Project	• Construction of one open pit with underground development, a tailings storage facility, waste rock storage, overburden storage, low-grade stockpile, a 115 kV transmission line, and on-site electrical substation. The site is 15 km east of Dryden and 5 km north of Wabigoon. Operation is anticipated to be 12 years.	Yes	Yes	Yes
25	Rehabilitation of Steep Rock Mine	• Stabilization and remediation of the former Steep Rock Mine, including a plan for enhanced natural recovery that will increase the size of Steep Rock Lake in the coming decades.	Yes	Yes	Yes
31	Commercial Forestry	• Planned forestry harvest activities and roads derived from Forest Management Plans.	Yes	Yes	Yes

km = kilometre; kV = kilovolt.

Table 6.5-58 Additional Reasonably Foreseeable Developments that Overlap and Interact with the Moose Regional Study Area

ID	Project/Activity	Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
1	Thunder Bay Correctional Complex	• Construction of the new 345-bed, multipurpose Thunder Bay Correctional Complex to replace the city's existing jail and correctional centre.	Yes	Yes	Yes
5	Lac Seul First Nation broadband upgrade	• Installation of two new 36 m self-supporting towers, 6.5 km of new fibre optic cable (terrestrial), and 2 km of new underwater fibre optic cable. The broadband towers will be installed in sites that are partially disturbed. The terrestrial fibre optic cable will be trenched along existing roadway and water pipeline rights-of-way. The new underwater fibre will be laid between the Kejick Bay boat launch and the Whitefish Bay landing.	Yes	Yes	Yes
7	Paved shoulders, resurfacing Highway 11	• Adding paved shoulders and resurfacing 35.3 km of Highway 11, starting 6.0 km east of Highway 102.	Yes	Yes	Yes
9	McVicars and Corbett Creek culverts rehabilitation	• Rehabilitation of McVicars Creek culvert, 6 km west of Hodder Ave, and Corbett Creek culvert, 5 km west of Highway 130, Thunder Bay.	Yes	Yes	Yes
10	John Street culvert replacement	• Replacement of the John Street culvert, west of Highway 11/17, Thunder Bay.	Yes	Yes	Yes
11	Highway 61, reconstruction	• Reconstruction of Highway 61,south of Highway 130 north to Kaministiquia River bridge, Thunder Bay	Yes	Yes	Yes
14	Highway 17 East of Highway 105, reconstruction	• Reconstruction of Highway 17 East, east of Highway 105, Vermilion Bay.	Yes	Yes	Yes
29	Potential deep geological repository site	• Preliminary assessments by Nuclear Waste Management Organization are underway near Ignace to identify suitable areas for a deep geological repository site for nuclear waste. Currently no decision between choosing the Ignace location or a location in South Bruce, Bruce County.	Yes	Yes	Yes
30	Agnico Eagle Hammond Reef Gold Mine	• Construction, operation, decommissioning, and abandonment of a new open-pit gold mine. Mining would occur for 11 years; there would be an on-site mill.	Yes	Yes	Yes
33	Treasury Metals Inc. Goldlund Gold Project	• Exploration of a decommissioned underground and open pit mine, 30 km from Dryden. Currently, 27,000 m of drilling is scheduled to be carried out with the intent to upgrade the current mineral resource estimate.	Yes	Yes	Yes
34	Treasury Metals Inc. Miller Gold Project	• Proposed open pit mine with no associated processing infrastructure.	Yes	Yes	Yes

km = kilometre; m = metre.

Table 6.5-59 Reasonably Foreseeable Developments that Overlap and Interact with the Gray Fox Regional Study Area

Project ID	Project Name	Description	Spatial Overlap of Net Effects	Temporal Overlap of Net Effects	Included in Cumulative Effects Analysis
6	McIntyre Creek culvert rehabilitations	• Culvert rehabilitations at McIntyre Creek, 1 km west of Highway 102, Thunder Bay, and Wild Goose Creek, 6 km east of Highway 527, Shuniah.	Yes	Yes	Yes
8	Blind Creek culvert rehabilitation	• Culvert rehabilitation at Blind Creek, 7 km east of Highway 527, Shuniah.	Yes	Yes	Yes
17	Highway 11B resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11B, Atikokan.	Yes	Yes	Yes
18	Highway 11 resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11, from Oliver Road, Kakabeka to Shabaqua.	Yes	Yes	Yes
19	Highway 102, resurfacing	• Resurfacing Highway 102 west of Highway 589 to Highway 11/17, Thunder Bay.	Yes	Yes	Yes
20	CPR Kaministiquia River bridge and CNR overhead bridges rehabilitation and removal	• Rehabilitation and removal of CPR overhead Kaministiquia River bridge and CNR overhead bridge, 4 km east of Highway 17, Sistonen's Corner.	Yes	Yes	Yes
25	Rehabilitation of Steep Rock Mine	• Stabilization and remediation of the former Steep Rock Mine, including a plan for enhanced natural recovery that will increase the size of Steep Rock Lake in the coming decades.	Yes	Yes	Yes
31	Commercial Forestry	• Planned forestry harvest activities and roads derived from Forest Management Plans.	Yes	Yes	Yes

km = kilometre.

Table 6.5-60: Summary of Cumulative Effects Assessment Interactions for Wildlife

ID	Project/Activity	Description	Potential Cumulative Effect	Quantified in the Cumulative Effects	Wildlife Criteria that Quantified in Cumulative Effects
1	Thunder Bay Correctional Complex	• Construction of the new 345-bed, multipurpose Thunder Bay Correctional Complex to replace the city's existing jail and correctional centre.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
5	Lac Seul First Nation broadband upgrade	• Installation of two new 36 m self-supporting towers, 6.5 km of new fibre optic cable (terrestrial), and 2 km of new underwater fibre optic cable. The broadband towers will be installed in sites that are partially disturbed. The terrestrial fibre optic cable will be trenched along existing roadway and water pipeline rights-of-way. The new underwater fibre will be laid between the Kejick Bay boat launch and the Whitefish Bay landing.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
6	McIntyre Creek culvert rehabilitations	• Culvert rehabilitations at McIntyre Creek, 1 km west of Highway 102, Thunder Bay, and Wild Goose Creek, 6 km east of Highway 527, Shuniah	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
7	Paved shoulders, resurfacing Highway 11	• Adding paved shoulders and resurfacing 35.3 km of Highway 11, starting 6.0 km east of Highway 102.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
8	Blind Creek culvert rehabilitation	• Culvert rehabilitation at Blind Creek, 7 km east of Highway 527, Shuniah.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
9	McVicars and Corbett Creek culverts rehabilitation	• Rehabilitation of McVicars Creek culvert, 6 km west of Hodder Ave, and Corbett Creek culvert, 5 km west of Highway 130, Thunder Bay	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
10	John Street culvert replacement	• Replacement of the John Street culvert, west of Highway 11/17, Thunder Bay	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
11	Highway 61, reconstruction	• Reconstruction of Highway 61, south of Highway 130 north to Kaministiquia River bridge, Thunder Bay	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
12	Highway 17, resurfacing	• Resurfacing of Highway 17 west, west of Highway 72, Dinorwic.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)

ID	Project/Activity	Description	Potential Cumulative Effect	Quantified in the Cumulative Effects	Wildlife Criteria that Quantified in Cumulative Effects
13	Osaquan, Melgund, and Shoshowae Creek culverts, rehabilitation	• Rehabilitation of Osaquan Creek culver, 8 km west of Ignace, Melgund Creek culvert, 56 km west of Ignace, and Shoshowae Creek culvert, 10 km west of Dryden.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)
14	Highway 17 East of Highway 105, reconstruction	• Reconstruction of Highway 17 East, east of Highway 105, Vermilion Bay.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Moose
17	Highway 11B resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11B, Atikokan	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
18	Highway 11 resurfacing, paved shoulders	• Resurfacing and adding paved shoulders to Highway 11, from Oliver Road, Kakabeka to Shabaqua.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
19	Highway 102, resurfacing	• Resurfacing Highway 102 west of Highway 589 to Highway 11/17, Thunder Bay.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
20	CPR Kaministiquia River bridge and CNR overhead bridges rehabilitation and removal	• Rehabilitation and removal of CPR overhead Kaministiquia River bridge and CNR overhead bridge, 4 km east of Highway 17, Sistonen's Corner.	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
21	Seine River bridge rehabilitation	• Rehabilitation of the Seine River bridge, 21 km north of Highway 11B, Atikokan	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)
22	Turtle and Little Turtle River bridges rehabilitation	• Rehabilitation of Turtle River bridge, 44 km south of Highway 17, Atikokan, and Little Turtle River bridge, 79 km south of Highway 17, Atikokan	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)
23	Revell River No. 3 bridge, rehabilitation	• Rehabilitation of the Revell River No. 3 bridge, 1 km east of Highway 622, Ignace	• Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)

ID	Project/Activity	Description	Potential Cumulative Effect	Quantified in the Cumulative Effects	Wildlife Criteria that Quantified in Cumulative Effects
24	Treasury Metals Inc. Goliath Gold Project	• Construction of one open pit with underground development, a tailings storage facility, waste rock storage, overburden storage, low-grade stockpile, a 115 kV transmission line, and on-site electrical substation. The site is 15 km east of Dryden and 5 km north of Wabigoon. Operation is anticipated to be 12 years.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	Yes	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)
25	Rehabilitation of Steep Rock Mine	• Stabilization and remediation of the former Steep Rock Mine, including a plan for enhanced natural recovery that will increase the size of Steep Rock Lake in the coming decades.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution.	No	All wildlife criteria
29	Potential deep geological repository site	• Preliminary assessments by Nuclear Waste Management Organization are underway near Ignace to identify suitable areas for a deep geological repository site for nuclear waste. Currently no decision between choosing the Ignace location or a location in South Bruce, Bruce County.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	No	Moose
30	Agnico Eagle Hammond Reef Gold Mine	• Construction, operation, decommissioning, and abandonment of a new open-pit gold mine. Mining would occur for 11 years; there would be an on-site mill.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	Yes	Wildlife and Wildlife Habitat and Moose (excluding Gray Fox)

ID	Project/Activity	Description	Potential Cumulative Effect	Quantified in the Cumulative Effects	Wildlife Criteria that Quantified in Cumulative Effects
31	Commercial Forestry	• Planned forestry harvest activities and roads derived from Forest Management Plans.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	Yes	All wildlife criteria
33	Treasury Metals Inc. Goldlund Gold Project	• Exploration of a decommissioned underground and open pit mine, 30 km from Dryden. Currently, 27,000 m of drilling is scheduled to be carried out with the intent to upgrade the current mineral resource estimate.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	Yes	Moose
34	Treasury Metals Inc. Miller Gold Project	• Proposed open pit mine with no associated processing infrastructure.	• Loss or alteration of vegetation and topography that may change habitat availability, use, and connectivity and contribute to cumulative effects on wildlife abundance and distribution. • Sensory disturbance (lights, smells, noise, dust, human activity, viewscape) can change wildlife habitat availability, use and connectivity (movement and behaviour), which can lead to changes in wildlife abundance and distribution. • Use of linear corridors and converted habitat (i.e., younger, more productive forest) by prey and predators leading to decreases in survival and reproduction of prey.	No	Moose

CPR = Canadian Pacific Railway; km = kilometre; kV = kilovolt; m = metre.

6.5.10.1 Moose

6.5.10.1.1 Habitat Availability

Habitat Loss

The RFDs that overlap with the moose and gray wolf RSA and will remove moose habitat are presented in Table 6.5-61 and Table 6.5-58. Estimates of habitat loss presented in the subsections below are conservative estimates as project footprints for future mines are not available. As such, for the Treasury Metal's Goliath and Goldlund gold projects, the entire lease areas were assumed to be disturbed in the Cumulative Effects Assessment. The Project and other RFDs that overlap with the LSA will contribute to a loss of approximately 1,968 ha (4.6%) and 2,990 ha (0.2%) of moderate to high suitability habitat in the LSA and moose and gray wolf RSA, respectively, relative to the Baseline Characterization (Table 6.5-69).

The Lakehead, Dog River-Matawin, Wabigoon, English River, Lac Seul, Whiskey Jack, Black Spruce, Dryden, and Boundary Waters FMAs intersect the moose and gray wolf RSA. Site-specific moose values such as aquatic feeding areas, mineral licks and moose calving areas are protected by area of concern prescriptions in the Stand and Site Guide (MNR 2010a). Similarly, areas of high value moose habitat cover, as designated by the MNRF District Biologist, are considered when planning harvest renewal and tending (MNR 2012; MNRF 2017; Domtar 2019; Greenmantle 2019; Resolute 2019, 2020, 2021a, 2021b; DFMC 2021; OFM 2022). Forestry may provide suitable habitat for moose at 10 to 26 years post-harvest (Nelson et al. 2008).

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for moose. Climate warming is predicted to result in increased temperatures and decreased precipitation levels in northwestern Ontario (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013), which will lower water levels in wetlands that moose rely on between spring and fall, and reduce snow depth in winter, potentially improving access for predators. Climate change may also result in the loss of conifer cover, which provides important habitat for moose, especially during the winter.

Age structure of forest is predicted to change at the landscape scale as a result of an increase in the frequency and intensity of fire associated with climate change (Thompson et al. 1998; Colombo 2008; Nituch and Bowman 2013). Areas that have been burned become optimal for moose at 10 to 26 years postfire (Nelson et al. 2008). The Ontario Wildland Fire Management Strategy (OWFMS) includes managing wildfire to meet ecological and resource objectives (MNRF 2014a,b,c,d,e). Forestry management practices in Ontario include fire suppression, which over the last 60 years has prolonged the forest fire return cycle, leading to an increase in the average age of the forest. Before fire suppression, the boreal forest complex of northwestern Ontario was approximately 30 years younger than it was during the 1970s (Carleton 2001). It is expected that over the long-term, outcomes of the OWFMS will alter habitat availability for moose differently than what might have otherwise occurred naturally.

Sensory Disturbance

There are several future highway resurfacing and reconstruction projects in the moose and gray wolf RSA. Moose may avoid the local area during project construction because of high levels of sensory disturbance. However, sensory disturbance effects from current use of highways are likely to have more of an influence of moose habitat availability than small-scale, short-term highway rehabilitation projects (Bartzke et al. 2014, 2015).

Portions of Treasury Metals Inc.'s Goliath, Goldlund, and Miller gold projects, the Rehabilitation of Steep Rock Mine project, the potential deep geological repository project, and Agnico Eagle Hammond Reef Gold Mine project are in the moose and gray wolf RSA. Sensory disturbance from the operation of the Hammond Reef, Goliath, Goldlund, and Miller mines, and the potential deep geological repository project, as well as from forestry activities and rehabilitation activities at the Steep Rock Mine may cause local changes in moose habitat availability.

Table 6.5-61: Changes to Habitat Availability for Moose in the Cumulative Effects Assessment

Habitat Suitability	Terrestrial LSA Baseline Characterization (ha)	Terrestrial LSA Cumulative Effects (ha)	Terrestrial LSA Change in Area (ha)	Terrestrial LSA Percent Change (%)	Moose and Gray Wolf RSA Baseline Characterization (ha)	Moose and Gray Wolf RSA Cumulative Effects (ha)	Moose and Gray Wolf RSA Change in Area (ha)	Moose and Gray Wolf RSA Percent Change (%)
High	60,638	58,949	-1,689	-2.8%	1,798,126	1,798,126	-2,488	-0.1%
Moderate	15,463	15,184	-279	-1.8%	676,092	676,092	-502	-0.1%
Low	37,645	36,469	-1,177	-3.1%	1,644,153	1,644,153	-1924	-0.1%
Poor	51,329	50,130	-1,199	-2.3%	1,188,900	1,188,900	-1,333	-0.1%

Note: Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: Cumulative effects include net changes from the Project and RFDs.

- = negative; % = percent; ha = hectare; LSA = local study area; n/a = not applicable; RFD = reasonably foreseeable development; RSA = regional study area.

6.5.10.1.2 Habitat Distribution

Habitat Loss

Some RFDs in the LSA and moose and gray wolf RSA will remove moose habitat and result in additional fragmentation. Besides the Project, there are no large linear corridor projects planned in the near future in the moose and gray wolf RSA. Small, point-source RFDs in the moose and gray wolf RSA, such as the Thunder Bay Correctional Complex, Lac Seul First Nation broadband upgrade project, and numerous culvert and bridge replacements, rehabilitations, and removals, are not expected to act as barriers to moose movements and population connectivity.

Current forestry practices in Ontario are aimed at reducing habitat fragmentation (MNRF 2017; Domtar 2019; Greenmantle 2019; Resolute 2019, 2020, 2021a, 2021b; DFMC 2021; OFM 2022). Decreased habitat fragmentation may have a positive effect on moose movements and population connectivity if linear disturbances greater than 90 m are reclaimed (Joyal et al. 1984).

Portions of Treasury Metals Inc.'s Goliath, Goldlund, and Miller gold projects, the Rehabilitation of Steep Rock Mine project, the potential deep geological repository project, and Agnico Eagle Hammond Reef Gold Mine project are in the moose and gray wolf RSA. These projects are primarily point-source disturbances but could have some linear features such as transmission line ROWs and roads. It is expected that linear features associated with mines or the deep geological repository project that are greater than 90 m wide may cause local changes to moose movements. However, no changes to regional population connectivity are anticipated as linear disturbances from mines will not span the moose and gray wolf RSA.

As with habitat availability, climate change and wildfire may contribute cumulatively to changes in the distribution of moose habitat. Moose distribution will likely contract in the presence of future climate change (Rempel 2012; Teitelbaum et al. 2021). Climate warming is predicted to alter forest landscapes through reduced forest patch size, diversity, and distribution as local conditions favour different plant species (Thompson et al. 1998; Colombo 2008; Nituch and Bowman 2013). An increase in the frequency and intensity of wildfires could also fragment suitable habitats for moose.

6.5.10.1.3 Survival and Reproduction

Habitat Loss

The Project and RFDs may influence survival and reproduction of moose by decreasing the carrying capacity in the WMUs intersected by the corridor and large-scale RFDs, such as Treasury Metals Inc.'s Goliath, Goldlund, and Miller gold projects, the Steep Rock Mine rehabilitation project, the deep geological repository project, and Agnico Eagle's Hammond Reef Gold Mine project. RFDs and the Project are predicted to remove 2,990 ha of moderate to high suitability habitat in the RSA. As habitat loss will be spread out in the moose and gray wolf RSA, impacts to the carrying capacity of individual moose ranges in the moose and gray wolf RSA are anticipated to be negligible.

Climate change is predicted to contribute to cumulative changes in the survival and reproduction of moose. The ability of moose to lose body heat has been postulated as a demographic constraint of their large body size and as an explanation for selection of wetland and mature forest that provide thermal relief (Renecker and Hudson 1986; Street et al. 2015b; Teitelbaum et al. 2021). A reduction in the abundance or distribution of these habitats from climate change may reduce moose survival and reproduction rates due to increased energy expenditure from intraspecific competition or dispersal to acquire these important habitats. Climate warming is also predicted to result in greater overlap between moose and white-tailed deer (Thompson et al. 1998; Murray et al. 2006), which may increase moose mortality through higher predation risk from wolves or infestation of meningeal brain worm (*Parelaphostrongylus tenuis*), which is carried by white-tailed deer (Thompson et al. 1998). Moose densities may be lower in the presence of future climate change (Rempel 2012), but moose use several climatic and habitat spaces, which suggests that they have capacity to adapt to climate change (Teitelbaum et al. 2021).

Sensory Disturbance

Increases in sensory disturbance due to the construction, operation, and/or reclamation of RFDs is unlikely to alter moose survival and reproduction. Increases in moose movement rates caused by avoidance of humans were found to have a negligible effect on the overall energy budget of moose that are in good condition (Neumann et al. 2011).

Climate change is predicted to contribute to cumulative changes in the survival and reproduction of moose. The ability of moose to lose body heat has been postulated as a demographic constraint of their large body size and as an explanation for selection of wetland and mature forest that provide thermal relief (Renecker and Hudson 1986; Street et al. 2015b; Teitelbaum et al. 2021). A reduction in the abundance or distribution of these habitats from climate change may reduce moose survival and reproduction rates due to increased energy expenditure from intraspecific competition or dispersal to acquire these important habitats. Climate warming is also predicted to result in greater overlap between moose and whitetailed deer (Thompson et al. 1998; Murray et al. 2006), which may increase moose mortality through higher predation risk from wolves or infestation of meningeal brain worm (*Parelaphostrongylus tenuis*), which is carried by white-tailed deer (Thompson et al. 1998). Moose densities may be lower in the presence of future climate change (Rempel 2012), but moose use several climatic and habitat spaces, which suggests that they have capacity to adapt to climate change (Teitelbaum et al. 2021).

Collisions with Project Vehicles and Equipment

The creation of new and upgrading of existing access roads for RFDs could negatively affect moose through collisions with RFD vehicles and equipment (Jalkotzy et al. 1997; Trombulak and Frissell 2000). Collision risk from vehicles or equipment associated with RFDs is anticipated to be higher during RFD construction than during operations due to more vehicles and equipment being required on site. It is expected that RFDs will implement mitigation to limit collisions with moose, which will limit changes to moose survival and reproduction.

Public Access

The creation of new and upgrading of existing access roads for RFDs could negatively affect moose through collisions with public vehicles (Jalkotzy et al. 1997; Trombulak and Frissell 2000). Upgrades to existing roads could increase traffic volume and traffic speed, which could reduce moose survival by decreasing the chance of an individual crossing a road successfully (EBA 2001; Jaarsma et al. 2006; Litvaitis and Tash 2008; Underhill and Angold 2000). The creation of new access created for RFDs is likely to increase collision risk for moose more than upgraded roads because new roads will attract members of the public that are seeking new areas in which to hunt or recreate.

An increase in access for hunters may also decrease moose survival and reproduction.

Use of Linear Corridors and Converted Habitat

Linear disturbances created for Treasury Metals Inc.'s Goliath, Goldlund, and Miller gold projects, the Rehabilitation of Steep Rock Mine project, the potential deep geological repository project, and Agnico Eagle Hammond Reef Gold Mine, such as transmission line ROWs and roads, could lower moose survival and reproduction by increasing moose encounter rates with predators (Ehlers 2016), as well as predator travel speed (Dickie et al. 2017, 2019).

The reduction in habitat fragmentation due to current forest practices (MNRF 2017; Domtar 2019; Greenmantle 2019; Resolute 2019, 2020, 2021a, 2021b; DFMC 2021; OFM 2022) is likely to decrease the number of linear disturbance features in the RSA. This could increase moose survival and reproduction by limiting encounter rates with wolves and wolf travel speeds (Ehlers 2016; Dickie et al. 2017, 2019).

6.5.10.1.4 Cumulative Effects Assessment Classification

Habitat Availability

Habitat Loss

Negative effects from changes to habitat availability from direct vegetation removal from RFDs, including the Project, are certain but of small magnitude (removal of 0.2% of moderate to high suitability habitat in the moose and gray wolf RSA that is available at Baseline Characterization) (Table 6.5-62). Effects from changes to habitat availability from RFDs can be continuous (e.g., mines, transmission lines [the Project]) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., decreased wetland cover) may have continuous, permanent effects on moose habitat availability that occur at the beyond regional scale. Effects from changes to habitat availability from habitat loss from wildfire and other natural disasters (e.g., storms) in the moose and wolf RSA are expected to be frequent and reversible in the long-term.

Sensory Disturbance

Negative effects to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some moose individuals may already be adapted to human activities in the moose and gray wolf RSA. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for most RFDs because sensory disturbance will primarily be of short duration (i.e., associated with Project construction or forest harvesting) (Table 6.5-60). Effects from moose avoidance of RFDs are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance from RFDs will occur at the local to regional scale, depending on timing and spatial overlap of activities.

Habitat Distribution

Habitat Loss

Negative effects from changes in habitat distribution from habitat loss are possible, not certain, because moose are highly mobile and can occupy fragmented landscapes. Effects from changes to habitat distribution from removal by RFDs can be continuous (e.g., mines, transmission lines [the Project]) or frequent (e.g., forestry). Direct vegetation removal by human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., potential range contraction) may have continuous, permanent effects on moose habitat distribution that occur at the beyond regional scale. Effects from changes to habitat distribution from habitat loss from wildfire and other natural disasters (e.g., storms) in the moose and wolf RSA are expected to be frequent and reversible in the long-term.

Survival and Reproduction

Use of Linear Corridors and Converted Habitat

Cumulative effects from changes in moose survival and reproduction due to use of linear corridors and converted habitat are possible, not certain, because RFDs are considered to implement mitigation to limit effects from this interaction. Effects would occur permanently for RFDs with indefinite lifespans (e.g., transmission lines) or reversible in the long-term for RFDs that will be reclaimed. Effects would occur continuously at the regional scale (Table 6.5-62).

Table 6.5-62: Characterization of Predicted Cumulative Effects for Moose

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Habitat Loss	Direct	Negative	Direct loss of 1968 ha of moderate to high suitability habitat (4.6% of the LSA) from Baseline Characterization. Direct loss of 0.2% of the RSA Baseline Characterization moderate to high suitability habitat. Reduction to habitat availability due to climate change.	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible[(c)]	Frequent to Continuous	Certain	Not significant
Habitat Availability	Sensory Disturbance	Indirect	Negative	Reduced quality of habitat and possible avoidance from sensory disturbance.	Local to Regional[(b)]	Medium or Long-term/ Reversible or Permanent/Irreversible[(d)]	Frequent to Continuous	Probable	Not significant
Habitat Distribution	Habitat Loss	Direct	Negative	Small reduction in movements among habitat patches due to fragmentation of suitable habitat. Possible range contraction due to climate change.	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible[(c)]	Frequent to Continuous	Possible	Not significant
Survival and Reproduction	Use of Linear Corridors and Converted Habitat	Indirect	Negative	Small increase in predation risk after implementation of mitigation measures.	Regional	Long-term/Reversible to Permanent/Irreversible	Continuous	Probable	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.

a) Some effects occur at the beyond regional scale due to climate change and other natural disturbance factors

b) Local if no temporal overlap among RFD activities; regional if temporal overlap among RFD activities.

c) Some habitat disturbed by RFDs would be reclaimed, reversing the effects from habitat loss and habitat fragmentation.

d) Effects are reversible over the medium-term for RFDs where most effects are of short duration (e.g., occurs during construction, forest harvesting).

e) Neutral changes are not carried forward for the characterization of net effects (see Section 5.0 for more details)

% = percent; ha = hectares; RFD = Reasonably Foreseeable Development; RSA = regional study area; LSA = local study area.

6.5.10.1.5 Assessment of Significance

Past and existing activities in the Baseline Characterization have negatively affected habitat availability, habitat distribution, and survival and reproduction of moose in the moose and gray wolf RSA. Moose are primarily threatened by direct and indirect habitat loss (Street et al. 2015a), altered predator-prey relationships (Dussault et al. 2005, Street et al. 2015a), and hunting (Timmermann et al. 2002). Habitat is not a limiting factor for moose in the Baseline Characterization or Cumulative Effects Assessment as moderate to high suitability habitat covers 46.8% of the RSA at Baseline Characterization and 46.6% in the Cumulative Effects Assessment (change of 0.2%). The cumulative direct disturbance to moderate to high suitability moose habitat from the Project and other RFDs is predicted to be 4.6% of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization. This is a conservative estimate of habitat loss as entire lease areas for the Treasury Metal's Goliath and Goldlund projects were assumed to be disturbed for the Cumulative Effects Assessment.

The RFDs are not anticipated to result in changes to moose movements or population connectivity, relative to the Baseline Characterization, as disturbances are either point source, linear disturbances that parallel existing disturbances, or linear corridors that are narrower than the width reported to inhibit moose movements (Joyal et al. 1984). Additionally, it is assumed the RFDs will use mitigation measures that avoids and limits effects to moose survival and reproduction.

Climate change is predicted to result in drier conditions that lead to more frequent and severe fires in the Ontario boreal forest (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013). It is anticipated that forage availability may decrease in the first few years post-fire and lead to declines in recruitment. However, burned forest may become highly suitable for moose from 10 to 26 years post-burn as forest regeneration provides optimal forage (Nelson et al. 2008). Fire suppression practices in older forest stands in Ontario began 30 years ago (Carleton 2001), so continued fire suppression may limit effects from increased wildfire frequency and intensity in the future. As such, changes to the amount and quality of habitat in the RSA are uncertain.

Climate warming is predicted to result in greater overlap between moose and white-tailed deer (Thompson et al. 1998, Murray et al. 2006), which may increase moose mortality through higher predation risk from wolves or infestation of meningeal brain worm (Thompson et al. 1998). The magnitude and extent of these changes is unknown because there is high uncertainty regarding the potential effects of climate change; predictions are based on simulations that can be highly variable and many scenarios are possible.

Aerial surveys conducted in by the Ontario Government between 1975 and 2023 indicate moose populations in the Project study areas are declining, and estimated population densities are mostly below the objectives for WMUs in Zone C1, which prioritize moderate to high densities of moose (Appendix 6.5-A). Adjacent WMUs south of the LSA (Zone D1) also prioritize moderate to high moose densities, however the 2022 population estimates in Zone D1 are similarly below the objectives (MNRF 2023). Adjacent WMUs north of the LSA are categorized as Zone B, which prioritizes low to moderate moose density in support of caribou populations (MNRF 2023).

Moose display life history traits (e.g., high reproductive and dispersal rates, ability to use many types of habitats) that provide flexibility to adapt to different ecozones, the rate of increasing landscape alteration by humans, and climate change. The most recent surveys of moose populations by the MNRF indicate that for WMUs in the moose and gray wolf RSA that prioritize moderate to high densities of moose (i.e., Zones C and D) have moose densities that are mostly below the desired ecological goals, which indicates uncertainty in their ability to absorb existing effects from disturbances that exist at Baseline Characterization. The combined evidence concerning the cumulative changes to moose habitat availability, distribution, and survival and reproduction in the moose and gray wolf RSA from Baseline Characterization to the Cumulative Effects Assessment suggests that moose populations would likely continue to maintain their current state in the moose and gray wolf RSA, although possibly at a lower abundance. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of moose in or beyond the moose and gray wolf RSA. Consequently, effects on moose in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-62).

6.5.10.2 Gray Fox

6.5.10.2.1 Habitat Availability

Habitat Loss

The only RFDs that occur in the gray fox RSA are the Project and forestry activities in the Lakehead, Dog River-Matawin, and Boundary Waters FMAs. As such, habitat loss is not quantified for the cumulative effect assessment; effects from the Project are outlined in Section 6.5.7.3.

Forestry activities in the gray fox RSA may have resulted in historical fragmentation of gray fox habitat. Current forestry practices aimed at reducing habitat fragmentation (Greenmantle 2019, Resolute 2020,2021a) may have a negative impact on gray fox habitat availability as this species has been found to prefer fragmented landscapes (Crooks 2002; Collins 2012).

Climate change is expected to have a positive effect on gray fox habitat availability as this species' distribution expansion in North America is correlated with warming temperatures and the expansion of deciduous forest (Bozarth et al. 2011; COSEWIC 2015).

Sensory Disturbance

Gray foxes may be sensitive to sensory disturbance from human activities, which can result in indirect habitat loss. Sensory disturbance from human disturbance activities may have a larger influence on gray fox habitat availability during the denning period than other periods.

6.5.10.2.2 Habitat Distribution

Habitat Loss

Current forestry practices that are aimed at reducing habitat fragmentation in the Lakehead, Dog River-Matawin, and Boundary Waters FMAs (Greenmantle 2019, Resolute 2020,2021a), may have a negative impact on gray fox movements by reducing travel ability along human linear features (Dickie et al. 2017, 2019).

6.5.10.2.3 Survival and Reproduction

All potential net effects to gray fox survival and reproduction from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.2.4 Cumulative Effects Assessment Classification

Habitat Availability

Habitat Loss

Negative effects from changes to habitat availability from direct vegetation removal from RFDs (the Project) are certain but of small magnitude (removal of 1.1% of moderate to high suitability habitat in the gray fox RSA that is available at Baseline Characterization) (Table 6.5-63). Effects from changes to habitat availability from RFDs can be continuous (e.g., transmission lines [the Project]) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., regrowth in harvested areas).

Sensory Disturbance

Negative effects to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some gray fox individuals may already be adapted to human activities in the gray fox RSA. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for most RFDs because sensory disturbance will primarily be of short duration (i.e., associated with Project construction or forest harvesting) (Table 6.5-63). Effects from gray fox avoidance of RFDs are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance from RFDs will occur at the local to regional scale, depending on timing and spatial overlap of activities.

Habitat Distribution

Habitat Loss

Negative effects from changes in habitat distribution from habitat loss are possible, not certain, because gray foxes are highly mobile and can occupy fragmented landscapes. Effects from changes to habitat distribution from removal by RFDs can be continuous (e.g., transmission lines [the Project]) or frequent (e.g., forestry). Direct vegetation removal by human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., regrowth in harvested areas).

Table 6.5-63: Characterization of Predicted Cumulative Effects for Gray Fox

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Habitat Loss	Direct	Negative	Direct loss of 2,345 ha of moderate to high suitability habitat (3.4% of the LSA or 1.1% of the RSA from Baseline Characterization).	Regional	Long-term/Reversible to Permanent/Irreversible[b]	Frequent to Continuous	Certain	Not significant
Habitat Availability	Sensory Disturbance	Indirect	Negative	Reduced quality of habitat and possible avoidance from sensory disturbance.	Local to Regional[a]	Medium or Long-term/ Reversible or Permanent/Irreversible[c]	Frequent to Continuous	Probable	Not significant
Habitat Distribution	Habitat Loss	Direct	Negative	Small reduction in movements among habitat patches due to fragmentation of suitable habitat	Regional	Long-term/Reversible to Permanent/Irreversible[b]	Frequent to Continuous	Possible	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.

a) Local if no temporal overlap among RFD activities; regional if temporal overlap among RFD activities.

b) Some habitat disturbed by RFDs would be reclaimed, reversing the effects from habitat loss and habitat fragmentation.

c) Effects are reversible over the medium-term for RFDs where most effects are of short duration (e.g., occurs during construction, forest harvesting).

% = percent; ha = hectares; RFD = reasonably foreseeable development; RSA = regional study area; LSA = local study area.

6.5.10.2.5 Assessment of Significance

Past and existing activities in the Baseline Characterization have negatively affected habitat availability, habitat distribution, and survival and reproduction of gray fox in the gray fox RSA. Gray foxes are primarily threatened by hunting and trapping (COSEWIC 2015). Habitat is not a limiting factor for gray fox in the Baseline Characterization or Cumulative Effects Assessment as moderate to high suitability habitat covers 83.9% of the gray fox RSA at Baseline Characterization and 83.0% in the Cumulative Effects Assessment (change of 0.9%). The cumulative direct disturbance to moderate to high suitability gray fox habitat from the Project and other RFDs is predicted to be 3.4% of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization. Only the Project was considered an RFD in the quantitative assessment of cumulative habitat loss from baseline conditions as no other quantifiable RFDs overlap the gray fox RSA.

The RFDs in the gray fox RSA (i.e., the Project and forestry activities) are not anticipated to result in changes to gray fox movements or population connectivity, relative to the Baseline Characterization, as disturbances in gray fox habitat fragmented landscapes and movements do not appear to be inhibited by developments that have high traffic volumes (Schreier and Coen 2017). Additionally, it is assumed the RFDs will use mitigation measures that avoids and limits effects to gray fox survival and reproduction.

Climate change is predicted to result in a northward expansion of deciduous forest, as well as drier conditions that lead to more frequent and severe fires in the Ontario boreal forest (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013). The expansion of deciduous forest is expected to have a positive impact on gray fox (Bozarth et al. 2011), while more frequent fires may have negative effects. As such, changes to the amount and quality of habitat in the gray fox RSA are uncertain.

Gray fox display life history traits (e.g., high reproductive and dispersal rates, ability to occupy fragmented habitats) that provide flexibility to adapt to different ecozones, the rate of increasing landscape alteration by humans, and climate change. In recent years, the number of provincial occurrence records and citizen science observations of gray fox has increased, indicating that populations in Ontario, including the RSA, are increasing. That gray fox populations appear to be increasing reflects this species' ability to absorb effects from disturbances that exist at Baseline Characterization. The combined evidence concerning the cumulative changes to gray fox habitat availability, distribution, and survival and reproduction in the gray fox RSA from Baseline Characterization to the Cumulative Effects Assessment indicates that gray fox populations would continue to be self-sustaining. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of gray fox in or beyond the gray fox RSA. Consequently, effects on gray fox in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-63).

6.5.10.3 Furbearers (Gray Wolf)

6.5.10.3.1 Habitat Availability

Sensory Disturbance

Sensory disturbance from the operation of the Hammond Reef, Goliath, Goldlund, and Miller mines and the potential deep geological repository project, as well as from rehabilitation activities at the Steep Rock Mine may cause local changes in gray wolf use but are not expected to result in large changes to regional habitat availability. Sensory disturbance from traffic on forestry roads and from harvesting activities may change local gray wolf habitat use but are not expected to result in changes to habitat availability in the moose and gray wolf RSA. Sensory disturbance from logging activities may have a larger influence on wolf habitat availability during the denning period than then rendezvous and nomadic periods.

6.5.10.3.2 Habitat Distribution

All potential net effects to gray wolf habitat distribution from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.3.3 Survival and Reproduction

All potential net effects to gray wolf survival and reproduction from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.3.4 Cumulative Effects Assessment Classification

Habitat Availability

Sensory Disturbance

Effects from changes to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some gray wolf individuals and packs may adapt to human activities. RFDs are expected to implement mitigation to limit disturbance to active wolf dens, but this mitigation may not be completely effective and wolf dens may be abandoned if disturbed. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., bridge and culvert rehabilitations, forestry) (Table 6.5-64). Effects from avoidance are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance will occur at the local to regional scale depending on the temporal and spatial overlap of activities.

Table 6.5-64: Characterization of Predicted Cumulative Effects for Gray Wolf

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Sensory Disturbance	Indirect	Negative	Reduced quality of habitat and possible avoidance.	Local to Regional[(a)]	Medium or Long-term/ Reversible or Permanent/Irreversible[(b)]	Frequent to Continuous	Probable	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.

a) Local if no temporal overlap among RFD activities; regional if temporal overlap among RFD activities.

b) Effects are reversible over the medium-term for RFDs where most effects are of short duration (e.g., occurs during construction, forest harvesting).

ha = hectares; RFD = reasonably foreseeable development; RSA = regional study area; LSA = local study area

6.5.10.3.5 Assessment of Significance

Past and existing activities in the Baseline Characterization have negatively affected habitat availability, habitat distribution, and survival and reproduction of gray wolf in the moose and gray wolf RSA. However, there are estimated to be 8,800 wolves in Ontario (MNR 2005) and densities reported in 2005 were higher than estimates from 2001, which indicates that populations are increasing (Gable et al 2022). Habitat is not a limiting factor for gray wolf in the Baseline Characterization or Cumulative Effects Assessment as this species is a habitat generalist that is able to occupy several different habitat types.

The RFDs are not anticipated to result in direct changes to wolf habitat abundance as this species is a habitat generalist that relies more on prey abundance than habitat type. Similarly, RFDs are not expected to change gray wolf habitat distribution, movements, or population connectivity, relative to the Baseline Characterization, as disturbances are either point source or linear corridors that may be preferred travel corridors for gray wolves (Paquet and Callaghan 1996; Gurarie et al. 2011; Dickie et al. 2017). Wolf survival and reproduction are not expected to be impacted by RFDs as it is expected that RFDs will implement mitigation measures to limit changes to wolf survival and reproduction. Overall, climate change is anticipated to have a neutral to positive effect on wolf habitat availability, habitat distribution, and reproduction and survival.

Gray wolves are resilient and adaptable and able to accommodate many threats such as disease, parasites, injuries caused by prey, and exploitation and persecution by humans (e.g., culls) (Mech 1974). Gray wolves also have a high reproductive rate and are capable of rapid population growth if the availability of prey is sufficiently high. Therefore, the combined evidence concerning the cumulative changes to gray wolf habitat availability, distribution, and survival and reproduction in the moose and gray wolf RSA from Baseline Characterization to the Cumulative Effects Assessment indicates that wolf populations would continue to be self-sustaining. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of gray wolf in or beyond the moose and gray wolf RSA. Consequently, effects on wolf in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-64).

6.5.10.4 Furbearers (American Marten)

6.5.10.4.1 Habitat Availability

Habitat Loss

The RFDs that overlap with the RSA and will remove American marten habitat are presented in Table 6.5-65. Estimates of habitat loss presented in the subsections below are conservative estimates as project footprints for future mines are not available. As such, for the Treasury Metal’s Goliath Gold project, the entire lease area was assumed to be disturbed in the Cumulative Effects Assessment.

The RFDs, including the Project, that overlap with the LSA will contribute to a loss of approximately 858 ha (2.4%) of moderate to high suitability American marten habitat in the LSA relative to the Baseline Characterization (Table 6.5-65). RFDs, including the Project, will remove approximately 916 ha (0.8%) of moderate to high suitability American marten habitat in the RSA compared to the Baseline Characterization (Table 6.5-65).

The Lakehead, Dog River-Matawin, Wabigoon, Dryden, and Boundary Waters FMAs intersect the RSA. Forestry management plans for these FMAs incorporate landscape level habitat objectives to support American marten such as texture and pattern targets for mature and old forest (Domtar 2019; Greenmantle 2019; Resolute 2020, 2021a, DFMC 2021).

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence American marten habitat availability. Climate change may result in the loss of conifer cover, which provides important habitat for American marten.

Age structure of forest is predicted to change at the landscape scale as a result of an increase in the frequency and intensity of fire associated with climate change (Thompson et al. 1998; Colombo 2008; Nituch and Bowman 2013). Forestry management practices in Ontario include fire suppression, which, over the last 60 years, has prolonged the forest fire return cycle leading to an increase in the average age of the forest. Before fire suppression, the boreal forest complex of northwestern Ontario was approximately 30 years younger than it was during the 1970s (Carleton 2001). It is expected that over the long-term, outcomes of the OWFMS will alter habitat availability for marten differently than what might have otherwise occurred naturally.

Sensory Disturbance

There are several future highway resurfacing projects in the RSA. American marten may avoid the local area during project construction because of high levels of sensory disturbance. However, sensory disturbance effects from current high vehicle presence on highways are likely to have more of an influence of marten habitat availability than small-scale, short-term highway rehabilitation (Collins 2020). Sensory disturbance from the operation of the Hammond Reef and Goliath mines, as well as from rehabilitation activities at the Steep Rock Mine and forestry activities, including roads, may cause local changes in marten habitat availability. American marten in California were found to avoid wildlife crossing structures along highways in California, possibly due to sensory disturbance from vehicles (Collins 2020).

Table 6.5-65: Changes to Habitat Availability for American Marten in the Cumulative Effects Assessment

Habitat Suitability	Terrestrial LSA Baseline Characterization (ha)	Terrestrial LSA Cumulative Effects (ha)	Terrestrial LSA Change in Area (ha)[(a)]	Terrestrial LSA Percent Change (%)[(a)]	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)[(a)]	Terrestrial RSA Percent Change (%)[(a)]
Moderate to High	37,387	36,481	-906	-2.4%	121,833	120,917	-916	-0.8%
Unsuitable	127,267	128,173	906	0.7%	425,207	426,123	916	0.2%

a) Changes in habitat area result from a conversion suitable habitat to unsuitable habitat.

Note: Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: Cumulative effects include net changes from the Project and RFDs.

ha = hectare; - = negative; n/a = not applicable; % = percent; RFD = reasonably foreseeable development

6.5.10.4.2 Habitat Distribution

Habitat Loss

Some RFDs in the LSA and RSA will remove vegetation and result in habitat fragmentation and changes to marten movements. Besides the Project, there are no large linear corridor projects planned in the in the RSA. Portions of Treasury Metals Inc.'s Goliath Gold project and the Rehabilitation of Steep Rock Mine project are in the RSA. These projects are primarily point-source disturbances but could have some linear features such as transmission line ROWs and roads. Effects of RFDs on marten movements could vary depending on disturbance type. Some studies indicate that marten do not cross linear disturbances (Tigner et al. 2015; Robitaille and Aubry 2000; Collins 2020), while others found that marten movement is not impeded by resource roads, trails, and paved highways (Coffin et al. 2002).

Current forestry practices in Ontario are aimed at reducing habitat fragmentation (Domtar 2019; Greenmantle 2019; Resolute 2020, 2021a, DFMC 2021). Reducing fragmentation in harvested landscapes is expected to help maintain resident marten populations in these areas (Chapin et al. 1998; Evans and Mortelliti 2022).

As with habitat availability, climate change and wildfire may indirectly contribute to changes in the distribution American marten by changing the distribution of conifer forest habitat. Additionally, as climate change is predicted to result in drier conditions in the Ontario boreal forest (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013), this is expected to result in a lower winter snowpack in the RSA. A reduction in winter snowpack could result in a change to American marten habitat distribution (Wasserman et al. 2012).

Reducing fragmentation in harvested landscapes is expected to help maintain resident marten populations in these areas (Chapin et al. 1998).

6.5.10.4.3 Survival and Reproduction

All potential net effects to American marten survival and reproduction from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.4.4 Cumulative Effects Assessment Classification

Habitat Availability

Habitat Loss

Negative effects from changes to habitat availability from direct vegetation removal from RFDs, including the Project footprint, are certain but of small magnitude (removal of 0.8% of moderate to high suitability habitat in the RSA that is available at Baseline Characterization) (Table 6.5-60). Effects from changes to habitat availability from RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., decreased conifer forest cover) may have continuous, permanent effects on marten habitat availability that occur at the beyond regional scale. Effects from changes to habitat availability from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Sensory Disturbance

Effects from changes to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some marten individuals may adapt to human activities. RFDs are expected to implement mitigation to limit disturbance to active marten dens, but this mitigation may not be completely effective and dens may be abandoned if disturbed. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., highway rehabilitations, forestry) (Table 6.5-66). Effects from avoidance are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance will occur at the local to regional scale depending on the temporal and spatial overlap of activities.

Habitat Distribution

Habitat Loss

Changes in habitat distribution and movements due to direct habitat removal from RFDs (i.e., increased habitat fragmentation) are possible, not certain, because marten are highly mobile and can occupy fragmented landscapes. Effects from changes to habitat distribution from removal by RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct vegetation removal by human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., potential range contraction due to changes in winter snowpack) may have continuous, permanent effects on marten habitat distribution that occur at the beyond regional scale. Effects from changes to habitat distribution from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Table 6.5-66: Characterization of Predicted Cumulative Effects for American Marten

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Habitat Loss	Direct	Negative	Negligible effect from loss of moderate to high suitability habitat, including, 906 ha of the LSA and 916 ha of the RSA of (2.4% of the LSA and 0.2% of the RSA at Baseline Characterization). Reduction to habitat availability due to climate change	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible[(c)]	Frequent to Continuous	Certain	Not significant
Habitat Availability	Sensory Disturbance	Indirect	Negative	Reduced quality of habitat and possible avoidance. Possible abandonment of den sites.	Local to Regional[(b)]	Medium or Long-term/ Reversible or Permanent/Irreversible[(d)]	Frequent to Continuous	Probable	Not significant
Habitat Distribution	Habitat Loss	Direct	Negative	Small reduction in movements among habitat patches due to fragmentation of suitable habitat. Possible range contraction due to climate change.	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible[(c)]	Frequent to Continuous	Possible	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.
a) Some effects occur at the beyond regional scale due to climate change and other natural disturbance factors
b) Local if no temporal overlap among RFD activities; regional if temporal overlap among RFD activities.
c) Some habitat disturbed by RFDs would be reclaimed, reversing the effects from habitat loss and habitat fragmentation.
d) Effects are reversible over the medium-term for RFDs where most effects are of short duration (e.g., occurs during construction, forest harvesting).
% = percent; ha = hectares; RFD = reasonably foreseeable development; RSA = regional study area; LSA = local study area; N/A = not applicable

6.5.10.4.5 Assessment of Significance

Past and existing activities in the Baseline Characterization have negatively affected habitat availability, habitat distribution, and survival and reproduction of American marten in the RSA. However, this species is still common and widespread throughout central and northern Ontario (MNRF 2016b). This indicates that the American marten population in the RSA is able to absorb effects from disturbances that exist at Baseline Characterization. Habitat is not a limiting factor for American marten in the Baseline Characterization or Cumulative Effects Assessment as moderate to high suitability habitat covers 22.2% of the RSA at Baseline Characterization and 22.1% in the Cumulative Effects Assessment (change of 0.1%). The cumulative direct disturbance to moderate to high suitability American marten habitat from the Project and other RFDs is predicted to be 2.4% of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization.

The RFDs are anticipated to result in small, direct changes to marten habitat availability, habitat distribution, movements, and population connectivity relative to Baseline Characterizations. Removal of 858 ha or 0.8% of moderate to high suitability habitat at the RSA scale, or the equivalent of one marten home range, is anticipated to have a negligible effect on American martens in the RSA. Current forestry practices in Ontario are aimed at maintaining texture and pattern targets for mature and old forest that are suitable for marten, as well as reducing habitat fragmentation; these factors are likely to improve marten habitat in the RSA compared to Baseline Characterization. Overall, climate change is anticipated to have a negative effect on marten habitat availability, habitat distribution, and reproduction and survival but effects are uncertain.

American martens are adaptable and resilient to natural and human-related disturbances and associated changes in habitat availability and distribution. Additionally, American martens are capable of rapid population growth when there are suitable habitat conditions (Fryxell et al. 1999, 2001; Powell et al. 2003). Therefore, the combined evidence concerning the cumulative changes to American marten habitat availability, distribution, and survival and reproduction from Baseline Characterization to the Cumulative Effects Assessment indicates that marten populations would continue to be self-sustaining in the RSA. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of American marten in or beyond the RSA. Consequently, effects on marten in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-66).

6.5.10.5 Furbearers (Beaver)

6.5.10.5.1 Habitat Availability

Habitat Loss

The RFDs that overlap with the RSA and will remove beaver habitat are presented in Table 6.5-57. Estimates of habitat loss presented in the subsections below are conservative estimates as project footprints for future mines are not available. As such, for the Treasury

Metal's Goliath Gold project, the entire lease area was assumed to be disturbed in the Cumulative Effects Assessment.

The RFDs that overlap with the LSA, including the Project, will contribute to a loss of 495 ha (3.8%) of moderate to high suitability beaver habitat in the LSA relative to the Baseline Characterization (Table 6.5-68). The RFDs, including the Project, will remove 509 ha (1.3%) of moderate to high suitability beaver habitat in the RSA compared to the Baseline Characterization (Table 6.5-67).

Table 6.5-67: Changes to Beaver Habitat Availability in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Area (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)[(a)]	LSA Percent Change (%)	RSA Baseline Area (ha)	RSA Cumulative Effects (ha)	RSA Change in Area (ha)[(a)]	RSA Percent (%)
High	11,698	11,489	-209	-1.8%	35,052	34,833	-219	-0.6%
Moderate	13,893	13,607	-285	-2.1%	40,053	39,763	-290	-0.7%
Low	6,248	6,122	-127	-2.0%	17,374	17,241	-133	-0.8%
Poor[(a)]	119,800	120,421	621	0.5%	413,037	413,679	642	0.2%

a) Changes in habitat area result from a conversion high, moderate, low habitat to poor habitat.

Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: Cumulative effects include net changes from the Project and RFDs.

% = percent; ha = hectare; - = negative; LSA = local study area; RSA = regional study area.

The Lakehead, Dog River-Matawin, Wabigoon, Dryden, and Boundary Waters FMAs intersect the RSA. Generally, forestry activities are not expected to have large effects on beavers because of required setback buffers around riparian areas. However, beaver dams may be removed if old forestry roads are re-established in a FMU (Domtar 2019; Greenmantle 2019; Resolute 2020, 2021a, DFMC 2021).

Beavers are expected to be resilient to climate change as this species occupies many climatic and hydrologic regimes. Beaver ponds can make waterbodies and watercourses more productive and resilient to climate change (Pollock et al. 2014; Jordan and Fairfax 2022).

Climate change is predicted to dramatically increase beaver densities in the interior portions of their range in Ontario and Quebec, while only a slight northward expansion of their range is predicted (Jarema et al. 2009).

6.5.10.5.2 Habitat Distribution

All potential net effects to beaver habitat distribution from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.5.3 Survival and Reproduction

All potential net effects to beaver survival and reproduction from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.5.4 Cumulative Effects Assessment Classification

Habitat Availability

Habitat Loss

Negative effects on beaver from changes to habitat availability from direct vegetation removal from RFDs, including the Project, are certain but of small magnitude (removal of 1.3% of moderate to high suitability habitat in the RSA that is available at Baseline Characterization) (Table 6.5-68). Effects from changes to habitat availability from RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Table 6.5-68: Characterization of Predicted Cumulative Effects for Beaver

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Habitat Loss	Direct	Negative	Direct loss of 509 ha of moderate to high suitability habitat (1.3% of the RSA Baseline Characterization).	Regional	Long-term/Reversible to Permanent/Irreversible[(a)]	Frequent to Continuous	Certain	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.

a) Some habitat disturbed by RFDs would be reclaimed, reversing the effects from habitat loss and habitat fragmentation.

% = percent; ha = hectares; RFD = reasonably foreseeable development; RSA = regional study area; LSA = local study area; N/A = not applicable

6.5.10.5.5 Assessment of Significance

Past and existing activities in the Baseline Characterization have negatively affected habitat availability, habitat distribution, and survival and reproduction of beaver in the RSA. However, this species' population has rebounded since the end of the fur trade and there are currently 6 to 12 million beavers in Ontario (Ontario Parks 2022).

The RFDs including the Project, are anticipated to result in small, direct changes to beaver habitat availability, after implementation of mitigation, relative to the Baseline Characterization; cumulative effects are not anticipated for beaver habitat distribution or survival or reproduction. Removal of 509 ha or 1.3% of suitable habitat at the RSA scale is anticipated to have a negligible effect on beavers in the RSA. Climate change is anticipated to have a positive effect on beaver habitat availability, habitat distribution, and reproduction and survival.

Beavers are adaptable and resilient to natural and human-related disturbances and associated changes in habitat availability. Additionally, beavers are capable of rapid population growth when trapping is properly managed, as indicated by the population rebound in Ontario since the end of the fur trade (Ontario Parks 2022). Therefore, the combined evidence concerning the cumulative changes to beaver habitat availability, distribution, and survival and reproduction from Baseline Characterization to the Cumulative Effects Assessment indicates that beaver populations would continue to be self-sustaining in the RSA. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of beaver in or beyond the RSA. Consequently, effects on beaver in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-68).

6.5.10.6 Little Brown Myotis and Northern Myotis

6.5.10.6.1 Habitat Availability

Habitat Loss

The RFDs that overlap with the RSA and will remove little brown myotis and northern myotis maternity roost habitat are presented in Table 6.5-57. Estimates of habitat loss presented in the subsections below are conservative estimates as project footprints for future mines are not available. As such, for the Treasury Metal's Goliath Gold project, the entire lease area was assumed to be disturbed in the Cumulative Effects Assessment.

It is anticipated that the RFDs that overlap with the RSA will contribute to a loss of approximately 70 ha of little brown myotis and northern myotis candidate maternity roost habitat in the LSA and 196 ha of little brown myotis and northern myotis candidate maternity roost habitat in the RSA relative to the Baseline Characterization (Table 6.5-69). RFDs, including the Project, will remove approximately 1,629 ha (1%) of little brown myotis and northern myotis maternity roost habitat in the RSA compared to the Baseline Characterization (Table 6.5-69).

The Lakehead, Dog River-Matawin, Wabigoon, Dryden, and Boundary Waters FMAs intersect the RSA. Forestry management plans for these FMAs incorporate operational prescriptions to support bats such as restrictions on activities near bat hibernacula, and bat roosting sites (Domtar 2019; Greenmantle 2019; Resolute 2020, 2021a, DFMC 2021).

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence bat habitat availability. Wildfire may result in the removal of bat maternity roost habitat.

Age structure of forest is predicted to change at the landscape scale as a result of an increase in the frequency and intensity of fire associated with climate change (Thompson et al. 1998; Colombo 2008; Nituch and Bowman 2013). Forestry management practices in Ontario include fire suppression, which, over the last 60 years, has prolonged the forest fire return cycle leading to an increase in the average age of the forest. Before fire suppression, the boreal forest complex of northwestern Ontario was approximately 30 years younger than it was during the 1970s (Carleton 2001). It is expected that over the long-term, outcomes of the OWFMS will alter habitat availability for little brown myotis and northern myotis differently than what might have otherwise occurred naturally.

Table 6.5-69: Changes to Maternity Roost Habitat Availability for Little Brown Myotis and Northern Myotis in the Cumulative Effects Assessment

Habitat Suitability	Terrestrial LSA Baseline Characterization (ha)	Terrestrial LSA Cumulative Effects (ha)	Terrestrial LSA Change in Area (ha)[(a)]	Terrestrial LSA Percent Change (%)[(a)]	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)[(a)]	Terrestrial RSA Percent Change (%)[(a)]
Suitable	53,827	52,324	-1,503	-2.8%	165,911	164,282	-1,629	-1%
Unsuitable	110,936	112,439	1,503	+1.4%	377,669	379,298	1,629	+0.4%

a) Changes in habitat area result from a conversion suitable habitat to unsuitable habitat.

Note: Some of the numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

Note: Cumulative effects include net changes from the Project and RFDs.

+ = positive; ha = hectare; - = negative; n/a = not applicable; % = percent; RFD = reasonably foreseeable development

Sensory Disturbance

There are several future highway resurfacing projects in the RSA. Little brown myotis and northern myotis may avoid the local area during project construction because of high levels of sensory disturbance. However, there is little information on how little brown myotis and northern myotis respond to sensory disturbance.

6.5.10.6.2 Habitat Distribution

Habitat Loss

Changes in habitat distribution due to the Project and RFDs are not likely to result in local changes in the distribution of little brown myotis and northern myotis populations that overlap the RSA. Maternity habitat will still be widely and commonly distributed in the RSA.

Little brown myotis may forage in small clearings and along forest edges. Linear disturbances may facilitate bat movements in the RSA.

It is assumed that regulatory approval of RFDs will require proponents to demonstrate that they are meeting the habitat distribution objectives for little brown myotis as outlined in the recovery strategy (Environment Canada 2015a). Based on this assumption, changes in the distribution of occupied habitat are unlikely due to the protection this species and its habitat receives under the provincial *Endangered Species Act* (ESA) and the federal *Species at Risk Act* (SARA).

6.5.10.6.3 Survival and Reproduction

All potential net effects to little brown myotis and northern myotis survival and reproduction from the Project were deemed negligible and no interactions were carried forward to the cumulative effects assessment.

6.5.10.6.4 Cumulative Effects Assessment Classification

Habitat Availability

Habitat Loss

Negative effects from changes to maternity roost habitat availability from direct vegetation removal from RFDs are certain but of small magnitude (removal of 1% of suitable habitat in the RSA that is available at Baseline Characterization) (Table 6.5-69). Effects from changes to habitat availability from RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects may have continuous, permanent effects on little brown myotis and northern myotis habitat availability that occur at the beyond regional scale. Effects from changes to habitat availability from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Sensory Disturbance

Effects from changes to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some bat individuals may adapt to human activities. RFDs are expected to implement mitigation to limit disturbance to active little brown myotis and northern myotis roosts, but this mitigation may not be completely effective and roosting areas may be abandoned if disturbed. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., highway rehabilitations, forestry) (Table 6.5-70). Effects from avoidance are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance will occur at the local to regional scale depending on the temporal and spatial overlap of activities.

Habitat Distribution

Habitat Loss

Changes in habitat distribution and movements due to direct habitat removal from RFDs (i.e., increased habitat fragmentation) are certain. Effects from changes to habitat distribution from removal by RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct vegetation removal by human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., increased wildfires) may have continuous, permanent effects on little brown myotis and northern myotis habitat distribution that occur at the beyond regional scale. Effects from changes to habitat distribution from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Table 6.5-70: Characterization of Predicted Cumulative Effects for Little Brown Myotis

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Reversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	Habitat Loss	Direct	Negative	Direct loss of approximately 1,629 ha of candidate bat maternity roost habitat in the RSA. Reduction to habitat availability due to climate change.	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible	Frequent to Continuous	Certain	Not significant
Habitat Availability	Sensory Disturbance	Direct	Negative	Reduced quality of roosting habitat and possible avoidance of LSA from sensory disturbance during construction.	Local to Regional[(b)]	Medium or Long-term/ Reversible or Permanent/Irreversible[(d)]	Frequent to Continuous	Probable	Not significant
Habitat Distribution	Habitat Loss	Direct	Negative	Small reduction in the spatial distribution of habitat due to the loss of approximately 1,629 ha of candidate maternity roost habitat in the RSA. Changes in habitat distribution due to climate change.	Regional to Beyond Regional[(a)]	Long-term/Reversible to Permanent/Irreversible	Frequent to Continuous	Possible	Not significant

Note: Natural factors include climate change and associated effects, inclement weather (e.g., storms), and wildfire.
a) Some effects occur at the beyond regional scale due to climate change and other natural disturbance factors
b) Local if no temporal overlap among RFD activities; regional if temporal overlap among RFD activities.
c) Some habitat disturbed by RFDs would be reclaimed, reversing the effects from habitat loss and habitat fragmentation.
d) Effects are reversible over the medium-term for RFDs where most effects are of short duration (e.g., occurs during construction, forest harvesting).
Ha = hectares; RFD = reasonably foreseeable development; RSA = regional study area; LSA = local study area; N/A = not applicable

6.5.10.6.5 Assessment of Significance

The RFDs are anticipated to result in small, direct changes to little brown myotis and northern myotis habitat availability and habitat distribution relative to Baseline Characterization. Removal of1,629 ha or 1% of the maternity roost habitat at the RSA scale, is anticipated to have a negligible effect on little brown myotis and northern myotis populations in the RSA. Of maternity roosting habitat would be lost. Little brown myotis and northern myotis maternity roost habitat is widespread and abundant in the RSA and is not considered limiting for these species in northern Ontario.

RFDs may remove maternity habitat, but hibernation habitat is expected to be avoided after the implementation of mitigation measures, such as restricting construction activities including tree clearing within 200 m of potential hibernacula and restricting construction activities that cause vibrations and loud noises (e.g., drilling, blasting, implosion splicing) during the hibernation season.

Occupied maternity roost habitat is not anticipated to be removed after the implementation of mitigation measures, such as managing, to the extent possible, the removal of potential maternity roost habitat outside of the maternity roost season (May 1 to August 31) and implementing site specific mitigation in limited areas where potential maternity roost habitat is removed during the maternity roost season.

Forestry is predicted to further reduce habitat availability for little brown myotis; however, ongoing fire suppression may continue to increase the age of forest stands in the RSAs, which may increase habitat quality for little brown myotis.

Changes in habitat distribution from a given project in the Cumulative Effects Assessment has the potential to result in local changes in the movement patterns of little brown myotis and northern myotis populations that overlap with the RSAs. However, it is assumed that regulatory approval of RFDs will require proponents to demonstrate that they are meeting the habitat distribution objectives for little brown myotis as outlined in the recovery strategy (Environment Canada 2015a). Subsequently, connectivity among populations is expected to not be influenced in the Cumulative Effects Assessment.

Incremental changes due to the Project Footprint are predicted to not negatively affect little brown myotis and northern myotis populations that overlap with the RSA. Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of little brown myotis and northern myotis in or beyond the RSA. Consequently, effects on little brown myotis and northern myotis in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-70).

6.5.10.7 Herpetofauna (Snapping Turtle and Spring Peeper)

6.5.10.7.1 Habitat Availability

RFDs within the Wildlife and Wildlife Habitat RSA have the potential to reduce herpetofauna habitat availability through direct habitat loss and avoidance due to sensory disturbance. Sensory disturbance from the operation of the Hammond Reef, Goliath, Goldlund, and Miller mines and the potential deep geological repository project, as well as from rehabilitation activities at the Steep Rock Mine may cause local changes in herpetofauna use but are not expected to result in large changes to regional habitat availability. Sensory disturbance from traffic on forestry roads and from harvesting activities may change local herpetofauna habitat use but are not expected to result in changes to habitat availability in the RSA. Sensory disturbance from logging activities may have a larger influence on herpetofauna habitat availability during the breeding and nesting period than the summer or winter habitat periods.

There are several future highway resurfacing projects in the RSA. Herpetofauna may avoid the local area during project construction because of high levels of sensory disturbance. However, sensory disturbance effects from current high vehicle presence on highways are likely to have more of an influence of herpetofauna habitat availability than small-scale, short-term highway rehabilitation.

Climate warming is expected to result in drier conditions in northwestern Ontario (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013), which could decrease wetland habitat availability. There is a large degree of uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable.

6.5.10.7.2 Habitat Distribution

Some RFDs in the LSA and RSA will remove vegetation and result in habitat fragmentation and changes to the to herpetofauna movements. Besides the Project, no large linear corridor projects are planned in the RSA. Portions of Treasury Metals Inc.'s Goliath Gold project, the Rehabilitation of Steep Rock Mine project, and Agnico Eagle Hammond Reef Gold Mine project are in the RSA (Table 6.5-60). These projects are primarily point-source disturbances but could have some linear features associated with the construction and operation. These features could act as movement barriers between habitat types (i.e., breeding, nesting, wintering, etc.). Effects on herpetofauna habitat distribution and movements are difficult to predict in advance, but are expected to vary depending on the scale, extent, and magnitude of the disturbance(s).
It is assumed the RFDs will use mitigation measures that avoids and minimizes effects to herpetofauna populations.

Overall, connectivity among herpetofauna habitat patches is expected to be maintained in the Cumulative Affects Assessment despite potential increased fragmentation which would be localized in nature.

6.5.10.7.3 Survival and Reproduction

The RFDs in the RSA have the potential to increase herpetofauna mortality through collisions with vehicles. These effects are expected to be highest where roadways are within close proximity to wetlands and large waterbodies, particularly if they bisect these features. Implementation of mitigation measures to reduce the risk of vehicle collisions is anticipated to mitigate herpetofauna injury and mortality.

Climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer. These changes are likely to have a positive effect on herpetofauna. However, climate change may also increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can reduce fecundity and egg success.

The direction and magnitude of changes in the Cumulative Effects Assessment are uncertain because climate change predictions are based on simulations that can be highly variable. There is also a large amount of uncertainty around the location, geographic extent, and feasibility of the RFDs. It is expected that RFDs will be required to implement mitigation measures that will limit cumulative effects on the survival and reproduction for herpetofauna. Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of these species in the Cumulative Effects Assessment. The small changes in habitat availability and distribution from RFDs, including the Project, are predicted to have no measurable effect on survival and reproduction rates of herpetofauna in the RSA.

6.5.10.7.4 Cumulative Effects Assessment

Habitat Availability

Habitat Loss

Negative effects from changes to habitat availability from direct vegetation removal from RFDs are certain but expected to be of small magnitude. Effects from changes to habitat availability from RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct removal of habitat from human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., decreased wetland availability) may have continuous, permanent effects on herpetofauna habitat availability that occur at the beyond regional scale. Effects from changes to habitat availability from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Sensory Disturbance

Effects from changes to habitat availability from sensory disturbance (avoidance or reduction in habitat quality) are considered probable, rather than certain, because some herpetofauna may adapt to human activities. RFDs are expected to implement mitigation to limit disturbance to herpetofauna breeding, nesting and wintering habitat, but this mitigation may not be completely effective and herpetofauna nest, eggs, larvae may become unviable if disturbed. Effects from avoidance due to sensory disturbance are expected to be reversible in the medium-term for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., bridge and culvert rehabilitations, forestry). Effects from avoidance are expected to be reversible in the long-term (after closure and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Effects from sensory disturbance from permanent forestry roads in the RSA will be permanent. Effects from sensory disturbance will occur at the local to regional scale depending on the temporal and spatial overlap of activities.

Habitat Distribution

Habitat Loss

Changes in habitat distribution and movements due to direct habitat removal from RFDs (i.e., increased habitat fragmentation) are possible, not certain, because herpetofauna can occupy fragmented landscapes. Effects from changes to habitat distribution from removal by RFDs can be continuous (e.g., mines, transmission lines) or frequent (e.g., forestry). Direct vegetation removal by human activities can have effects that are permanent (e.g., permanent forestry roads, transmission lines) or reversible in the long-term (e.g., reclamation of mines, regrowth in harvested areas).

Climate change and related effects (e.g., potential range contraction due to changes in winter snowpack) may have continuous, permanent effects on herpetofauna habitat distribution that occur at the beyond regional scale. Effects from changes to habitat distribution from habitat loss from wildfire and other natural disasters (e.g., storms) in the RSA are expected to be frequent and reversible in the long-term.

Sensory Disturbance

Negative effects from changes to herpetofauna habitat distribution due to sensory disturbance are expected to be possible, frequent, and medium-term. Only small shifts in herpetofauna home range sizes and locations due to sensory disturbance from RFDs are predicted. Therefore, effects from changes to habitat distribution would be small because sensory disturbance is not expected to affect the connectivity of herpetofauna populations that overlap the RSA.

Survival and Reproduction

Habitat Loss

Negative effects from RFDs on herpetofauna survival and reproduction from direct habitat loss and/or alteration to specialized habitat (i.e., amphibian breeding habitat, turtle nesting area, and turtle wintering habitat) are probable. A small increase in mortality and/or reduced reproductive capacity is considered possible among affected individuals. Habitat loss may in turn affect herpetofauna survival and reproduction and reduce their local abundance because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate.

Sensory Disturbance

Negative effects from RFDs on herpetofauna survival and reproduction from sensory disturbance are possible. Sensory disturbance from the RFDs is expected to degrade specialized herpetofauna habitat. Consequently, herpetofauna are predicted to avoid degraded habitat resulting in an adverse effect on survival and reproduction because displaced individuals may have higher energetic costs associated with movement, meeting their requirements for forage and cover, or finding a mate. Any direct effect of sensory disturbance on herpetofauna survival and reproduction through an increase in chronic stress is predicted to be of negligible magnitude because the effects of sensory disturbance were predicted to be reversible at the end of construction and reclamation activities (short-term).

Collisions with Vehicles

Negative effects from RFDs on herpetofauna survival and reproduction from collisions with vehicles and equipment are expected to be certain. Mitigation implemented for the RFDs is predicted to limit direct mortality of herpetofauna from collision with RFD project vehicles relative to baseline characterization of the Project; however, adverse effects of collision risk cannot be completely removed because traffic will increase as a result of the RFDs. Mortality of individuals over the life of the RFDs is likely to occur after implementation of the mitigation. The effect is considered to be reversible over the medium-term because the largest risk to herpetofauna from collisions with Project vehicles would occur when traffic volumes are highest during construction. Long-term effects from maintenance vehicles during the operation stage are considered unlikely because the frequency, speed, and number of vehicles will be low.

6.5.10.7.5 Assessment of Significance

Increased temperatures associated with climate change could have both positive and negative effects on herpetofauna in the RSA (Lesbarrères et al. 2014). In a positive direction, a warming climate would likely lead to an earlier start to breeding seasons, faster growth of embryos, larvae, and juveniles, and range expansion for existing populations and new species. In a negative direction, herpetofauna populations in the RSA may have to deal with shifting availability of food resources, changes in water availability, expansion of diseases and parasites, and increased human activity associated with increased northward expansion.

Reductions of habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of beaver in or beyond the RSA. Consequently, effects on beaver in the Cumulative Effects Assessment are predicted to be not significant.

Table 6.5-71: Characterization of Predicted Cumulative Effects for Herpetofauna (Snapping Turtle and Spring Peeper)

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss • Sensory disturbance	Direct	Negative	Low. Habitat loss and behavioural avoidance of habitat due to increased sensory disturbance.	Local	Medium term	Frequent	• Certain (direct habitat loss) • Probable (Sensory disturbance)	Not significant
Habitat Distribution	• Habitat loss • Sensory disturbance	Direct	Negative	Low. Habitat loss and behavioural avoidance of habitat due to increased sensory disturbance.	Local	Medium term	Frequent	• Certain (direct habitat loss) • Probable (Sensory disturbance)	Not significant
Survival and Reproduction	• Habitat loss • Sensory disturbance • Incidental take • Vehicle collisions	Direct	Negative	Low. Reduced reproductive output due to increased sensory disturbance and increased mortality from vehicle collisions over the life of the RFDs.	Local	Medium term	Frequent	Possible	Not significant

RFD = reasonably foreseeable development.

6.5.10.8 Raptors (Bald Eagle)

6.5.10.8.1 Habitat Availability

RFDs have the potential to reduce bald eagle habitat availability in the LSA and RSA through direct habitat loss and avoidance due to sensory disturbance. Fire suppression and climate change may mitigate the effects of forestry on habitat availability for the bald eagle because Ontario's forests are shifting towards mature forest stands (Carleton 2001), which may increase the amount of suitable nesting habitat. Climate change may benefit bald eagle populations through a range expansion farther north into areas with apparent suitable habitat and food conditions but with low eagle densities at baseline characterization due to a limited ice-free period (Grier et al. 2003). There is a large degree of uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable.

- The Project and other RFDs are predicted to remove 1,976 ha (2.89%) of moderate to high suitability bald eagle habitat in the LSA, relative to baseline characterization (Table 6.5-72).
- The Project and other RFDs are predicted to remove 2,151 ha (0.98%) of moderate to high suitability bald eagle habitat in the RSA (Table 6.5-72).

Table 6.5-72: Changes to Habitat Availability for Bald Eagle in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	68,388	66,412	-1,976	-2.89%	219,104	216,953	-2,151	-0.98%
Unsuitable	96,399	98,375	1,976	2.05%	329,017	331,168	2,151	0.65%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

hydro one

6.5.10.8.2 Habitat Distribution

RFDs will alter the distribution of bald eagle habitat in the RSA compared to baseline characterization (Attachment 6.5-B-8, in Appendix 6.5-B). Changes in habitat distribution from any given project in the Cumulative Effects Assessment may alter territory sizes and locations (Fraser et al. 1985; Anthony and Isaacs 1989), but populations that overlap with the RSA should remain well connected. Effects from changes to bald eagle habitat distribution from human activities and natural factors are likely to continue throughout the Cumulative Effects Assessment because of forest harvesting, the Project, the Agnico Eagle Hammond Reed Gold Min, and Treasury Metals Goliath Gold Project, are all expected to operate indefinitely. Climate change will also continue over the foreseeable future and may allow bald eagles to expand their ranges northward. Clean-up and reclamation of portions of RFDs (including the Project access roads) are likely to reduce effects from habitat fragmentation.

6.5.10.8.3 Survival and Reproduction

Bald eagles are thought to be somewhat resilient to climate change in terms of habitat availability and distribution but may be less adaptable in terms of effects on food supply (Armstrong 2014). Drying and shrinking wetlands could reduce the availability of foraging habitat, and warm, wet springs may increase mercury levels in fish and bioaccumulation in bald eagles. These negative effects to food supply may be partially offset by expanding ranges of warm water fish species, which may increase prey availability for bald eagles.

The Project, the Agnico Eagle Hammond Reed Gold Mine, and the Treasury Metals Goliath Gold Project have the potential to increase bald eagle mortality through collisions with transmission lines. These effects are expected to be highest where the transmission lines pass within one kilometre of large waterbodies and is not surrounded by forest. Installation of reflectors for the Project is anticipated to mitigate bald eagle injury and mortality. RFDs are likely to be required to implement mitigation measures, such as avoiding landscape alteration in shoreline areas, to limit effects on bald eagle populations. The small changes in habitat availability from RFDs, including the Project, are expected to reduce the predicted abundance of individuals in the RSA (see below) but is unlikely to have negative effects on bald eagles as habitat remains abundant and well distributed in the RSA and is likely not a key factor limiting population size.

- Applying a density estimate of 0.15 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-72) results in an estimated reduction of three individuals in RSA relative to the Baseline Characterization (i.e., from a predicted 328 to 325 eagles).

6.5.10.8.4 Cumulative Effects Assessment Classification

Effects from direct habitat loss of moderate to high suitability bald eagle habitat in the Cumulative Effects Assessment are certain (Table 6.5-72). The direct loss of bald eagle habitat availability from RFDs is conservatively assumed to be continuous and permanent for transmission line projects, and frequent and reversible in the long term for forestry, and continuous and reversible in the long term for mines.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable (not certain) because some individuals may adapt to human activities and are expected to occur at the local to regional scale (dependent on the degree of temporal overlap between RFDs). Effects from habitat avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., forestry). Permanent roads would have irreversible effects on bald eagle populations that are within or overlap the RSA. It is assumed that 30% of all access roads or trails (new and existing to be improved access), excluding those within the ROW, will be permanent (i.e., retained after construction for maintenance). Effects from sensory disturbance from mines will be reversible in the long term (i.e., after closure and reclamation).

RFDs may possibly result in a small shift in bald eagle territory sizes or locations but populations that overlap the RSA are anticipated to be remain well connected in the Cumulative Effects Assessment. Bald eagle may expand their ranges northward with climate warming. Effects from changes in habitat distribution from landscape alteration are possible and are expected to occur at the regional scale. The effects to bald eagle habitat distribution are permanent for transmission lines and reversible in the long term for forestry and mines.

There may be a small reduction in the abundance of bald eagle nesting habitat in the RSA, compared to baseline characterization, which could influence bald eagle survival and reproduction. Sensory disturbance from forestry and mining may affect productivity of bald eagles with home ranges that overlap with the RSA. Effects are predicted to possibly occur at the local to regional scale as a result of sensory disturbance (dependent on the degree of temporal overlap between RFDs).

The Project and RFDs may increase the number of bald eagle mortalities from collisions with the transmission lines. Increases in mortality from collisions with the transmission lines will be reduced by implementing mitigation measures, such as installing reflectors on the transmission line. However, mortality risk will not be completely removed and so the effect is considered to be probable to occur continuously and indefinitely as the projects would operate for the foreseeable future.

Effects from climate change occur continuously and permanently at the beyond regional scale. Effects from wildfire and other natural factors (e.g., severe storms) would be frequent, reversible in the long term, and are probable to occur at the regional to beyond regional scale.

Table 6.5-73: Characterization of Predicted Cumulative Effects for Bald Eagle

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Direct loss of 1,976 ha of moderate to high suitability habitat (2.89%) of the LSA baseline characterization. • Direct loss of 0.98% of the RSA baseline characterization. • Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	• Certain (direct loss) • Probable (sensory disturbance)	Not significant
Habitat Distribution	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to loss of 1,976 ha of moderate to high suitability habitat. • Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	• Possible	Not significant
Survival and Reproduction	• Habitat loss; • Vehicle collisions; • Electrocution and collisions with the transmission line; and • Increase in edge habitat.	Direct	Negative	• Reduction in predicted abundance by three individuals compared to baseline characterization (habitat loss). • Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take) • Medium term (vehicle collisions)	Continuous	• Possible	Not significant

% = percent; - = negative; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.8.5 Assessment of Significance

RFDs, including the Project, are predicted to produce measurable changes to habitat availability, distribution and survival and reproduction for bald eagles. In the Cumulative Effects Assessment, the Project footprint and other RFDs would remove 2,151 ha (0.98%) of moderate to high suitability habitat in the RSA. This relates to a reduction in predicted abundance in the RSA by three individuals from Baseline Characterization to the Cumulative Effects Assessment. The amount of habitat loss predicted in the Cumulative Effects Assessment is likely an overestimate as the entire lease boundaries for future mine projects were used as the disturbance footprint. The actual footprints for these mining projects are likely to be smaller than the lease area. Additionally, it is anticipated that RFDs will be required to implement mitigation measures to limit effects on bald eagle populations.

The Project and RFDs have the potential to reduce bald eagle habitat availability and distribution in the RSA through direct habitat loss and avoidance due to sensory disturbance. Some individuals may adapt or habituate to sensory disturbance. Changes in habitat distribution will have effects on movement and habitat use, but bald eagle populations that overlap with the RSA should remain well connected because this species is highly mobile. Overall, the small changes in habitat availability and distribution (and associated predicted reduction in abundance) should have little detectable influence on the abundance of bald eagle that overlap the RSA.

Climate change is predicted to have varying influences on habitat availability, habitat distribution and survival and reproduction of bald eagles in the Cumulative Effects Assessment. In general, bald eagles are thought to be less vulnerable to climate change than other species with more specialized requirements and more limited distributions (Armstrong 2014).

The combined evidence concerning the cumulative effects on bald eagle from changes in habitat availability, distribution, and survival and reproduction in the RSA from baseline characterization to the Cumulative Effects Assessment indicates that populations would continue to be self-sustaining and ecologically effective. Consequently, cumulative effects from past and present activities, the Project and RFDs on bald eagles are predicted to be not significant (Table 6.5-73).

6.5.10.9 Marshbirds (Trumpeter Swan)

6.5.10.9.1 Habitat Availability

RFDs have the potential to reduce trumpeter swan habitat availability in the LSA and RSA through direct habitat loss and avoidance due to sensory disturbance. Climate warming is expected to result in drier conditions in northwestern Ontario (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013), which could decrease wetland habitat availability. There is a large degree of uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable.

- The Project and other RFDs are predicted to remove 445 ha (1.4%) of moderate to high suitability trumpeter swan habitat in the LSA, relative to Baseline Characterization (Table 6.5-74:).
- The Project and other RFDs are predicted to remove 499 ha (0.4%) of moderate to high suitability trumpeter swan habitat in the RSA (Table 6.5-74:).

Table 6.5-74: Changes to Habitat Availability for Marshbirds (Trumpeter Swan) in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	32,457	32,013	-445	-1.37%	131,618	131,120	-499	-0.38%
Unsuitable	132,330	132,775	445	0.34%	416,502	417,001	499	0.12%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

6.5.10.9.2 Habitat Distribution

RFDs will alter the distribution of trumpeter swan habitat in the RSA compared to baseline characterization (Attachment 6.5-B-9, in Appendix 6.5-B). Changes in habitat distribution from any given project in the Cumulative Effects Assessment may alter territory sizes and locations due to sensitivity to human disturbance (Mitchell and Eichholz 2020), but populations that overlap with the RSA should remain well connected. Effects from changes to trumpeter swan habitat distribution from human activities and natural factors are likely to continue throughout the Cumulative Effects Assessment because of forest harvesting, the Project, the Agnico Eagle Hammond Reed Gold Min, and the Treasury Metals Goliath Gold Project are all expected to operate indefinitely. Climate change will also continue over the foreseeable future and may decrease wetland habitat availability for trumpeter swans. Clean-up and reclamation of portions of RFDs (including the Project access roads) are likely to reduce effects from habitat fragmentation.

6.5.10.9.3 Survival and Reproduction

Warmer and drier conditions in Ontario due to climate change may alter availability of wetland habitat for breeding and foraging. Climate change may also increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can reduce fecundity and nest success. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

The Project, the Agnico Eagle Hammond Reed Gold Min, and the Treasury Metals Goliath Gold Project have the potential to increase trumpeter swan mortality through collisions with electrical lines. These effects are expected to be highest where the transmission lines pass within one kilometre of large waterbodies and is not surrounded by forest. Installation of reflectors for the Project is anticipated to mitigate trumpeter swan injury and mortality. RFDs are likely to be required to implement mitigation measures, such as avoiding activities in shoreline areas, to limit effects on trumpeter swan populations. The small changes in habitat availability and distribution from RFDs, including the Project, are predicted to have no measurable effect on survival and reproduction rates of trumpeter swans in the RSA.

- Applying a density estimate of <0.01 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-74) results in an estimated reduction of <0.06 individuals in RSA relative to the Baseline Characterization (i.e., from a predicted 15.3 to 15.2 swans).

6.5.10.9.4 Cumulative Effects Assessment Classification

Effects from direct habitat loss of moderate to high suitability trumpeter swan habitat in the Cumulative Effects Assessment are certain (Table 6.5-74). The direct loss of trumpeter swan habitat availability from RFDs is conservatively assumed to be continuous and permanent for transmission line projects, and frequent and reversible in the long term for forestry, and continuous and reversible in the long term for mines.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable (not certain) because some individuals may adapt to human activities and are expected to occur at the local to regional scale (dependent on the degree of temporal overlap between RFDs). Effects from habitat avoidance due to sensory disturbance is expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., transmission lines) or is of short duration (e.g., forestry). Permanent roads would have irreversible effects on trumpeter swan populations that are within or overlap the RSA. It is assumed that 30% of all access roads or trails (new and existing to be improved access), excluding those within the ROW, will be permanent (i.e., retained after construction for maintenance). Effects from sensory disturbance from mines will be reversible in the long term (i.e., after closure and reclamation).

RFDs may possibly result in a small shift in trumpeter swan territory sizes or locations but populations that overlap the RSA are anticipated to be remain well connected in the Cumulative Effects Assessment. Effects from changes in habitat distribution from landscape alteration are possible and are expected to occur at the regional scale. The effects to trumpeter swan habitat distribution are permanent for transmission lines and reversible in the long term for forestry and mines.

There may be a small reduction in the abundance of trumpeter swan nesting habitat in the RSA, compared to baseline characterization, which could influence trumpeter swan survival and reproduction. Sensory disturbance from forestry and mining may affect productivity of trumpeter swan with home ranges that overlap with the RSA. Effects are predicted to possibly occur at the local to regional scale as a result of sensory disturbance (dependent on the degree of temporal overlap between RFDs).

The Project and RFDs may increase the number of trumpeter swan mortalities from collisions with the transmission lines. Increases in mortality from collisions with the transmission lines will be reduced by implementing mitigation measures, such as reflectors on the transmission lines. However, mortality risk will not be completely removed and so the effect is considered to be probable to occur continuously and indefinitely as the projects would operate for the foreseeable future.

Effects from climate change occur continuously and permanently at the beyond regional scale. Effects from wildfire and other natural factors (e.g., severe storms) would be frequent, reversible in the long term, and are probable to occur at the regional to beyond regional scale.

Table 6.5-75: Characterization of Predicted Cumulative Effects for Marshbirds (Trumpeter Swan)

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Sensory disturbance.	Direct	Negative	• Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	• Certain (direct loss) • Probable (sensory disturbance)	Not significant
Habitat Distribution	• Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	Possible	Not significant
Survival and Reproduction	• Vehicle collisions; • Electrocution and collisions with the transmission line; • Increase in edge habitat; and • Incidental take.	Direct	Negative	• Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat, and incidental take).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take) • Medium term (vehicle collisions)	Continuous	Possible	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.9.5 Assessment of Significance

RFDs, including the Project, are predicted to produce measurable changes to habitat availability, distribution and survival and reproduction for trumpeter swans. In the Cumulative Effects Assessment, the Project footprint and other RFDs would remove 499 ha (0.4%) of moderate to high suitability habitat in the RSA. This relates to a reduction in predicted abundance in the RSA by less than one individual from Baseline Characterization to the Cumulative Effects Assessment. The amount of habitat loss predicted in the Cumulative Effects Assessment is likely an overestimate as the entire lease boundaries for future mine projects were used as the disturbance footprint. The actual footprints for these mining projects are likely to be smaller than the lease area. Additionally, it is anticipated that RFDs will be required to implement mitigation measures to limit effects on trumpeter swan populations.

The Project and RFDs have the potential to reduce trumpeter swan habitat availability and distribution in the RSA through direct habitat loss and avoidance due to sensory disturbance. Some individuals may adapt or habituate to sensory disturbance. Changes in habitat distribution will have effects on movement and habitat use, but trumpeter swan populations that overlap with the RSA should remain well connected because this species is highly mobile. Overall, the small changes in habitat availability and distribution (and associated predicted reduction in abundance) should have little detectable influence on the abundance of trumpeter swan that overlap the RSA.

Climate change is predicted to have varying influences on habitat availability, habitat distribution and survival and reproduction of trumpeter swan in the Cumulative Effects Assessment.

The combined evidence concerning the cumulative effects on trumpeter swan from changes in habitat availability, distribution, and survival and reproduction in the RSA from baseline characterization to the Cumulative Effects Assessment indicates that populations would continue to be self-sustaining and ecologically effective. Consequently, cumulative effects from past and present activities, the Project and RFDs on trumpeter swans are predicted to be not significant (Table 6.5-75).

6.5.10.10 Songbirds (Canada Warbler, Eastern Wood-Pewee, and Olive-sided Flycatcher)

6.5.10.10.1 Habitat Availability

RFDs, including the Project, will decrease habitat availability (and distribution) in the RSA; however, the changes are overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for forest songbirds. Forestry management practices in Ontario include fire suppression, which over the last 60 years has prolonged the forest fire return cycle, leading to an increase in the average age of the forest. Before fire suppression, the boreal forest complex of northwestern Ontario was approximately

30 years younger than it was during the 1970s (Carleton 2001). It is expected that over the long-term, outcomes of the OWFMS will alter habitat availability for forest songbirds differently than what might have otherwise occurred naturally.

It is expected that over the long-term, reduced forestry activity combined with fire suppression activities could result in a shift to artificially old, broadleaved forests (MNR 2012b). The effect of this shift to old forests on Canada warbler, eastern wood-pewee and olive-sided flycatcher is unknown and depends on the density of the canopy and shrub layer that will exist in old forests in the RSA. Furthermore, the shift to broadleaved forests will not likely be favorable for olive-sided flycatcher because the species prefers open coniferous or mixed-coniferous stands (Altman and Sallabanks 2012).

Sensory disturbance from mines, highway expansions, and construction of transmission lines would reduce the quality of breeding habitat adjacent to these areas. Avoidance of habitat due to sensory disturbance may be reversible after the construction stage of some projects such as pipelines and transmission lines where most sensory disturbance occurs during construction and sensory disturbance during operations is generally limited to infrequent maintenance activities.

- Canada Warbler:
  - The Project and other RFDs are predicted to remove 1,820 ha (3%) of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization (Table 6.5-76).
  - The Project and other RFDs are predicted to remove 1,948 ha (0.9%) of moderate to high suitability Canada warbler habitat in the RSA (Table 6.5-76).
- Eastern Wood-Pewee:
  - The Project and other RFDs are predicted to remove 1,461 ha (2.7%) of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization (Table 6.5-77).
  - The Project and other RFDs are predicted to remove 1,581 ha (1%) of moderate to high suitability Canada warbler habitat in the RSA (Table 6.5-77).
- Olive-Sided Flycatcher:
  - The Project and other RFDs are predicted to remove 2,385 ha (2.9%) of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization (Table 6.5-78).
  - The Project and other RFDs are predicted to remove 2,455 ha (0.9%) of moderate to high suitability Canada warbler habitat in the RSA (Table 6.5-78).

Table 6.5-76: Changes to Habitat Availability for Canada Warbler in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	70,451	68,631	-1,820	-2.58%	212,260	210,312	-1,948	-0.92%
Unsuitable	94,336	96,156	1,820	1.93%	335,861	337,809	1,948	0.58%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Table 6.5-77: Changes to Habitat Availability for Eastern Wood-Pewee in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	54,375	52,913	-1,461	-2.69%	165,313	163,732	-1,581	-0.96%
Unsuitable	110,413	111,874	1,461	1.32%	382,808	384,389	1,581	0.41%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

Table 6.5-78: Changes to Habitat Availability for Olive-sided Flycatcher in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	83,579	81,194	-2,385	-2.85%	259,869	257,414	-2,455	-0.94%
Unsuitable	81,208	83,593	2,385	2.94%	288,251	290,706	2,455	0.85%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

6.5.10.10.2 Habitat Distribution

RFDs occurring in the corridor LSA and RSA will remove Canada warbler, eastern wood-pewee, and olive-sided flycatcher habitat and result in additional fragmentation (Attachment 6.5-B-10, Attachment 6.5-B-11, Attachment 6.5-B-12, in Appendix 6.5-B). The timing and location of forest harvesting in the RSA are unknown. It is assumed the RFDs will use mitigation measures that avoids and minimizes effects to forest songbird populations.

As with habitat availability, climate change, wildfires, and fire suppression activities may contribute cumulatively to changes in the distribution of forest songbird habitat. Climate warming is predicted to alter forest landscapes through reduced forest patch size, diversity, and distribution as local conditions favour different plant species (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013). An increase in the frequency and intensity of wildfires could also fragment suitable habitats for forest songbirds. More frequent and intense wildfires from climate warming are predicted to enable fire tolerant plants to expand their ranges northward (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013). Furthermore, over the long-term, reduced forestry activity combined with fire suppression activities and climate change could result in a shift to artificially old, broadleaved forests (MNR 2012). These factors could result in a potential change to vegetation structure and composition, which could negatively affect Canada warbler, eastern wood-pewee, and olive-sided flycatcher.

Overall, connectivity among forest songbird habitat patches is expected to be maintained in the Cumulative Effects Assessment despite potential increased fragmentation from natural factors and RFDs. Canada warblers, eastern wood-pewees, and olive-sided flycatchers are likely to fly over or around RFDs in search of suitable nesting sites.

6.5.10.10.3 Survival and Reproduction

RFDs including the Project, may negatively affect forest songbird survival and reproduction in the RSA by removing habitat, increasing sensory disturbance, and increasing risk of nest predation and parasitism due to increased edge effects. Canada warblers may be less sensitive to increased predation and nest parasitism risk due to increased edge from RFDs because they are interior forest nesters. Furthermore, eastern wood-pewees and olive-sided flycatchers may be less sensitive to increased nest parasitism risk since they are only moderately regular to rare cowbird hosts (Altman and Sallabanks 2020, Watt et al. 2020). However, habitat availability will be decreased with increased edge and changes to habitat availability is considered the largest threat to Canada warbler populations (Environment Canada 2016a). Furthermore, while causes of decline to eastern wood-pewee and olive-sided flycatcher populations are unclear, they are most likely related to habitat loss, degradation, and alteration (COSEWIC 2012, Environment Canada 2016b, COSEWIC 2018b). The loss of breeding habitat may affect reproductive success if individuals are displaced or return to breeding grounds to find habitat removed and subsequently are unable to establish a new territory or establish a territory in lower quality habitat. Overall, the loss of moderate to high suitability breeding habitat due to RFDs is expected to result in a reduction in the predicted abundance of the RSA (see below) but is unlikely to have negative effects on Canada warblers, eastern wood-pewees, and olive-sided flycatchers, as habitat remains abundant and well distributed in the RSA and is likely not a key factor limiting their population sizes. Mitigation measures are expected to limit effects of habitat loss on survival and reproduction.

Climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer. These changes are likely to have a positive effect on Canada warbler because this species is one of the last warbler species to arrive on breeding grounds (COSEWIC 2008)a. A longer growing season may allow for Canada warblers to raise more than one clutch per year, which is currently not possible with the timing of this species' migration patterns (COSEWIC 2008a). However, warmer and drier conditions in Ontario due to climate change may also alter the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long distance migrant species, such as Canada warblers, eastern wood-pewees and olive-sided flycatchers, often exhibit a strong synchronization between breeding and peak food abundance, and climate change may create a temporal mismatch between reproduction and optimal foraging conditions for prey (COSEWIC 2008a, Both et al. 2009, Nebel et al. 2010, COSEWIC 2012, COSEWIC 2018b).

Climate change is also predicted to increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can result in reduced fecundity and nest success. Individuals may also be susceptible to extreme weather events outside of the breeding season. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

The direction and magnitude of changes in the Cumulative Effects Assessment are uncertain because climate change predictions are based on simulations that can be highly variable. There is also a large amount of uncertainty around the location, geographic extent, and feasibility of the RFDs. It is expected that RFDs will be required to implement mitigation measures that will limit cumulative effects on the survival and reproduction for Canada warblers, eastern wood-pewees, and olive-sided flycatchers. Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of these species in the Cumulative Effects Assessment.

- Canada Warbler:
  - Applying a density estimate of 0.99 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-76) results in an estimated reduction of 19 individuals in the RSA relative to the Baseline Characterization (i.e., from a predicted 2,109 to 2,090 Canada warblers). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

- Eastern Wood-Pewee:
  - Applying a density estimate of 0.07 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-77) results in an estimated reduction of 1 individual in the RSA relative to the Baseline Characterization (i.e., from a predicted 109 to 108 eastern wood-pewees). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.
- Olive-Sided Flycatcher:
  - Applying a density estimate of 0.12 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-78) results in an estimated reduction of three individuals in the RSA relative to the Baseline Characterization (i.e., from a predicted 301 to 298 olive-sided flycatchers). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

6.5.10.10.4 Cumulative Effects Assessment Classification

Effects from direct habitat loss of moderate to high suitability Canada warbler, eastern wood-pewee and olive-sided flycatcher habitat are certain (Table 6.5-76, Table 6.5-77 and Table 6.5-78). Effects from changes to habitat availability are expected to occur at the regional to beyond regional scale, due to forestry, climate change, other natural factors, and RFDs.

The direct loss of forest songbird habitat availability from transmission lines is conservatively assumed to be continuous and permanent at the regional scale. However, disturbed areas may become suitable following reclamation and habitat fragmentation would likely reduce the net effects on eastern wood-pewee and olive-sided flycatcher habitat availability since these species use forest edge (reversible in the long term).

Effects from forestry and fires are reversible in the long term.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable (not certain) because some individuals may adapt to human activities. Effects from avoidance due to sensory disturbance are expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines) or is of short duration (forestry). Sensory disturbance effects from highways and other permanent roads will be permanent.

Changes to habitat distribution are possible; these species may shift territories away from areas of human disturbance. Gaps less than 50 m wide are not anticipated to negatively effect Canada warbler, eastern wood-pewee or olive-sided flycatcher population connectivity in or beyond the RSAs (Norris and Stutchbury 2001, Bayne and Hobson 2001, Fraser and Stutchbury 2004, MacIntosh et al. 2011).

Effects from changes in habitat distribution will occur continuously at the regional to beyond regional scale and will be permanent due to projects with an indefinite lifespan (e.g., transmission lines) and natural factors such as climate change.

Cumulative effects from changes in Canada warbler, eastern wood-pewee, and olive-sided flycatcher survival and reproduction are possible to occur and may occur continuously and indefinitely at the regional to beyond regional scale due to factors such as climate change, forestry, and RFDs that extend beyond the RSA.

Table 6.5-79: Characterization of Predicted Cumulative Effects for Songbirds (Canada Warbler, Eastern Wood-Pewee and Olive-sided Flycatcher)

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss; and • Sensory disturbance.	Direct	Negative	Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation. **Canada warbler** • Direct loss of 1,820 ha of moderate to high suitability habitat (2.6 %) of the LSA baseline characterization. • Direct loss of 0.92% of the RSA baseline characterization. **Eastern wood-pewee** • Direct loss of 1,461 ha of moderate to high suitability habitat (2.7%) of the LSA baseline characterization. • Direct loss of 1% of the RSA baseline characterization. **Olive-sided flycatcher** • Direct loss of 2,385 ha of moderate to high suitability habitat (2.9 %) of the LSA baseline characterization. • Direct loss of 0.9% of the RSA baseline characterization.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	• Certain (direct loss) • Probable (sensory disturbance)	Not significant
Habitat Distribution	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to loss of approximately 1,400 ha to 2,400 ha of moderate to high suitability habitat. • Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	Possible	Not significant
Survival and Reproduction	• Habitat loss; • Vehicle collisions; • Electrocution and collisions with the transmission line; • Increase in edge habitat; and • Incidental take.	Direct	Negative	• Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat, and incidental take). **Canada warbler** • Reduction in predicted abundance by 19 individuals compared to baseline characterization (habitat loss). **Eastern wood-pewee** • Reduction in predicted abundance by 1 individual compared to baseline characterization (habitat loss). **Olive-sided flycatcher** • Reduction in predicted abundance by three individuals compared to baseline characterization (habitat loss).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take) • Medium term (vehicle collisions and sensory disturbance)	Continuous	• Probable (direct loss and sensory disturbance) • Possible (vehicle collisions, electrocution, and collisions with the transmission line, increase in edge habitat, and incidental take)	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.10.5 Assessment of Significance

Habitat does not appear to be a limiting factor for these species in the RSA at baseline characterization (30% to 50% of RSA) or the Cumulative Effects Assessment (34% of RSA). The cumulative direct disturbance to moderate to high suitability forest songbird habitat from the Project and other RFDs is predicted to be approximately 1,500 to 2,500 ha (0.92% to 0.96%) of moderate to high suitability habitat in the RSA that was present at Baseline Characterization. Habitat is still intact and well distributed in the RSA in the Cumulative Effects Assessment. RFDs may decrease the predicted abundance of Canada warblers, eastern wood-pewees and olive-sided flycatchers by up to 19, one, and three individuals, respectively in the RSA, relative to Baseline Characterization conditions. The estimates of habitat loss and reductions in abundance are likely overestimated as the entire lease boundaries of future mines was assumed to be disturbed, which is not likely to be the case. Overall, changes in habitat availability and distribution are expected to be within the resilience and adaptive capacity limits of Canada warbler eastern wood-pewee and olive-sided flycatcher populations overlapping the RSA.

Brown-headed cowbird density in the RSA is approximately 12 times less than densities in southern Ontario (Cadman et al. 2007). The Project will be routed along existing linear disturbance features as much as possible, and other RFDs such as mines are point-source disturbances. As such, it is unlikely that RFDs, including the Project would create habitat for substantial increases in cowbird densities, and correspondent negative effects on Canada warblers, eastern wood-pewees, and olive-sided flycatchers, in the RSA relative to baseline characterization conditions.

The Project combined with RFDs has the potential to result in local changes in habitat connectivity, but not over the entire RSA. Future linear disturbances are located primarily adjacent to Highway 17 and all other RFDs are point disturbances. Connectivity among populations is expected to remain intact.

The combined evidence concerning the cumulative changes in habitat availability, habitat distribution, and survival and reproduction in the RSA from baseline characterization to the Cumulative Effects Assessment indicates that Canada warbler, eastern wood-pewee, and olive-sided flycatcher populations would continue to be self-sustaining, although possibly at a lower abundance. Reductions in habitat availability, distribution, and survival and reproduction are not expected to affect the ecological effectiveness of Canada warbler, eastern wood-pewee, and olive-sided flycatcher in the RSA or beyond the RSA. Consequently, cumulative effects on these species are predicted to be not significant (Table 6.5-79).

6.5.10.11 Bank Swallow

6.5.10.11.1 Habitat Availability

RFDs, including the Project, will decrease habitat availability (and distribution) in the RSA; however, the changes are overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

In addition to human activities, forestry activities and natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for bank swallow. Climate change could have a negative effect on bank swallow habitat availability by increasing inclement weather events, as periods of prolonged rainfall could cause the collapse of bank colonies (COSEWIC 2013b). Forestry activities and wildfire events in the RSA could have positive effects on bank swallow habitat availability, in the short term, by increasing the amount of suitable open foraging habitat on the landscape. Alternatively, in the long term, reduced forestry activity combined with fire suppression activities could result in forest succession, leading to a decrease in the amount of suitable open foraging habitat on the landscape.

- The Project and other RFDs are predicted to remove 230 ha (2.9%) of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization (Table 6.5-80), including removal of 7 ha of protected Category 3 habitat.
- The Project and other RFDs are predicted to remove 230 ha (1.4%) of moderate to high suitability habitat in the RSA (Table 6.5-80).

Table 6.5-80: Changes to Habitat Availability for Bank Swallow in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	7,867	7,638	-230	-2.92%	16,220	15,990	-230	-1.42%
Unsuitable	156,920	157,150	230	0.15%	531,901	532,131	230	0.04%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

6.5.10.11.2 Habitat Distribution

RFDs occurring in the corridor LSA and RSA will remove bank swallow habitat and result in additional fragmentation (Attachment 6.5-B-13, in Appendix 6.5-B). The Agnico Eagle Hammond Reef Gold Mine, Treasury Metals Goliath Gold Project, and numerous highway transportation projects that are all linear disturbances, which could act as partial barriers to bank swallow movements. However, bank swallows are a highly mobile species and have been found to use anthropogenic disturbance areas for nesting. It is assumed the RFDs will use mitigation measures that avoids and minimizes effects to bank swallow populations.

Overall, connectivity among bank swallow habitat patches is expected to be maintained in the Cumulative Effects Assessment despite potential increased fragmentation from natural factors and RFDs. Bank swallows are likely to fly over or around RFDs.

6.5.10.11.3 Survival and Reproduction

Climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer. These changes are likely to have a positive effect on bank swallow as a longer growing season may allow for this species to frequently raise more than one clutch per year. However, climate change may also increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can reduce fecundity and nest success. More frequent and intense hurricanes are predicted as a result of climate change; these events may negatively affect individuals during fall migration and on wintering grounds (COSEWIC 2013b). Climate change may create a temporal mismatch between bank swallow reproduction and optimal foraging conditions for prey (Both et al. 2009, COSEWIC 2013b, Nituch and Bowman 2013).

The direction and magnitude of changes in the Cumulative Effects Assessment are uncertain because climate change predictions are based on simulations that can be highly variable. There is also a large amount of uncertainty around the location, geographic extent, and feasibility of the RFDs. It is expected that RFDs will be required to implement mitigation measures that will limit cumulative effects on the survival and reproduction for this species. Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of these species in the Cumulative Effects Assessment. The small changes in habitat availability and distribution from RFDs, including the Project, are predicted to have no measurable effect on survival and reproduction rates of bank swallows in the RSA.

- Applying a density estimate of 0.07 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-80) results in an estimated reduction of <0.2 individual in the RSA relative to the Baseline Characterization (i.e., from a predicted 11.4 to 11.2 bank swallows). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

6.5.10.11.4 Cumulative Effects Assessment Classification

Effects from direct habitat loss of moderate to high suitability bank swallow habitat are certain (Table 6.5-81). Effects from changes to habitat availability are expected to occur at the regional to beyond regional scale, due to forestry, climate change, other natural factors, and RFDs.

The direct loss of bank swallow habitat availability from transmission lines is conservatively assumed to be continuous and permanent at the regional scale. However, in the short-term, cleared areas may become suitable habitat for bank swallow foraging.

Effects from forestry and fires are reversible in the long term.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable (not certain) because some individuals may adapt to human activities. Effects from avoidance due to sensory disturbance are expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines) or is of short duration (forestry). Sensory disturbance effects from highways and other permanent roads will be permanent.

Effects from changes in habitat distribution will occur continuously at the regional to beyond regional scale and will be permanent due to projects with an indefinite lifespan (e.g., transmission lines) and natural factors such as climate change.

Cumulative effects from changes in bank swallow survival and reproduction are possible to occur and may occur continuously and indefinitely at the regional to beyond regional scale due to factors such as climate change, linear developments, forestry management, fire suppression, and RFDs that extend beyond the RSA.

Table 6.5-81 Characterization of Predicted Cumulative Effects for Bank Swallow

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Direct loss of 230 ha of moderate to high suitability habitat (2.9%) of the LSA baseline characterization. • Direct loss of 1.4% of the RSA baseline characterization. • Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation.	Local	• Permanent (direct loss) • Medium term (sensory disturbance).	Continuous	• Certain (direct loss) • Probable (sensory disturbance).	Not significant
Habitat Distribution	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to loss of 230 ha of moderate to high suitability habitat. • Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss). • Medium term (sensory disturbance).	Continuous	Possible	Not significant

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Survival and Reproduction	• Vehicle collisions; • Electrocution and collisions with the transmission line; • Increase in edge habitat; and • Incidental take.	Direct	Negative	• Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat, and incidental take).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take). • Medium term (vehicle collisions and sensory disturbance).	Continuous	• Probable (direct loss and sensory disturbance) • Possible (vehicle collisions, electrocution, and collisions with the transmission line, increase in edge habitat, and incidental take).	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.11.5 Assessment of Significance

Habitat availability is not limiting for bank swallow at Baseline Characterization or the Cumulative Effects Assessment and the predicted abundance in the RSA and LSA is estimated to remain similar during all assessment cases. The Project and RFDs are predicted to remove from 230 ha (1.4%) of moderate to high suitability habitat in the RSA, relative to the Baseline Characterization. This is a highly conservative estimate as most RFDs may not be constructed. Also, mine lease boundaries were used as the project footprints in the habitat model, which are likely larger than final design plans. Forest management activities in the RSA are predicted to have positive and negative effects on bank swallow by creating suitable habitat in the short-term but decreasing habitat in the long-term because of forest succession.

The Project, combined with RFDs, has the potential to result in local changes in habitat connectivity, but likely not throughout the RSA, as the future projects only intersect portions of the RSA; connectivity among bank swallow populations should remain intact. RFDs may result in changes to bank swallow survival and reproduction in the RSA; however, it is assumed that the RFDs will implement mitigation measures that avoid and minimize effects.

Climate change will likely alter habitat availability, habitat distribution, and survival and reproduction of bank swallows in the Cumulative Effects Assessment; however, there is high uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable and many scenarios are possible.

Overall, the weight of evidence from the analysis predicts that cumulative changes to bank swallow habitat availability, habitat distribution, and survival and reproduction are within the resilience and adaptability limits of the species. The combined effects from the Project and RFDs should not have a negative influence on bank swallow populations in the RSA to be self-sustaining and ecologically effective. Consequently, the incremental and cumulative effects from the Project and other past, present, and RFDs on bank swallow in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-81).

6.5.10.12 Eastern Whip-poor-will

6.5.10.12.1 Habitat Availability

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for eastern whip-poor-will. Climate warming is expected to result in drier conditions in northwestern Ontario (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013), which could increase habitat availability (Environment Canada 2015b). Forest management activities and natural disturbances in the RSAs will continue to have positive and negative effects on eastern whip-poor-will. Clearcut logging combined with fire suppression can improve habitat for eastern whip-poor-will by creating a juxtaposition of early and late successional forests (COSEWIC 2009). It is expected that over the long-term, outcomes of OWFMS will change habitat availability for eastern whip-poor-will differently than what might have otherwise occurred naturally.

- The Project and other RFDs are predicted to remove 2,998 ha (3.1%) of moderate to high suitability habitat in the LSA relative to the baseline characterization (Table 6.5-82), including removal of protected Category 2 habitat (1 ha) and Category 3 habitat (4 ha).
- The Project and other RFDs are predicted to remove 3,160 ha (1.2%) of moderate to high suitability whippoorwill habitat in the RSA (Table 6.5-82).

Table 6.5-82: Changes to Habitat Availability for Eastern Whip-poor-will in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	97,203	94,205	-2,998	-3.08%	298,974	295,813	-3,160	-1.06%
Unsuitable	67,584	70,582	2,998	4.44%	249,147	252,307	3,160	1.27%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

6.5.10.12.2 Habitat Distribution

RFDs, including the Project, are expected to remove eastern whip-poor-will habitat and result in additional fragmentation (Attachment 6.5-B-17, in Appendix 6.5-B). Linear disturbances could act as barriers to eastern whip-poor-will movements in the RSAs. However, eastern whip-poor-will are a highly mobile species and have been found to use linear disturbances for breeding and foraging. It is assumed the RFDs will use mitigation measures that avoids and minimizes changes to whip-poor-will habitat and population connectivity. Overall, connectivity among eastern whip-poor-will habitat patches is expected to be maintained in the Cumulative Effects Assessment despite potential increased fragmentation from natural factors and RFDs. Eastern whip-poor-wills are likely to fly over or around RFDs in search of suitable nesting sites.

6.5.10.12.3 Survival and Reproduction

Climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer. These changes are likely to have a positive effect on eastern whip-poor-will as a longer growing season may allow for this species to frequently raise more than one clutch per year. However, climate change is also predicted to increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can result in reduced fecundity and nest success. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

Warmer and drier conditions in Ontario due to climate change may alter the onset of spring and summer and the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long-distance migrants such as eastern whip-poor-wills often exhibit a strong synchronization between breeding and peak food abundance, and climate change may create a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009, COSEWIC 2009). However, uncertainty is high regarding the potential effects of climate change because predictions are based on simulations that can be highly variable. Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of these species in the Cumulative Effects Assessment. The small changes in habitat availability and distribution from RFDs, including the Project, are predicted to have no measurable effect on survival and reproduction rates of whip-poor-wills in the RSA.

- Applying a density estimate of 0.01 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-83) results in an estimated reduction of <0.4 individual in the RSA relative to the Baseline Characterization (i.e., from a predicted 29.9 to 29.6 whip-poor-wills). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

6.5.10.12.4 Cumulative Effects Assessment

Effects from direct habitat loss of moderate and high suitability eastern whip-poor-will habitat and changes to habitat distribution are considered certain (Table 6.5-83). However, this species can use transmission line and roadway ROWs, clear cuts, and reclaimed surface mines as breeding habitat (COSEWIC 2009). In southern Ontario, eastern whip-poor-will abundance is positively correlated with linear disturbance density which may also be reflected in northwestern Ontario (English et al. 2016). Effects from changes to habitat availability and habitat distribution from RFDs are expected to occur at the regional scale. Effects from changes to habitat availability and distribution may occur at the regional to beyond regional scale due to forestry, RFDs that extend beyond the RSA, climate change, and other natural factors.

Effects from the direct loss of eastern whippoorwill habitat availability and distribution from human activities are conservatively assumed to be continuous and permanent, although whippoorwill may use recently disturbed areas for breeding and foraging.

Effects from changes to habitat availability, habitat distribution, and survival and reproduction from forestry and natural factors such as wildfire will be frequent and reversible in the long term. Effects from climate change and natural factors such as declining insect populations may be permanent and continuous. Mines would have continuous effects that are reversible in the long term.

Effects from avoidance or reduction in habitat quality from sensory disturbance are probable (not certain) because some individuals may adapt to human activities. Effects from avoidance due to sensory disturbance are expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines), and reversible in the long term (after operations and reclamation) for projects where sensory disturbance occurs during operations (e.g., mines). Permanent roads and highways will have irreversible effects.

Cumulative effects from changes in eastern whip-poor-will survival and reproduction are possible to occur and may occur continuously and indefinitely at the regional to beyond regional scale due to factors such as climate change, forestry, natural factors, and RFDs that extend beyond the RSA.

Table 6.5-83: Characterization of Predicted Cumulative Effects for Eastern Whip-poor-will

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Direct loss of 2,998 ha of moderate to high suitability habitat (3.1%) of the LSA baseline characterization. • Direct loss of 1.1% of the RSA baseline characterization. • Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	• Certain (direct loss) • Probable (sensory disturbance)	Not significant
Habitat Distribution	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to loss of 2,998 ha of moderate to high suitability habitat. • Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss) • Medium term (sensory disturbance)	Continuous	Possible	Not significant
Survival and Reproduction	• Vehicle collisions; • Electrocution and collisions with the transmission line; • Increase in edge habitat; and • Incidental take.	Direct	Negative	• Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat, and incidental take).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take) • Medium term (vehicle collisions and sensory disturbance)	Continuous	Possible	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.12.5 Assessment of Significance

Currently, sufficient numbers of individuals that are capable of reproduction are available to sustain the population and increase abundance in Canada (Environment Canada 2015b). Climate warming is predicted to result in drier forests and longer summers in northern Ontario, which could positively affect eastern whip-poor-will survival and reproduction. This species appears to be resilient and adaptive to physical disturbance of the landscape. Eastern whip-poor-will abundance may be positively correlated with linear disturbance density (English et al. 2016).

Habitat does not appear to be limited in the RSA at baseline characterization 54.6% of RSA) or the Cumulative Effects Assessment (54.0% of RSA). The cumulative direct disturbance from the Project and RFDs is predicted to remove 1.1% (3,160 ha) of moderate to high suitability eastern whip-poor-will habitat that is present in the RSA at baseline characterization. Habitat is still intact and well distributed in the RSA in the Cumulative Effects Assessment. The predicted abundance of eastern whip-poor-wills in the RSA is not expected to change from the baseline characterization to the Cumulative Effects Assessment. The estimates of habitat loss and reductions in abundance are likely overestimated as the entire lease boundaries of future mines was assumed to be disturbed, which is not likely to be the case. Additionally, there is uncertainty as to whether most RFDs will be constructed. Transmission lines and reclaimed mines may also provide highly suitable habitat for this species (COSEWIC 2009, English et al. 2016). Furthermore, vegetation removal in open habitats (i.e., suitable eastern whip-poor-will habitat) will likely to be limited as these habitats are likely to contain compatible vegetation that will not need to be removed during the construction and operation stages. Overall, changes in habitat availability and distribution are expected to be within the resilience and adaptive capacity limits of whip-poor-will populations overlapping the RSA.

The Project, combined with RFDs, has the potential to result in local changes in habitat connectivity, but not over the entire RSA. Future linear disturbances are located primarily in association with, and adjacent to Highway 17 and all other RFDs are point disturbances. Connectivity among populations is expected to remain intact.

The combined evidence concerning the cumulative changes in habitat availability, habitat distribution, and survival and reproduction in the RSAs from baseline characterization to the Cumulative Effects Assessment indicates that eastern whip-poor-populations will continue to be self-sustaining and ecologically effective. Consequently, cumulative effects on whip-poor-will are predicted to be not significant (Table 6.5-83).

6.5.10.13 Landbirds (Common Nighthawk)

6.5.10.13.1 Habitat Availability

In addition to human activities, natural factors such as climate change and wildfire may contribute cumulatively to influence habitat availability for common nighthawk. Climate warming could have a positive effect on common nighthawk habitat availability by resulting in drier conditions in northern Ontario (Thompson et al. 1998, Colombo 2008, Nituch and Bowman 2013). Forest management activities in the RSA will continue to have positive and negative effects on common nighthawk. In the short-term, forest clearing may increase the amount of suitable habitat on the landscape by creating clearings in the forest.

- The Project and other RFDs are predicted to remove 148 (2.2%) of moderate to high suitability habitat in the LSA, relative to the Baseline Characterization (Table 6.5-84).
- The Project and other RFDs are predicted to remove 155 ha (0.8%) of moderate to high suitability common nighthawk habitat in the RSA (Table 6.5-84).

Table 6.5-84: Changes to Habitat Availability for Common Nighthawk in the Cumulative Effects Assessment

Habitat Suitability	LSA Baseline Characterization (ha)	LSA Cumulative Effects (ha)	LSA Change in Area (ha)	LSA Percent Change (%)	Terrestrial RSA Baseline Characterization (ha)	Terrestrial RSA Cumulative Effects (ha)	Terrestrial RSA Change in Area (ha)	Terrestrial RSA Percent Change (%)
Moderate-High[1]	6,737	6,589	-148	-2.19%	18,900	18,745	-155	-0.82%
Unsuitable	158,051	158,199	148	0.09%	529,220	529,375	155	0.03%
Total	**164,787**	**164,787**	**n/a**	**n/a**	**548,121**	**548,121**	**n/a**	**n/a**

Note: Some numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; RSA = regional study area.

1) Refer to Appendix 6.5-A for details about habitat types in each suitability category.

6.5.10.13.2 Habitat Distribution

RFDs, including the Project will remove common nighthawk habitat and result in additional fragmentation (Attachment 6.5-B-18, in Appendix 6.5-B). Linear disturbances could act as barriers to common nighthawk movements in the RSAs. However, common nighthawks are a highly mobile species and have been found to use anthropogenic disturbance areas for nesting. It is assumed that the RFDs will use mitigation measures that avoid and minimize changes to nighthawk habitat and population connectivity.

Overall, connectivity among common nighthawk habitat patches is expected to be maintained in the Cumulative Effects Assessment despite potential increased fragmentation from natural factors and RFDs. Nighthawks are likely to fly over or around RFDs in search of suitable nesting sites.

6.5.10.13.3 Survival and Reproduction

Climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to be longer. These changes are likely to have a positive effect on common nighthawk as a longer growing season may allow for this species to frequently raise more than one clutch per year. However, climate change may also increase the frequency and intensity of extreme weather events, including droughts and heavy precipitation. Extreme weather events during the breeding season can reduce fecundity and nest success. The frequency and intensity of hurricanes are predicted to increase as a result of climate change, which may negatively affect individuals during fall migration and on wintering grounds.

Warmer and drier conditions in Ontario due to climate change may alter the onset of spring and summer and the timing of insect hatches (Nituch and Bowman 2013). Insectivorous long-distance migrants such as common nighthawks often exhibit a strong synchronization between breeding and peak food abundance, and climate change may create a temporal mismatch between reproduction and optimal foraging conditions for prey (Both et al. 2009; COSEWIC 2007). However, uncertainty is high regarding the potential effects of climate change because predictions are based on simulations that can be highly variable. Although there is uncertainty in the magnitude of changes to survival and reproduction, effects are not expected to exceed the resilience or adaptability limits of these species in the Cumulative Effects Assessment. The small changes in habitat availability and distribution from RFDs, including the Project, are predicted to have no measurable effect on survival and reproduction rates of nighthawks in the RSA.

- Applying a density estimate of 0.01 individuals/km² to the amount of moderate to high suitability habitat remaining in the Cumulative Effects Assessment (Table 6.5-84) results in an estimated reduction of <0.05 individual in the RSA relative to the Baseline Characterization (i.e., from a predicted 5.7 to 5.6 nighthawks). The value is likely overestimated as habitat loss from future project footprints is unknown and calculated using conservative assumptions.

6.5.10.13.4 Cumulative Effects Assessment Classification

Effects from direct habitat loss of moderate to high suitability common nighthawk habitat and changes to habitat distribution are considered certain (Table 6.5-85). However, common nighthawks nest and forage in forest openings and areas with gravel and so may benefit from human disturbances. Effects from changes to habitat availability and habitat distribution are expected to occur at the regional scale to beyond regional scale due to forestry, RFDs, climate change, and other natural factors.

Effects from the direct loss of common nighthawk habitat availability and distribution from transmission line projects are conservatively assumed to be continuous and permanent. However, nighthawks may use recently disturbed areas for breeding and foraging, which may reduce the net effects on habitat availability.

Effects from sensory disturbance (avoidance or reduction in habitat quality) are probable (not certain) because some individuals may adapt to human activities. Effects from avoidance due to sensory disturbance are expected to be reversible at the end of construction and reclamation activities (medium term) for projects where most sensory disturbance occurs during construction (e.g., pipelines and transmission lines) or is of short duration (e.g., forestry). Effects from avoidance are expected to be reversible in the long term for projects where sensory disturbance occurs during operations (e.g., mines). Sensory disturbance effects from highways and other permanent roads will be permanent.

Effects from changes in habitat distribution from direct habitat loss are probable at the regional scale. The effects to habitat distribution are permanent for transmission lines and reversible in the long term for forestry and mines.

Cumulative effects from changes in survival and reproduction are possible to occur permanently and on the regional scale as a result of direct habitat loss. Effects to survival and reproduction will be reversible in the medium to long term at the local to regional scale as a result of sensory disturbance (dependent on the degree of temporal overlap between RFDs.

Cumulative effects from changes in common nighthawk survival and reproduction are possible to occur and may occur continuously and indefinitely at the regional to beyond regional scale due to factors such as climate change, forestry, natural factors, and RFDs that extend beyond the RSA.

Table 6.5-85: Characterization of Predicted Cumulative Effects for Common Nighthawk

Indicators	Cumulative Effect	Direct/ Indirect	Direction	Magnitude	Geographic Extent	Duration / Irreversibility	Frequency	Likelihood of Occurrence	Significance
Habitat Availability	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Direct loss of 148 ha of moderate to high suitability habitat (2.2%) of the LSA baseline characterization. • Direct loss of 0.8% of the RSA baseline characterization. • Reduced quality of nesting and roosting habitat and possible avoidance in the LSA from sensory disturbance during construction and reclamation.	Local	• Permanent (direct loss) • Medium term (sensory disturbance).	Continuous	• Certain (direct loss) • Probable (sensory disturbance)	Not significant
Habitat Distribution	• Habitat loss; and • Sensory disturbance.	Direct	Negative	• Slight shifts in territory sizes or locations due to loss of 148 ha of moderate to high suitability habitat. • Slight shifts in territory sizes or locations due to increased human disturbance.	Local	• Permanent (direct loss) • Medium term (sensory disturbance).	Continuous	Possible	Not significant
Survival and Reproduction	• Vehicle collisions; • Electrocution and collisions with the transmission line; • Increase in edge habitat; and • Incidental take.	Direct	Negative	• Mortality of a few individuals over the life of the Project may occur (vehicle collisions and electrocution and collisions with the transmission line). • Reduced survival and/or reproduction due to increased predation risk (increase in edge habitat, and incidental take).	Local	• Permanent (direct loss, increase in edge habitat, electrocution and collisions with the transmission line and incidental take) • Medium term (vehicle collisions and sensory disturbance).	Continuous	Possible	Not significant

< = less than; % = percent; ha = hectare; LSA = local study area; RSA = regional study area.

6.5.10.13.5 Assessment of Significance

Habitat availability is not limiting for common nighthawk at Baseline Characterization or the Cumulative Effects Assessment and the predicted abundance in the RSA and LSA is estimated to remain similar during all assessment cases. The Project and RFDs are predicted to remove from 155 ha (0.8%) of moderate to high suitability habitat in the RSA, relative to the Baseline Characterization. This is a highly conservative estimate as most RFD may not be constructed. Also, mine lease boundaries were used as the project footprints in the habitat model, which are likely larger than final design plans. Forest management activities in the RSA are predicted to have positive and negative effects on common nighthawk by creating suitable habitat in the short-term but decreasing habitat in the long-term because of forest succession.

The Project, combined, with RFDs has the potential to result in local changes in habitat connectivity, but likely not throughout the RSA, as the future projects only intersect portions of the RSA; connectivity among nighthawk populations should remain intact. RFDs may result in changes to nighthawk survival and reproduction in the RSA; however, it is assumed that the RFDs will implement mitigation measures that avoid and minimize effects.

Climate change will likely alter habitat availability, habitat distribution, and survival and reproduction of common nighthawks in the Cumulative Effects Assessment; however, there is high uncertainty regarding the potential effects of climate change because predictions are based on simulations that can be highly variable and many scenarios are possible.

Overall, the weight of evidence from the analysis predicts that cumulative changes to nighthawk habitat availability, habitat distribution, and survival and reproduction are within the resilience and adaptability limits of the species. The combined effects from the Project and RFDs should not have a negative influence on common nighthawk populations in the RSA to be self-sustaining and ecologically effective. Consequently, the incremental and cumulative effects from the Project and other past, present, and RFDs on common nighthawk in the Cumulative Effects Assessment are predicted to be not significant (Table 6.5-85).

6.5.11 Prediction Confidence in the Assessment

Prediction confidence refers to the degree of certainty in the net effects predictions and associated determination of significance. The effects assessment deals with predictions of future circumstances and predicts interactions of the Project and other developments or activities within complex ecosystems. Scientific inference is associated with uncertainty, and prediction confidence (how confident we are in our assessment results) depends on the level of uncertainty and the manner in which it is addressed. Primary factors affecting confidence in the predictions made in the wildlife assessment include:

- Availability and accuracy of baseline data;
- Accuracy of vegetation maps (FRI data) and wildlife habitat models;

- Level of understanding of the strength of potential effects (i.e., mechanisms) on each criterion;
- Level of certainty associated with the effectiveness of proposed mitigation, where applicable; and
- Level of understanding of the cumulative drivers of change in indicators and associated effects on assessment endpoints.

The level of certainty was considered during the effects assessment, and how uncertainty was addressed to increase the level of confidence so that net effects will not be worse than predicted, such as building conservatism into the analysis and assessment. Uncertainty in the assessment was managed by:

- Conducting quality assurance and quality control on baseline data;
- Updating the accuracy of FRI ecosite data through field studies (Vegetation and Wetlands Section 6.4; Appendix 6.4-A);
- Reviewing historical data and relevant vegetation and wildlife studies conducted in the study areas;
- Collecting local and regional data to understand ecological relationships relevant to potential interactions and inform the assessment;
- Using data to make inferences about ecological interactions and mechanisms of change;
- Comparing assessment results to relevant published literature;
- Reviewing regional information such as FMPs and in WMUs; and
- Addressing climate change as a precautionary outcome for each effects criterion (e.g., negative effect of climate change on wildlife criterion). However, where potential effects of climate change were better understood, criterion responses were based on available scientific evidence.

Remaining uncertainty was primarily addressed by making assumptions that overestimated rather than underestimated potential effects of the Project and RFDs (i.e., a precautionary assessment). For example, the Project will use existing access as much as possible to minimize new disturbance to the landscape. In some cases, existing roads/trails may need to be cleared or widened, depending on the results of field inspections. As a precautionary approach, in these cases where uncertainty exists, these roads/trails were considered part of the Project footprint because the extent of vegetation removal is highly uncertain at this stage of the planning process.

Some habitats disturbed by the Project through temporary access roads and water crossings, laydown and storage yards, and construction camps are expected to be reclaimed, which would contribute to reducing net Project effects. In addition, although vegetation under the transmission conductors will be maintained at heights consistent with safety guidelines, residual low shrub and tree cover is expected to provide forage and movement paths for some wildlife species (e.g., moose, marten, and Canada warbler). Therefore, the confidence in predictions concerning effects on wildlife from the Project is moderate to high.

Analyses indicated that the accuracy of the FRI ecosite data was low. For wildlife, the uncertainty is managed by completing the assessment using habitat models that combine ecosites into broad-scale categories of moderate to high habitat suitability. Therefore, predicted effects on wildlife from the incremental and cumulative effects of the Project and other developments have a moderate level of confidence.

Spatial information was not available for all RFDs and therefore these RFDs could not be incorporated into the wildlife habitat models. Therefore, there is moderate uncertainty in accuracy of disturbance due to RFDs. For the purpose of this assessment, the loss of wildlife habitat due to the Project and RFDs is assumed to be permanent and irreversible because the Project is expected to operate indefinitely, and reclamation plans are not available for planned RFDs. Overall, the confidence in predictions concerning effects on wildlife resulting from the Project and RFDs is moderate.

Predicting how an ecosystem or an individual species will cope with climate change is difficult and many scenarios are possible (Dawson et al. 2011). In general, forests are predicted to shift northward and species composition in the criterion-specific RSAs will become more similar to species south of Lake Superior (Huff and Thomas 2014). Changes in water levels and flows are uncertain and may result in negative or positive changes to wildlife and wildlife habitat. An increase in wildfire is predicted with climate change. The number, frequency, and severity of wildfires in many parts of the world have increased from 1960 to 2013 (Bladon et al. 2014). Climate change and fire suppression practices are thought to be the largest contributors to the trend. A recent prediction for Canada indicates the potential for a 74% to 118% increase in average burn area by the end of this century (Flannigan et al. 2005). Fire alters many components of the environment including air quality, water quality, soil characteristics, vegetation cover, and hydrological processes.

For most species, climate change will have both positive and negative effects on habitat availability, habitat distribution, and survival and reproduction (Nituch and Bowman 2013). For example, in the Lake Superior basin, climate change is expected to alter the onset of spring and summer. Spring and summer are expected to begin earlier and the growing season is expected to last longer (Huff and Thomas 2014). These changes may provide migratory birds with opportunities to produce second broods or re-nest if the first attempt fails. However, climate change is also predicted to increase the frequency and intensity of extreme weather events, which can result in reduced fecundity and nest success for many bird species (George et al. 1992; Conrey et al. 2016).

As expected, there is a low level of confidence in predicted effects from climate change to wildlife. However, where there was ambiguity in the response of a species to climate change, the assessment considered a precautionary outcome for each criterion (i.e., adverse effect of climate change on wildlife populations in the Cumulative Effects Case).

6.5.12 Monitoring

This section identifies recommended effects monitoring to verify the predictions in the assessment and the effectiveness of the mitigation measures, and compliance monitoring to evaluate whether the Project has been constructed, implemented and operated in accordance with the commitments made in the EA Report. The objectives of the monitoring programs include:

- Evaluate the effectiveness of mitigation measures and reclamation, and modify or enhance as necessary through adaptive management;
- Identify unanticipated potentially negative effects, including possible accidents and malfunctions; and
- Contribute to continual improvement.

A summary of the monitoring activities relevant to the protection of wildlife and wildlife habitat are described below:

- Hydro One and its contractor(s) will employ the services of qualified Environmental Inspector(s) to guide implementation, monitor and report on the effectiveness of the construction procedures and mitigation measures for minimizing potential impacts.
- The contractor will provide the appropriate resource specialist, if required, to inspect or monitor Project activities at or near sensitive areas.
- The contractor will monitor during construction for incidental features (e.g., waterbody, rare plant, rare vegetation community, wildlife species of concern, archaeological resources) that have not been previously identified within the Project footprint.
- The contractor or the Environmental Inspector will inspect equipment and vehicle arriving on to the Project prior to Project footprint entry.
- The Environmental Inspector will monitor the implementation of the Vegetation Management Plan and provides recommendations to improve the Vegetation Management Plan on an ongoing basis.
- The Contractor will monitor and manage weed infestations on a regular and ongoing basis along the ROW and on topsoil stockpiles to determine need for additional weed control measures as outlined in the Invasive Species Management Plan.

- The contractor or the Environmental Inspector will conduct visual inspection of the construction area and Project access roads to monitor adherence to traffic protocols and speed limits by all Project personnel.
- A Safety Manager may be designated to monitor traffic safety for the Project.
- The Environmental Inspector will monitor management and disposal of waste.
- The Environmental Inspector will monitor blasting operations for adherence to the Blasting and Communication Management Plan.
- Post-construction monitoring of the Project footprint will begin following reclamation, within one growing season and address any reclamation concerns, including but not limited to soil erosion, revegetation, slope stability and weeds.
- Hydro One will oversee implementation of the environmental mitigation measures during operation and maintenance.

6.5.13 Information Passed on to Other Components

Results of the wildlife and wildlife habitat assessment were reviewed and incorporated into the following components of the EA:

- Land and resource use (Section 7.1);
- First Nations rights, interests, and use of land and resources (Section 7.7); and
- Métis rights, interests, and use of land and resources (Section 7.8).

6.5.14 Criteria Summary

Table 6.5-86 presents a summary of the assessment results by criteria for the Project.

Table 6.5-86: Wildlife and Wildlife Habitat Assessment Summary

Criteria	Assessment Summary
Moose	• Net effects are assessed to be not significant to moose. • Cumulative effects are assessed to be not significant to moose.
Gray fox	• Net effects are assessed to be not significant to gray fox. • Cumulative effects are assessed to be not significant to gray fox.
Furbearers (gray wolf, American marten and beaver)	• Net effects are assessed to be not significant to furbearers (gray wolf, American marten and beaver). • Cumulative effects are assessed to be not significant to furbearers (gray wolf, American marten and beaver).

Criteria	Assessment Summary
Little brown myotis and northern myotis	• Net effects are assessed to be not significant to little brown myotis and northern myotis. • Cumulative effects are assessed to be not significant to little brown myotis and northern myotis.
Herpetofauna (snapping turtle and spring pepper)	• Net effects are assessed to be not significant to herpetofauna (snapping turtle and spring pepper). • Cumulative effects are assessed to be not significant to herpetofauna (snapping turtle and spring pepper).
Raptors (bald eagle)	• Net effects are assessed to be not significant to raptors (bald eagle). • Cumulative effects are assessed to be not significant to raptors (bald eagle).
Marsh birds (trumpeter swan)	• Net effects are assessed to be not significant to marsh birds (trumpeter swan). • Cumulative effects are assessed to be not significant to marsh birds (trumpeter swan).
Songbirds (Canada warbler, eastern wood-pewee, and olive-sided flycatcher)	• Net effects are assessed to be not significant to songbirds (Canada warbler, eastern wood-pewee, and olive-sided flycatcher). • Cumulative effects are assessed to be not significant to songbirds (Canada warbler, eastern wood-pewee, and olive-sided flycatcher).
Bank swallow	• Net effects are assessed to be not significant to bank swallow. • Cumulative effects are assessed to be not significant to bank swallow.
Barn swallow and chimney swift	• Net effects are assessed to be not significant to barn swallow and chimney swift. • The Project is not predicted to contribute to cumulative effects.
Bobolink	• Net effects are assessed to be not significant to bobolink. • The Project is not predicted to contribute to cumulative effects.
Eastern whip-poor-will	• Net effects are assessed to be not significant to eastern whip-poor-will. • Cumulative effects are assessed to be not significant to eastern whip-poor-will.
Landbirds (common nighthawk)	• Net effects are assessed to be not significant to landbirds (common nighthawk). • Cumulative effects are assessed to be not significant to landbirds (common nighthawk).

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