MANITOBA – MINNESOTA TRANSMISSION PROJECT
Environmental Impact Statement

ASSESSEMENT OF POTENTIAL EFFECTS ON WILDLIFE AND WILDLIFE HABITAT

CHAPTER 9
SEPTEMBER 2015

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ABBREVIATIONS AND ACRONYMS

AMP	Access Management Plan
APLIC	Avian Power Line Interaction Committee
ATV	all-terrain vehicle
CEnvPP	Construction Environmental Protection Plan
CLI	Canadian Land Inventory
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
CWS	Canadian Wildlife Service
EC	electrical conductivity
EIS	environmental impact statement
EPP	Environmental Protection Program
ER	Ecological Reserve
ESRD	Alberta Environment and Sustainable Resource Development
FRI	Forest Resource Inventory
GPS	global positioning system
HSI	Habitat Suitability Index
KPIs	key person interviews
LAA	local assessment area
LCC	Land Cover Classification
MB BBA	Manitoba Breeding Bird Atlas
MBCA	*Migratory Birds Convention Act*
MB CDC	Manitoba Conservation Data Centre
MB CEC	Manitoba Clean Environment Commission
MCWS	Manitoba Conservation and Water Stewardship
MESEA	*The Endangered Species and Ecosystems Act* (Manitoba)
MHA	Manitoba Herps Atlas
MMR	Manitoba Mineral Resources
MMTP	Manitoba–Minnesota Transmission Project

MN DNR	Minnesota Department of Natural Resources
NEB	National Energy Board
PDA	Project development area
PTH	provincial trunk highway
RAA	regional assessment area
RMs	rural municipalities
ROW	right-of-way
RPA	route planning area
RVTC	Riel–Vivian Transmission Corridor
SAR	species at risk
SARA	*Species at Risk Act*
SLTC	Southern Loop Transmission Corridor
SOCC	species of conservation concern
TDR	Technical Data Report
TDS	total dissolved solid
TSS	total suspended solid
VC	valued component
VES	visual encounter survey
WMA	Wildlife Management Area

GLOSSARY OF TECHNICAL TERMS

Adaptive management	The process of updating management practices in response to ongoing observations.
Clutch size	The number of eggs in a nest.
Corvid	A group of medium to large-sized passerines in the family *Corvidae.*
Crepuscular	Active during dawn and dusk.
Ecological Reserve	Crown lands in Manitoba designated to preserve unique and rare natural (biological and geological) features of the province and examples of natural and modified ecosystems.
Edge effects	Differences in structure at the transition between habitat types, most notably at forest edges, where structure contrasts with the forest interior, and favours a different plant and wildlife species.
Effective habitat	Habitat that supports diverse and stable wildlife populations.
Elk bugling	Vocalizations made by bull elk in breeding season to communicate with their harem of cows and other bull elk.
Forest interior	Forested area that is isolated from edge effects, commonly believed to influence the outer 100 m of forests.
Furbearer	An animal of a species or type listed in Division 2 of Schedule A of *The Wildlife Act*, C.C.S.M. c. W130 or declared by the regulations to be a fur bearing animal, or any part thereof.
Grassland	Habitat dominated by perennial grasses (see Chapter 10 – Vegetation and Wetlands).
Habitat generalist	Wildlife species that inhabits a wide variety of habitat types.
Habitat intactness	The degree to which a particular habitat patch is free of disturbance.
Icterid blackbird	Blackbirds (including cowbirds and grackles) within the family *Icteridae.*
Lagomorph	Rabbits and hares (family Leporidae) and pikas (family Ochotonidae).
Lek	A traditionally used area where groups of male grouse display courtship dances to prospective female partners.

Local assessment area	The extent to which direct and indirect effects of the Project are likely to occur for most wildlife, and represents the maximum activity restriction setback distance for wildlife SOCC; includes a 1 km buffer on either side of the PDA.
Modified wildlife habitat	Human-altered habitat that remains productive for some wildlife species.
Natural habitat	Habitat with little or no ongoing disturbance from human activities.
Passerines	Perching birds from the order Passeriformes; generally songbirds, including flycatchers, corvids, thrushes, warblers, sparrows, finches, and blackbirds.
Preliminary route options	A series of routing options for the transmission line considered in early Project stages and from which the Final Preferred Route was developed.
Project development area	The footprint of the Project where physical disturbance is expected to occur.
Regional assessment area	The regional area used to determine the significance of Project-specific effects on wildlife and wildlife habitat and assess cumulative effects; includes a 15 km buffer on either side of the PDA.
Southern Loop Transmission Corridor	A dedicated transmission corridor between the Dorsey Converter Station (near Rosser) and the Riel Converter Station (east of Winnipeg). It will accommodate multiple transmission lines necessary for system reliability and meeting future energy demands in southern Manitoba.
Species assemblage	The community of species occurring in a given location.
Species of conservation concern	Species that are rare, disjunct or at risk throughout their range or in Manitoba and in need of further research; includes species at risk defined as wildlife listed under *The Endangered Species and Ecosystems Act* or the federal *Species at Risk Act* or by the Committee on the Status of Endangered Wildlife in Canada, or considered rare (ranks 1, 2, or 3) by the Manitoba Conservation Data Centre (MB CDC).

Valued component	Components of the natural and human environment that are considered by the proponent, public, First Nations, Metis, scientists and other technical specialists and government agencies involved in the assessment process to have scientific, ecological, economic, social, cultural, archaeological, historical, or other importance.
Wildlife Management Area	Crown lands in Manitoba designated for the "better management, conservation and enhancement of the wildlife resource of the province." Wildlife Management Areas exist for the benefit of wildlife and for the enjoyment of people. They play an important role in biodiversity conservation and provide for a variety of wildlife-related forms of recreation, including birding and wildlife watching.

9 Assessment of Potential Environmental Effects on Wildlife and Wildlife Habitat

9.1 Introduction

Manitoba Hydro is proposing construction of the Manitoba–Minnesota Transmission Project (MMTP, or the Project), which involves the construction of a 500 kilovolt (kV) AC transmission line in southeastern Manitoba. The transmission line would originate at the Dorsey Converter Station northwest of Winnipeg, continue south around Winnipeg and within the Existing Transmission Corridor (Existing Corridor), the Southern Loop Transmission Corridor (SLTC) and the Riel–Vivian Transmission Corridor (RVTC), to just east of Provincial Trunk Highway (PTH) 12. The transmission line then continues southward on a New Right-of-way (New ROW) across the rural municipalities of Springfield, Tache, Ste. Anne, La Broquerie, Stuartburn and Piney to the Manitoba–Minnesota border crossing south of the community of Piney. The Project also includes the construction of terminal equipment at the Dorsey Converter Station, electrical upgrades within the Dorsey and Riel converter stations, and modifications at the Glenboro South Station requiring realignment of transmission lines entering the station.

Based on the above description, the assessment of the Project is divided into three components:

- transmission line construction in the Existing Corridor, extending from Dorsey Converter Station to just east of PTH 12;
- transmission line construction in a New ROW, extending south from the Anola area to the border by Piney; and
- station upgrades—at Glenboro South Station, Dorsey Converter Station and Riel Converter Station—and transmission line realignment work at Glenboro South Station.

Wildlife and wildlife habitat is considered a valued component (VC) because it is a critical part of a functioning ecosystem and plays a vital role in ecological and biological processes. Sustainable wildlife populations and intact wildlife habitat are often indicative of a healthy ecosystem, as key biological processes and interactions must be in place for some key wildlife species to exist. Wildlife and wildlife habitat is important for recreational and social reasons. Representatives from Swan Lake, Long Plain and Black River First Nations indicated that "the health and abundance of wildlife is very important to our culture and sustenance" (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015).

Access to natural habitat areas and wildlife provides a source of income currently and historically for some in the region. For many, having access to wilderness areas and wildlife allows for continued practice of traditional and recreational hunting and trapping by resource users (see Chapter 11 – Traditional Land and Resource Use and Chapter 16 – Land and Resource Use).

Given that environmental systems are interrelated, changes in other VCs (*e.g.*, vegetation and wetlands) could affect wildlife abundance and habitat availability. Since European settlement, wildlife habitat has been substantially reduced throughout much of southern Manitoba due to the conversion of native plant communities (*i.e.*, grassland, wetland, forest) into agriculture and urban development (Smith *et al.* 1998). Changes in habitat availability have affected the abundance and distribution of many wildlife species and their populations that currently range within the region. Today, natural wildlife habitat (*i.e.*, grasslands, wetlands and forests) remains primarily in Crown land areas, such as provincial parks and ecological reserves, along river corridors, and in eastern portions of the Project region (Map 9-1 – Wildlife Habitat in the Eastern Project Region; Map 9-2 – Wildlife Habitat in the Western Project Region Glenboro; Map 9-3 – Designated and Protected Lands in the Eastern Project Region; Map 9-4 – Designated and Protected Lands in the Western Project Region). In the east, large bog complexes such as the Caliento Bog, and forests such as the Sandilands Provincial Forest, provide habitat for a diversity of wildlife.

Some of the Project components (*e.g.*, Dorsey Converter Station) are located in modified prairie landscapes that provide little suitable habitat for most wildlife, while other components located east of PTH 12 (*i.e.*, New ROW) traverse areas of intact native habitat known to support a diversity of species.

There are three key wildlife and wildlife habitat-related issues associated with potential Project interaction:

- potential increase in bird mortality associated with bird-wire strikes
- potential for increase in wildlife mortality associated with expanded access to remote areas
- potential for change in habitat availability

The Project has the potential to increase bird-wire strikes; particularly where the transmission line is located in or adjacent to wetlands and rivers that concentrate large-bodied birds such as geese and cranes. Bird-wire interactions are most commonly associated with the shield wires, a narrow wire that runs above the conductors and serves to dissipate the effects of lightning strikes on transmission equipment (Scott *et al.* 1972; Faanes 1987; Savereno *et al.* 1996). Transmission lines in areas that concentrate birds, particularly those located between roosting (*i.e.*, resting), foraging, or breeding sites can have higher collision risk for birds (APLIC 2012). In these areas, waterbirds, especially ducks and geese, are particularly vulnerable to collisions due to their daily movement patterns, which peak during low light periods around sunrise and sunset.

The ROW may enhance predator mobility into areas that were previously less accessible, decrease predator search times for prey and make prey escape more difficult (Thomas 1995; James *et al.* 2000). Wolves, coyotes (*Canis latrans*) and red fox (*Vulpes vulpes*) may benefit from

enhanced access to prey species, leading to increased predation on white-tailed deer (*Odocoileus virginianus*), furbearers, small mammals and ground-dwelling birds (Winter *et al.* 2000). The ROW may also enhance access for hunters and trappers, which could also lead to increased mortality risk for some species such as white-tailed deer and American marten (*Martes americana*).

Clearing of the ROW will decrease forest cover and increase open habitat, which can negatively affect forest interior specialists, such as ovenbird, that are dependent on extensive stands of undisturbed habitat (Yahner 1988). However, other species that specialize in edge habitat may benefit from the open habitat along the ROW. Some studies have reported increased density and diversity of small mammals (Clarke *et al.* 2006), birds (Baker *et al.*1998*;* Askins *et al.* 2012) and invertebrates (Johnson *et al.* 1981) along managed transmission line corridors. These three key issues, along with potential mitigation measures, were evaluated during the transmission line routing process (Chapter 5 –Transmission Line Routing), which considered interactions between the Project and native habitat (*e.g.*, wetlands), protected areas, large patches of forest and other locations known to support species at risk.

Hundreds of wildlife species occur in the Project region and it is not practical to address each species individually. Rather, the discussion of wildlife and wildlife habitat in this chapter focuses on selected focal species and species assemblages associated with three broad wildlife groups: mammals, birds, and herptiles. Rationale for the selection of the focal species and species assemblages is presented in Table 9-1. For each group, species of conservation concern (SOCC) are discussed, including species at risk (SAR) defined as wildlife listed under *The Endangered Species and Ecosystems Act* (MESEA), the federal *Species at Risk Act* (SARA), or the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and/or considered rare (ranks 1, 2, or 3) by the Manitoba Conservation Data Centre (MB CDC).

Table 9-1 Focal Species and Species Assemblages for Evaluation of Wildlife and Wildlife Habitat

Animal Group	Species or Species Assemblage	Rationale for Selection
Mammals	Elk (*Cervus canadensis*)	The Vita elk herd in southeastern Manitoba is small, and generally restricted to a limited area overlapping the eastern part of the regional assessment area (RAA, see Section 9.2.1). There is concern that the Project may increase this herd's vulnerability to mortality resulting from increased access.
	White-tailed deer	White-tailed deer are highly valued by resource users (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015; Roseau River Anishinabe First Nation 2015). Hunting of this species is important for livelihoods of local outfitters. There were concerns raised through the engagement process that the Project may increase white-tailed deer vulnerability to mortality resulting from increased access.

Animal Group	Species or Species Assemblage	Rationale for Selection
	Moose (*Alces alces*)	Moose are rare in the region, but First Nations have expressed the importance of this traditionally hunted species (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015, Peguis First Nation 2015; Roseau River Anishinabe First Nation 2015a, b, c).
	Black bear	Black bear is a predator furbearer valued by resource users. Hunting of this species is important for livelihoods of local outfitters.
	Other furbearers	Furbearers are an important component of the ecosystem and some species (*e.g.*, American marten) are valued by resource users (Cooper 2014, pers. comm.; Paciorka 2014, pers. comm.). Grey fox (*Urocyon cinereoargenteus*) is listed as Threatened under SARA and American badger (*Taxidea taxus*) is listed as Special Concern by COSEWIC.
	Bats	Two resident bat species (little brown myotis (*Myotis lucifugus*) and northern myotis (*Myotis septentrionalis*)) are listed as Endangered under SARA and MESEA.
Birds	Open forest birds (*e.g.*, golden-winged warbler)	Birds with a preference for open forest and forest edges may experience local changes in habitat availability as a result of the Project.
	Interior forest birds (*e.g.*, ovenbird)	Birds with a preference for interior forest habitat are sensitive to loss and fragmentation of forest habitat. Forest birds serve as useful indicators of forest and ecosystem health.
	Grassland birds (*e.g.*, sharp-tailed grouse [*Tympanuchus phasianellus]*)	Grassland birds have experienced widespread habitat loss through most of the prairies. Some species are sensitive to development.
	Wetland Birds (*e.g.*, waterbirds)	Overhead wires present a collision risk to birds. This risk is elevated in areas that concentrate waterbirds (such as sandhill cranes [*Grus canadensis*], ducks and geese).
Herptiles	Upland herptiles (*e.g.*, red-sided garter snake [*Thamnophis sirtalis*])	Herptiles favouring upland habitat for part or all of their life cycle may be vulnerable to increased mortality risk and disturbance of movement corridors during Project construction.
	Wetland herptiles (*e.g.*, northern leopard frog)	Herptiles favouring wetland habitat for part or all of their life cycle may be vulnerable to changes in habitat availability. Northern leopard frog was used as a representative focal species for wetland herptiles.

9.1.1 Regulatory and Policy Setting

9.1.1.1 Primary Regulatory Guidance

A list of the various regulatory requirements that were considered in developing this environmental impact statement (EIS) can be found in the Project description (Chapter 2, Section 2.3). Particular consideration was given to the following federal and provincial legislation and guidelines in the preparation of this environmental assessment:

- the Project Final Scoping Document, issued on June 24, 2015, by Manitoba Conservation and Water Stewardship's Environmental Approvals Branch, which represents the Guidelines for this EIS;
- the relevant filing requirements under the *National Energy Board Act* (R.S.C., 1985, c. N-7), and guidance for environmental and socio-economic elements contained in the National Energy Board (NEB) Electricity Filing Manual, Chapter 6; and
- the *Canadian Environmental Assessment Act, 2012* (S.C. 2012, c. 19, s. 52) and its applicable regulations and guidelines.

9.1.1.2 Additional Federal Guidance

Assessment of the potential environmental effects of the Project on wildlife and wildlife habitat focuses on species that are protected under one or more of the following acts:

- Federal *Species at Risk Act* (SARA) – The purpose of SARA (2002) is to protect SAR in Canada. Recovery strategies are developed to manage species that are listed under SARA as threatened, endangered, or extirpated. Species listed as Special Concern are managed to prevent them from becoming threatened or endangered. SARA prohibits:
    - killing, harming or harassing endangered or threatened SAR (sections 32 and 36)
    - destroying critical habitat of endangered or threatened SAR (sections 58, 60 and 61)
    - contravening regulations established from actions plans (section 53), management plans (section 71) or other regulations outlining the protection of critical habitat (section 59)

    SARA (section 79) also states that:

    - (1) Every person who is required by or under an Act of Parliament to ensure that an assessment of the environmental effects of a project is conducted must, without delay, notify the competent minister or ministers in writing of the project if it is likely to affect a listed wildlife species or its critical habitat.
    - (2) The person must identify the adverse effects of the project on the listed wildlife species and its critical habitat and, if the project is carried out, must ensure that measures are taken to avoid or lessen those effects and to monitor them. The measures

must be taken in a way that is consistent with any applicable recovery strategy and action plans.

- *Migratory Birds Convention Act* (MBCA) - The MBCA (1994) and associated regulations provide for the protection of migratory birds, their eggs and their nests. It applies to all native bird species except American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), upland gamebirds, wild turkey (*Meleagris gallopavo*), raptors, belted kingfisher (*Megaceryle alcyon*), owls, corvids, and icterid blackbirds.
- A Canadian Wildlife Service (CWS) Scientific Permit (take) for the collection and possession of the carcasses of dead migratory birds, as defined under Article 1 of the *Migratory Birds Convention Act* (1994), was obtained on September 2, 2014, as part of preparation for Project-specific baseline bird mortality monitoring effort (Wildlife and Wildlife Habitat Technical Data Report).

9.1.1.3 Additional Provincial Guidance

Assessment of the potential environmental effects of the Project on wildlife and wildlife habitat focuses on species that are protected under one or both of the following Province of Manitoba acts:

- *The Wildlife Act* (Manitoba) – *The Wildlife Act* (2000) prohibits activities such as the hunting, killing, capturing, taking, possessing, importing, exporting, buying or selling of wild animals except as permitted by the Act, a regulation or a permit. A "wild animal" is defined as an animal of a species listed in Schedule A of the Act or declared by a regulation under the Act to be a wild animal. This includes all amphibians, selected reptiles and mammals, and most birds (including those not protected under the *Migratory Bird Convention Act*) known to exist in Manitoba.
- *The Endangered Species and Ecosystems Act* (MESEA) – MESEA (2015) regulates the protection of threatened and endangered species in Manitoba, including mammals, birds, reptiles, amphibians, fish, and plants. For species designated as threatened, endangered, extirpated or extinct, recovery strategies are developed to prevent further reduction and to promote the recovery of species. When a species has been designated extirpated, Manitoba Conservation and Water Stewardship (MCWS) must prepare a recovery strategy that sets out the steps to be taken to reintroduce the species in Manitoba, unless the Minister determines that it is not practicable to reintroduce the species.

Manitoba Hydro has adopted a sustainable development policy and 13 guiding principles that influence corporate decisions, actions and day-to-day operations to achieve environmentally sound and sustainable economic development (Manitoba Hydro 1993). Manitoba Hydro applies the principles of sustainable development in all aspects of its operations. Through corporate decisions and actions to provide electrical services, Manitoba Hydro endeavors to meet the needs of the present without compromising the ability of future generations to meet their needs (Manitoba Hydro n.d.1).

9.1.2 Engagement and Key Issues

Manitoba Hydro undertook three rounds of engagement to receive feedback on wildlife and wildlife habitat through the public and the First Nation and Metis engagement processes. Additional information on these engagement processes is available in Chapter 3 – Public Engagement and Chapter 4 – First Nation and Metis Interactions, respectively. The engagement process also consisted of key person interviews (see Wildlife and Wildlife Habitat Technical Data Report [TDR]), landowner communications, and meetings with key stakeholder groups (*e.g.,* MCWS). In some cases, feedback received through the engagement processes was specific to particular route segments within the Route Planning Area (RPA) (Chapter 3 – Public Engagement; Chapter 7 –Assessment Methods, Map 7-1 – Route Planning Area), but more often it was general. Feedback received through these engagement processes related to wildlife and wildlife habitat was reviewed and incorporated into the weighting of route segments prior to each of the two route selection workshops (Chapter 3 – Public Engagement).

Key wildlife and wildlife habitat issues raised during the Public Engagement Process and the First Nation and Metis Engagement Process were wildlife habitat changes, wildlife mortality, and wildlife disturbance.

During Project planning and design (Chapter 5 – Transmission Line Routing), Manitoba Hydro considered interactions between the Project and wildlife and wildlife habitat, as well as any associated agricultural, other biophysical and socio-economic interactions. Considerations were made to reduce potential Project effects on wildlife and wildlife habitat through avoidance or mitigation by design. These considerations were influenced by information received during the public engagement process, input from First Nations (Manitoba Hydro 2014/2015, pers. comm.; Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015; Roseau River Anishinabe First Nation 2015a, b, c) as well as through recent Manitoba Hydro project experience (*e.g.,* Bipole III Transmission Project (Bipole III) and Clean Environment Commission recommendations [MB CEC 2013] (Section 9.2.3).

The following avoidance mitigation measures were considered particularly important:

- avoidance of proposed and existing protected areas (e.g., Spur Woods and Watson P. Davidson wildlife management areas [WMAs]
- avoidance of large tracts of boreal forest and wetland (e.g., Sandilands Provincial Forest) located east of Marchand
- avoidance of the area known to support the Vita elk herd (near Vita)

In planning the Project, Manitoba Hydro decided to route a portion of the transmission line within existing transmission line corridors (SLTC and RVTC). The decision carries reliability risk but was made to reduce adverse environmental effects such as interference or conflict with wildlife habitat (Chapter 2 – Project Description). Manitoba Hydro values the importance of wildlife and wildlife habitat to stakeholders, First Nations and Metis, and the general public. Multiple transmission

lines already traverse the Project region, and Manitoba Hydro seeks to reduce additional adverse effects on wildlife and wildlife habitat due to its projects.

Design-based mitigation included consideration and use of the following, to the extent practical:

- scheduling land clearing to occur outside of the sensitive breeding period (April to August)
- scheduling winter construction in areas that support natural wildlife habitat

Other mitigation measures related to Project effects on wildlife and wildlife habitat are described in the Chapter 10 – Vegetation and Wetlands.

The three main themes of wildlife and wildlife habitat-related issues identified during the engagement processes (*i.e.*, change [loss or alteration] of wildlife habitat, change in wildlife mortality risk and disturbance to wildlife) are discussed below.

9.1.2.1 Change in Wildlife Habitat

Within the Project region, wildlife habitat has been substantially altered by agriculture and development. Agriculture is the dominant land use in areas surrounding the Glenboro South Station, the Dorsey and Riel converter stations, and the Existing Corridors. In these areas, natural wildlife habitat exists in Crown land areas (*e.g.*, Beaudry Provincial Park, Watson, P. Davidson WMA), along the Assiniboine River corridor, and as small fragments of grassland, forest and wetland dispersed across the landscape. Areas of natural wildlife habitat are more common and widespread in the easternmost parts of the Project region near Ste. Genevieve, Richer and Sundown. In these areas, natural wildlife habitat (such as forest, wetland, and grassland), has been replaced or fragmented by agriculture, residential development, roads, utility corridors, mining, and recreational trails. Some large areas of intact (*i.e.*, not fragmented) wildlife habitat remain in areas east of PTH 12, particularly the Watson P. Davidson WMA and surrounding Sandilands Provincial Forest. Species that inhabit the eastern parts of the Project area are white-tailed deer, moose, American elk, wolf, coyote, black bear, furbearers, a variety of birds including species at risk (*e.g.,* golden-winged warbler),and frogs and reptiles.

With the exception of elk, most of the wildlife populations that inhabit the eastern parts of the Project area are widespread throughout areas that support natural wildlife habitat. The Caribou-Vita elk herd (Vita elk herd) has a more limited distribution, occupying a core area near Vita and Arbakka, Manitoba during winter, and Caribou, Minnesota during summer. The Vita elk herd consists of about 100 to 150 individuals that move between Manitoba and Minnesota. The Minnesota Department of Natural Resources (MN DNR) has a Strategic Management Plan for Elk (MN DNR 2009) and operates an annual lottery-based hunt when the elk herd populations are high enough. There is no regulated hunting season in Manitoba (rights-based harvesting is permitted; MCWS 2013a and 2014b); however, MCWS occasionally conducts aerial surveys to monitor the Vita elk herd in Manitoba.

Concerns about habitat fragmentation were raised by MCWS and through the engagement processes in relation to the route segments proposed in areas supporting intact wildlife habitat. In Round 1, alternative routes traversed areas of intact wetland and forest habitat in the eastern and southern portions of the RPA (Chapter 5 – Transmission Line Routing). Routes in the far eastern region were eliminated because they compared less favorably with routes having more western border crossings, when all criteria (including habitat intactness) were considered. In Round 2, concerns about intactness and access were raised again regarding the route segment proposed along the eastern side of Watson P. Davidson WMA, near Pocock Lake Ecological Reserve (ER) and Sandilands Provincial Forest (Chapter 5 – Transmission Line Routing). MCWS indicated that under *The Wildlife Act*, developments that alter wildlife habitat are prohibited in WMAs. MCWS further expressed concern that the area east of Watson P. Davidson WMA is relatively intact with limited access (MCWS 2015; Leavesley 2015, pers. comm.). Developing a new transmission line in this area would fragment wildlife habitat and increase access. Feedback received through the engagement processes expressed interest in protecting this area from further forest loss because it supports important habitat for a variety of wildlife species including black bear, white-tailed deer, and a variety of birds. To address these environmental concerns, this route segment was eliminated from further consideration (Chapter 5 – Transmission Line Routing). Fragmentation effects on wildlife and wildlife habitat is discussed in sections 9.5.2.1.1 and 9.5.2.3.1.

In general, some stakeholder groups expressed concerns about the transmission line being within or adjacent to ecological reserves (*e.g.*, Pockock Lake ER) and WMAs (*e.g.*, Spur Woods WMA), as they support valued wildlife and wildlife habitat. Most of these protected areas are interconnected by the Sandilands Provincial Forest (Map 9-3 – Designated and Protected Lands in the Eastern Project Region) a large area of Crown land. During evaluation of alternative routes in Round 2, the role of this area as providing important habitat connectivity was considered. The preferred route that resulted from this selection process avoids this area (Chapter 5 – Transmission Line Routing).

Other locations identified as a concern for wildlife included Round 2 alternative routes that traversed some of the transitional habitats between the Boreal Plains and Boreal Shield ecozones (*e.g.*, near St. Genevieve) (Wildlife and Wildlife Habitat TDR Map 1-1 – Ecoregions and Ecozones Traversed by the Project Area). Through feedback received through the engagement processes, concerns about the Project affecting the abundant wildlife known to inhabit this area including white-tailed deer, sandhill crane, sharp-tailed grouse, migratory birds, SAR (*e.g.*, golden-winged warbler, red-headed woodpecker [*Melanerpes erythrocephalus*]), salamanders, frogs, toads and snakes. Concern was raised about the alternative route options traversing areas of critical golden-winged warbler habitat (Artuso 2014, pers. comm.). Effects on golden-winged warbler critical habitat are discussed in Section 9.5.2.1.1.

Feedback collected through the engagement processes also indicated that the Caliento and Sundown bogs are highly important ecologically as they support a variety of wildlife species including turtles, garter snakes, frogs and birds. In Round 2, one of the alternative route segments (211; Chapter 5 – Transmission Line Routing) proposed in this area traversed a large

portion of the Sundown Bog complex near the Manitoba-Minnesota border. A route along the northern edge of the bog was determined as part of the preferred route through the transmission line routing process (*i.e.*, 210; Chapter 5 – Transmission Line Routing).

9.1.2.2 Wildlife Mortality

Concerns about wildlife mortality were centered primarily on the Project increasing hunter and predator access in previously intact and less accessible reaches of the RPA. Some of the preliminary route options presented in Round 1 traversed areas known to support the Vita elk herd near Vita. Through the engagement processes there was concern that a transmission line through the core elk range would increase hunter and predator access and threaten the viability of the elk herd. MCWS further indicated that the elk herd resides primarily on private lands (Leavesley 2015, pers. comm.). Concerns raised regarding the Vita elk herd were considered in the transmission line routing process. Through this process, the route determined avoided the area frequented by the herd.

Feedback received expressed concern over the potential for increased wildlife mortality along some of the alternative route segments located in areas of intact wildlife habitat. Creating new access in these areas could lead to increased hunting of deer and bear and increased predation of deer by wolves. Of particular concern were the route segments that traversed areas east of Watson P. Davidson WMA near Marchand (a number of routes from Round 1 [Chapter 5 – Transmission Line Routing], and segment 207 in Round 2). While most of these route segments were eliminated from further consideration after Round 1, one still remained along the east side of the Watson P. Davidson WMA (segment 207). These concerns were considered in the transmission line routing process and the preferred route determined is located west of the Watson P. Davidson WMA.

General concerns regarding bird-wire strikes were raised by Artuso (2015, pers. comm.), who indicated that transmission lines present a collision risk to sandhill cranes, particularly in areas where cranes breed and/or move between agricultural fields and roosting. Concern was raised about the alternative route traversing Caliento Bog, an area known to support breeding habitat for sandhill cranes (Artuso 2015, pers. comm.).

9.1.2.3 Wildlife Disturbance

Disturbance to wildlife due to Project construction activities and post-construction recreational use of the ROW was raised as a concern during the engagement process. Feedback received through the engagement processes raised concern about construction timing affecting breeding birds. The suggestion was made that Manitoba Hydro construct in the winter and avoid the breeding bird season. Disturbance to wildlife by recreational users travelling along the proposed ROW was also expressed as a concern.

To control access (and associated disturbance) during Project construction and operation, Manitoba Hydro will implement an Access Management Plan (AMP). This plan describes a number of restrictions on access such as the restricted use of non-construction vehicles on the construction site including Project personnel recreation vehicles. Access is further limited by the small portion of the Project on publically accessible Crown lands. Terrain constraints will impede access in the summer, particularly in wetland areas. Chapter 10 – Vegetation and Wetlands provides additional information on Project-related disturbance effects on wildlife.

9.2 Scope of Assessment

The scope of the assessment of potential Project effects on wildlife and wildlife habitat was influenced by the following:

- issues and concerns raised throughout the engagement processes;
- provincial and federal acts and regulations pertaining to wildlife and wildlife habitat;
- spatial and temporal boundaries; and
- learnings from past assessments.

9.2.1 Spatial Boundaries

The following spatial boundaries are used to assess Project effects, including residual and cumulative environmental effects, on wildlife and wildlife habitat in the region surrounding the Existing Corridor, New ROW and converter stations (Map 9-5 – Project Infrastructure and Wildlife and Wildlife Habitat Assessment Areas):

- **Project development area** (PDA): encompasses the Project footprint and is the anticipated area of physical disturbance associated with the construction and operation and maintenance of the Project (see Map Series 7-100 – Project Development Area).
- **Local assessment area** (LAA): includes all components of the PDA plus a 1 km buffer surrounding each component. The LAA was established to consider the area in which the Project activities could have effects on wildlife and wildlife habitat. Benitez-lopez *et al.* (2010) reported that most songbirds and waterbirds have lower abundances within 1 km of infrastructure. In addition, denning black bears are particularly sensitive to noise disturbance within 1 km of dens (Linnell *et al.* 2000). A review of literature for other wildlife known to occur within the region did not reveal a greater distance in which effects from Project activities could be measured.

- **Regional assessment area** (RAA): includes the PDA, LAA and a 15 km buffer around all components of the PDA. The RAA is used to assess cumulative effects and the significance of Project-specific effects on wildlife and wildlife habitat. The RAA encompasses the home ranges or dispersal distances of the most wide-ranging species in this assessment, including black bear (5 to 25 km^2 [females; Government of British Columbia 2001]), white-tailed deer (89 km^2 [Fisher *et al.* 2013]), elk (12 to 52 km^2 [Jones 1997]) and red-sided garter snake (18 km dispersal [Gregory and Stewart 1975]). Determination of the RAA is supported by baseline field studies, key person interviews and First Nation ATK.

9.2.2 Temporal Boundaries

The Project construction schedule is provided in the Project description (Chapter 2). Subject to regulatory approval, transmission line construction for the SLTC will start in Q3 2017 and will be completed by Q2 2018. During this period, construction activities will peak in November and December of Q4 2017 and Q1 2018. Construction of the transmission line from Riel to the border will commence in Q2 2018 and will be completed by Q1 2020. During this time, activities will peak in Q1 2019.

Modifications to the Dorsey Converter Station are planned for the period from Q2 2018 to Q4 2019. Modifications to the Riel Converter Station are scheduled to begin in Q3 2017 with a completion date of Q4 2019. Modifications to the Glenboro South Station will span from Q1 to Q4 2019. The Project is expected to have a service life of at least 100 years.

Wildlife and wildlife habitat in the RAA have been subject to agricultural conversion and human-related clearing for more than 100 years (Henderson and Koper 2014). Over the past 150 years, the length of the fire cycle in parts of Manitoba has increased from 55 to 200 years, which potentially raises the risk of large fires occurring (Tardif 2004; Flannigan *et al.* 2005a) as more vegetation is available to burn. The last large fire in the RAA occurred in 2011; it burned approximately 15,000 ha in total (Manitoba Conservation and Water Stewardship 2014a). Fires that have burned approximately 600–800 ha are the next largest on record; they occurred twice between 1928 and 2013: once in 1976 and once in 2012.

This assessment considers a past temporal boundary of approximately 100 years, however, greater emphasis is placed on changes in conditions since 1976, the oldest large fire on record in the RAA. The future temporal boundary is five to 10 years beyond the end of the construction phase. Natural vegetation recovery is expected during this 5–10 year period, with the exception of vegetation that will be maintained by mowing or spraying (*i.e.*, tall trees and shrubs).

In eastern areas of the RAA near Marchand and Piney, notable changes in wildlife populations occurred in the late 1990s for moose (Hristienko 2015, pers. comm.). In the 1980s, moose were more prevalent in the area but have since declined in the area due to a combination of factors including human development, increased hunting pressure, and disease (*e.g.,* brainworm, liver fluke) (Rebizant 2015, pers. comm.).

9.2.3 Learnings from Past Assessments

The assessment of potential Project-related effects on wildlife and wildlife habitat in the RAA has been shaped by feedback received through previous environmental assessments conducted by Manitoba Hydro (*i.e.*, Wuskwatim Transmission Project, Bipole III, Keeyask Transmission Project, and the Keeyask Generation Project), and results of wildlife monitoring programs (*e.g.,* Wuskwatim and Bipole III transmission projects*).*

For example, the selection of the wildlife and wildlife habitat VC reflects the ecosystem-based approach recommended by the Manitoba Clean Environment Commission (MB CEC) in the Bipole III CEC Panel Report (MB CEC 2013). The focus on this VC is also in response to criticism of the Bipole III environmental assessment (Manitoba Hydro 2011) for the redundancy that was generated by identifying and assessing multiple, individual wildlife species as valued ecosystem components. This assessment reduces the potential for redundancy by focusing on wildlife and wildlife habitat as a whole, with emphasis on natural wildlife habitat (*e.g.*, forest, grassland, wetland) and focal species and species groups identified as being important to the public (*e.g.*, white-tailed deer), First Nations and Metis (*e.g.*, moose), and regulators (*e.g.*, SOCC).

As was done for the Keeyask Generation Project (KHLP 2012), and recommended for the Bipole III environmental assessment in the Bipole III MB CEC Panel Report (MB CEC 2013), baseline studies for the Project included wildlife (*i.e.*, mammal, bird and herptile) investigations at proxy areas (*e.g.*, existing 500 kV M602F, 230 kV R49R transmission lines). The Bipole III MB CEC report indicated it would have been good had Manitoba Hydro predicted bird line-strike mortality estimates using data gathered under Bipole I and II (potential proxy areas) (MB CEC 2013). The use of proxies was incorporated into the design of the Project baseline environmental studies, which included aerial track surveys, camera trap studies, breeding bird surveys, herptile surveys, and bird strike mortality monitoring under existing transmission lines (*e.g.*, M602F) located within the RAA. See Section 9.3.1.4 and the Wildlife and Wildlife Habitat TDR for additional information on these studies.

The Bipole III MB CEC Panel Report also emphasized the importance of understanding fragmentation effects on wildlife habitat. For this Project, habitat fragmentation analysis was conducted for wildlife habitat (*i.e.*, native forest, wetland, grassland) (Wildlife and Wildlife Habitat TDR) and is discussed in Section 10.5.2.

Methods used to gather information and assess potential Project-related effects on wildlife and wildlife habitat within the RAA are consistent with those used in other assessments of similar projects that focused on wildlife and wildlife habitat (*e.g.,* Maxim Power 2009; Manitoba Hydro 2012b and 2014). Magnitude rating criteria for change in wildlife habitat (Section 9.3.2.3) are consistent with those used in EAs for other large projects, including the Labrador-Island Transmission Link (Nalcor 2012) and recently licensed Keeyask Generation Project (KHLP 2012). Separate criteria were defined for species at risk, following the recommendations of the Joint Review Panel report on the Site C Clean Energy Project (JRP 2014).

Mitigation measures proposed in this assessment are similar to those used successfully in other Manitoba Hydro Projects, such as Bipole III and the Wuskwatim Transmission Project. The effectiveness of bird flight diverters is supported by the literature (Jenkins *et al.* 2010; APLIC 2012) and results of bird-wire collision mortality monitoring conducted for the Wuskwatim Transmission Project (Manitoba Hydro 2012c). Monitoring revealed low bird mortalities (n=3 birds) at 16 environmentally sensitive sites marked with swan flight diverters (Manitoba Hydro 2012c).

9.3 Methods

9.3.1 Existing Conditions

9.3.1.1 Sources of Information

Existing information sources were reviewed to collect wildlife and wildlife habitat baseline information for the RPA, RAA, LAA, and PDA. Information sources included the following:

- Manitoba Conservation Data Centre (MB CDC 2014) – The centre was contacted to obtain the locations of historically recorded occurrences of SOCC and sensitive wildlife habitat features for the RAA. Data were used to inform route selection, field survey design, and the assessment of potential Project effects.
- COSEWIC (COSEWIC 2015a) – The website was reviewed to identify species listed by COSEWIC with potential to occur within the RAA.
- Species at Risk Public Registry (Government of Canada 2015a) – The registry was reviewed to identify species listed under the *Species at Risk Act* with potential to occur within the RAA.
- MESEA (MCWS 2014b) – The Act was reviewed to identify provincially listed species. This list was compared to other sources, including field records, to identify listed species known or having the potential to occur in the RAA.
- Manitoba Herps Atlas (MHA 2015) – The membership-based interactive mapping program was referenced to obtain locations of recorded observances of existing amphibian and reptile species in the RAA.
- Prairie Pothole Region of North America (Ducks Unlimited 2015) – Identified overlap of the RAA with this important waterfowl breeding region.
- Manitoba Mineral Resources (2013) – Mines Branch (MMR) – The interactive map was reviewed to identify existing or abandoned mines or shafts within the RAA that could serve as potential anthropogenic bat hibernacula.

- Historic Resources Branch Inventory of Archaeological Sites – The inventory was reviewed to identify industrial developments within the RAA that could serve as potential anthropogenic bat hibernacula.
- Minnesota Department of Natural Resources (MN DNR 2009) – Strategic Management Plan for Elk and 2015 elk population aerial survey data.
- MCWS provided information on the distribution and abundance of big game species within the RAA including 2011 and 2014 survey data.
- Habitat Suitability Index (HSI) Model for Manitoba Elk (TAEM 1998) was used to better understand the habitat preferences for elk throughout the year.
- The Habitat Suitability Index (HSI) Model for White-tailed Deer (The Manitoba Forestry/Wildlife Management Project 1996) was used to understand the habitat preferences for white-tailed deer throughout the year.
- The Birds of North America Online database (2015) was reviewed to identify key life history attributes for birds breeding in the RAA.
- Important Bird Areas of Canada (IBA Canada 2015) online database was reviewed to determine whether any Important Bird Areas (IBAs) existed within or adjacent to the RAA.
- Manitoba Breeding Bird Atlas (MB BBA 2015) – The Atlas was reviewed to identify breeding records of SOCC in the RAA. Data were obtained for SOCC having potential to breed in the area, as well as for bird groups not targeted by field surveys (*e.g.*, owls). Data were used to inform development of species-specific potential habitat maps and guide field survey design.
- Recovery strategies and management plans for SARA listed species were reviewed.
- The online eBird (eBird 2012) database was reviewed to identify occurrences of SAR within the RAA.
- The 2013 and 2014 Manitoba Hunting Guides (MCWS 2013a and 2014c), which identified game hunting areas (GHAs) and hunting regulations and bag limits for respective GHAs within the RAA.
- The 2013 and 2014 Manitoba Trapping Guides (MCWS 2013b and 2014d), provided information on the trapping system and regulations in the RAA.
- Information on the WMAs in the RAA was reviewed through an interactive website for Manitoba Wildlife Management Areas (MCWS 2015).

9.3.1.2 Desktop Analysis

Information gathering was guided by the key wildlife and wildlife habitat issues identified during an examination of Project linkages/interactions (Section 9.5.1) and through input collected through the engagement processes (Section 9.1.2). A number of existing data sources were reviewed for information (*e.g.*, habitat requirements, population trends, occurrence data, location of breeding sites) on mammals (*e.g.,* elk, white-tailed deer, moose, black bear, other furbearers and bats), birds (*e.g.*, waterbirds, raptors, woodpeckers, songbirds), and herptiles (*e.g.*, toads, frogs, snakes, turtles, salamanders) having potential to occur within the RPA. Key sources of information are listed below. For a complete listing of information sources used in the development of Section 9.4, see Wildlife and Wildlife Habitat TDR.

Natural wildlife habitat (*i.e.,* forest, wetland and grassland) within the RAA was mapped and described using Forest Resource Inventory (FRI) land cover data (Table 9-2; MCWS 2001). The intactness of wildlife habitat was described by quantifying the number and size of contiguous habitat blocks (*i.e.,* not bisected by a road or other linear feature) that exist within the RAA, as well as the current density of linear features (length of roads, trails, transmission lines per km^2). Information on the spatial boundaries of designated lands and protected areas was obtained from MCWS and mapped for the RAA.

Table 9-2 Forest Resource Inventory Cover Classes used to Estimate Wildlife Habitat Availability

Habitat Type	Class	Sub-class	Description
Natural Wildlife Habitat	Forest	Hardwood	Stands with ≥ 75% basal area comprising deciduous tree species.
		Softwood	Stands with ≥ 75% basal area comprising coniferous tree species (*e.g.,* pine and spruce species).
		Mixedwood	Stands with < 75% basal area comprising deciduous or coniferous tree species.
	Grassland / Meadow	Dry upland ridge	> 50% of the area covered by grass species.
		Moist prairie	
		Wet meadow	
		Sand prairie	

Habitat Type	Class	Sub-class	Description
	Wetland	Muskeg	Wetland dominated by sphagnum moss and heath plants and scattered brush.
		String bogs	Wetlands dominated by sphagnum moss with narrow peat ridges (2–3 m) perpendicular to the angle of drainage.
		Marsh	Wetland completely or partially covered with tall grass, rushes, or sedges but unsuitable for hay.
		Willow/Alder	Low lying areas with a saturated water table presently supporting willow or alder growth.
Modified Wildlife Habitat	Fields	Hayland	Areas of private and leased land cleared of tree cover and presently under an agricultural use.
		Cropland	
		Pasture	
		Land clearing	
		Abandoned land	
	Unclassified	Drainage ditch	Right-of-way, roads, gravel pits, beaches, summer resorts, mines, etc.
		Dugout	
		Gravel pit / mine / dump	
		Road / railway	
		Town / residential	
		Transmission / pipeline	

A data gap analysis was conducted following the desktop review of available wildlife information, addressing key issues, Project linkages (*i.e.,* pathway of effects) and the availability and reliability of existing information. Some of the gaps identified related to the distribution of the Vita elk herd, migratory birds (*e.g.,* location of concentration sites), bird-wire collision mortality estimates from existing transmission lines in the region, distribution and relative abundance of large mammals, location of areas that concentrated SOCC such as northern leopard frog. These gaps were addressed through key person interviews (Wildlife and Wildlife Habitat TDR, Section 2.3.2), ATK and targeted field programs (Wildlife and Wildlife Habitat TDR, Section 2.3.3).

9.3.1.3 Key Person Interviews

Key person interviews were conducted with 20 individuals from various stakeholder groups, including:

- MCWS
- Minnesota Department of Natural Resources [MN DNR]
- contributors to the MB Herps Atlas and Manitoba Breeding Bird Atlas
- five Manitoba wildlife associations
- Faculty of Science at the University of Winnipeg
- Parkland Mews Falconry
- landowners and other interested parties

Two questionnaires were developed for the mammal studies, one specific to understanding more about the distribution of elk, and the other on broader topics related to mammal populations and their habitats (Wildlife and Wildlife Habitat TDR). Although the questionnaires focused on mammals, information on other wildlife species and their habitats were also gathered and incorporated into the synthesis of existing conditions for wildlife and wildlife habitat. Separate questionnaires were developed for bird and herptile interviews.

9.3.1.4 Field Studies

Thirteen wildlife field studies were undertaken between February 2014 and February 2015 (Wildlife and Wildlife Habitat TDR). Studies aimed at filling information gaps related to the species and species assemblages are identified in Table 9-1. Identified gaps were associated with the location of sensitive wildlife habitats, existing levels of bird-wire collision mortality under existing transmission lines (*e.g.*, M602F), and distribution and abundance of wildlife species in the RPA and in some cases along existing transmission lines. Field studies addressed three broad wildlife categories:

- mammals – camera trap study and aerial winter track and elk breeding surveys;
- birds – breeding birds, nocturnal (*i.e.*, targeting nightjars and yellow rail), migration (*i.e.,* driving survey), waterbird movement (*i.e.,* at local staging areas), sharp-tailed grouse lek (*i.e.*, breeding area), and bird mortality monitoring surveys; and
- herptiles – wetland herptile, roadside amphibian call count, and visual encounter surveys.

An overview of the field studies, including an overview of the rationale, objectives, study design and methods, is presented below. For more details, see Wildlife and Wildlife Habitat TDR.

9.3.1.4.1 Mammals

LARGE MAMMAL SURVEY

Rationale

The construction of a linear corridor through the southern portions of RPA could result in the loss or alteration of some mammal habitat due to forest clearing and fragmentation. In some remote areas, the addition of a transmission line ROW could improve hunter and/or predator access. Increased access could lead to changes in mammal distribution across the landscape and possibly present a barrier to species that avoid open habitat. To understand predicted effects on mammals, information on the distribution of large mammals was gathered using motion-detection camera traps (Photo 9-1).

Objectives

The primary objective of the large mammal survey was to gather information on the presence of elk within the RPA. A review of desktop information and information received through interviews indicated that the Vita elk herd inhabits areas near Vita and Arbakka (MCWS 2014e, pers. comm.) Movement patterns between their fall/winter range in Manitoba and summer range in Minnesota (and their potential overlap with the alternative routes) were unclear (Franke 2014, pers. comm.).

The second objective of the camera trap study was to gather information on the abundance and distribution of white-tailed deer, black bear, and other furbearers along alternative route segments. The third objective was to understand mammal use of existing transmission lines transecting the RPA (*i.e.*, M602F).

Photo 9-1 Remote Camera Deployment

Study Design

Two study designs were used to gather information on large mammals in the RPA. One involved 36 cameras placed in areas of potentially suitable elk habitat (Map 9-6 – Mammal Camera Trap Locations 2014), as modeled using FRI and the MB Elk Habitat Suitability Index (HSI; TAEM Consultants 1998). Cameras were set up in a paired configuration with one camera directly on an alternative route segment and one 500 to 800 m from the route in the same habitat type (Map 9-6). The paired configuration provides baseline data for future comparison of mammal density on versus off the ROW, as well as between pre-Project and post-Project conditions.

The second study design involved 20 cameras placed at 22 sites (two cameras were relocated in July) along the existing 500 kV transmission line (M602F). Sites were 0.5 to 12 km apart and were located adjacent to game trails (Map 9-6).

Methods

Following methods described by Ancrenaz *et al.* (2012), Meek *et al.* (2012), and guidance from Manitoba Hydro and experienced biologists, Reconyx™ cameras were:

- attached to trees at approximately 1 m from the ground level
- situated so that vegetation that might falsely trigger or obscure the camera view (within at least 5 m of the camera's view) was absent or removed
- used in continuous photo capture mode (*i.e.,* 5 picture burst with no time delay)
- operated using compact flash type I/II cards (generally 2 GB Sandisk Ultra I/II®)

Cameras were deployed from late April to early May 2014 and in early July crews returned to all camera locations to download the images, maintain the cameras and sites (*e.g.*, replace batteries, remove vegetation if necessary, or redirect cameras tampered with by black bears). In early October, 2014 cameras were retrieved and images were downloaded.

ELK BREEDING SURVEY

Rationale

The Vita elk herd in southeastern Manitoba is small, and generally restricted to a limited area overlapping the eastern part of the RAA. There is concern that the Project may increase this herd's vulnerability to mortality resulting from increased access.

The presence of breeding or rutting habitat for elk was identified as an information gap, and to address this, elk breeding surveys were conducted in areas known to support elk as well as in areas along the alternative routes. Information collected augmented elk data gathered by the camera trap study, aerial track survey and other sources of elk location data.

Objectives

The objective of the elk breeding survey was to identify whether elk breeding or rutting activity occurs within the vicinity of the alternative routes, and confirm elk presence in areas known to support elk at other times of the year.

Study Design

Call-broadcast surveys were used to identify the distribution of breeding elk in the areas known to support elk, as well as in areas of suitable habitat within the RPA, as identified by HSI analysis (TAEM Consultants 1998).

Surveys occurred along five road-based transects near alternative routes and one road-based survey route in the area known to support the Vita elk herd (~3 to 8 km west of the RAA) (Map 9-7 – Elk Breeding Survey Locations 2014). Survey points were located approximately 1.6 km apart to reduce the risk of double-counting and optimize spatial survey coverage (Map 9-7).

Methods

Surveys were conducted in September 2014 to coincide with the elk breeding season (Conway and Gibbs 2005; Hansen *et al.* 2015); three routes were surveyed three times from early to mid-September 2014, while the two additional routes were surveyed once on September 29 to 30, 2014. Surveys were conducted between 0.5 hours before sunrise to 2 hours after sunrise when calling rates are highest (Hansen *et al.* 2015), and during periods of good weather (wind ≤ 20km/h, and precipitation not exceeding a light, intermittent drizzle).

At each survey point, a digital recording of elk bugling obtained through US Fish & Wildlife Service (US FWS 2014) was played using electronic amplified speakers. A call-broadcast protocol was used to standardize survey methods:

- 1 minute waiting period to let disturbance subside
- 1 minute of listening
- 30 seconds of elk bugling
- 1.5 minutes of listening
- 30 seconds of elk bugling
- 1.5 minutes of listening

The estimated location of any elk responding to calls was noted.

AERIAL WINTER TRACK SURVEY

Rationale

An aerial survey of mammals and mammal tracks during late winter period (Photo 9-2) is an efficient way of determining large mammal distribution, species composition and movement patterns over a large area.

Photo 9-2 Aerial Winter Track Surveys

Objectives

The primary objective of the aerial winter track survey was to provide information on winter distribution, density and habitat associations of deer, elk, and furbearers in the RPA. A secondary objective was to provide information on species richness (*i.e.*, number of species) per habitat type and to determine whether mammals, particularly small furbearers, were crossing existing transmission lines (*i.e.*, M602F and R49).

Study Design

Following methods described by O'Donovan *et al.* (2011), transect surveys were conducted by fixed-wing aircraft in five 20 km × 20 km survey blocks in February 2014 (Map 9-8 – Aerial Winter Mammal Track Survey Location 2014). These surveys focused on natural wildlife habitat (*i.e.*, forest, wetland, grassland) in the RPA identified using habitat suitability indices (The Manitoba Forestry/Wildlife Management Project 1996 and TAEM Consultants 1998) and FRI (MCWS 2001) vegetation classification data, as the preferred route and RAA had not yet been defined.

In January 2015, surveys were repeated using a helicopter and the survey design was modified to improve overall coverage of the recently defined preferred route (Map 9-9 – Aerial Winter Mammal Track Survey Location 2015).

Methods

In mid-February 2014, surveys were conducted by experienced wildlife tracking specialists from Alaska using two Piper Super Cub airplanes. Each aircraft contained a single individual who acted as both the pilot and observer. Each survey block was surveyed using a single aircraft flying transects at 1 km intervals at an approximate height of 100 m and ground speed of approximately 100 km/h (O'Donovan *et al.* 2011). A custom Global Positioning Service (GPS) program allowed for quick and efficient recording of both species and locational data while allowing the observer to maintain a visual of both sides of the survey transect at all times. All tracks on 200 m of either side of the aircraft were recorded. For white-tailed deer, only tracks were noted; for all other species, any individuals observed were also noted. The existing 230 kV (R49R) and 500 kV (M602F) transmission lines were surveyed from the US border to the Winnipeg city limits, counting tracks along the ROW during a single pass.

In late January 2015, one pilot and a team of three biologists conducted the aerial surveys using a Jet Ranger helicopter. Surveys were conducted at flight heights of approximately 100 m above ground and at ground speeds of approximately 100 km/h. Again, all tracks (especially ungulate, furbearer, and small mammal tracks) on 200 m of either side of the aircraft were recorded.

9.3.1.4.2 Birds

BREEDING BIRD SURVEY

Rationale

Development of the Project could result in the loss and/or alteration of some bird habitat due to land clearing. To understand how these changes will affect birds, surveys were required to characterize the bird communities inhabiting grasslands, forests and wetlands (Photo 9-3).

Photo 9-3 Breeding Bird Surveys

Objectives

The objectives of breeding bird surveys were to gather information on the abundance and distribution of birds breeding in the RPA and along existing transmission lines, to establish baseline species richness and density estimates for breeding birds in broad habitat types representative of the RPA, and to assess how bird communities differ on and off the transmission line ROW.

Study Design

Using a stratified random design, survey points were selected within the representative broad habitat types potentially affected by the Project (*i.e.*, grassland, wetland, hardwood forest and softwood forest) as identified by FRI habitat data (MCWS 2001) (Map 9-10 – Breeding Bird Survey Locations 2014). Survey points were distributed by major habitat type relative to the overall amount of the respective habitat types within a 1 km area of the routes to obtain proportional representation. Points were located on, and adjacent to (within 100 m) the alternative

routes, and in reference areas (within 1 km of alternative routes) (Map 9-10). Locations of plots were randomly chosen to permit the collection of edge and interior habitat. In some instances, access limitations required the relocation of points to alternate sites in comparable habitat. This design facilitates the collection of information on a variety of species and ecosystems including forest interior birds (*e.g.*, ovenbird), open forest birds (*e.g.*, golden-winged warbler), grassland birds (*e.g.*, bobolink [*Dolichonyx oryzivorus]*), and wetland birds, and will provide a basis for future monitoring efforts.

Breeding bird surveys were also conducted along the existing M602F transmission line to compare bird community structures on an established transmission line (Map 9-10). Survey plots were distributed by major habitat type relative to the overall amount of the respective habitat types within 1 km of the alternative routes to obtain proportional representation.

Methods

Following methods described by Ralph *et al.* (1995) and Bibby *et al.* (2000), 174 point-counts were surveyed in June through to early July 2014 (Map 9-10). All plots were surveyed between sunrise and 1000h (Bibby *et al.* 2000) under good weather conditions (*i.e.*, wind ≤ 20 km/h and precipitation not exceeding a light, intermittent drizzle). Locations of species at risk detected during surveys were mapped. Surveys were conducted by a two-person team using the point-count method, with one biologist identifying all birds heard or observed within the 100 m radius plot during a 10-minute listening period and estimated distance and direction to each individual. Any birds heard or observed outside of the 10-minute listening period, beyond 100 m, or flying over the plot, were recorded as incidental observations. The second crew member assisted primarily with navigation and habitat assessment, but did not contribute bird observations for the survey.

SHARP-TAILED GROUSE LEK SURVEY

Rationale

Sharp-tailed grouse congregate at traditional breeding areas called leks**.** Leks are typically located in grassland habitats (including pasture; Photo 9-4), and are often used year after year for courtship activities. Sharp-tailed grouse are sensitive to disturbance during the breeding period and to loss of grassland habitat including areas supporting leks.

Photo 9-4 Sharp-tailed Grouse Lek Surveys

Objectives

The objective of the sharp-tailed grouse lek survey was to identify whether any grouse leks (*i.e.*, breeding areas) occur along the alternative routes.

Study Design

Potential suitable sharp-tailed grouse habitats *e.g.,* were identified by mapping grassland and pasture identified by the Land Cover Classification (LCC) (EOSD-NRCAN 2001) and FRI data (MCWS 2001). Survey sites were located in potentially suitable habitat near the alternative routes (where road access was available) and in areas where sharp-tailed grouse were historically observed (*e.g.*, near Marchand) (Artuso 2014, pers. comm.) (Map 9-11– Sharp-tailed Grouse Lek Survey Locations 2014).

Methods

Following methods adapted from Alberta Environment and Sustainable Resource Development (ESRD 2013), 21 sites were surveyed in suitable habitat near the alternative routes between late April and mid-May, 2014 to coincide with the grouse breeding period in southeastern Manitoba (Map 9-11). Surveys took place between one half hour before sunrise and three hours after sunrise, the period during which grouse are most active. Surveys were conducted during good weather conditions (*i.e.*, wind ≤20 km/h and precipitation not exceeding a light, intermittent drizzle (Connelly *et al.* 1998; Balderson *et al.* 2013). At each survey site, a team of two biologists listened for sharp-tailed grouse courtship calls and used binoculars to scan for grouse within a 400 m radius plot during a 5-minute survey period. Distances were estimated to each grouse observed and the sex of each individual was recorded. Location data for sharp-tailed grouse leks were then mapped within the RAA.

NIGHTJAR SURVEY

Rationale

The Project may traverse areas that provide common nighthawk (*Chordeiles minor*) (listed as Threatened under SARA and MESEA) and eastern whip-poor-will (listed as Threatened under SARA) breeding habitat.

Objectives

The objective of the nightjar survey was to understand the relative abundance and distribution of common nighthawk and eastern whip-poor-will in relation to potential habitat within the RPA.

Study Design

Forty point count survey locations were selected along four road-based routes traversing potential common nighthawk habitat (*e.g.*, dry upland ridge, mature softwood, pasture [Brigham *et al.* 2011]) and eastern whip-poor-will habitat (*e.g.*, open deciduous forest [Cannings *et al.* 1987; Brigham 1989; Campbell *et al.* 1990]) within the RPA (Map 9-12 – Common Nighthawk Survey Locations 2014; Map 9-13 Eastern Whip-poor-will Survey Locations 2014). Potentially suitable habitat was mapped using FRI spatial data (MCWS 2001).

Methods

Following standard nightjar survey protocols described by Brigham and Barclay (1992) and BC RIC (1998), 40 point-count locations were surveyed along four routes in mid-June, 2014. Since common nighthawk and eastern whip-poor-will are crepuscular (*i.e.*, active at dusk and/or dawn), evening surveys were carried out between one hour before and one half hour after sunset, under good environmental conditions (*i.e.*, wind ≤20 km/h, temperature ≥7°C, and precipitation not exceeding a light, intermittent drizzle; BC RIC 1998). A team of two biologists recorded nightjars heard or observed during a six-minute point count. One biologist identified the nightjars, estimating the distance and direction to all detections, while the other biologist recorded the observations. Locations of nightjar observations were overlaid with potentially suitable habitat to show the distribution of occurrences in the RPA.

YELLOW RAIL SURVEY

Rationale

The Project may traverse areas that provide yellow rail breeding habitat such as wet meadow, fens, and bogs. Yellow rail is a nocturnally active wetland species listed as Special Concern under SARA.

Objectives

The objective of the yellow rail survey was to understand the distribution of yellow rail in potentially suitable habitat located within the RPA.

Study Design

Potential habitat for yellow rail (*e.g.*, wet meadow, muskeg [Bookhout 1995]) was mapped in the RPA using FRI data. Information was compared to past breeding evidence for yellow rails (MB BBA 2015) to identify key areas where rails were previously observed. A total of 19 areas of potential rail habitat were identified near road access points (Map 9-14 – Yellow Rail Survey Locations 2014). Some of these sites overlapped with areas where rails had been detected previously (*e.g.*, near Richer and Sundown).

Methods

Following methods adapted from Bazin and Baldwin (2012) and the Saskatchewan Ministry of Environment (2014a), road-based point-counts were conducted at 13 sites in late June 2014 (Map 9-14). Surveys were conducted between 2300h and 0030h for a period of 10 minutes in good environmental conditions (*i.e.*, wind ≤20 km/h, temperature ≥7°C, and precipitation not exceeding a light, intermittent drizzle; Saskatchewan Ministry of Environment 2014a). Yellow rails heard during the 10-minute point-count were recorded by a team of two biologists, along with the estimated distance and direction of all detections.

In addition to road-based surveys, remote recording units (Wildlife Acoustics SongMeter and TASCAM® DR-100mkII) were deployed at six off-road sites with potential yellow rail habitat. Recording units were programmed to record for 10 minutes each hour starting 30 minutes after sunset and continuing to 0000 h.

BIRD MIGRATION SURVEYS

Rationale

Development of the Project could elevate the mortality risk to migratory birds moving through the region due to the presence of overhead wires. Species most vulnerable to collisions with transmission lines include large-bodied birds such as waterfowl and cranes. While some sites that attract congregations of waterbirds were known from desktop review, the bird migration survey (Photo 9-5) was aimed at determining whether any other locations of importance occur within the RPA.

Photo 9-5 Bird Migration Surveys

Objectives

The objectives of migration surveys were to gain an understanding of bird use of the RPA (particularly waterbirds and raptors) during spring and fall migration, and to identify whether important migratory 'stop-over' or staging habitats/landscape features are present in the region.

Study Design

Spring surveys were conducted along a pre-selected route involving primary and secondary roads within the RPA. The selected route (approximately 213 km) optimized coverage of the alternative route from the southern edge near the Manitoba-Minnesota border to the Deacon Reservoir east of Winnipeg (Map 9-15 – Spring Migration Survey Route 2014).

Fall migration tends to be more prolonged than in spring, with birds 'staging' in areas where there are good food sources. To address the potential for heightened collision risk, fall driving surveys were expanded (approximately 330 km in length) to increase coverage of the alternative routes (with adjustments made to include any potentially sensitive areas identified during spring fieldwork) and the SLTC (Map 9-16 – Fall Migration Survey Route 2014).

Methods

Following standard protocols outlined in Bibby *et al.* (2000), surveys were conducted in the RPA during the spring and fall migration periods. Spring migration driving surveys occurred over a two-day period each week for three weeks in May 2014. Fall driving surveys were conducted over a two-day period each week for four weeks between mid-September and mid-October, 2014.

Surveys were conducted between 0800 h and 1600 h (Bibby *et al.* 2000), in good environmental conditions (*i.e.*, wind ≤20 km/h and precipitation not exceeding a light, intermittent drizzle; Ralph *et al.* 1995).

In spring, surveys began in the northern portion of the RPA, and progressed to the south to reduce double counting birds moving northwards. Similarly, fall surveys began in the southern portion of the RPA, and progressed north. Vehicle speed during the surveys was approximately 50 km/h (Bibby *et al.* 2000). When birds were observed the vehicle was stopped to aid in accurate identification of species and abundance. Data collected for each observation included coordinates and waypoints on a handheld GPS device, bird species, number observed, and information on bird activity (*e.g.*, loafing or local movement, flight direction, flight height). If bird species could not be identified due to observation distance, lighting conditions, bird movement *etc.*, then a determination of bird group (*e.g.*, duck spp., raptor spp.) was made based on silhouette, behavior, and/or flight pattern.

BIRD MOVEMENT SURVEY

Rationale

The potential for birds to collide with overhead wires is elevated in areas where large numbers of individuals congregate and undertake daily movements. The degree of risk can be better understood and mitigated through knowledge of typical movement patterns, including numbers, timing, and direction of flights. A bird movement survey (Photo 9-6) targeted key waterbird staging areas to address this gap in knowledge.

Photo 9-6 Bird Movement Surveys

Objectives

The objectives of the bird movement surveys were to provide data on the number, distribution and flight patterns of birds using major waterbodies located in the RPA, to guide siting decisions and other mitigation measures.

Study Design

Surveys were conducted at open-water wetlands and watercourse crossings having the potential to support waterbirds (and thus present a potential for increased collision risk). Wetlands selected for surveys were within 500 m of the alternative routes.

Spring surveys were conducted at one open-water wetland (Richer Lake) (Map 9-17 – Bird Movement Spring Survey Locations Spring 2014). Fall surveys were expanded to include two additional open-water wetlands (Lonesand Lake and Sundown Lakes), two river crossings (Red River and Assiniboine River), and one reservoir (Deacon Reservoir) (Map 9-18 –Bird Movement Survey Locations Fall 2014).

Methods

Following standard protocols described by Environment Canada (CWS 2007), bird movement surveys were conducted during spring and fall migration periods. Spring surveys occurred once per week over a three-week period in mid-May, 2014. Surveys were conducted in the morning and evening for a period of 0.5 hours (between one half hour before sunrise to one hour after sunrise, and between one hour before sunset to a half hour after sunset). Surveys occurred during periods of good weather conditions (*i.e.*, wind ≤20 km/h and precipitation not exceeding a light, intermittent drizzle) (Ralph *et al.* 1995).

Fall surveys occurred once per week over a four-week period from mid-September to mid-October 2014. Surveys were conducted for one hour in the evening (between one hour before sunset to one half hour after sunset).

Survey sites were monitored using binoculars from vantage points along the waterbody with good visibility, and data collected at each site included bird species, number observed, and flight direction (fall surveys only) and height of birds entering or leaving the area (CWS 2007). If birds could not be identified to species due to observation distance, lighting conditions, bird movement, *etc.*, then a determination of bird group (*e.g.*, duck spp., raptor spp.) was made based on silhouette, behavior, and/or flight pattern.

BIRD MORTALITY MONITORING

Rationale

Development of the Project could elevate the mortality risk to migratory birds moving through the region due to the presence of overhead wires. Although a number of studies have been undertaken around the world to assess collision rates with transmission lines, many variables influence the results including land cover, topography, and proximity to major migratory flyways. Since no existing data are available for southern Manitoba, monitoring of existing transmission lines in the RPA (Photo 9-7) was undertaken to provide an estimate of collision risk for the Project.

Photo 9-7 Bird Mortality Surveys

Objectives

The objective of the bird mortality monitoring study was to develop transmission line-related bird mortality estimates for the Final Preferred Route, with consideration of differences by habitat, *i.e.*, open areas (grassland/agriculture) vs. forested areas, located near and apart from waterbodies. The study focused on an existing 500 kV transmission line (M602F) and the 230 kV lines (*e.g.*, D55Y) that transect the RPA.

Study Design

Using FRI data, survey sites were identified within agriculture, grassland and forest habitats (MCWS 2001). Sites were classified a priori as high risk (located adjacent to a permanent waterbody [*e.g.,* Assiniboine River, Deacon Reservoir]), moderate risk (located adjacent to a wetland/riparian area [*e.g.,* streams, marsh]) or low risk (located in upland habitat) (Map 9-19 – Bird Mortality Monitoring Locations 2014). An effort was made to select an equal number of sites

in each of the three landcover types and in high, moderate and low collision risk areas. Alberta Environment and Sustainable Resource Development (ESRD) recommends searching a distance from the transmission line equal to the height of one tower (ESRD 2011). Therefore, each survey site was 60 m wide (width of existing ROW) by 250 m long.

A total of 16 survey sites were identified along the existing transmission line, and based on landcover type availability, sites covered eight forest, six agriculture and two grassland habitats (Map 9-19). Survey sites were located on east-west and north-south oriented portions of M602F, as well as on the north-south oriented 230 kV lines (*e.g.,* D55Y) that cross the Assiniboine River (Map 9-19).

Methods

A Canadian Wildlife Service (CWS) Scientific Permit (Take) for the collection and possession of the carcasses of dead migratory birds, as defined under Article 1 of the *Migratory Birds Convention Act* (1994), was obtained on September 2, 2014, as part of preparation for the bird mortality monitoring effort (Wildlife and Wildlife Habitat TDR, Section 2.4.3.7).

Searches were conducted over a period of three mornings per week for four weeks, between late September and mid-October 2014, which coincides with the peak of fall migration in southern Manitoba (OHMIC 2014). Since most collisions tend to occur around dawn and dusk (McNeil *et al.* 1985), surveys began at sunrise and ended at approximately 1330 h. Surveys were conducted during the earlier part of day to reduce the loss of carcasses to scavengers (*e.g.*, ravens, skunks; ESRD 2011). Surveys were not conducted in high winds (>50 km/h) or rain exceeding a light, intermittent drizzle.

Based on Environment Canada (2007), Lausen *et al.* (2010) and Alberta Environment and Sustainable Resource Development (ESRD 2011) protocols, three types of surveys were conducted to estimate bird mortality rates:

- carcass searches: documented mortalities due to collisions
- scavenger removal trials: documented the effects of scavengers on carcass search results
- searcher efficiency trials: determined the effects of searcher bias on carcass search results

Carcass Searches

At each survey site, a team of six trained technicians walked in parallel lines approximately 5 to 6 m apart, at a slow and steady pace (approximately 2 km/h) along the length of each transect (*i.e.,* 250 m). Areas with particularly tall and dense vegetation (>30 cm vegetation height and no bare ground visible) were not searched, as heavy vegetation obstructs searchers view of the ground and their ability to see carcasses (OMNR 2011). Areas not searched were delineated on a map and later removed from the total search area during analysis.

All bird carcasses or evidence of possible collisions (*i.e.,* >5 feathers/m^2; Barrientos *et al.* 2012) were recorded and removed to prevent double counting (Janss and Ferrer 1998; Barrientos *et al.*

2012). Signs of predation and scavenging were recorded during surveys (Ginter and Desmond 2004).

All carcasses found during the search efforts were collected, tagged and individually frozen; some specimens were used for searcher efficiency testing and scavenger removal trials. Where possible, carcasses were identified to species and technicians recorded the state of decomposition to estimate days since mortality. GPS coordinates and photographs were taken for each carcass, and site-specific information was recorded, including vegetation height, percent vegetation cover, and distance and direction from the centre of the ROW.

Scavenger Removal Trials

Environment Canada's *Recommended Protocols for Monitoring Impacts of Wind Turbines on Birds* (2007) are applicable to transmission line ROWs, with appropriate modifications for linear disturbances. These trials estimate the effect that local scavengers may have on carcass search results (Ponce *et al.* 2010; Huso 2011). Scavenger removal trials were conducted by placing a known number of bird carcasses across the different landcover type/collision risk areas (to account for variation in scavenging rates between habitat types) and checking weekly for a period of two weeks to determine length of time until the carcass was scavenged. Scavenger trials began in the second week of the four-week search period, with birds placed in week two and checked in weeks three and four. Carcasses used in the scavenger removal trials were obtained from Prairie Wildlife Rehabilitation Centre in Winnipeg.

Searcher Efficiency Trials

Searcher efficiency trials were conducted in each habitat to account for differences in search efficiency between different types of ground cover (*e.g.,* tall grass vs. cropland). Since searchers worked all sites as a team, trials were testing team's search efficiency, not individual searcher efficiency. The team was tested twice over the four-week monitoring period. A known number of marked carcasses were randomly placed within the search area by an independent 'tester' (one to two carcasses were placed per search area). The location of each test carcass was recorded by the tester for retrieval in the event the carcass was not found. Searchers conducted carcass searches as usual. At the end of the day, any remaining carcasses not found by scavengers were collected. Carcasses used in the searcher efficiency testing were those obtained from the Prairie Wildlife Rehabilitation Centre and intact carcasses collected during carcass searches.

AERIAL STICK NEST SURVEY

Rationale

Clearing of the New ROW and vegetated areas of the Existing Corridor (*e.g.,* riparian crossings) has the potential to remove trees that may support large raptor stick nests. Raptor nests are considered important habitat features as they can be used year after year by different species.

Understanding the abundance and distribution of large raptor nests provides an indication of the regions used by breeding raptors.

Objectives

To identify the presence of large stick nests along the alternative routes.

Survey Design

Surveys for raptor nests were focused to areas along the alternative routes and Existing Corridor.

Methods

Surveys occurred by helicopter in the spring and fall of 2014, when leaves were absent from trees. Surveys were conducted at flight heights of approximately 100 m above ground and at ground speeds of approximately 100 km/h. Two observers, one located on either side of the helicopter, searched for large conspicuous stick nests within a 200 m viewing distance of the helicopter. Nests identified were georeferenced using a GPS unit.

9.3.1.4.3 Herptiles

WETLAND HERPTILE SURVEYS

Rationale

Wetland surveys for herptiles (*i.e.,* reptiles and amphibians) were designed to characterize baseline habitat conditions (*e.g.*, water quality) at permanent and semi-permanent ponds located in the RPA, and to identify the location of sensitive sites where amphibians and reptiles congregate during the breeding season and pre-overwintering period. Establishing a baseline for water-quality conditions at wetlands located along the Final Preferred Route (Photo 9-8) is essential for future monitoring of potential changes in amphibian and reptile habitat. These surveys also noted presence of amphibians and reptiles, which contributed to identification of sensitive sites used for breeding and/or overwintering.

Photo 9-8 Wetland Herptile Surveys

Objectives

The objectives of the wetland herptile surveys were to collect baseline water quality data on wetlands occupied by herptiles and to identify the location of sites where amphibians and reptiles congregate during the spring breeding season, as well as in the fall during staging period prior to overwintering. These surveys focused on detecting the western boreal/prairie populations of northern leopard frogs (Special Concern under SARA), a focal species for herptiles (Table 9-1).

Study Design

Wetland herptile surveys in the RPA were conducted at permanent and semi-permanent waterbodies expected to provide potential northern leopard frog breeding and/or overwintering habitat, as well as at locations with previous records of detection of this SOCC (MB CDC 2014) (Map 9-20 – Wetland Herptile Survey Locations 2014). Sites were identified through land cover mapping and orthophoto interpretation and included wetlands and waterbodies within 500 m of the PDA. This buffer represents the maximum activity restriction setback for northern leopard frog breeding ponds (Environment Canada 2009).

Methods

A total of 11 wetlands were surveyed in mid-May, 2014 (Map 9-20). Fall surveys from late August to late September 2014 were undertaken at 26 wetlands, including five of those visited in spring (Map 9-20). The survey schedule was timed to coincide with the northern leopard frog breeding season (*i.e.,* from late April to mid-May) (MHA 2015), and overwintering congregation period (*i.e.,* late August to late September) (Collicutt 2014, pers. comm.).

Water quality data were collected with a Hanna® HI98130 high accuracy pH, electrical conductivity (EC), total dissolved solids (TDS), total suspended solids (TSS) and temperature meter. Turbidity was measured with a LaMotte® 2020wi portable turbidity meter. Measurements were taken at three locations in the shallow water zone at the edge of each wetland at approximately 30 cm to 50 cm depth and between 2 m and 5 m from the shoreline. Measurements from the three locations were averaged to estimate site composite values for water pH, water temperature, TDS and TSS at each wetland. Wetland vegetation community characteristics (*e.g.*, dominant plant species, presence of emergent and submergent vegetation) were recorded and photographed, and weather conditions (*e.g.*, temperature, wind direction and speed, cloud cover and precipitation) were recorded.

A field crew of two biologists visually inspected wetlands using binoculars to search for basking turtles. Following the visual inspection during spring surveys, biologists stood near the wetland edge listening for calling frogs for five minutes.

ROADSIDE AMPHIBIAN CALL COUNTS

Rationale

Loss or degradation of breeding and/or overwintering wetland habitats along the Final Preferred Route could have adverse effects on the local population of herptiles such as northern leopard frog. Nocturnal roadside amphibian call counts are helpful in understanding the relative abundance and distribution of amphibians in areas supporting potential breeding or overwintering habitat.

Objectives

The objective of the roadside amphibian call count surveys was to gather information on amphibian presence, relative abundance, species diversity and distribution of amphibians within breeding within the RPA.

Study Design

Survey routes targeted wetlands and waterbodies in the RPA, and were focused in areas with a greater density of wetlands identified using FRI data (MCWS 2001). Six survey routes with 10 listening stops spaced at 800 m intervals (n=60 stops) were located along roadways traversed by the alternative routes, in a broad area extending from the town of Anola to the town of Menisino (Map 9-21 – Roadside Amphibian Call Count Survey Locations 2014). Nocturnal call count surveys were also conducted at the wetland amphibian survey sites. Six of the wetlands were located within survey routes and were visited as one of the 10 stops within each route. Five of the wetlands did not lie within roadside survey routes and were surveyed separately with one stop per wetland.

Methods

A total of 65 nocturnal roadside surveys were conducted between 0.5 hours after sunset and 0100 h, in mid-May 2014, to coincide with the breeding period of the northern leopard frog (*i.e.,* May through early June) (SK MOE 2014b) (Map 9-21). Following protocols consistent with Species Detection Survey Protocols developed by Saskatchewan Government (SK MOE 2014b), nocturnal surveys were conducted in weather conditions with winds less than 20 km/hr, ambient temperature ≥5°C, water temperature ≥10°C, and/or rain no heavier than a drizzle (Kendell 2002; USGS 2012). Each survey consisted of a two-minute waiting period to allow disturbance associated with observer access to subside, followed by a five-minute listening period. Species observed at each location were noted, along with their relative abundance based on a calling index adapted from the widely accepted protocol developed by Mossman *et al.* (1998) (SK MOE 2014b). Data on amphibian presence, relative abundance, species diversity and distribution within the RPA contributed to the assessment of herptile habitat quality ranks and identification of sensitive areas in the RAA and Final Preferred Route (Wildlife and Wildlife Habitat TDR, Section 3).

VISUAL ENCOUNTER SURVEYS

Rationale

The Alberta ESRD sensitive species inventory guidelines (ESRD 2013) suggest that late summer visual encounter surveys (VES) may be appropriate when surveying for northern leopard frog young-of-the-year or investigating particular waterbodies that will be affected by a construction footprint (Photo 9-9). Northern leopard frog is representative of wetland herptiles (Table 9-1) known to occur within the RPA. Information gathered in the late summer/early fall season was used to augment data gathered during spring studies.

Photo 9-9 Herptile Visual Encounter Surveys

Objectives

The objectives of the VES were to (a) detect herptiles, particularly northern leopard frog, at permanent and semi-permanent ponds and waterbodies located along the alternative routes; and (b) identify sensitive site locations, such as waterbodies where amphibians (*e.g.*, northern leopard frog and eastern tiger salamander (*Ambystoma tigrinum*)) and reptiles (*e.g.*, common snapping turtle (*Chelydra serpentina*)) congregate over winter.

Study Design

All waterbodies having potential to provide overwintering habitats for amphibians (*i.e.,* watercourses, and semi-permanent and permanent wetlands) were identified along the alternative route. From these, sites were selected for VES based on presence of suitable foraging habitat (*i.e.,* grassland habitat) in adjacent areas and accessibility (*i.e.,* many wetlands are on private land) (Map 9-22 – Visual Encounter Survey Locations 2014).

Methods

Visual encounter surveys were conducted at 26 sites between late August and late September, 2014, with a single survey conducted at each water body between 1500 h and 1800 h (Map 9-22). Following protocols consistent with *Species Detection Survey Protocols* developed by Saskatchewan Government (SK MOE 2014b), surveys were conducted by two biologists walking side by side at a distance of 5 m apart along wetland margins or stream banks. Any amphibians observed within the waterbody 1 m from the shore, in a 1 m strip of the waterbody shoreline, or within a 3 m strip of the upland habitat adjoining the water's edge were documented.

The VES was conducted for a prescribed amount of time (20 minutes) (Kendell 2002; SK MOE 2014b) and under average seasonal air temperatures. Surveys were suspended if precipitation exceeded a light rain or ambient air temperatures dropped below 15°C. Data on amphibian presence, relative abundance, species diversity and distribution within the RPA contributed to the assessment of herptile habitat quality ranks and identification of sensitive areas in the RAA and Final Preferred Route.

9.3.1.5 Addressing Uncertainty

As part of the environmental effects assessment of the Project, uncertainties are addressed through careful assumptions. To provide a higher confidence in the final determination of significance, assumptions err on the side of being conservative. The following are limitations or assumptions made during fieldwork, analysis and interpretation of the data gathered for the wildlife and wildlife habitat assessment:

- Field survey locations were limited to provincially owned lands (*i.e.*, Crown lands) and areas of privately owned lands where permission to access was granted. Private landowners have the option to refuse study teams access to their lands. This limited wildlife studies in grassland habitats and at some wetland sites, which are largely privately owned. To adjust for this, surveys targeted grasslands adjacent to roads and waterbodies in 'surrogate' areas (*i.e.*, sites similar to those sites deemed inaccessible).
    - Land management practices on privately owned land are variable and are at the discretion of the landowner, within the bounds of applicable legislation and zoning by-laws. Whereas, Crown lands are coded according to operational limits that set out land use, permissible level of development and requirements for multiple uses.
- The Project is located within an Open Trapping Area (Zones 1, 3 and 4), which is a large area that is not divided into smaller registered traplines. Consequently, the type and number of animals harvested in these zones is aggregated and not divided into smaller geographic zones that align with the Project. In the absence of trapline data specific to the RAA, baseline surveys were designed to gather information on furbearer use of the RAA in portions of the existing 500 kV M602F transmission line.
- There is currently limited knowledge of the Vita elk herd's movements due to the paucity of long-term monitoring data. This uncertainty was addressed through elk breeding surveys, winter track surveys, large mammal surveys and KPIs.

9.3.2 Assessment Methods

9.3.2.1 Assessment Approach

The following section describes the approach undertaken in conducting the wildlife and wildlife habitat assessment.

9.3.2.1.1 Change in Habitat Availability

FRI land cover data (MCWS 2001) were used to map natural wildlife habitat (*i.e.*, wetland, deciduous, coniferous, mixedwood forest, grassland; Table 9-2) within the RAA. Direct change in habitat availability for wildlife was measured by calculating the total area of suitable wildlife habitat overlapping the PDA. Where the PDA is within grassland and wetland habitat, direct change in habitat availability will be limited to sites where permanent structures (*e.g.*, towers) are planned, as habitat within the ROW will remain similar. The change in wildlife habitat availability was not calculated for stations where upgrades and/or expansions are proposed because existing natural wildlife habitat is absent at these locations.

Project-related changes in wildlife habitat intactness (*i.e.*, size and number of habitat patches free from human infrastructure) was measured as the length of linear features/km^2 (*e.g.*, roads, trails, transmission lines), and number and size of core areas (habitat patches greater than 200 ha) in the RAA. While intactness for vegetation and wetlands considers all habitat adjacent to linear features (Section 10.3.2.1.1) wildlife can be sensitive to sensory disturbance and edge effects associated with linear features (Driscoll *et al.* 2005; Environment Canada 2013b). Therefore core areas of intact habitat for wildlife were delineated by applying a 100 m buffer to all low use linear features and developments (*e.g.*, trails, pipelines, transmission lines) and a 200 m buffer to all high use linear features (*e.g.*, roads, highways). Remaining patches of intact grassland, wetland, and/or forest habitat greater than 200 ha were treated as core areas of wildlife habitat.

Potentially suitable habitat for focal species such as ovenbird and American marten were developed by analysing the FRI data set for habitat attributes necessary to support breeding. These attributes were identified from the literature. Forest fire mapping was used to update habitat mapping generated by the FRI (*i.e.,* areas of regenerating forest were removed from the marten habitat map).

Indirect changes in habitat availability were assessed qualitatively through a review of pertinent literature describing the extent to which wildlife responds to construction noise and activity (Hockin *et al.* 1992; Linnell *et al.* 2000; Rogala *et. al* 2011), and to the presence of infrastructure (Jalkotzy *et al.* 1997; Benitez-lopez *et al.* 2010; Bartzke *et al.* 2014). The estimated influence of indirect effects takes into consideration the application of relevant mitigation measures (*e.g.*, activity restriction windows, setbacks).

9.3.2.1.2 Mortality Risk

Mortality risk to birds was assessed by evaluating bird abundance data gathered during baseline migration driving surveys and bird movement surveys, proximity of bird concentration sites to the PDA, and considering the expected implementation of mitigation measures.

In addition, the potential increase in wildlife mortality risk related to potential increase in access to wildlife habitat was assessed through a fragmentation analysis, which identified areas of new access created by the ROW. This was achieved by mapping linear features and measuring changes in the size and number of forest patches in the RAA. Potential changes in mortality risk associated with increased hunter and predator access are discussed qualitatively, recognizing that many species are locally harvested and/or trapped by resource users, First Nation and Metis.

Wildlife mortality arising from vehicle collisions were described by reviewing available literature, with an emphasis on data from Manitoba (*e.g.,* Bipole III) and anticipated increases in traffic rates attributable to the Project construction.

9.3.2.2 Potential Environmental Effects, Effect Pathways and Measurable Parameters

Potential Project-related effects on wildlife and wildlife habitat were identified through a process that considered the relationships or linkages between the Project components and wildlife and wildlife habitat within the RAA.

A number of pathways were identified in which potential effects on wildlife and wildlife habitat could occur as a result of Project construction and operation. The key pathways having potential to affect wildlife and wildlife habitat are:

- land clearing along parts of the New ROW will alter the composition of wildlife habitat by removing trees and shrubs;
- construction noise and activity may cause some wildlife to temporarily avoid otherwise suitable habitats;
- fragmentation of forests may lead to site-specific changes in wildlife species composition (increased habitat suitability for forest edge species and avoidance of ROW habitats by forest interior species);
- fragmentation of forests may result in increased hunter and predator access, which could lead to increased mortality risk for some species; and
- overhead wires present a mortality risk to birds through bird-wire contact, or “strikes.”

Examination of these pathways resulted in identification of two potential environmental effects: change in wildlife habitat availability and change in wildlife mortality risk. The rationale for the selection of these effects and the measurable parameters that were selected are presented in Table 9-3.

Table 9-3 Potential Environmental Effects, Effects Pathways and Measurable Parameters for Wildlife and Wildlife Habitat

Potential Environmental Effect	Effect Pathways	Measurable Parameter(s) and Units of Measurement	Notes or Rationale for Selection of the Measureable Parameter
Change in habitat availability	Forest cover removal along sections of the New ROW and at tower locations; regeneration of open grass and shrub dominated community in cleared areas; habitat avoidance by wildlife due to sensory disturbance; fragmentation of forest habitat may alter habitat use (*e.g.*, avoidance of forest edges by edge sensitive species)	Change in the extent of habitat (ha)	Quantifies direct loss (removal) of habitat and indirect loss (due to wildlife avoidance)
		Change in habitat intactness (number and size of core areas; length of linear features/km^2)	Quantifies the degree of habitat fragmentation
Change in mortality risk	Presence of overhead wires is a collision risk for birds; equipment and noise during ROW clearing could affect denning wildlife and wildlife with limited dispersal capabilities; increased construction-related traffic could increase risk of wildlife-vehicle interactions; clearing of ROW may enhance access to previously inaccessible areas, leading to increased hunting and predation on wildlife	Transmission line collisions (predicted # of individuals)	Addresses mortality of birds due to the presence of Project infrastructure
		Proximity (m) of wildlife concentration sites to Project infrastructure	Wildlife mortality risk will not be uniform along the ROW. Potential for the risk to be higher in areas that concentrate birds (*e.g.*, waterbodies). For mammals, potential for risk to be higher in less disturbed forested areas
		Change in habitat intactness (number and size of core areas; length of linear features/km^2)	Hunter and predator access is influenced by the presence of linear disturbance (*i.e.*, the metric used to measure habitat fragmentation)
		Vehicle collisions (# of individuals)	Addresses loss of wildlife (*i.e.*, birds, mammals) due to increased traffic associated with Project construction

9.3.2.3 Residual Environmental Effects Description Criteria

Terms used to characterize residual (*i.e.*, after mitigation) environmental effects on wildlife and wildlife habitat are summarized in Table 9-4.

Table 9-4 Characterization of Residual Environmental Effects on Wildlife and Wildlife Habitat

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Direction	The trend of the residual effect	**Positive**—an effect that shifts measurable parameters in a direction beneficial to wildlife and wildlife habitat relative to baseline **Adverse**—an effect that moves measurable parameters in a direction detrimental to wildlife and wildlife habitat relative to baseline **Neutral**—no net change in measurable parameters for wildlife and wildlife habitat relative to baseline
Magnitude	The amount of change in habitat for wildlife relative to existing conditions[1]	**Negligible**—no measurable change in wildlife habitat measurable parameters **Low**—Project has an effect on less than 10% of wildlife habitat within the LAA **Moderate**—Project has an effect on 10–20% of wildlife habitat within the LAA **High**—Project has an effect on greater than 20% of wildlife habitat within the LAA
	The amount of change in habitat for Species at Risk relative to existing conditions[1]	**Negligible**—no measurable change in wildlife habitat measurable parameters **Low**—Project has an effect on less than 5% of species at risk habitat within the LAA **Moderate**—Project has an effect on 5–10% of species at risk habitat within the LAA **High**—Project has an effect on greater than 10% of species at risk habitat within the LAA
	Change in mortality risk	**High**—Project has population level effects on multiple species **Medium**—Project has population level effects on one or two species **Low**—Project has no population level effects despite some risk of mortality
Geographic Extent	The geographic area in which an environmental effect occurs	**PDA**—residual effects are restricted to the PDA **LAA**—residual effects extend into the LAA **RAA** – residual effects interact with those of other projects in the RAA

Characterization	Description	Quantitative Measure or Definition of Qualitative Categories
Frequency	Identifies when the residual effect occurs and how often during the Project or in a specific phase	**Single event**—residual effect occurs once during the Project **Multiple irregular event** (no set schedule) — residual effect occurs periodically at irregular intervals **Multiple regular event**—residual effect occurs periodically at regular intervals **Continuous**—residual effect occurs continuously over the assessment period
Duration	The period of time required until the measurable parameter or the VC returns to its existing condition, or the effect can no longer be measured or otherwise perceived	**Short-term**—residual effect restricted to construction phase **Medium-term**—residual effect extends beyond construction **Permanent**—residual effect extends for the lifetime of the Project
Reversibility	Pertains to whether a measurable parameter or the VC can return to its existing condition after the Project activity ceases	**Reversible**—residual effect is likely to be reversed after activity completion **Irreversible**—residual effect is unlikely to be reversed or returned to baseline conditions
Ecological Context	Existing condition and trends in the area where environmental effects occur	**Undisturbed**—area is relatively undisturbed or not adversely affected by human activity **Disturbed**—area has been substantially previously disturbed by human development or human development is still present

NOTE:
[1] Based on benchmarks used for other recent EAs (KHLP 2012; Nalcor 2012; JRP 2014)

9.3.2.4 Significance Thresholds for Residual Environmental Effects

An overall determination of significance is made for the Project's residual effects and the cumulative residual effects on wildlife and wildlife habitat after mitigation measures are implemented. There are no specific provincial or federal regulations that set thresholds for determining the significance of environmental effects on wildlife and wildlife habitat found within the RAA.

Significance was determined using qualitative and quantitative approaches, through professional judgment and previous experience assessing Project effects on wildlife and wildlife habitat.

Significant effects on wildlife and wildlife habitat are those that meet any of the following criteria (based on Lynch-Stewart 2004):

- threaten the long-term persistence or viability of wildlife populations, including any effects that would lead to species extinction, extirpation or up-listing to special concern, threatened or endangered status;
- diminish the potential or prolong threats to species recovery, such as effects that are contrary to or inconsistent with the goals, objectives or activities of federal recovery strategies and action plans; or
- diminish the capacity of critical habitat to provide for the recovery and survival of wildlife at risk.

9.4 Existing Conditions for Wildlife and Wildlife Habitat

This section provides an overview of wildlife and wildlife habitat as it is today, followed by more detailed discussion of existing conditions for SOCC, mammals, birds and herptiles. Within the mammals, birds and herptile sections, existing conditions are described for the key focal species or species assemblages outlined in Table 9-1.

9.4.1 Overview

Historically, the western part of the RAA (*i.e.*, west of the New ROW) was native grassland and the eastern part (*i.e.*, areas east and south of the Existing Corridor) was forest, with some wetlands interspersed in both regions. Over time, human settlement resulted in extensive conversion of grassland habitat into agriculture. Currently only 38% of the RAA is considered natural wildlife habitat (*e.g.*, forest, grassland, wetland; MCWS 2001). The remainder of the RAA is either used for agriculture (47%) or is developed (15%). The predominance of agriculture is particularly evident along the SLTC and in the western part of the RAA near the Glenboro South Station. Along the SLTC, the distribution of wildlife habitat is limited to areas along the

Assiniboine River and La Salle River and in Crown Lands, such as the Beaudry Provincial Park. In the Glenboro South Station area, wildlife habitat is limited to the Assiniboine River corridor, and Crown Lands such as Spruce Woods Provincial Park and WMAs located north of the station. (Map 9-4 – Designated and Protected Lands in the Western Project Region). In a fragmented landscape dominated by agriculture, these interconnected areas north of the Glenboro South Station function as wildlife corridors, facilitating movement of species across the landscape while providing important breeding and overwintering habitat for a diversity of wildlife species.

Remnants of native vegetation, including native grassland, shrubland, forest, and wetlands occur primarily near Ste-Genevieve, Richer, Sundown and Piney, which currently supports 77% of the total amount of wildlife habitat in the RAA (Map 9-1 – Wildlife Habitat in the Eastern Project Region). Key waterbodies for wildlife include the Red, Assiniboine, Seine and Rat rivers; the Caliento, Sundown, and Carrick bogs; the Richer, Lac Bossé (a.k.a. Salmon Lake), Lonesand, and Sundown lakes; Deacon Reservoir; and Oak Bluff Lagoon (Map 9-3; Map 9-4).

Wildlife habitat occurs in designated lands and protected areas (Map 9-3; Map 9-4), but also in areas of Crown land and as smaller fragments on privately owned lands. Notable managed lands within the RAA that provide habitat for wildlife are: Sandilands, Wampum and Cathills provincial forests; Pocock Lake and Wampum ecological reserves; and Watson P. Davidson and Spur woods WMAs. Connectivity between wildlife habitat, including designated lands and protected areas, facilitates wildlife movement across the landscape, which is important in maintaining wildlife populations. Most of the WMAs and ecological reserves in the eastern RAA are loosely interconnected by the provincial forests, which span extensive areas to the east and south of Marchand (Map 9-3). Areas are considered loosely interconnected by the provincial forests because existing development (*e.g.*, roads, trails, forest harvesting, transmission lines) has fragmented much of the area (Map 9-23 – Habitat Fragmentation in the RAA).

The RAA does not include any Important Bird Areas (IBAs; IBA Canada 2015), and the Existing Corridor and New ROW are located outside of the Prairie Pothole Region (PPR) of Manitoba (Ducks Unlimited 2015). The Glenboro South Station is located within the PPR; small wetlands exist to the south and north of the station.

Habitat intactness within the RAA is measured by the number and size of core areas and length of linear features/km^2. There are no core areas of wildlife habitat greater than 200 ha near Glenboro South Station; however, eight core areas greater than 700 ha exist in the eastern part of the RAA near Ste. Genevieve, Richer, Sundown and Piney. Overall, wildlife habitat within the RAA is considered highly fragmented. The current level of linear disturbance in the RAA is 2.38 km/km^2.

Domestic resource use (*e.g.*, hunting and trapping) has and continues to be an activity that affects wildlife in the RAA. Over the last 10 years, regulated hunting activity (managed by MCWS) in the RAA has been stable, while rights-based hunting has been increasing (Leavesley 2015, pers. comm.). MCWS considers wildlife populations in the RAA to be generally stable, although it is recognised that environmental factors like severe weather and food availability can lead to

notable changes in species abundance from year to year (*e.g.*, white-tailed deer, black bear) (Leavesley 2015, pers. comm.; Hristienko 2015, pers. comm.).

The RAA supports a diversity of birds, mammals and herptiles. Approximately 225 bird species are known to occur in the RAA based on data from the Manitoba Breeding Bird Atlas (MB BBA 2015) and eBird (2015). Mammals and herptiles have not been inventoried in comparable detail but records suggest that at least 57 mammal species, 13 amphibian species, and 9 reptile species occur in the RAA (Banfield 1974; Preston 1982; CARCNET 2012; MHA 2015; MB CDC 2014; MB BBA 2015). Further details on existing conditions for wildlife are provided in the Wildlife and Wildlife Habitat TDR.

9.4.2 Species of Conservation Concern

Forty-five SOCC have the potential to occur within the RAA; 17 SOCC were observed during 2014 wildlife surveys (Table 9-5).

Table 9-5 Wildlife Species of Conservation Concern with Potential to Occur in the RAA

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC[4]	Habitat Association[5]	Detected During Field Surveys
TERRESTRIAL INVERTEBRATES							
Mottled dusky moth	*Erynnis martialis*	No status	Endangered	No status	S2	Grassland	
Pale yellow dune moth	***Copablepharon grandi***s	Special Concern	Special Concern	Endangered	S1	Dune	
Dusky dune moth	***Copablepharon longipe***n***ne***	Endangered	Endangered	Endangered	S1	Dune	
White flower moth	***Schinia bim****a****tris***	Endangered	Endangered	Endangered	S1	Dune	
Verna's flower moth	***Schini***a ***verna***	Threatened	Threatened	Endangered	S1	Dune	
Golden-edged gem	***Schinia*** a***vemensis***	Endangered	Endangered	Endangered	S1	Dune	
Monarch	*Danaus plexippus*	Special Concern	Special Concern	No status	S3B	Grassland	
HERPTILES							
Northern leopard frog (western boreal/prairie population)	*Lithobates pipiens*	Special Concern	Special Concern	No status	S4	Wetland	✓
Eastern tiger salamander	*Ambystoma tigrinum*	No status	Endangered	No status	S2	Wetland	✓
Western tiger salamander	*Ambystoma mavortium*	No status	Special Concern	No status	S4S5	Wetland	
Common snapping turtle	*Chelydra serpentina serpentine*	Special Concern	Special Concern	No status	S3	Wetland	✓
Prairie skink	*Eumeces septentrionalis*	Endangered	Endangered	Endangered	S1	Sandy grasslands	

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC[4]	Habitat Association[5]	Detected During Field Surveys
Western hognose snake	*Heterodon nasicus*	No Status	No Status	Threatened	S1S2	Grassland	
MIGRATORY BIRDS							
Trumpeter swan	*Cygnus buccinator*	No status	No status	Endangered	S1S2B	Wetland	
Horned grebe	*Podiceps auritus*	No status	Special Concern	No status	S3B	Wetland	
Least bittern	*Ixobrychus exilis*	Threatened	Threatened	Endangered	S2S3B	Wetland	✓
Great egret	*Ardea alba*	No Status	No Status	No Status	S2S3B	Wetland	✓
Ferruginous hawk	*Buteo regalis*	Threatened	Threatened	Endangered	S1S2B	Grassland	
Yellow rail	*Coturnicops noveboracensis*	Special Concern	Special Concern	No status	S3S4B	Wetland	✓
Eastern whip-poor-will	*Antrostomus vociferus*	Threatened	Threatened	Threatened	S3B	Open Forest	✓
Common nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	S3B	Open Forest	✓
Chimney swift	*Chaetura pelagica*	Threatened	Threatened	Threatened	S2B	Urban	
Red-headed woodpecker	*Melanerpes erythrocephalus*	Threatened	Threatened	Threatened	S2B	Open Forest	
Burrowing owl	*Athene cunicularia*	Endangered	Endangered	Endangered	S1	Grassland	
Short-eared owl	*Asio flammeus*	Special Concern	Special Concern	Threatened	S2S3B	Grassland	✓
Peregrine falcon	*Falco peregrinus anatum/tundrius*	Special Concern	Special Concern	Endangered	S1B	Urban	✓
Eastern wood-pewee	*Contopus virens*	No status	Special Concern	No status	S4S5	Open Forest	✓

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC[4]	Habitat Association[5]	Detected During Field Surveys
Olive-sided flycatcher	*Contopus cooperi*	Threatened	Threatened	Threatened	S3S4B	Open Forest	✓
Loggerhead shrike (excubitorides subspecies)	*Lanius ludovicianus excubitorides*	Threatened	Threatened	Endangered	S1B	Grassland	
Bank swallow	*Riparia riparia*	No status	Threatened	No status	S4B	Wetland	✓
Barn swallow	*Hirundo rustica*	No status	Threatened	No status	S4B	Grassland	✓
Sprague's pipit	*Anthus spragueii*	Threatened	Threatened	Threatened	S2B	Grassland	
Chestnut-collared longspur	*Calcarius ornatus*	Threatened	Threatened	Endangered	S1S2B	Grassland	
Golden-winged warbler	*Vermivora chrysoptera*	Threatened	Threatened	Threatened	S3B	Open Forest	✓
Pine warbler	*Setophaga pinus*	No status	No status	No Status	S2B	Interior Forest	✓
Canada warbler	*Cardellina canadensis*	Threatened	Threatened	Threatened	S4B	Interior Forest	
Baird's sparrow	*Ammodramus bairdii*	No status	Special Concern	Endangered	S1B	Grassland	
Grasshopper sparrow	*Ammodramus savannarum*	No status	No status	No status	S2B	Grassland	
Bobolink	*Dolichonyx oryzivorus*	No Status	Special Concern	No Status	S4B	Grassland	✓
Rusty blackbird	*Euphagus carolinus*	Special Concern	Special Concern	No Status	S3S4B	Open Forest	

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC[4]	Habitat Association[5]	Detected During Field Surveys
MAMMALS							
American badger	*Taxidea taxus taxus*	No status	Special Concern	No status	S4	Grassland	
Little brown myotis	*Myotis lucifugus*	Endangered	Endangered	Endangered	S2N, S5B	Open Forest	
Northern myotis	*Myotis septentrionalis*	Endangered	Endangered	Endangered	S3S4N, S4B	Open Forest	
Grey fox	*Urocyon cinereoargenteus*	Threatened	Threatened	No status	-	Open Forest	
Star-nosed mole	*Condylura cristata*	No status	No status	No status	S3	Open Forest	

NOTES:

[1, 2] SARA Registry searches conducted on June 24, 2015

[3] *The Endangered Species and Ecosystems Act*

[4] Manitoba Conservation Data Centre (MD CDC) ranking is as follows:
S = Province-wide status
1 = Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.
2 = Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.
3 = Uncommon throughout its range or in the province (21 to 100 occurrences).
4 = Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (>100 occurrences).
5 = Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.
S#S# = Range of uncertainty about the exact rarity of the species.
B = Breeding status of a migratory species.

[5] Dune– open sand dunes, specifically, areas from the crest of dunes to the edge where native vegetation grows

Sandy Grassland – grassland areas primary made up of sandy loose soils

Urban – urban areas with tall structures for nesting purposes

Open Forest Species

Five of the 11 SOCC associated with open forest habitat were observed during field surveys, while other recent (<10 years) observations exist for the remaining species (eBird 2015; MB BBA 2015; Table 9-5).

Common nighthawk was the most abundant open forest bird SOCC observed during field studies, with detections near the towns of Richer, La Broquerie, Sundown and Sandilands. Although habitat for common nighthawk (*i.e.*, open forest, edge habitat, and woodland clearings) is widespread and abundant throughout the eastern portion of the RAA, only one individual was detected during baseline breeding surveys. All other nighthawk detections were of individuals moving through the area during their spring migration in mid-May. Common nighthawk observations in the RAA have been reported near Glenboro South Station, riparian areas and urban forests in Winnipeg, near Ste. Anne, northwest of Richer, and near Sandilands (eBird 2015; MB BBA 2015; MB CDC 2014).

Eastern whip-poor-will is a ground-nesting species that relies on semi-open forests, and forests with clearings, particularly dry deciduous or mixedwood forest (COSEWIC 2009). During field studies, eastern whip-poor-will were observed along the Final Preferred Route southwest of Marchand, and near Lonesand. They were also observed near Ross, in an area north of Marchand, and near Sundown (Wildlife and Wildlife TDR). Other sources report eastern whip-poor-will throughout the eastern part of the RAA from areas northwest of Richer, south to Marchand, and in the southern part of the RAA near Sandilands and Sundown (eBird 2015; MB BBA 2015; MB CDC 2014).

Golden-winged warbler is a ground-nesting songbird that breeds in shrubby habitats adjacent to mature stands of deciduous and mixedwood forest (Environment Canada 2014a). Golden-winged warblers will use up to 200m of the forest edge and up to 200m of the forest openings containing shrubs (Environment Canada 2014a). Forest openings are used to a lesser extent (*i.e.,* up to 50m from forest edge) if shrubs are absent, such as in areas of grassland (Environment Canada 2014a). It is the only species within the RAA to have defined critical habitat within southern Manitoba (Map 9-24 –Golden Winged Warbler Habitat in the RAA) (Environment Canada 2014a). Critical habitat overlaps with the eastern part of the RAA near Ross, south through Richer, La Broquerie, Marchand, and continues to the border near Sundown and Piney (Map 9-24) (Environment Canada 2014a). Although there are records of this species throughout the eastern portion of the RAA (where potential habitat exists), observations are most concentrated in the areas surrounding Ste-Geneviève, Ross, and Richer (Artuso 2015, pers. comm.; BSC 2015). Golden-winged warbler habitat is often regenerated by natural and human disturbances (*e.g.*, logging, ROW development, wildfires and natural forest gaps) (Environment Canada 2015a). Regenerating habitats, such as those found within hydroelectric utility corridors, are considered preferred habitat for this species (Environment Canada 2014a) if corridors are maintained in a manner that retains shrubs and herbs along forest edges (Confer and Pascoe 2003; Artuso 2015 pers. comm.). Six golden-winged warblers were detected during the 2014 breeding bird surveys; three were observed along the Final Preferred Route in areas southwest of Marchand and south

of the Watson P. Davidson WMA, two were observed north of Marchand along the existing 230 kV transmission line, and one was observed south of Richer.

Eastern wood-pewee was detected in the eastern part of the RAA near the towns of Richer, La Broquerie, and Marchand where deciduous and mixedwood forest edges and clearings are common. Olive-sided flycatchers use edge habitats supporting an abundance of snags and tall trees for perching. Edge habitats are often created by fire, beaver ponds, swamps and human disturbance (*e.g.*, logging) (Altman and Sallabanks 2012). Olive-sided flycatcher have predominantly been reported along the eastern part of the RAA north of Richer, east of Marchand, and near Piney, although there have been several reports of migrants passing through Winnipeg (eBird 2015; MB BBA 2015; MB CDC 2014).

Red-headed woodpecker breeding habitat is scattered along the boreal forest transition zone where open deciduous forest, forest edges, and a high density of dead trees used for nesting are prevalent (Carey et al 2003). Red-headed woodpecker observations in the RAA have been reported primarily near the Glenboro South Station, along riparian corridors and urban forests in Winnipeg where mature deciduous trees and open forest are common, northwest of Richer, east of Steinbach, and near Sundown (eBird 2015; MB BBA 2015; MB CDC 2014).

Grey fox, while not observed during field surveys, has been reported by KPIs and is expected to be an occasional resident in the RAA. Considered a habitat generalist, grey fox generally inhabit forested areas close to water and is often found on the outskirts of urban centres. The extreme southeast corner of Manitoba represents the northern range limit of grey fox.

Interior Forest Species

One of the two SOCC associated with interior forest habitat were observed during field surveys, while other recent (<10 years) observations exist for the remaining species (eBird 2015; MB BBA 2015; Table 9-5).

Canada warbler is a shrub-nesting songbird that breeds in a variety of forest types that support a well-developed shrub layer (COSEWIC 2008a). Although potential Canada warbler habitat (*e.g.*, mixedwood, deciduous, and coniferous forest, willow/alder and wooded riparian habitats; COSEWIC 2008a) is widespread throughout the eastern part of the RAA, the RAA falls outside of their preferred breeding range. Key areas known to support the species occur in areas further northwest (*e.g.*, Duck Mountains) and east (*e.g.*, Whiteshell Provincial Park) of the RAA (Artuso 2015, pers. comm.; MB BBA 2014). A small number of breeding individuals may be present in the RAA (near the towns of Piney, Richer and Marchand (MB BBA 2015) but most other records in the RAA are of migrants heading to/from northern breeding areas (Artuso 2015, pers. comm.). No Canada warblers were detected during 2014 breeding bird surveys for the Project.

Pine warbler, identified as rare throughout its range or in the province, is a migrant species that lives in pine or mixed pine-deciduous forest, is rarely seen away from pines. Migrating pine warblers have been known to use shrubs and deciduous trees.Two pine warblers were detected during 2014 breeding bird surveys for the Project.

Grassland Species

Three of the 14 SOCC associated with grassland habitat were observed during field surveys, while other recent (<10 years) observations exist for the remaining species (eBird 2015; MB BBA 2015; Table 9-5).Bobolink is a grassland songbird species most often associated with meadows, pastures, and agricultural crops that exist near waterbodies (COSEWIC 2010). Bobolink was the most commonly observed grassland SOCC but was found only along the SLTC during field studies. Grassland habitat in the RAA is shown in Map 9-25 – Grassland Habitat.

Short-eared owls use a wide variety of open grassland and agricultural habitats that occur in the RAA (Carey *et al.* 2003). Observations of short-eared owls in the RAA have been reported near Glenboro Station South, along the SLTC, near Ste. Anne, Richer, east of Marchand and Sandilands (eBird 2015; MB BBA 2015) and pair of short-eared owls has been confirmed nesting near the Brady landfill south of Winnipeg (Artuso 2015, pers. comm.). One short-eared owl was observed during 2014 field surveys for the Project foraging over a field near the Sundown/Caliento Bog.

Loggerhead shrike nest in shrubs in open landscapes, including grassland, pasture, and agriculture. Observations in the RAA have occurred near the Glenboro South Station, Winnipeg, Ste. Anne, and Steinbach. Loggerhead shrike were not observed during 2014 Stantec field surveys.

Sprague's pipit nests primarily in large grassland areas, with a preference for native prairie; as such its distribution in Manitoba is largely restricted to the southwestern part of the province. Historical observations within the RAA are limited to the area around Glenboro South Station, and an isolated sighting south of Sandilands, but none have been reported during the past decade, nor were any observed during 2014 field surveys.

Grasshopper sparrow requires large grasslands, particularly native prairie, for breeding. Its range is largely restricted to southwestern Manitoba although observations of this species have been reported near Glenboro South Station, and near Sundown and Caliento (eBird 2015; MB BBA 2015; MB CDC 2014). Grasshopper sparrows were not detected during 2014 field surveys.

Barn swallow observations are widespread, and have been reported throughout the RAA (eBird 2015; MB BBA 2015; MB CDC 2015) but are most commonly associated with open grassland, pasture, and agricultural habitat with artificial structures nearby for nesting (Carey *et al.* 2003). Barn swallows were observed during field studies for the Project near Ste-Genevieve, between La Broquerie and Richer and west of Marchand.

American badger was not observed within the RAA although a number of dens/burrows were identified in potential badger habitat.

The prairie skink is known to occur within the area of Spruce Woods Provincial Park. The closest historical record of prairie skink to the LAA is approximately 6.5 km northwest of the Glenboro South Station PDA (MHA 2014). With a maximum home range of up to 100 m (Nelson 1963) and specific habitat requirements for sand prairie (COSEWIC 2004), this species is not expected to range as far as the Glenboro South Station PDA.

The western hognose snake also occurs in the area of Spruce Woods Provincial Park. The closest historical record of western hognose snake to the LAA is approximately 5 km north of the Glenboro South Station PDA (MHA 2014). This species is not expected to occur within the Glenboro South Station PDA due to the general lack of suitable prairie and open woodland habitat with loose or sandy soils (MHA 2014). Western hognose snake are also limited in their movements, which typically don't extend beyond 200 m (Platt 1969).

Two of the seven SOCC terrestrial invertebrates are associated with grassland habitat: monarch and mottled dusky moth (also known as the mottled duskywing). Monarch is considered widespread in the RAA as it occurs wherever common milkweed and wildflowers (*e.g., Solidago* spp., purple loosestrife (*Lythrum salicaria*)) occur (Environment Canada 2014b). Two historical observations of mottled dusky moth have been recorded within the RAA (2008), one approximately 2 km south of South Junction, and the other approximately 14 km east of Richer (COSEWIC 2012b).

Wetland Species

Seven of the 10 SOCC associated with wetland habitat were observed during field surveys, while other recent (<10 years) observations exist for the remaining species (Table 9-5).

Field surveys detected yellow rail in wetlands located northwest of Ross and east of Giroux, and in wetlands located near the towns of Richer and Sundown. This species preference for wet meadows and sedge dominated shallow wetlands (Environment Canada 2013c) make the grassy wetlands located north of Richer and in the large Caliento-Sundown bog complex near Sundown (MB BBA 2015) suitable habitat where it is also known to occur. Nine yellow rail were detected during road-based and remote recorder surveys, and incidentally during other surveys. Field surveys detected least bittern in wetlands supporting tall emergent vegetation near Ross.

Least bittern breed in wetlands, marshes, and shrubby swamps dominated by emergent vegetation surrounded by areas of open water (Carey *et al.* 2003). Least bittern observations in the RAA have been reported north of Richer and in the southwest near Zhoda and Caliento (eBird 2015; MB BBA 2015; MB CDC 2015). Field studies detected least bittern northwest of Ross and in Lonesand Lake (Wildlife and Wildlife TDR).

Great egret is a colonial breeder near a wide variety of waterbodies, including streams and wetlands (Mccrimmon *et al.* 2011). Although two separate incidental observations of adult great egrets were made during field surveys in the southern half of the RAA, breeding colonies were not observed.

Horned grebe observations in the RAA have been reported near Glenboro South Station, Winnipeg, Deacon Reservoir, and north of Richer (eBird 2015; MB BBA 2015). Their primary breeding habitat occurs in the prairie pothole region of southwest Manitoba where small permanent and semi-permanent ponds and marshes with a mix of open water and emergent vegetation are common (Carey *et al.* 2003). MB CDC has no recorded observations of horned grebes in the RAA (MB CDC 2014).

Trumpeter swan typically breed in freshwater marshes, ponds, and lakes found in areas outside of the RAA, such as Mud Lake near Piney (MB BBA 2015). Within the RAA, records of trumpeter swan exist near Richer, Marchand, Sandilands, and Sundown (eBird 2015; MB BBA 2015; MB CDC 2014). Trumpeter swans were not observed during field surveys.

Although bank swallows can occur in a variety of habitats, their primary natural habitats are eroded shorelines of lakes, ponds, wetlands, rivers and creeks (COSEWIC 2013a). They are known to occur in the RAA (eBird 2015; MB BBA 2015; MB CDC 2014) and were observed during field surveys for the Project northeast of Ste-Genevieve. An active bank swallow colony was discovered nearby in the vertical, silty sand banks of a quarry located near approximately 6 km northwest of Ste-Genevieve.

The northern leopard frog occurs throughout the RAA where semi-permanent and permanent waterbodies exist such as along the Assiniboine River north of Glenboro and east of Winnipeg along the La Salle River and Red River south of Winnipeg (MHA 2014; MB CDC 2014). Northern leopard frog are widely distributed throughout the eastern part of the RAA, inhabiting the Seine River near Marchand and La Broquerie, the Rat River south of Lonesand, and Sundown Lake (MHA 2014; MB CDC 2014).

Common snapping turtle (*Chelydra serpentina*) is known to occur throughout the RAA, including along the Assiniboine River north of Glenboro South Station, along the Red River and Seine River in Winnipeg, and 3 km north of Marchand (MHA 2014; MB CDC 2014). Additionally, one record of a common snapping turtle nest is located along the Red River in St. Norbert. Common snapping turtles are expected to occur throughout the RAA where suitable habitat exists, including permanent waterbodies and watercourse and where sandy and loose soils provide nesting opportunities. Field surveys detected snapping turtle southwest of Lonesand near the Rat River.

The eastern tiger salamander is listed as Endangered by COSEWIC (2014b) and only rare historic records exist within the RAA, including one in the Pocock Lake Ecological Preserve east 12 km northeast of Final Preferred Route and one in a tributary of the Rat River 6 km south of Sandilands (MHA 2014). Two additional historic records exist near Marchand, although their exact location is not known (COSEWIC 2013c). The eastern tiger salamander is thought to have a small range, occupying semi-permanent and permanent waterbodies and watercourses in southern Manitoba, limited between the Red River in the west to the Whitemouth River in the east and south of the TransCanada Highway (COSEWIC 2013c; MHA 2014). One eastern tiger salamander was detected during fall visual encounter surveys along a tributary to the Rat River (Wildlife and Wildlife Habitat TDR).

The western tiger salamander (Prairie/Boreal population) inhabits some of the semi-permanent and permanent waterbodies and watercourses from the Saskatchewan-Manitoba border, east to the Red River (COSEWIC 2012; MHA 2014. Within the RAA, historical records of western tiger salamander exist near the town of Glenboro (2 km north of Glenboro South Station) and in areas 4 to 15 km north and southeast from Glenboro South Station (MHA 2014; MB CDC 2014).

Dune Species

Five of the seven SOCC terrestrial invertebrate species have been observed historically in active sand dune habitat along the border between Spruce Woods Provincial Park and Canadian Forces Base Shilo (Environment Canada 2011, 2014c, 2015b, 2015c, 2015d) approximately 13km from the Glenboro South Station PDA. Environment Canada (2011, 2014c, 2015d) has identified critical habitat for golden-edged gem, dusky dune moth, and white flower moth, none of which falls within the LAA. No observations of Verna's moth have been recorded since 1979 (Environment Canada 2015b).

9.4.3 Mammals

Fifty-seven mammal species, ranging from mice and voles to large ungulates and predators, inhabit a wide variety of habitats within the RAA including developed agricultural areas, riparian habitats, and forested habitats (Banfield 1974). The greatest diversity of mammals occurs in the RAA (near Ste. Genevieve, Richer, Lonesand, Sundown and Piney), where natural wildlife habitat remains. The discussion of the mammal community focuses on four key species and two species assemblages (Table 9-1): white-tailed deer, elk, moose, black bear, other furbearers and bats.

Elk

There are over 7,000 elk in Manitoba, located primarily in the Riding Mountain, Duck Mountains, Interlake, Porcupine Hills, and Spruce Woods areas (MCWS 2014e). Some smaller satellite herds exist in Manitoba, including near the town of Vita, approximately 3 km southwest from the RAA. This herd is often referred to as the Caribou-Vita herd because the core area in which they generally occupy spans between the towns of Caribou, Minnesota and Vita, Manitoba. For this assessment, the herd is referred to as the 'Vita elk herd'.

The number of individuals comprising the Vita elk herd has been increasing since the populations re-established in the mid-late 1980s (MN DNR 2009; Dettman 2015, pers. comm.; Rebizant 2015, pers. comm.). The origin of this herd is not completely understood. Some animals may have repopulated from northern Minnesota, while other individuals may have originated from the herds in Spruce Woods and Pembina Valley (Rebizant 2015, pers. comm.; MN DNR 2015). Today the population of the herd is considered stable at 100-150 individuals (Leavesely 2015, pers. comm.). Rights-based hunting in the region includes the harvest of elk by First Nations, including Black River First Nation and Roseau River Anishinabe First Nation (Chapter 11 – Traditional Land and Resource Use); licensed hunting of this herd is not permitted in Manitoba, but does occur in Minnesota.

Elk are a generalist herbivore that use edge habitats therefore requiring a mosaic of habitat types that include dense forest and shrub for cover and open grasslands and hayfields for foraging (Banfield 1974; TAEM 1998) (Map 9-26 Potential Elk Habitat). Potential elk habitat is thought to be not limiting in the southeastern area of Manitoba (near Vita and Piney) (Leavesley 2015, pers. comm.). Data gathered from the desktop review and KPIs suggests that the Vita elk herd maintains consistent use of a core area between Vita and the Canada-US border with rare

observations as far east as Piney (Leavesley 2015, pers. comm.; MCWS 2011). Roseau River Anishinabe First Nation indicated that they hunt elk in the area NW of Caliento and also in the Spur woods WMA (Roseau River Anishinabe First Nation 2015c). In their report, Black River FN elders indicated that elk were hunted in the area south of Watson P. Davidson WMA, continuing southeast to Spur Woods WMA and then towards Piney (BRFN *et al.* 2015).

Overlap between the core elk range and the RAA occurs near Caliento and Vita, approximately 8 km west of the LAA. The boundaries of the core area were defined using results from MCWS aerial surveys (MCWS 2011), KPIs and baseline field surveys. In this area, the elk herd benefits from private landowners that prohibit hunting, tolerate crop and hay bale depredation by elk, and in some cases provide elk with supplemental feed (Bilawchuk 2014, pers. comm.; Leavesley 2015, pers. comm.). The conditions that support the elk herd in this core area are not considered static, and could change with changes in land ownership, land use, and hunting pressure (Leavesely 2015, pers. comm.). Elk can travel in excess of 50 km to avoid human disturbances and hunting pressure, or to seek out alternate food and water sources (Leavesley 2015, pers. comm.). The greatest threats to the Vita elk herd is habitat fragmentation, particularly Crown lands and contiguous habitat patches, which can lead to increased predation rates and increased hunting opportunities for hunters (Leavesley 2015, pers. comm.).

Despite repeated baseline survey efforts in 2014 and 2015, elk and/or elk sign (tracks, antlers, pellets, browse) were not detected in the LAA.

White-tailed deer

White-tailed deer is a widespread generalist species found throughout Manitoba including the RAA (MCWS 2014f) and despite recent population declines, long term population trends remain stable (Leavesley 2015, pers. comm.). Recent population declines are due primarily to consecutive harsh winters, but also increased hunting pressure from rights-based hunting and predation by wolves and coyotes (Leavesley 2015, pers. comm.; Rebizant 2015, pers. comm.). As a managed species, white-tailed deer are an important game species to resource users, and First Nation (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015; Roseau River Anishinabe First Nation; 2015 Wildlife and Wildlife Habitat TDR, Section 2.3.2.2). Camera trap and aerial studies conducted in 2014 and 2015 found deer to be widespread and abundant throughout areas surveyed including along existing transmission lines M602F (500 kV) and R49R (230 kV).

Within the RAA, preferred habitat of white-tailed deer is concentrated in areas near Ste. Genevieve, Richer, Sundown and Piney, and in the Watson P. Davidson and Spur Woods WMAs. Many of these areas were identified by First Nations (including Black River, Long Plain, Swan Lake, and Peguis First Nations) as being historic and current areas for subsistence hunting (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015). Suitable habitat for deer includes forest mosaics that support regenerating or low-growing shrubs and grasses often associated with forest edges and riparian areas; however, agricultural fields (particularly hayfields) are also used (Banfield 1974). Hardwood forests provide important over-wintering habitat for deer as evidenced by the highest density of deer and deer tracks

observed during winter aerial track surveys. Although mixedwood forest is not prevalent in the RAA, these forests are known to support habitat mosaics, such as found within the Watson P. Davidson WMA, are also important for deer. Designated in 1961, the Watson P. Davidson was in part, formed to protect dense forested habitat for overwintering white-tailed deer (Leavesley 2015, pers. comm.). Threats to white-tailed deer include increased hunter harvesting rates and increased predation rates as a result of increased access, particularly in heavily wooded areas (Leavesley 2015, pers. comm.).

Moose

Moose were a common ungulate species in southeastern Manitoba prior to the late 1990s but populations in the region have since collapsed (Dettman 2015, pers. comm.; Leavesley 2015, pers. comm.; Rebizant 2015, pers. comm.). Despite the presence of suitable moose habitat (*e.g.*, shrubby wetlands, alder swamps, sub-climax deciduous forest; Banfield 1974), moose are rare in southeastern Manitoba due to a combination of factors such as habitat fragmentation, predation by wolves, parasites, fires suppression, and unregulated harvest (Leavesley 2015, pers. comm.; Rebizant 2015, pers. comm.; Hristienko 2015, pers. comm.).

The areas south of the Watson P. Davidson Wildlife Management Area heading southeast to the Spur Woods WMA and south of Piney, in the RAA was identified as containing moose habitat, especially near Piney (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015). A Roseau River Anishinabe First Nation Elder indicated in Oral History Interview on May 19 (Roseau River Anishinabe First Nation 2015b) that moose were hunted near Piney and especially in swampy areas near Mensino in the LAA. Roseau River Anishinabe First Nation noted subsistence hunting of moose occurs throughout the Project area: around Sandilands, west of Sundown, northwest of Caliento, and north of South Junction (Roseau River Anishinabe First Nation 2015c).

Rare moose sightings have been reported in the RAA (Wiebe 2014, pers. comm.; Holme 2014, pers. comm.) and moose tracks were incidentally observed on two occasions during 2014 field studies. One set of tracks was noted in the LAA, in a mixedwood forest interspersed with low-lying shrubby habitat located between Lonesand Lake in the east and the Rat River in the west, and one incidental observation of a set of cow and calf moose tracks was made in the Watson P. Davidson WMA, east of the Sandilands Provincial Forest. A camera trap on M602F (northeast of Piney) also captured evidence of a moose walking along the existing ROW in July 2014.

Black bear

Black bear populations in the RAA are considered generally stable (Rebizant 2015, pers. comm.; Hristienko 2015, pers. comm.), although 25 years of bait station monitoring by a local outfitter (KC's Outfitting) may suggest numbers in southeastern Manitoba are increasing (Holme 2014, pers. comm.). Local wildlife authorities agreed that bear populations in the area have remained stable to increasing (Cooper 2014, pers. comm.; Tostowaryk 2014, pers. comm.; Hristienko 2015, pers. comm.; Rebizant 2015, pers. comm.).

Black bear is an important species to resource users, and First Nations (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015; see Wildlife and Wildlife Habitat TDR, Section 2.3.2.2). Guided black bear hunting as a tourism activity is an established economic activity within southern parts of the RAA (five hunting outfitters in the RAA) and is regulated by the provincial government (Holme 2014, pers. comm.). Within the RAA, black bear is considered common and widespread throughout areas supporting forest habitat; particularly at the forest-agricultural habitat interface (Holme 2014, pers. comm.; Hristienko 2015, pers. comm.; Rebizant 2015, pers. comm.). Results from field studies and an independent bear bait station study (Manitoba Hydro 2015) identified bear activity within the vicinity of the alternative routes, along existing transmission line M602F (Photos 9-10 and 9-11), and other forested parts of the RAA.

Black bears hibernate for the winter, selecting dens in hollows under fallen trees, under brush-piles or holes dug into the soil or banksides (Crook and Chamberlain 2010). Bears are known to hibernate in the RAA (Holme 2014, pers. comm.); one adult bear was observed sitting on a den during late aerial mammal track surveys in January 2015.

Other Furbearers

Many small mammal species and furbearers have been reported as important to First Nations for hunting and trapping (*e.g.,* rabbit, beaver, muskrat, coyote, wolf; Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Roseau River Anishinabe First Nation 2015c; Manitoba Hydro 2014/2015, pers. comm.). Large furbearers such as bobcat (*Lynx rufus*), coyote, and wolf are associated with woodland habitat in the Boreal Plains and Boreal Shield ecozones, which include the RAA (Smith *et al.* 1998). Wolves and coyotes, and their tracks, were commonly noted during aerial surveys, with wolves seen mainly in forested areas and coyotes in more open agricultural habitats.

Photo 9-10 Black Bear on Existing Transmission Line ROW M602F

Photo 9-11 Camera Trap Photo of Two Black Bears on Existing Transmission Line ROW M602F

Smaller mammals in the RAA include the least weasel (*Mustela nivalis*), striped skunk (*Mephitis mephitis*), red fox, American marten, and fisher (*Martes pennanti*). These species are typically associated with wooded areas but also make use of adjacent open habitat. American marten are more tolerant of fragmented landscapes (Map 9-27 – Potential American Marten Habitat) (Cheveau *et al.* 2013), whereas fisher tend to use more contiguous forest blocks (Zielinski *et al.* 2013). American marten were detected near Sundown, and fisher were detected along M602F near Pocock Lake Ecological Reserve. American marten is a focal species identified in Table 9-1 due to their value to resource users (Leavesley 2015, pers. comm.; Cooper 2014, pers. comm.) and sensitivity to changes in mature forest habitat.

Desktop review identified a variety of rodent and lagomorph species likely present the RAA, many of which were observed incidentally during the course of field surveys, and are expected to occur wherever suitable habitat exists.

Bats

Within the RAA, suitable roosting and foraging habitat for bats occurs along the Assiniboine and Red rivers, and in the forest and wetland areas found along parts of the Final Preferred Route. The presence of natural or anthropogenic bat hibernacula habitat within the RAA is not expected due to the absence of abandoned mines or other anthropogenic underground caverns (Willis 2014, pers. comm.; Heritage Resources Branch 2014). Karst landforms (limestone caverns) do exist in the RAA, but do not appear to support hibernating species (Wildlife and Wildlife Habitat TDR).

While other bat populations are apparently stable, little brown myotis and northern (long-eared) myotis are both listed as Endangered under SARA and MESEA. White Nose Syndrome, an often fatal fungal infection of the nasal and wing membranes of hibernating bats, is widely believed to be the biggest threat to bat populations across North America; while it does not yet appear to have reached Manitoba, it is prevalent in Ontario (OMNR 2011), and present in Minnesota as well (MN DNR 2013).

9.4.4 Birds

Of the 225 bird species known to occur in the RAA, 163 were detected during 2014 field surveys, most of which were songbirds. Grassland habitats contained the highest density of breeding birds (5.48 ± 0.29 SE) during spring 2014 field surveys, followed by wetland habitats (4.64 ± 0.33 SE), hardwood habitats (4.26 ± 0.25 SE), and softwood habitats (3.74 ± 0.24 SE; Wildlife and Wildlife Habitat TDR).

Bird communities along existing transmission line M602F (500 kV) differed in composition to those surveyed along the alternative routes (including the Final Preferred Route). The M602F line supported greater frequency of edge-tolerant or shrub-associated species, but overall diversity was comparable between alternative routes and the M602F line.

Field surveys conducted during the spring and fall migration periods revealed concentrations of waterbirds at the Red River and Assiniboine River crossings, near the Brady Road Resource Management Facility (*i.e.*, landfill), within the cells at Deacon Reservoir, and at Richer Lake, Lonesand Lake, and Sundown Lake. The most common bird species observed in these areas were Canada goose (*Branta canadensis*), ring-billed gull (*Larus delawarensis*), and a variety of ducks.

Open Forest Birds

Most of the open forest habitat within the RAA exists as early successional deciduous and mixedwood forest, forest edges, woodlots, and natural or manmade clearings (Map 9-1 – Wildlife Habitat in the Eastern Project Region). Open forest birds are associated primarily with the boreal forest transition zone from the northern boundary of the RAA, south through Richer, La Broquerie, Marchand, Sandilands, and Sundown, although some species were also observed in riparian corridors on the Assiniboine River and Red River near Winnipeg. In areas of open forest common passerines are least flycatcher (*Empidonax minimus*), blue jay (*Cyanocitta cristata*), American robin (*Turdus migratorius*), yellow warbler (*Setophaga petechia*), and American goldfinch (*Spinus tristis*). Common open forest raptors include turkey vulture (*Cathartes aura*), Cooper's hawk (*Accipiter cooperii*), and great horned owl (*Bubo virginianus*). Ruffed grouse (*Bonasa umbellus*) is a common forest upland game bird and a permanent resident of the RAA.

Interior Forest Birds

Interior forest birds are associated primarily with large patches of dense, closed canopy deciduous and mixedwood forests in the transition zone north of Richer, and in coniferous forests of the boreal shield east of Marchand, and near Sandilands and Piney (Map 9-1). In these areas common interior forest passerines are red-eyed vireo (*Vireo olivaceus*), ovenbird, yellow-rumped warbler (*Setophaga coronata*), and white-throated sparrow (*Zonotrichia albicollis*). Interior forest raptors include sharp-shinned hawk (*Accipiter striatus*) and great gray owl (*Strix nebulosa*). Spruce grouse (*Falcipennis canadensis*) is found throughout the coniferous and mixedwood areas of the RAA.

Grassland Birds

The Existing Corridor, parts of the eastern RAA (from Ste. Anne to Sundown), and Glenboro South Station, are located on the northeastern extent of grassland and prairie bird breeding ranges. Most of the native grassland habitat within the RAA has been modified by agriculture and exists as pasture or cropland (Map 9-1). In these areas, common grassland passerines are savannah sparrow (*Passerculus sandwichensis*), clay-colored sparrow (*Spizella pallida*) and western meadowlark (*Sturnella neglecta*). Common grassland raptors are red-tailed hawk (*Buteo jamaicensis*) and American kestrel (*Falco sparverius*). Sharp-tailed grouse and gray partridge (*Perdix perdix*) are grassland upland game birds and year-round residents in the RAA.

Three active sharp-tailed grouse leks supporting approximately 25 sharp-tailed grouse were identified in the RAA during 2014 spring lek surveys. All three leks occur adjacent to the New ROW in areas southwest of Ste. Genevieve, and north and south of La Broquerie (Map 9-28 –

Sharp-tailed Grouse Leks). Seven other leks exist within the RAA, two of which are located 5 km west of the New ROW, just south of the Rat River (Baldwin 2015, pers. comm.). The other four occur in the RAA near Glenboro South Station (Baldwin 2015, pers. comm.). The leks in this area are over 4 km from the station (Map 9-29 Sharp-tailed Grouse Leks Glenboro South Station) (Wildlife and Wildlife Habitat TDR, Section 2.4).

Wetland Birds

The most common types of wetlands in the RAA are large open water wetlands (*i.e.,* Lonesand Lake, Sundown Lake, Richer Lake), bogs, fens and marshes. Other aquatic habitats include rivers (*i.e.,* Red River, Assiniboine River), reservoirs (*i.e.* Deacon Reservoir), and lagoons (*i.e.,* Oak Bluff Lagoon) (Map 9-30 – Bird Concentration Sites in the RAA). Although all of these areas are considered important to waterbirds such as geese during the spring and fall migration periods, the areas that supported the highest abundance of birds were the Red River, Assiniboine River, and Deacon Reservoir (Map 9-30). Another feature known to attract concentrations of waterbirds during the migration season is the Brady Road Resource Management Facility (Map 9-30). With the exception of the Brady Road Resource Management Facility, all of these areas are typically used for roosting during fall migration, with birds making daily movements into surrounding agricultural fields to forage. Smaller concentrations of other waterbirds such as ducks were observed on Richer Lake, Lonesand Lake, and Sundown Lake.

Common songbirds inhabiting wetland habitat are sedge wren (*Cistothorus platensis*), swamp sparrow (*Melospiza georgiana*), and red-winged blackbird (*Agelaius phoeniceus*).

9.4.5 Herptiles

Thirteen amphibian species and nine reptile species have the potential to occur in the RAA (CARCNET 2012; MHA 2015; see Wildlife and Wildlife Habitat TDR. Wetlands such as marshes, fens and the Caliento and Sundown bogs and watercourses, such as the Rat, La Salle, Seine and Assiniboine rivers, provide important breeding and/or overwintering habitat for many herptile species, particularly frogs, toads and salamanders. Deeper wetlands (*e.g.,* Lac Bossé and Richer, Lonesand, and Sundown lakes) and rivers that do not freeze to the bottom provide important overwintering habitat for frogs and turtles. These species hibernate on the bottom of wetlands, streams and rivers that support oxygenated waters throughout the winter (Environment Canada 2013a).

Although most herptiles are dependent on wetlands, some species require upland terrestrial habitats for a portion of their lifecycle. For instance, northern leopard frog forage in grassland habitats located in close proximity to wetlands, eastern tiger salamander overwinters in moist woodlands (MHA 2015), and turtles rely on areas supporting sandy soils for egg laying. Within the RAA, turtle nesting areas exist west of Lonesand Lake (Holme 2014, pers. comm.) and along a sandy trail located east of Sundown Lake, north of the New ROW (Wildlife and Wildlife Habitat TDR). Field surveys revealed the presence of one eastern tiger salamander along the Rat River

west of Woodridge. Other records of this species occurrence in the RAA are further north along the Seine River (COSEWIC 2013b).

Some species, such as the red-sided garter snake, forage along the edges of wetlands but breed and overwinter in upland habitats. Snake overwintering sites, or hibernacula, may exist in areas of the RAA supporting surficial limestone formations (east of Marchand, south to Sundown). In these areas, sinkholes or subsurface crevices have the potential to support snake hibernacula (Manitoba Mineral Resources 2013). Although there are no records of snake hibernacula within the RAA (Wildlife and Wildlife TDR), areas around Lonesand and Sundown, have the highest potential to support red-sided garter snake hibernacula. This is based on surficial limestone mapping and the abundance of snakes observed crossing roads and highways in these areas (Holme 2014, pers. comm.).

9.4.6 Summary

Currently only 38% of the RAA is considered natural wildlife habitat (*e.g.*, forest, grassland, wetland; MCWS 2001). The remainder of the RAA is used for agriculture (47%) or is developed (15%). The predominance of agriculture is particularly evident along the SLTC and in the western part of the RAA near the Glenboro South Station. Along the SLTC, the distribution of wildlife habitat is limited to areas along the Assiniboine River and La Salle River and in Crown Lands, such as the Beaudry Provincial Park. In the Glenboro South Station area, wildlife habitat is limited to the Assiniboine River corridor, and Crown Lands such as Spruce Woods Provincial Park and WMAs located north of the station. Natural wildlife habitat is more prominent where the New ROW traverses the RAA. Remnants of native vegetation, including native grassland, shrubland, forest, and wetlands occur primarily near Ste-Genevieve, Richer, Sundown and Piney, which currently supports 77% of the total amount of wildlife habitat in the RAA. Crown lands such as Watson P. Davidson WMA, Spur Woods WMA, ecological reserves and provincial forests provide habitat for a diversity of wildlife in this area.

The RAA does not include any Important Bird Areas (IBAs) (IBA Canada 2015), and the Existing Corridor and New ROW are located outside of the Prairie Pothole Region (PPR) of Manitoba (Ducks Unlimited 2015). The Glenboro South Station is located within the PPR; small wetlands exist to the south and north of the station.

Habitat intactness within the RAA is measured by the number and size of core areas of habitat, and length of linear features/km^2. There are no core areas of wildlife habitat greater than 200 ha near Glenboro South Station; however, eight core areas greater than 700 ha exist in the eastern part of the RAA near Ste. Genevieve, Richer, Sundown and Piney. Overall, wildlife habitat within the RAA is highly fragmented by linear development, forestry practices, residential development, and agriculture. The current level of linear disturbance in the RAA is 2.38 km/km^2.

Threats to wildlife inhabiting the area include habitat fragmentation, disease, weather, predation, hunting and trapping. Over the last 10 years, regulated hunting activity (managed by MCWS) in the RAA has been stable, while rights-based hunting has been increasing (Leavesley 2015, pers.

comm.). MCWS considers wildlife populations in the RAA to be generally stable, although it is recognised that environmental factors like severe weather and food availability can lead to notable changes in species abundance from year to year (Leavesley 2015, pers. comm.; Hristienko 2015, pers. comm.).

Forty-five SOCC have the potential to occur in the RAA. Most of these species are birds (27 species), however seven terrestrial invertebrate, six herptile, and five mammal SOCC may also occur. Five invertebrates and two herptile SOCC (*i.e.,* prairie skink and western hognose snake) have specialized habitat requirements that are found only within the vicinity of Spruce Woods Provincial Park, located on the periphery of the RAA north of the Glenboro South Station. Seventeen SOCC were detected during baseline surveys (14 birds, two amphibians and one reptile). The RAA overlaps with critical habitat for golden-winged warbler near Ste-Genevieve, Richer and Vassar (Environment Canada 2014a). Golden-winged warbler is the only species within the RAA to have defined critical habitat within southern Manitoba (Map 9-23 – Golden Winged Warbler Habitat in the RAA) (Environment Canada 2014a, 2015c).

Upwards of 60 mammals may occur within the RAA, many of which are valued by resource users. Elk, white-tailed deer, moose and bear are some of the species harvested in the region (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015). Furbearers such as wolf, coyote, rabbit, beaver, and muskrat are some of the species trapped by First Nations (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Roseau River Anishinabe First Nation 2015c; Manitoba Hydro 2014/2015, pers. comm.) and resource users.

Within the RAA, the populations of white-tailed deer, bear, and elk are generally considered stable, although harsh winters, predation, hunting, disease, and parasites, can cause populations to fluctuate (Leavesley 2015, pers. comm.). Prior to the late 1990s moose were more prevalent in the area (Rebizant 2015, pers. comm.), hunted by First Nations in areas south of Watson P. Davidson WMA near Mensino and Piney (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015). Moose have since declined and are rare in the region. The Vita elk herd's range overlaps with the RAA near Sundown and Piney. The herd is comprised of 100 to 150 individuals (Leavesely, 2015 pers. comm.) and occupies a core area approximately 8 km southwest of the LAA between Vita and the Canada-US border (Leavesley 2015, pers. comm.; MCWS 2011). Rights-based hunting in the region includes the harvest of elk by First Nations, including Black River First Nation, and Roseau River Anishinabe First Nation (Chapter 11 – Traditional Land and Resource Use); licensed hunting of this herd is not permitted in Manitoba, but does occur in Minnesota.

The RAA has the potential to support 225 species of birds during the breeding and migration seasons. Canada geese are some of the most common species observed during the spring and fall migration period, congregating in areas near the Brady Road Resource Management Facility, Assiniboine River, Red River, and Deacon Reservoir. Smaller concentrations of waterbirds such as ducks were observed on Richer Lake, Lonesand Lake, and Sundown Lake.

Most of the grassland habitat within the RAA exists as perennial grassland. These areas, along with hayland and pasture (modified wildlife habitat) support songbirds such as savannah sparrow, clay-colored sparrow, and western meadowlark, and raptors such as northern harrier. Ten sharp-tailed grouse leks are known to occur in the RAA; three exist along the New ROW while the remaining seven occur outside of the LAA near the New ROW and Glenboro South Station. Open forest habitat occurs primarily near Ste-Genevieve, Richer and La Broquerie in the boreal forest transition zone. A diversity of birds inhabits this area such as red-headed woodpecker, eastern wood pewee, golden-winged warbler, eastern whip-poor will, and great-horned owl. Forest interior species such as ovenbird and red-eyed vireo also inhabit the transition zone and boreal forest to the east.

Thirteen amphibian species and nine reptile species have the potential to occur in the RAA. Wetlands such as marshes, fens and the Caliento and Sundown bogs and watercourses, such as the Rat, La Salle, Seine and Assiniboine rivers, provide important breeding and/or overwintering habitat for many herptile species, particularly frogs, toads and salamanders. Reports of eastern tiger salamander within the RAA, are limited to areas along the Seine River (COSEWIC 2013a); field surveys revealed the presence of one eastern tiger salamander along the Rat River west of Woodridge. Deeper wetlands (*e.g.,* Lac Bossé and Richer, Lonesand, and Sundown lakes) and rivers that do not freeze to the bottom provide important overwintering habitat for northern leopard frog, common snapping turtle, and western painted turtle. Although there are no records of snake hibernacula within the RAA, areas around Lonesand and Sundown have the highest potential to support red-sided garter snake hibernacula. This is based on surficial limestone mapping and the abundance of snakes observed crossing roads and highways in these areas (Holme 2014, pers. comm.).

9.5 Assessment of Environmental Effects on Wildlife and Wildlife Habitat

This section assesses and evaluates the potential effects of the Project on wildlife and wildlife habitat resulting from construction, operation and maintenance activities. Mitigation measures are presented and residual effects are evaluated in the context of the LAA.

9.5.1 Project Interactions with Wildlife and Wildlife Habitat

Project interactions with wildlife and wildlife habitat were identified based on review of past transmission line projects, monitoring and follow up programs, surveys along the proxy 500 kV M602F transmission line, and expert judgment. Project components and physical activities have the potential to change the abundance and distribution of wildlife by interacting with wildlife habitat availability and wildlife mortality risk (Table 9-6). These interactions are indicated by check marks in Table 9-6, and are discussed in detail in Sections 9.5.2 to 9.5.4 in the context of effects

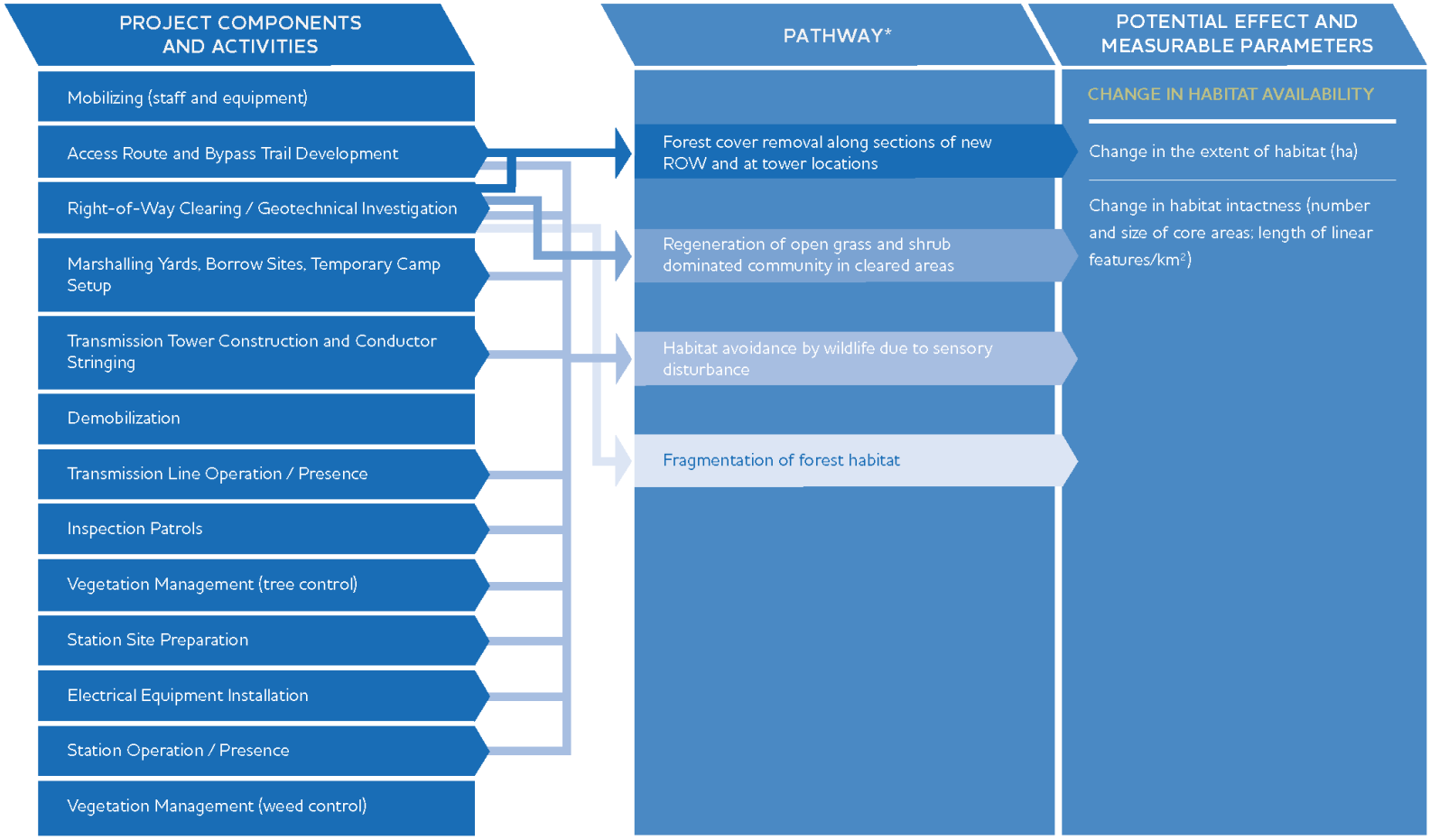
interactions, standard and Project-specific mitigation and residual effects. The potential interactions between the Project (by component and phase), and wildlife and wildlife habitat are presented in Figure 9-1.

Table 9-6 Potential Project-Environment Interactions and Effects on Wildlife and Wildlife Habitat

Project Components and Physical Activities	Potential Environmental Effects	
	Change in Habitat Availability	Change in Mortality Risk
Transmission Line Construction Activities		
Mobilizing (staff and equipment)	–	✓
Access Route and Bypass Trail Development	✓	✓
Right-of-way Clearing/Geotechnical Investigation	✓	✓
Marshalling Yards (Borrow Sites, Temporary Camp Setup)	✓	–
Transmission Tower Construction and Conductor Stringing	✓	✓
Demobilization	–	✓
Transmission Line Operation/Maintenance		
Transmission Line Operation/Presence	✓	✓
Inspection Patrols	✓	✓
Vegetation Management (tree control)	✓	✓
Station Construction		
Station Site Preparation	✓	–
Electrical Equipment Installation	✓	–
Station Operation/Maintenance		
Station Operation/Presence	–	–
Vegetation Management (weed control)	–	–

NOTES:
"✓" = Potential interactions that might cause an effect
"–" = Interactions between the Project and the VC are not expected.

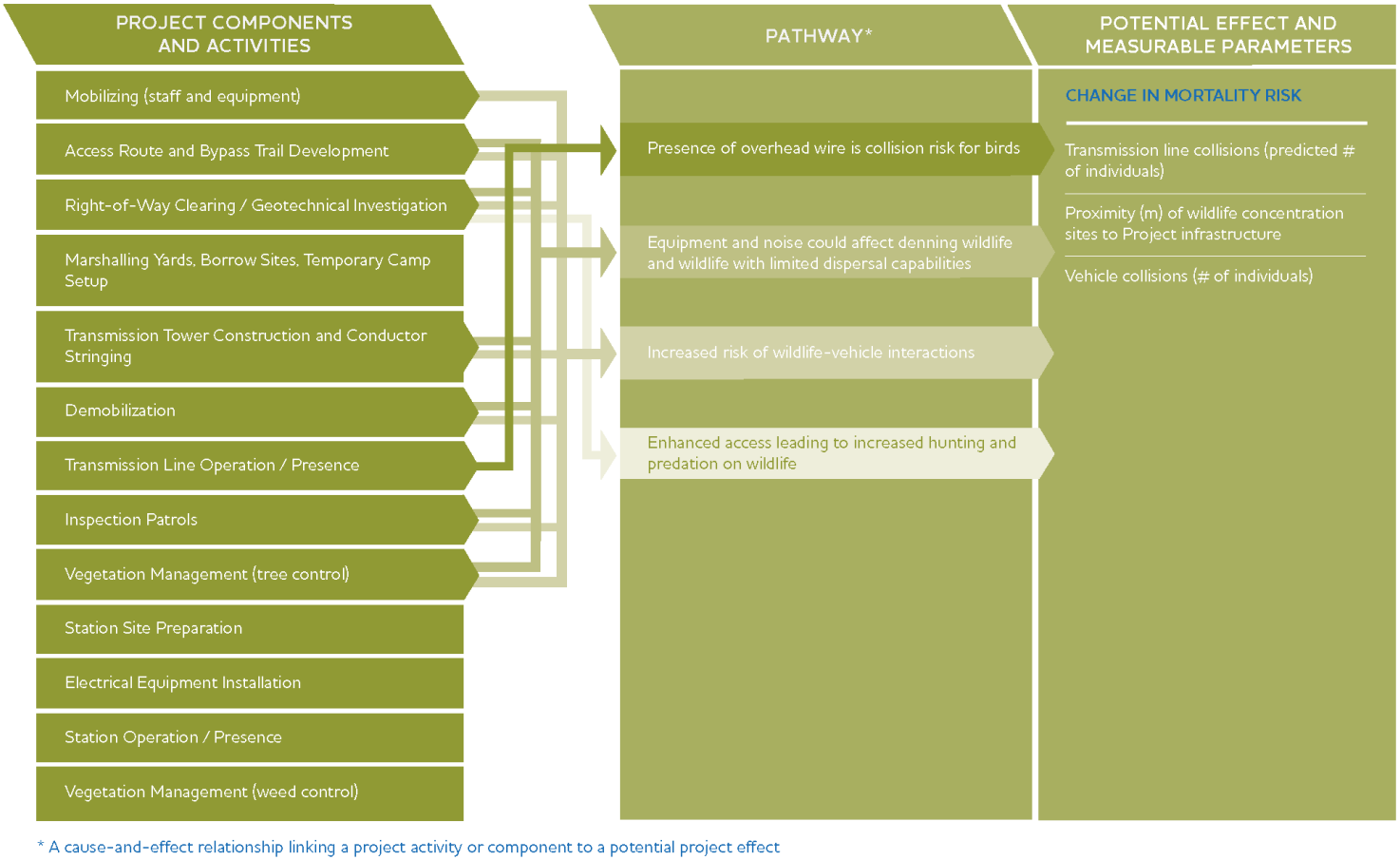
Wildlife and Wildlife Habitat



* A cause-and-effect relationship linking a project activity or component to a potential project effect

Figure 9-1 Pathways Figure

Wildlife and Wildlife Habitat



* A cause-and-effect relationship linking a project activity or component to a potential project effect

Figure 9-1 Pathways Figure (continued)

Mobilization of staff and equipment is not expected to interact with wildlife habitat availability, as activities will be largely limited to existing infrastructure. Interactions between wildlife and wildlife habitat and marshalling yards and temporary camps are not expected, because this temporary infrastructure will be located in disturbed areas where natural wildlife habitat has been previously altered or removed. However, use of borrow sites may disturb wildlife and wildlife habitat in surrounding areas.

With the exception of Glenboro South Station, which will involve modifications of existing transmission lines near a wetland, changes in wildlife habitat availability and mortality risk are not anticipated at stations. Modifications to Dorsey and Riel converter stations, including demobilization and station operation and weed control, will not interact with wildlife habitat availability or mortality risk, because they are located on cultivated land or within existing fenced compounds, which have low potential to support wildlife.

9.5.2 Assessment of Change in Habitat Availability

This section discusses the direct and indirect pathways in which the Project may alter habitat availability. The assessment of potential change in habitat availability is organized by Project phase as the pathways of effects are different between the construction and operation and maintenance phases.

9.5.2.1 Pathways for Change in Habitat Availability

Availability of suitable habitat is important for the persistence of wildlife species at both a local and regional scale. Wildlife habitat is the environment that supports wildlife, which includes the vegetation communities and physical terrain that provide food, water and shelter for terrestrial animals. In this assessment, natural wildlife habitat comprises three broad land cover types: forest (consisting of hardwood/deciduous, mixedwood and softwood/coniferous forest), grassland (perennial grassland), and wetland (consisting of bog, fen, and marsh). Understanding that some of these broad land cover types have been altered by human development (*e.g.*, fragmented by roads, rural development), modified wildlife habitat in this assessment refers to those areas that have been directly altered by agriculture (*e.g.*, cropland, pasture), linear developments (*e.g.*, transmission lines, pipelines), resource extraction (*e.g.*, peat mines, gravel pits) and residential development *(e.g.*, towns, cities).

Environment Canada specifically defines critical habitat in recovery strategies for some species listed as Threatened or Endangered under SARA. Critical habitat is species-specific, and defined as that which is necessary for the survival or recovery of a listed wildlife species (SARA 2002, c.29 [section 2]). Golden-winged warbler is to date the only SARA-listed species having critical habitat defined within the RAA (Environment Canada 2014a). However, prohibitions under SARA with respect to critical habitat are restricted to federal lands (Gregoire 2015, pers. comm.), none of which are traversed by the Project. On that basis, no section 73 SARA permit will be required.

Where appropriate, the assessment will discuss potential Project-related effects on both wildlife habitat in general, and critical habitat for golden-winged warbler.

ROW clearing is the primary Project activity that may result in a direct and measurable change in wildlife habitat, including critical habitat, because it involves clearing in forested areas of the ROW and grubbing at transmission tower sites.

Indirect effects on habitat are those that reduce the effectiveness of existing or remaining habitat for wildlife. Indirect effects may occur through sensory disturbances (*e.g.*, noise, light) causing temporary displacement of some wildlife from otherwise suitable habitat. Such activity may be associated with ROW clearing, mobilizing staff and equipment, access route and bypass trail development, transmission tower construction and conductor stringing, upgrade work at the Glenboro South Station, and vegetation maintenance. These activities could disrupt and displace some wildlife from habitat located within and beyond the PDA. Indirect effects of ROW clearing are habitat fragmentation, which can create edge effects (*i.e.*, wildlife avoidance of the edge of cleared areas) and changes in wildlife movement (due to the presence of the ROW).

9.5.2.1.1 Construction

This section discusses the direct changes in wildlife habitat resulting from ROW clearing, access route and bypass trail development and transmission tower construction, and the indirect changes in wildlife habitat resulting from sensory disturbance (*e.g.*, noise) and changes in the size and shape of forest patches.

DIRECT CHANGE IN AVAILABLE WILDLIFE HABITAT

Direct change in wildlife habitat is primarily through removal of forest cover, to reduce potential effects on wildlife and wildlife habitat, clearing of trees will occur in winter *(i.e.,* outside of the sensitive breeding period for most wildlife species [April-August]) (Photo 9-12).

Photo 9-12 Winter Clearing of a Transmission Line ROW

ROW clearing for the Final Preferred Route will involve clearing an 80 to 100 m wide ROW through 36 km of forested habitat on the New ROW (near Ste-Geneviève, Richer and Sundown). Less clearing will be required along the remainder of the 179 km ROW, including the Existing Corridors, due to the lack of treed habitat. Notable exceptions are the riparian areas associated with Assiniboine River and Red River crossings, which will require some limited clearing of tree vegetation only. In forested areas of the New ROW, forested habitat will be converted to open habitat that will eventually be recolonized by grasses, forbs, and shrubs (Photo 9-13).

Photo 9-13 Shrub Regeneration along a Transmission Line ROW

Many forest-dependent wildlife (*e.g.*, white-tailed deer, black bear, ovenbird; Table 9-1) will lose some habitat during ROW clearing. This is likely to be of greatest concern for forest interior songbirds (*e.g.*, ovenbird) and forest interior mammals (*i.e.*, American marten).

The ovenbird is a representative focal species for forest-interior songbirds (Table 9-1). It is often used as an indicator of interior forest health because it is sensitive to habitat loss and changes in the size and configuration of forest patches (*i.e.,* habitat fragmentation; Burke and Nol 2000). Clearing of the ROW will result in the direct loss of some potential ovenbird breeding habitat (*i.e.,* mature deciduous and mixedwood forest), particularly in areas along the northeastern portion of the route (near Ste-Geneviève and south of Richer). Resulting changes in forest patch size and configuration could also reduce the amount of effective habitat available to birds and other wildlife due to edge effects. Edge effects occur when wildlife avoid edges of habitat patches due to reduced food availability, increased predation risk, and/or increased risk of brood parasitism (*e.g.*, when eggs of brown-headed cowbird (*Molothrus ater)* are laid in other species nests, are hatched and reared by the host, often at the cost of the hosts' own young). Edge effects generally extend into the first 100 m of forest patches (Driscoll *et al.* 2005; Environment Canada 2013b). Displacement of edge-sensitive forest birds (*e.g.*, ovenbird) resulting from habitat fragmentation is discussed towards the end of this section as an indirect effect on habitat.

American marten is an important furbearer valued by resource users (Table 9-1). A tree-dwelling furbearer, American marten is sensitive to habitat fragmentation because of their preference for contiguous patches of mature mixedwood and coniferous forest (Banfield 1974). Its known breeding range overlaps with the easternmost portion of the RAA (*i.e.*, Boreal Shield Ecozone) (Banfield 1974). In this area, potential American marten habitat is concentrated in areas east of the New ROW (*e.g.*, northeast of Sandilands, and areas northwest and northeast of Piney; Map 9-27 – Potential American Marten Habitat). Although the route avoids most of these areas, a small amount of potential American marten habitat will be affected in southern portions of the ROW, near Sundown and Piney. Land clearing will alter approximately 5 ha or 2% of the total available American marten habitat in the LAA (n=242 ha).

The potential for ROW clearing to have a direct interaction with habitat important for habitat generalists like white-tailed deer, black bear, gray wolf, and coyote is limited, as these species are wide-ranging and not dependent on any one particular habitat type. White-tailed deer is a focal species (Table 9-1) highly valued by resource users. White-tailed deer are most common in the eastern part of the RAA (between areas north of Ste-Geneviève and south of Piney), occupying a wide variety of habitat types such as forests, forest edges, and willow swales, where food (*e.g.*, shrubs, grasses) and shelter, are available (Leavesley 2015 pers. comm.; Banfield 1974). While ROW clearing will remove some white-tailed deer habitat for the short-term, new edge habitat suitable for white-tailed deer will re-establish during operation.

Habitat for black bear and wolves (*e.g.,* deciduous and coniferous forests, swamps and bogs, and wooded areas adjacent to agricultural fields; Banfield 1974) is also widespread in the eastern part of the RAA between areas north of Ste-Geneviève and south of Piney. Black bear occur primarily east and south of the Watson P. Davidson WMA. Wolves also occur in these areas, including the Watson P. Davidson WMA, along M602F and near Piney. A change in habitat availability for these species may alter movement patterns (a ROW through forested areas would facilitate travel) but is not expected to affect overall habitat availability.

A change in habitat availability associated with ROW clearing is anticipated to be negligible for the Vita elk herd because routing of the New ROW avoids the core areas known to support the elk (*i.e.*, near Vita and Arbakka). The location of these core areas is not static and could change in response to changes in habitat, availability of food sources, and hunting activity (Leavesely 2015, pers. comm.). Core areas could shift to other areas supporting potential elk habitat (*e.g.,* dense forest and shrub adjacent to grasslands and hayfields) in the region, including areas traversed by the New ROW and near Piney (Leavesley 2015, pers. comm.). Although the Vita elk herd's range overlaps with the southern portion of the New ROW, no elk were detected despite extensive field survey efforts (*i.e.*, large mammal survey, elk breeding survey, aerial winter track survey; (Wildlife and Wildlife Habitat TDR), nor were any detected in this area during MCWS 2011 aerial surveys (MCWS 2011). A number of factors may limit the herd's full use of their range including the presence of unsuitable habitat such as the Caliento and Sundown bogs, and hunting pressure (Leavesley 2015, pers. comm.).

Some wildlife species may benefit from increases in forest openings and edge habitat. In particular, bats (*e.g.*, little brown myotis and Northern Myotis) use edge habitats at greater rates due to the availability of both roosting and foraging habitats (Ethier and Fahrig 2011). Removal of forest cover is not expected to affect bat hibernacula, as bat hibernacula are not expected to occur in the RAA based on expert knowledge (Willis 2014, pers. comm.), lack of surficial geology conducive to natural cave formations, and absence of historical archaeological excavations such as tunnels or caverns, or mining sites in the area (Wildlife and Wildlife Habitat TDR).

Eastern whip-poor-will nest at the base of trees or shrubs located in forest patches, particularly along regenerating forest edges (Wilson and Watts 2008), and use adjacent open habitats for foraging (COSEWIC 2009). Clearing of the ROW will create new edge habitat for this species, particularly where the New ROW traverses deciduous and mixedwood forest. ROW clearing may also benefit common nighthawk, as this species prefers sparsely vegetated areas or areas of bare ground for nesting and open habitat for foraging. In some areas, use of the New ROW by eastern whip-poor-will and common nighthawk may be limited to foraging activities, as disturbance created by recreational vehicles may be too disruptive for nesting (Artuso 2015, pers. comm.).

ROW clearing will remove 475 ha of potential golden-winged warbler habitat located between Ste. Genevieve and Piney. The loss will be short-term as new shrubs and herbs will regenerate and provide 473 ha of habitat for golden-winged warbler. The net loss of habitat is 2 ha, and consists of low quality golden-winged warbler habitat (*i.e.,* deciduous or mixedwood forest with no suitable shrub or grass edge habitat). With the New ROW, the suitability of some of the low quality golden-winged warbler habitat will improve with the presence of regenerating shrubs and herbs along the New ROW. Managed utility ROWs (greater than 60m wide) that involve the selective spraying of herbicides (versus mowing), can provide suitable breeding for golden-winged warbler if vegetation control practices retain shrubs, grasses and forbs (Confer and Pascoe 2003). Nesting success rates in these managed corridors can be variable, influenced by a number of factors such as the presence and type of predators, and abruptness of edges between shrub and herb patches (Kubel and Yahner 2008). Softer edges between shrub and herb patches make travel more difficult for predators, and provide greater security for ground and shrub nesting birds (Kubel and Yahner 2008).

Clearing activities will have less of an effect on grassland and wetland species as effects on these habitats will be limited to tower locations and the centre line (Photo 9-14). Depending on the tower type, clearing could remove up to 100 m × 100 m of habitat (Chapter 2 – Project Description) for the short-term, as plants will naturally recolonize areas following tower construction. Compaction of soils and vegetation is anticipated along the Existing Corridor and New ROW due to the presence of construction equipment and personnel. Species most affected by soil compaction in grassland habitats are mammals that need loose soils for creating burrows or dens (*e.g.*, American badger, red fox). Ground nesting birds like sharp-tailed grouse and bobolink may be affected by the temporary loss of some habitat at tower sites and the compaction of vegetative concealment cover along the New ROW. Grassland areas potentially affected by soil and vegetation compaction exist along the existing ROW (*e.g.*, south of Oak Bluff)

and along the eastern portion of the New ROW (*e.g.*, near Ste-Geneviève, Richer, La Broquerie, southwest of Marchand, southwest of Watson P. Davidson WMA, and near Piney; Map 9-25 – Grassland Habitat in the RAA).

Photo 9-14 Wetland Habitat Traversed by a Transmission Line ROW

INDIRECT CHANGES IN WILDLIFE HABITAT

Habitat Fragmentation

During ROW clearing, habitat intactness may be reduced along segments of the ROW by dividing large habitat patches into smaller patches. This may result in reduced connectivity between wildlife breeding areas, overwintering grounds, and dispersal corridors. Habitat connectivity between patches is important in maintaining local and regional wildlife movements. Fragmenting forested areas may present a barrier for some species that reduce their risk of predation by avoiding open areas (*e.g.*, American marten [Kurki *et al.* 1998], some species of mice and voles [Storm and Choate 2012]).

Habitat fragmentation may lead to a reduction in intact core habitat, which is the undisturbed habitat that begins approximately 100 m in from the forest edge (Driscoll *et al.* 2005; Nol *et al.* 2005). Intact habitat is important in maintaining wildlife biodiversity, because the larger the core area the higher the biodiversity of the patch (Fahrig 2003). Minimum core area of intact habitat required to support 80% of area sensitive species is 200 ha (Environment Canada 2013b).

Some of the species most sensitive to forest fragmentation are forest interior birds (*e.g.,* ovenbird), which rely on large patches of contiguous habitat that are located away from the influences of edge habitat (Environment Canada 2013b). Preferred ovenbird breeding habitat consists of mature deciduous or mixedwood forest that contain >90 ha of core habitat (Burke and Nol 1998), although smaller patches of core habitat (<30 ha) are used if located near larger

patches (Burke and Nol 2000). Fragmentation of forest habitat and a reduction in core habitat size can increase the rate of nest predation and nest parasitism (by brown-headed cowbirds), and decrease food availability (*e.g.,* insects), clutch size, and nesting success of interior forest songbirds (Burke and Nol 1998; Porneluzi and Faaborg 1999; Falk *et al.* 2011). This can cause area-sensitive species like ovenbird to avoid edges by shifting their distribution (*e.g.*, breeding territories) to forest patches that provide larger core areas of interior forest (Machtans 2006; Lankau *et al.* 2013).

Potential Project effects on ovenbird were reduced through routing, which avoided large (greater than 90 ha) core patches of ovenbird habitat. The Project will transect 16 patches of mature deciduous and mixedwood habitat ranging in size from 1.8 ha to 82.7 ha. However, due to patch configuration and location of the PDA, core habitat will be reduced by only 0.3 ha within two small (*i.e.*, 10 to 12 ha) forest patches. Fragmentation effects on ovenbird are expected to be negligible as both of these patches are well below the minimum patch threshold for ovenbird (*i.e.,* 30 ha; Burke and Nol 2000). Based on ovenbird occurrence in eastern portions of the RAA, forest fragments smaller than 30 ha support ovenbird (MB BBA 2015). In these smaller forest patches, breeding success can be compromised by the presence of predators and brown-headed cowbirds that occupy forest edge habitats.

In areas of contiguous forest, movement patterns of mammalian predators may change in response to the cleared ROW. For species such as black bear, gray wolf, coyote, and red fox, a general increase of corridor use (*i.e.*, for efficient travel or hunting) is well documented (James 1999; Kurki *et al.* 1998; James and Stuart-Smith 2000; Smith *et al.* 2008; Latham *et al.* 2011b; Whittington *et al.* 2011; Tigner *et al.* 2014). All of these species are anticipated to use parts of the Final Preferred Route because all were detected using existing transmission line ROWs (*i.e.*, 500 kV M602F, 230 kV R49R) during field surveys (*e.g.*, camera trap, aerial winter track surveys).

Linear features, including transmission line ROWs, can benefit some mammalian predators (*e.g.*, wolves) by increasing predator-prey encounter rates and hunting efficiency (*e.g.,* decreasing energy and time expenditures; James *et al.* 2000; Smith *et al.* 2008; Latham 2011b). The clearing of the ROW may enhance predator-prey line-of-sight, increase ability to pick up the scent of fresh tracks and sign (*e.g.*, scat), and increase travel speed (James *et al.* 2000; Smith *et al.* 2008; Latham 2011a, 2011b). The resulting increase in predator-prey encounter rates could lead to an increase in predation risk for white-tailed deer, furbearers (*e.g.*, American marten) and upland gamebirds (*e.g.*, ruffed grouse) (Kurki *et al.* 1997; James 1999; Smith *et al.* 2008). Further discussion of changes in mortality risk is presented in Section 9.5.3.

Sensory Disturbance

In natural areas along the New ROW, sensory disturbance to wildlife will be reduced through winter construction, when many species are less mobile, dormant, or not present in the RAA (*e.g.,* migratory birds).

Most of the sensory disturbance (*i.e.*, noise, human presence) associated with winter construction (*i.e.,* 89 dBA at 15 m) will dissipate in approximately 500m (Physical Environment: Noise TDR). Periodic explosive discharges by implosive sleeves during conductor stringing will be louder at 115 dba (Physical Environment: Noise TDR). Winter clearing Noise may affect some wildlife active in the immediate area such as white-tailed deer, gray wolf and other furbearers. These animals may avoid the immediate vicinity of sensory disturbances including areas frequented by humans (*e.g.*, trails in remote habitats; Rogala *et al.* 2011).

Denning black bears are particularly sensitive to noise disturbance within 1 km of dens (Linnell *et al.* 2000). Black bear typically select denning sites that are 1 to 2 km from human disturbance (*e.g.*, roads, trails) as the energetic cost of relocating to a new den, if disturbed, can be high. Den abandonment by females with cubs can result in cub mortality (Linnell *et al.* 2000).

At the Glenboro South Station, noise and activity associated with electrical equipment installation may cause some wildlife, such as birds and amphibians using adjacent wetland habitat to temporarily avoid the area. Wildlife may also temporarily avoid areas adjacent to active borrow sites due to noise and activity.

9.5.2.1.2 Operation and Maintenance

INDIRECT CHANGES IN HABITAT

Although changes in habitat availability will be most pronounced during construction, operation and maintenance will continue to have an influence on wildlife and wildlife habitat through periodic disturbance associated with maintenance activities. In particular, noise and activity associated with vegetation management in the PDA (*i.e.*, for controlling noxious or restricted weeds and managing woody vegetation along the ROW), and use of all-terrain vehicles (ATVs) and snowmobiles for transmission line inspection, could reduce the effectiveness of habitat by causing some species to avoid the ROW and adjacent areas until the disturbance has ceased. These intermittent activities are not anticipated to have much of an effect on wildlife as transmission line inspection will occur once or twice a year during non-sensitive wildlife work windows. Vegetation management activities will be repeated over a longer cycle (every five to seven years as required), and will involve the use of less invasive and less destructive techniques than initial clearing to control woody vegetation.

Travel along the ROW by ATVs and other recreational vehicles is expected based on existing use of transmission line corridors through Crown land in the RAA (*e.g.*, M602F). These activities may cause some wildlife to temporarily avoid parts of the ROW. The Project could also result in indirect changes in habitat due to ATV-triggered wildfires. Previous fires in the RAA have been triggered by natural causes and by human causes such as ATVs (*i.e.*, vegetative debris trapped on ATVs can overheat and spark a fire). Some of these fires have resulted in extensive changes in forested habitat (*e.g.,* May 2008 fire in the Sandilands Provincial Forest [CBCNews 2015]).

Positive changes along cleared areas of the ROW will be the re-establishment of vegetation, as parts of the ROW will become foraging habitats for species like white-tailed deer, elk and moose that prefer food sources such as grasses and early successional trees and shrubs (Banfield 1974; Bramble and Brynes 1982; Bartzke *et al.* 2014). For some species of small mammal, this new habitat may lead to localized increases in abundance (*e.g.*, least chipmunk [*Tamias minimus*]; Storm and Choate 2012), which can in turn can lead to an increase in the abundance of medium-sized predators that prey on these species *(e.g.,* red fox) (Kurki *et al.* 1998).

Regeneration of golden-winged warbler habitat is anticipated in areas where the ROW traverses mature deciduous and mixedwood forest (*e.g.*, near Ste-Geneviève, Richer, and Piney). Re-establishment of shrubs, herbs and grasses in these areas will soften forest edges and provide golden-winged warbler with nesting and foraging habitat. An integrated vegetation management approach will be used to selectively control for trees while maintaining grass and shrub-dominated communities where the New ROW traverses forested areas. Utility corridors greater than 60 m wide can support golden-winged warbler habitat when woody vegetation is managed with less aggressive techniques (*e.g.*, mowing) and herbs and shrubs feather out ROW edges (Kubel and Yahner 2008).

The ROW may benefit larger sized predators (*e.g.*, gray wolf) by increasing access to prey foods and increasing travel efficiency in heavily forested areas where access is limited and snowmobiles provide a packed snowbase (*e.g.*, Latham *et al.* 2011a, 2011b). During aerial tracking survey in January 2015, wolves appeared most abundant in southeastern portions of the RAA, especially in areas along the existing M602F transmission line (Wildlife and Wildlife Habitat TDR).

9.5.2.2 Mitigation for Change in Habitat Availability

Selection of the Final Preferred Route took a balanced approach to reduce overlap with natural wildlife habitat; particularly in designated lands and protected areas, and large intact patches of forested lands. Other standard industry practices and avoidance measures, along with Project-specific mitigation as described in the Construction Environmental Protection Plan (CEnvPP) (Chapter 22) will be implemented during Project construction and operation and maintenance. This section highlights the key mitigation measures to be implemented during construction and operation and maintenance to limit effects on wildlife and wildlife habitat. Mitigation measures include the following:

- Wildlife features (*i.e.*, mineral licks and stick nests) will be identified in CEnvPP and mitigation applied such as buffers and/or setbacks prior to clearing.
- Clearing activities will not be carried out during the reduced risk timing windows for wildlife species without additional mitigation measures such as pre-clearing nest searches.
- Construction activities will be restricted to established roads, trails and cleared construction areas in accordance with the Access Management Plan (Chapter 22 – Environmental Protection, Follow-up and Monitoring).

- Environmentally sensitive sites, features and areas will be identified and mapped before clearing.
- In sensitive areas of critical golden-winged warbler habitat, ROW vegetation will be selectively cleared and managed with the integrated vegetation management program to enhance suitability for golden-winged warbler.
- Trees containing large nests of sticks and areas where active animal dens or burrows are encountered within the ROW will be buffered left undisturbed until unoccupied.
- Artificial structures for nesting may be provided if unoccupied nests must be removed.
- Natural low growing shrub and grass vegetated buffer areas of 30 m will be established around wetlands and riparian zones.
- Vehicle, equipment and machinery maintenance and repairs will be carried out in designated areas located at least 100 m from the ordinary high water mark of a waterbody, riparian area or wetland.
- Vehicle, equipment and machinery operators will perform a daily inspection for fuel, oil and fluid leaks and will immediately shutdown and repair any leaks found. All machinery working near watercourses will be kept clean and free of leaks.
- Contractor specific Erosion Protection and Sediment Control Plans will be prepared by the Contractor, accepted by Manitoba Hydro prior to construction and updated annually.
- Clearing wastes and other construction debris or waste will not be placed in wetland areas.
- Rehabilitation plans will include objectives for restoration of natural conditions, erosion protection, sediment control, non-native and invasive plant species management, wildlife habitat restoration and restoration of aesthetic values as required.

9.5.2.3 Characterization of Residual Environmental Effect for Change in Habitat Availability

9.5.2.3.1 Construction

Project effects on wildlife and wildlife habitat were reduced through routing, which resulted in minimal overlap with designated and protected lands, the core areas occupied by the Vita elk herd (Wildlife and Wildlife Habitat TDR), and large tracts of intact habitat (*e.g.*, forests, wetlands). Where the Project does traverse natural habitat, mitigation measures (*e.g.*, timing windows, setbacks and buffers) will be implemented to reduce adverse effects on wildlife and wildlife habitat.

DIRECT CHANGE IN HABITAT AVAILABILITY

Vegetation clearing along parts of the ROW will be carried out in the winter in order to reduce effects on wildlife and wildlife habitat. Removal of vegetation (*i.e.*, trees, shrubs) will result in a direct, long-term change in 550 ha of wildlife habitat (Table 9-7). The amount of forest habitat removed will approximately 2.5% of the total amount of forested habitat in LAA, and 0.4% of the total amount of potential wildlife habitat (*i.e.*, natural and modified habitats) in the LAA (Table 9-7). Removal of trees will reduce habitat for some forest dwelling species (*e.g.*, ovenbird), but as a result will increase modified wildlife habitat for other species, particularly open-habitat and forest edge species (*e.g.*, white-tailed deer, bats).

Forest areas cleared along the ROW will eventually regenerate to modified wildlife habitat consisting of shrub, herb, and grass dominated plant community. ROW clearing will therefore show as a loss in forest habitat, and a gain in modified wildlife habitat (Table 9-7).

Table 9-7 Wildlife Habitat Availability in the LAA

	Amount of Habitat		Change from Pre-Construction Levels	
	Pre-Construction (ha)	Post-Construction (ha)	Area (ha)	Percent (%)
New ROW				
Hardwood Forest	6,911	6589	-322	-4.7
Softwood Forest	3,384	3214	-170	-5.0
Mixedwood Forest	540	525	-15	-2.8
Grassland	1,600	1,600	0 [1]	0
Wetland	3,970	3,970	0 [1]	0
Modified Wildlife Habitat	8,890	9,397	+507	+3.1
Existing ROW				
Hardwood Forest	628	585	-43	-6.8
Softwood Forest	0	0	0	0
Mixedwood Forest	0	0	0	0
Grassland	230	230	0 [1]	0
Wetland	62	62	0 [1]	0
Modified Wildlife Habitat	20,027	20,070	+43	+0.2

	Amount of Habitat		Change from Pre-Construction Levels	
	Pre-Construction (ha)	Post-Construction (ha)	Area (ha)	Percent (%)
Stations			-	-
Hardwood Forest	0	0	0	0
Softwood Forest	0	0	0	0
Mixedwood Forest	0	0	0	0
Grassland	31	31	0 [1]	0
Wetland	4	4	0 [1]	0
Modified Wildlife Habitat	1,590	1,590	0 [1]	0
Total Forest	*11,463*	*10,913*	*-550*	*-4.8*
Total Modified Habitat	*30,507*	*31,057*	*+550*	*+1.8*
Total	***47,867***	***47,867***	***0***	***0***

NOTES:
[1] Quantified changes in wildlife habitat are associated with clearing forested habitats and modified wildlife habitat, although small changes in wetland and grassland habitat will occur along the centre line and at tower footprints

For most SOCC, change in the availability of habitat will be minimal and limited to tower locations. This is particularly the case for wetland species such as least bittern, yellow rail and grassland species such as short-eared owl, loggerhead shrike, and bobolink. Habitat for open forest species such as common nighthawk and eastern whip-poor-will will increase as a result of ROW clearing; however the New ROW's suitability as nesting habitat may be compromised by disturbance created by recreational vehicle activity (Artuso 2015, pers. comm.), particularly in areas where access is not restricted such as on Crown Lands. A net loss of less than 2 ha of potential low quality golden-winged warbler habitat is expected with ROW clearing and regeneration of shrub and herb dominated vegetation.

INDIRECT CHANGE IN HABITAT AVAILABILITY

With the Project, the density of linear features (*e.g.*, roads, pipelines, transmission lines, trails) in the RAA will increase by 1.3% (from approximately 2.38 km/km^2 to 2.42 km/km^2). This small increase is attributed primarily to ROW clearing along the forested portion of Final Preferred Route extending from just north of Ste-Genevieve to the Manitoba-Minnesota border. Within this area ROW clearing will have indirect effects on habitat by fragmenting forest, reducing intactness of forest patches, and increasing edge habitat.

The Final Preferred Route will traverse portions of eight intact core patches of natural wildlife habitat (*i.e.*, wetland, grassland, forest) ranging from approximately 700 to 12,000 ha (Table 9-8; Map 9-23 – Habitat Fragmentation in the RAA). These eight patches are considered "intact"

because linear features or other human developments do not traverse them. They support core wildlife habitat that is buffered 100 m from low use linear features and developments (*e.g.*, trails, pipelines, transmission lines) and 200 m from high use linear features (*e.g.*, roads, highways). With the exception of Patch 6 (comprised predominantly of wetland habitat), the route passes through the edges of these patches (Map 9-23; Table 9-9). Patch 6 will be divided into two large patches; however, effects of forest habitat fragmentation on wildlife in this area is anticipated to be minimal because 81% of habitats traversed are open (*i.e.*, grassland and wetland; Table 9-9). Largest habitat patches traversed by the ROW are located in the southern portion of the RAA, including Sundown Bog (12,064 ha; Patch 7, Table 9-8) and Caliento Bog (5,833 ha; Patch 5, Table 9-8) (Map 9-23). The ROW will traverse the northeastern edges of the Caliento Bog (Patch 5) and Sundown Bog (Patch 7), affecting mainly softwood forest but also wetland and a small amount of hardwood and mixedwood forest (Table 9-9; Map 9-23).

Table 9-8 Changes in the Size of Large (>200 ha) Habitat Patches Traversed by the New ROW

Habitat Patch	Pre-Construction Patch Area (ha)	Area Traversed by the New ROW	Post-Construction[1]				
			Patch A (ha)	Patch B (ha)	Patch C (ha)	Patch D (ha)	Patch E (ha)
1	710	15.4	642	15	5	19	13
2	2,285	20.6	2,031	230	3	–	–
3	1,327	27.4	1,164	135	–	–	–
4	2,817	22	2,479	295	19	2	–
5	5,833	34.4	5,424	374	–	–	–
6	2,615	70.5	1,683	861	–	–	–
7	12,064	138.8	10,794	1,118	13	–	–
8	1,884	8.5	1,863	12	–	–	–

NOTES:
[1] Patches formed by the New ROW
[2] Patch size determined by applying a 200 m buffer to high use linear features (*e.g.*, roads, highways) and 100 m to low use linear features (*e.g.*, transmission lines, pipelines, trails)

Table 9-9 Affected Habitat Types within the Large (>200 ha) Habitat Patches

Habitat Patch	Amount of Habitat Traversed by ROW (ha)	Post-Construction					
		Composition of Habitat Traversed[1] (%)					
		Grass-land	Hard-wood	Mixed-wood	Softwood	Wetland	Other
1	15.4	25	38	<1	–	36	–
2	20.6	31	53	–	–	16	–
3	27.4	–	63	–	–	37	–
4	21.9	–	66	–	35	–	–
5	34.4	–	6	–	72	20	2
6	70.5	20	14	–	5	61	–
7	138.8	–	7	5	69	19	–
8	8.5	59	–	–	13	22	6

NOTES:

[1] Based on FRI land cover classes (MB Conservation 2002)

With the Project, these eight patches of natural habitat will support between 600 and 10,800 ha of intact core habitat (a 12 to 16% decrease in patch size from pre-construction conditions). Total direct loss of forest habitat in these patches is 338 ha (61% of the 550 ha of forest habitat cleared along the ROW) (Table 9-7). Edge effects associated with the transmission line will result in the indirect loss of approximately 681 ha of habitat within these eight core habitat patches (Table 9-10). Total change in core patch size is 3.8%. Based on the size of remaining core habitat patches (*i.e.,* 600 to 10,800 ha), and the degree of overlap with open habitats such as wetlands and grasslands, effects on wildlife and wildlife habitat are considered small.

Table 9-10 Direct and Indirect Changes in Total Area of Large (>200 ha) Habitat Patches Traversed by Final Preferred Route

Pre-Construction	Post-Construction		
Total Patch Area (ha)	Direct Loss (ha)	Indirect Loss (ha)	% Change
26,540	338	681	3.8

NOTES:

[1] Patches buffered by 200 m along high use linear features (*e.g.*, roads, highways) and 100 m along low-use linear features (*e.g.*, transmission lines, pipelines, trails)

Overall, the residual effects for construction-related change in habitat availability for wildlife are expected to be low in magnitude because most ROW and station upgrades will occur on lands that provide marginal habitat for wildlife.

For these residual effects:

- Direction is adverse:
  - There will be direct and indirect habitat loss/alteration during construction.
- Magnitude is low:
  - The predicted direct change in natural wildlife habitat availability within the LAA is 5% (Table 9-7). Effects on grassland and wetland habitat due to the presence of heavy construction equipment will be negligible and short-term. The Project will have a small contribution to existing levels of habitat fragmentation (a 1.3% increase in linear disturbance resulting in a 12 to 16% reduction in core habitat intactness). Excluding short-term effects from construction equipment, the combined direct loss of natural wildlife habitat is 5% of forest habitat within the LAA, which is low (*i.e.*, <10% of the LAA) based on magnitude criteria presented in Table 9-4. Since wildlife depends on habitat and only a small amount of common habitat types (*i.e.,* deciduous forest, softwood forest) will be removed, the Project is unlikely to have a measurable effect on wildlife abundance in the LAA, however, temporary local shifts in wildlife distributions might occur.
- Geographic extent is the LAA:
  - Direct habitat loss will be confined to the PDA; however, indirect effects (*i.e.*, sensory disturbance, edge effects) will extend into the LAA.
- Frequency is a single to multiple irregular event:
  - Sensory disturbance associated with ROW clearing, construction of transmission infrastructure and station upgrades and expansion will occur multiple times at irregular intervals.
  - Habitat alteration will occur primarily once during ROW clearing.
- Duration is short-term to permanent (depending on habitat type and Project component):
  - Direct effects due to habitat alteration will be permanent, because the effects will extend for the lifetime of the Project.
  - Indirect effects due to habitat alteration (edge habitat avoidance by interior forest species) will also be permanent, as the effects will extend for the lifetime of the Project.
  - Sensory disturbance associated with ROW clearing, construction of transmission infrastructure and station upgrades and expansion will be short-term. Indirect effects on grassland habitat traversed by the ROW will also be short-term because it is anticipated that vegetation will naturally recover within two to three growing seasons.

- Change is reversible
  - Direct effects (*i.e.*, habitat loss) and indirect effects (*i.e.*, edge habitat avoidance) on habitat availability due to land clearing are reversible after the life of the Project (*i.e.,* with natural regeneration of ROW vegetation).
  - Indirect effects on habitat availability due to sensory disturbance (*i.e.*, wildlife avoidance) and presence of construction equipment in grassland and wetland areas are reversible once activity has ended.
- The ecological context is for the most part disturbed:
  - Most of the RAA contains relatively high levels of existing disturbance. However, the eastern part of the RAA has a higher proportion of remaining natural habitat, and some portions of it are relatively undisturbed.

9.5.2.3.2 Operation

Residual operation-related effects on wildlife habitat are associated with sensory disturbance from equipment used during ROW vegetation management and from recreational vehicles. Sensory disturbance from vegetation management equipment will be intermittent over the lifetime of the Project, occurring for one to two days within portions of the ROW every five to seven years as required. This disturbance may temporarily reduce the effectiveness of habitat by causing some species to avoid the ROW and adjacent areas during maintenance activities. Based on observed use of other existing transmission lines (*e.g.*, M602F), use of ATVs and other recreational vehicles may occur year-round on portions of the ROW. Shrubby vegetation will be maintained on the ROW where possible to impede ATV access and limit disturbance to wildlife; this may also reduce the risk of ATV-triggered wildfires.

The direct (via ROW clearing) and indirect (due to edge effects) change in habitat availability that occurred during construction will persist during operation; however, vegetation will re-establish and provide habitat for species that use open habitat and/or edge habitat (*e.g.*, white-tailed deer, golden-winged warbler).

For these residual effects, the:

- Direction is adverse and positive:
  - There will be indirect habitat loss along the ROW due to sensory disturbance causing habitat effectiveness to be reduced for some species.
  - There will be direct habitat gain for some species (*i.e.*, grassland/open habitat) as vegetation naturally regenerates along the ROW
- Magnitude is low:
  - With Project mitigation (*e.g.*, retention of shrubs), effects of sensory disturbance on wildlife are unlikely to have a measurable effect on the abundance of wildlife in the LAA; however, temporary local shifts in distributions might occur.

- Retention of shrubs in areas of the ROW that traverse mature deciduous and mixedwood habitat will increase potential habitat for some edge species (*e.g.*, golden-winged warbler).

- Geographic extent is the PDA:
  - ROW vegetation maintenance is limited to the PDA; increases in habitat availability associated with regeneration of ROW vegetation will also be confined to the PDA.
- Frequency is multiple times at irregular intervals:
  - Sensory disturbance associated with ROW inspection patrols and recreational vehicle use will occur multiple times at irregular intervals.
  - ROW vegetation management is anticipated every five to seven years.
- Duration is short-term to permanent:
  - Indirect effects on ROW and adjacent habitats (*i.e.*, wildlife avoidance) due to sensory disturbance will be short-term (*i.e.*, days), as most wildlife using these areas will return once disturbance ceases.
  - ROW vegetation will regenerate after the initial clearing. A shrub, herb and grass-dominated community will be managed by selective control of tall trees over the long-term.
- Change is reversible:
  - Indirect effects on habitat (*i.e.*, wildlife avoidance) due to sensory disturbance will be short-term and reversed once activity has ended.
    - Indirect effects on habitat (*i.e.*, wildlife avoidance) due to edge effects are reversible after the life of the Project (*i.e.,* with natural regeneration of ROW vegetation).
    - The effects of vegetation management along the ROW are reversible after the life of the Project (*i.e.,* with natural regeneration of ROW vegetation).
- The ecological context is for the most part disturbed:
  - Most of the RAA contains relatively high levels of existing disturbance. However, the eastern part of the RAA has a higher proportion of remaining natural habitat, and some portions of it are relatively undisturbed.

9.5.3 Assessment of Change in Mortality Risk

9.5.3.1 Pathways for Change in Mortality Risk

Pathways that may result in a change in wildlife mortality risk are associated primarily with bird collisions with conductors and/or shield wires, but also include vehicle collisions with terrestrial wildlife during ROW clearing, and alteration of habitat that may favour some predators.

The presence of overhead transmission lines, particularly shield wires, could increase the potential for bird-wire strikes. This is a concern for migratory birds, particularly larger-bodied species that have difficulty performing evasive manoeuvres to avoid transmission lines and structures (*e.g.,* sandhill crane) (Bevanger 1998).

During ROW clearing, equipment and/or toppling of trees may trample or crush small mammals such as mice and voles, having limited dispersal capabilities. Noise and activity associated with winter ROW clearing equipment could put denning bears at risk by forcing them to use up energy reserves in the search for an alternate den site. Construction of towers in some of the large wetland complexes could increase mortality risk to herptiles if exposed wetland substrates contain overwintering frogs and turtles. During ROW clearing, transmission line tower construction and conductor stringing, increased construction-related traffic on roads and highways could lead to increased vehicle-related mortality of wildlife (Manitoba Hydro 2015).

During operation, presence of towers may augment the availability of perching structures for raptors, resulting in an increase in mortality risk to their prey species (Lammers and Collopy 2007). Within forested areas of the LAA where access is currently limited (*i.e.,* near Lonesand, and areas southeast of Sundown), the ROW may increase mortality of game or prey species by improving hunter and predator access to wildlife. The presence of a transmission line ROW could also elevate wildlife mortality risk by increasing access for recreational users (*e.g.,* ATVs, snowmobiles), which could result in collisions with wildlife and/or destruction of nests.

9.5.3.1.1 Construction

This section discusses the change in wildlife mortality risk resulting from ROW clearing, access route and bypass trail development, tower construction and conductor stringing.

CHANGE IN DIRECT MORTALITY RISK

The potential for increased wildlife mortality risk during construction is reduced by limiting ROW clearing, access route and bypass trail development, tower construction and conductor stringing activities to the winter. Winter clearing presents some risk to resident wildlife, particularly small mammals with limited dispersal capabilities, furbearers that use dens or burrows, snakes that use hibernacula, and overwintering herptiles.

Mortality risk to small mammals will be elevated in natural areas of the ROW where clearing is required. Equipment and toppling of trees and brush may crush some small mammals not able to escape from dens/burrows. Mortality risk to black bears may increase for individuals denning in the PDA. Black bears are known to den within the RAA (Wildlife and Wildlife Habitat TDR) and therefore have potential to overwinter within the PDA, especially in the remote areas located along the southern portion of the New ROW (*i.e.*, south of Watson P. Davidson WMA) (Wildlife and Wildlife Habitat TDR).

Winter clearing and construction will reduce potential mortality risk to reptiles and amphibians because species will be dormant and concentrated primarily at wetlands. ROW clearing, access route and bypass trail development, transmission tower construction and conductor stringing in and around wetland sites will be managed in a manner that will protect wetland function (*e.g.*, trees will be cleared by methods that limit disturbance to other vegetation). Some of the wetlands (*e.g.*, Caliento Bog) found along the New ROW are too large to span without multiple towers. Siting towers in these habitats could affect the overwintering habitat of amphibians (*e.g.*, northern leopard frog) and reptiles (*e.g.*, snapping turtle) known to occur in the area. Herptile mortality risk may increase at tower locations if vegetation clearing and tower construction exposes herptiles hibernating in the wetland substrates.

Upland snake hibernacula could be at risk to winter clearing activities; however, no hibernacula were identified during desktop review, field studies or KPIs (Wildlife and Wildlife Habitat TDR). Mortality risk for snakes may be elevated in construction areas near Lonesand Lake. This area was identified has having potential to support snake hibernacula based on observations of snakes moving across Sundown Road (Holme 2014, pers. comm.).

During the construction phase, some roads will experience increased volumes, particularly during peak periods of workforce movement (*e.g.,* between shifts) and during peak periods of materials delivery. Changes in traffic levels are not expected to elevate mortality risk to wildlife inhabiting the area because the anticipated increase in traffic volume is within the normal variation of existing traffic volumes (Chapter 13 – Infrastructure and Services). Winter construction in areas supporting natural wildlife habitat will reduce the potential for wildlife-vehicle collisions as wildlife are typically less mobile during the winter, dormant, or overwintering in areas outside of the RAA.

CHANGE IN INDIRECT MORTALITY RISK

During construction, behavioural changes related to increased activity, noise and nighttime illumination from construction may cause an indirect increase in mortality risk due to disturbance to wildlife, resulting in behavioural changes and increased chance of predation. Wildlife such as small mammals, birds and amphibians may move from cover (behavioural change) because of disturbance from noise and vibration, putting them at greater risk of predation and mortality from exposure (Narins 1990; Habib *et al.* 2007). Disturbance from construction activities may also displace wildlife species into areas adjacent to the Project that may contain lesser quality habitats depending on a species' habitat requirements and dispersal abilities. This displacement may

result in increased energy expenditure potentially reducing an individual's survival and reproduction (Powlesland 2009).

Routing of the New ROW reduced indirect mortality risk to wildlife by avoiding large contiguous patches of forest. However, some of the smaller forest patches will be fragmented by ROW clearing, and will result in the creation of unnatural or 'hard' edges (*i.e.*, no young trees and shrubs between the forest patch and the open area). Edges can increase avian predation rates by both mammalian and avian predators (Chalfoun *et al.* 2002). Ground and shrub-nesting forest birds such as golden-winged warbler are particularly vulnerable to nest predation by small mammals and other birds (*e.g.*, American crow [*Corvus brachyrhynchos*] and blue jay) in fragmented forests (Hannon and Cotteril 1998; Burke and Nol 2000; Kubel and Yahner 2008; Weidinger and Kocvara 2010). Predatory birds like crows and jays prefer edge habitats and generally avoid forest interior habitat (Burke and Nol 2000; Chalfoun *et al.* 2002; Falk *et al.* 2011).

Clearing of the ROW and creation of forest edge habitat could lead to increased nest parasitism of ground and shrub nesting birds by brown-headed cowbirds (Rich *et al.* 1994; Burke and Nol 2000; Falk *et al.* 2011). Nest parasitism rates of forest interior species such as ovenbird can be as high as 30% in fragmented forest landscapes (Burke and Nol 2000). High rates of nest parasitism, in combination with nest predation rates, can effectively limit songbird populations from reaching replacement rates (Burke and Nol 2000).

9.5.3.1.2 Operation and Maintenance

This section will discuss the direct and indirect change in mortality risk associated with transmission line operation/presence and vegetation management.

CHANGE IN DIRECT MORTALITY RISK

During operation and maintenance, wildlife mortality pathways are primarily bird collisions with transmission lines and nest mortality by equipment used during periodic maintenance of ROW vegetation. Bird electrocutions are not anticipated at transmission lines, towers or stations due to the large spans between electrified parts (even a very large bird could not stretch wide enough to touch two electrified parts simultaneously).

Collisions with transmission lines are among the top causes of human-related bird mortality in Canada (Calvert *et al.* 2013). Other sources of bird mortality include collisions with vehicles and buildings, agriculture, hunting, and cats (domestic and feral). The degree of risk is influenced by several factors relating to transmission line design, location, and mitigation, as well as physical characteristics of the bird (species, size), and flight behaviour (flocking, aerial courtship displays) (APLIC 2012). Manitoba contributes substantially fewer bird mortalities than almost all other Provinces with bird mortality hotspots in Canada centered near major urban centers including the Toronto, Montreal, Vancouver, Calgary and Edmonton (Calvert *et al.* 2013).

The transmission line design will include conductor lines (lines that carry the electrical current) and two very thin (11 mm in diameter) shield wires, which are difficult to see, especially under low

light conditions (Chapter 2 – Project Description). Shield wires protect the system against lightning damage (Chapter 2 – Project Description), and when not mitigated, are the wires most often struck by birds in flight (Scott *et al.* 1972; Faanes 1987; Savereno *et al.* 1996).

The most common birds observed in the RAA during field studies were waterbirds (*e.g.*, ducks, geese, gulls). Heavy-bodied waterbirds like ducks, geese, cranes, and herons are considered most susceptible to transmission line collisions due to their relatively poor ability to perform evasive manoeuvres (Faanes 1987; Bevanger 1998; Janss 2000; Erickson *et al.* 2001; Rubolini 2005; APLIC 2012; Rioux *et al.* 2013). Birds that flock are more at risk for line strikes than solitary birds (Crowder 2000).

In the RAA, waterbird abundance is greatest during the fall migration period, with birds roosting in reservoirs, wetlands and rivers at night and foraging in open agricultural fields during the day. Suitable waterbird breeding habitat (*e.g.*, marsh) is limited in the RAA, as the RAA lies well outside of the productive waterfowl breeding habitats found in the western prairie pothole region of Manitoba. Sandhill cranes breed in some of the extensive wetland habitats (*e.g.*, bogs) located in the LAA; however, no concentrations of cranes were observed during field studies.

Field studies identified seven areas where waterbirds concentrate in the LAA (Table 9-11) (Map 9-30 – Bird Concentration Sites in the RAA). Two of these sites, the Assiniboine River and Red River, fall within the PDA (*i.e.*, on the proposed transmission line route). Transmission lines in areas that concentrate birds, particularly those located between roosting (*i.e.*, resting), foraging, or breeding sites can have higher collision risk for birds (APLIC 2012). In these areas, waterbirds (especially ducks and geese) are particularly vulnerable to collisions due to their daily movement patterns, which peak during low light periods (*e.g.*, around sunrise and sunset).

Table 9-11 Waterbodies Where Waterbirds Concentrate in the LAA

Waterbody	Proximity to PDA (m)	Average Number of Birds Observed/Weekly Site Visit[1] (peak number observed)
Red River	0	1,174 (1900)
Assiniboine River	0	588 (1603)
Deacon Reservoir	120	658 (2239)
Lonesand Lake	200	39 (43)
Richer Lake	730	115 (190)
Brady Road Resource Management Facility	1,000	2,380 (4125)
Sundown Lake	1,200	243 (886)

NOTES:

[1] Each site was visited once per week for one hour between September 22 and October 16 2014 (Wildlife and Wildlife Habitat TDR).

Since most bird collisions with overhead wires occur within 400 m of water (Faanes 1987) and in areas that concentrate birds (APLIC 2012), only three of the seven waterbodies in the LAA are considered high-risk areas for bird strikes: Deacon Reservoir, Assiniboine River and Red River. Deacon Reservoir provides roosting habitat for waterfowl and gulls in an area surrounded by potential forage habitat (*i.e.*, cropland). Birds observed moving in and out of the reservoir cells were travelling in all directions, including in areas to the east and north that overlap with the PDA and other existing transmission lines. Bird abundance is variable at Deacon Reservoir, and dependent on the timing and frequency of the City of Winnipeg seasonal deterrent program (Choquette 2015 pers. comm.). Based on bird abundance and bird mortality data gathered during field studies, collision risk to birds is anticipated to be highest where the PDA overlaps with river corridors (Wildlife and Wildlife Habitat TDR).

Collision risk is not anticipated to be an issue in areas near the Brady Road Resource Management Facility despite the high gull abundance observed during field surveys. The Final Preferred Route lies approximately 1 km south of the landfill and outside of the direct pathways to potential gull roosting sites located further north and northeast (*e.g.*, Red River, Deacon Reservoir, City of Winnipeg Retention ponds) (Map 9-30). Although Sundown Lake is located more than 1.2 km from the Final Preferred Route, collision risk is anticipated to be moderate near Sundown Lake because sandhill cranes breed in this area (MB BBA 2015; Artuso 2015, pers. comm.) and are known to be particularly vulnerable to collisions (Bevanger 1998).

Collision risk is anticipated to be low in the area near Richer Lake due to the separation of the Final Preferred Route from the lake (approximately 730 m; Table 9-11; Map 9-30). Nearly all birds observed moving in and out of Richer Lake travelled in a north-south direction (not towards the Final Preferred Route in the west).

The Final Preferred Route will traverse forested areas within 100 m of Lonesand Lake. Although bird abundance at this location was low during fall field surveys, the lake is known to support large bodied birds such as swans (Holme 2014, pers. comm.). Due to the proximity of the line from the lake, the collision risk is anticipated to be high for birds using this area.

CHANGE IN INDIRECT MORTALITY

Indirect wildlife mortality can occur as a result of the Project's presence, particularly the presence of the ROW, which may enhance predator mobility, and access for hunters and recreational users. The use of recreational vehicles (*e.g.*, ATVs) may result in collision-related wildlife mortality and/or destruction of nests. The presence of towers may lead to localized increases in raptor activity, which could lead to increased mortality risk for birds and/or small mammals.

The ROW may enhance predator mobility into areas that were previously intact and more difficult to traverse, which may decrease search times for prey and make prey escape more difficult (Thomas 1995; James and Stuart Smith 2000). Wolves, coyotes and fox may benefit from enhanced access to prey species, leading to increased predation on white-tailed deer, furbearers, small mammals and ground dwelling birds (Winter *et al.* 2000). Based on field observations, wolves were most abundant in the easternmost-forested regions of the RAA, including along the

500 kV M602F transmission line (Wildlife and Wildlife Habitat TDR). Changes in predation risk by wolves is anticipated where the ROW traverses remote forested areas. Such areas are uncommon along the Final Preferred Route due to existing infrastructure (*e.g.*, roads), residential development, agriculture and presence of extensive wetland complexes (*i.e.*, Caliento Bog, Sundown Bog). Notable exceptions are two core areas traversed by the southern portion of the Final Preferred Route (*i.e.*, core wildlife habitat Patches 5 and 7) (Table 9-9; Map 9-23– Habitat Fragmentation in the RAA). In both of these areas, the ROW will traverse softwood-dominated forest having potential to support white-tailed deer, furbearers (*e.g.*, American marten), small mammals, and ground nesting birds (*e.g.*, grouse).

The Project falls within Open Trapping Area Zones 1, 3 and 4, which allows for trapping to occur on Crown land, and where permissible on privately owned lands. Access to wildlife by trappers and hunters is not considered limited in the RAA due to the current level of linear disturbance (2.38 km/km^2). New access created by the ROW may lead to increases in furbearer trapping and game hunting in 14 km of previously remote areas of dense forest (*e.g.*, Patches 5 and 7; Map 9-23). Although increased access could elevate the mortality risk to species valued by trappers, such as American marten, and species valued by hunters, such as white-tailed deer, black bear and upland game birds, regional populations are managed and considered generally stable (Leavesley 2015, pers. comm.).

For some wildlife like small mammals and birds, localized increases in mortality may occur in areas where towers are constructed. Transmission towers have been shown to increase the efficiency of avian predators by providing elevated platforms for perching which increased predator visibility (Wakeley 1978; Graul 1980; Plumpton and Andersen 1997). The use of transmission towers as predatory perches by raptors can increase predation risk for prey species inhabiting areas near towers (BLM 2005). Vulnerable prey species include sharp-tailed grouse, especially in areas where leks occur (BLM 2005) (Map 9-28 - Sharp-tailed Grouse Leks; Map 9-29 – Sharp-tailed Grouse Leks Glenboro South Station).

9.5.3.2 Mitigation for Change in Mortality Risk

Standard industry practices and avoidance measures, along with Project-specific mitigation measures, will be implemented during construction and operation and maintenance, as listed in the CEnvPP.

The following mitigation measures will be implemented to reduce change in wildlife mortality risk:

- Construction activities will be restricted to established roads, trails and cleared construction areas in accordance with the Access Management Plan.
- Clearing activities will not be carried out during reduced risk timing windows for wildlife species without additional mitigation measures.

- In sensitive areas of critical golden-winged warbler habitat, ROW vegetation will be selectively cleared and managed with the integrated vegetation management program to enhance suitability for golden-winged warbler.
- Trees containing large nests of sticks and areas where active animal dens or burrows are encountered will be buffered and left undisturbed until unoccupied. Artificial structures for nesting may be provided if unoccupied nests must be removed.
- To reduce the potential for collisions with wires following wire installation, bird diverters will be placed at environmentally sensitive sites.
- Hunting and harvesting of wildlife, or possession of firearms by Project staff will not be permitted while working on the Project sites.

9.5.3.3 Characterization of Residual Environmental Effect for Change in Mortality Risk

This section characterizes the residual environmental effects for change in mortality risk using methods described in Section 9.3.2 (Table 9-4). Residual effects are those that remain after mitigation measures are considered.

9.5.3.3.1 Construction

Most adverse effects on wildlife and wildlife habitat in the LAA were mitigated during the planning and transmission line routing process by avoiding existing parks and protected areas, and through consideration of the core areas occupied by the Vita elk herd (Wildlife and Wildlife Habitat TDR), and large tracts of intact habitat (*e.g.,* forests, wetlands). Where the Project does traverse natural habitat, mitigation measures (*e.g.*, timing windows, setbacks and buffers) will be implemented to reduce adverse effects on wildlife and wildlife habitat.

ROW clearing, access route and bypass trail development under winter conditions reduces mortality risk to wildlife as most wildlife are less mobile, dormant or not present (*e.g.*, migratory birds) within the LAA. However, winter construction poses a mortality risk to small mammals, overwintering black bears and herptiles in southern areas of the New ROW. Hibernating bears are vulnerable to disturbance by construction activities, which can lead to indirect mortality if alternate shelter is not readily available. Measures outlined in the construction EPP (*i.e.,* contractor awareness of habitat features that may support bear dens) should permit most bear dens to be avoided by the Project.

Fragmentation of forest patches and creation of hard edges will increase predation risk to bird nests and enhance opportunities for brood parasitism by brown-headed cowbirds. These effects may lessen during the operation and maintenance phase as shrubs and herbs re-establish along the ROW.

The magnitude of this change will be negligible, ROW clearing, access route and bypass trail development, tower construction and conductor stringing will occur outside of the sensitive wildlife

windows. These measures, along with other mitigation implemented will reduce the potential for measurable changes in mortality risk. For this residual effect, the:

- Direction is adverse:
  - There will be an increase in mortality risk during construction.
- Magnitude is low:
  - With mitigation, the change in mortality risk is anticipated to be low. Project is not anticipated to have population level effects despite some mortality.
- Geographic extent is the LAA:
  - Direct change in mortality risk will be confined to the PDA; however, indirect effects (*i.e.,* potential for increased predation risk along forest edges) will extend into the LAA.
- Frequency is a multiple, irregular event:
  - Change in mortality risk will vary throughout the construction period.
- Duration is short-term:
  - Direct changes in wildlife mortality risk will be elevated during the construction period.
  - Indirect changes in wildlife mortality risk (due to increased predation risk along forest edge) are short-term.
- Change is reversible:
  - Direct change in wildlife mortality risk will cease once construction activity has ended. Indirect effects associated with increased predation risk along forest edges are reversible after the life of the Project (*i.e.,* with natural regeneration of ROW vegetation).
- The ecological context for the region is disturbed:
  - Most of the RAA contains relatively high levels of existing disturbance. However, areas traversed by the New ROW have a higher proportion of remaining natural habitat, and some portions of it are relatively undisturbed.

9.5.3.3.2 Operation

Most adverse effects on wildlife and wildlife habitat in the LAA were mitigated during the planning and transmission line routing process by avoiding existing parks and protected areas, and through consideration of the core areas occupied by the Vita elk herd (Wildlife and Wildlife Habitat TDR), and large tracts of intact habitat (*e.g.,* forests, wetlands), utilizing Existing Corridors, and paralleling portions of existing transmission lines (*e.g.,* 230 kV R49R) were considered in the transmission line routing process and in determining a final preferred route. Where the Project does traverse sensitive areas, mitigation measures (*e.g.*, bird flight diverters, selective ROW vegetation management measures) will be implemented to reduce adverse effects on wildlife and wildlife habitat.

During operation, mortality risk to wildlife is expected to increase with the presence of overhead transmission lines, and improved hunter, trapper and predator access in previously remote areas of the LAA. Overhead wires present a collision hazard to birds, particularly in areas where birds congregate (*e.g.*, Assiniboine River, Red River, and Deacon Reservoir). The incremental increase in mortality risk from the Project can be mitigated by adding bird flight diverter (Photos 9-15 and 9-16) to overhead wires at high collision risk sites such as the river crossings and Deacon Reservoir, and through the paralleling portions of existing transmission lines (*e.g.*, M602F, R49R). Applying bird diverters to shield wires has been shown to reduce bird mortality rates by 50% to 80% (Jenkins *et al.* 2010; APLIC 2012).

Photo 9-15 Installation of Bird Flight Diverter

Photo 9-16 Bird Flight Diverters on and Existing Transmission Line

Overall, the residual effects for operation-related change in mortality risk for wildlife are expected to be moderate in magnitude. The LAA supports few areas, such as lakes and open water wetlands, having potential to concentrate birds. Where sensitive areas occur, bird diverters will be installed to reduce collision risk to birds. Bird diverters (*e.g.,* swan flight diverters, bird flight diverters) are proven effective at reducing wildlife mortality risk on other transmission line projects located in Manitoba (*e.g.,* Wuskwatim Transmission Project), North America and other parts of the world (APLIC 2012).

The Project will make minimal contributions to the existing level of fragmentation in the RAA (1.3% increase from existing levels). Most of the areas traversed by the New ROW are heavily fragmented by agriculture and development such as roads and highways. As such, the potential for the Project to increase access to remote areas is limited to two forested areas south of the Watson P. Davidson WMA (near the Caliento and Sundown bogs). In these areas, wildlife mortality risk may increase as a result of increased hunter and/or predator access.

For these residual effects, the:

- Direction is adverse:
    - There will be increased mortality risk.
- Magnitude is low:
    - The LAA supports few areas, such as lakes and open water wetlands, having potential to concentrate birds. Where sensitive areas occur, mitigation measures (*i.e.,* bird flight diverters) will be implemented to reduce collision risk to birds. The change in hunter and predator access resulting from the Project is anticipated to be low as the Project will make minimal contributions to the existing level of fragmentation in the RAA (1.3% change from existing levels).
- Geographic extent is the LAA:
    - Increased mortality risk will be confined to the PDA; however, indirect effects on mortality risk (*i.e.*, increased predation due to increased forest edge) will extend into the LAA.
- Frequency is continuous:
    - Change in mortality risk will occur throughout the operation and maintenance phase.
- Duration is permanent:
    - The collision risk with overhead lines will persist for the life of the Project.
- Change is reversible:
    - Factors contributing to a change in wildlife mortality risk are reversible after the life of the Project (*i.e.,* with the removal of overhead wires and natural regeneration of ROW vegetation)

- The ecological context is for the most part disturbed:
  - Most of the RAA contains relatively high levels of existing disturbance. However, the eastern part of the RAA has a higher proportion of remaining natural habitat, and some portions of it are relatively undisturbed.

9.5.4 Summary of Environmental Effects on Wildlife and Wildlife Habitat

This section summarizes the Project effects analysis for change in wildlife habitat availability and change in mortality risk. Table 9-12 characterizes the environmental effects of the Project on wildlife and wildlife habitat using criteria defined in Table 9-4 (Section 9.3.2.3). The determination of significance of the environmental effects outlined in Table 9-12 is discussed in Section 9.6.1.

Table 9-12 Summary of Residual Environmental Effects on Wildlife and Wildlife Habitat

Project Phase	Residual Environmental Effects Characterization						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Construction	A	L	LAA	ST/P	S/IR	R	D
Operation and Maintenance	A/P	L	PDA	ST/P	IR	R	D
Construction	A	L	LAA	ST	IR	R	D
Operation and Maintenance	A	L	PDA	P	C	R	D

KEY

See Table 9-4 for detailed definitions

Direction: *A: Adverse; N: Neutral; P: Positive*

Magnitude: *N: Negligible; L: Low; M: Moderate; H: High*

Geographic Extent: *ROW/Site: PDA; Local: LAA; Regional: RAA*

Duration: *ST: Short-term; MT: Medium-term; P:Permanent*

Frequency: *S: Single event; IR: Irregular event; R: Regular event; C: Continuous*

Reversibility: *R: Reversible: I: Irreversible*

Ecological Context: *U:Undisturbed, D:Disturbed;*

N/A Not applicable

In summary, the Project will have adverse, low in magnitude effects on wildlife and wildlife habitat. The transmission line routing process considered designated and protected lands and large patches of intact forest in determining a final preferred route. ROW clearing will convert 550 ha of forest habitat into modified wildlife habitat consisting of a shrubs, herbs and grasses. This loss of forest cover is approximately 4.5% of the total amount of forest cover in the LAA, or 3.2% of the total amount of natural wildlife habitat within the LAA. Based on magnitude criteria, a 4.5% change in habitat availability for wildlife is low in magnitude (*i.e.,* less than 10% of habitat altered within the LAA; Table 9-4). Changes in American marten habitat are also anticipated to be low in magnitude. ROW clearing will remove approximately 2% of potential American marten habitat in the LAA. With regeneration and selective vegetation management along parts of the ROW, changes in critical golden-winged warbler habitat are anticipated to be small (less than 2 ha lost or 0.02% of existing potential golden-winged warbler habitat in the LAA). Changes in habitat for grassland and wetland bird SOCC such as bobolink and yellow rail are expected to be negligible, and limited to the transmission tower footprints.

Effects on bats are anticipated to be positive due to increased foraging opportunities along the ROW. The Project is not expected to affect bat hibernacula, as bat hibernacula are not expected to occur in the RAA based on expert knowledge (Willis 2014, pers. comm.), lack of surficial geology conducive to natural cave formations, and absence of historical archaeological excavations such as tunnels or caverns, or mining sites in the area.

The Project will increase the level of linear disturbance in the RAA by 0.04 km/km^2, a 1.3% increase over existing levels of fragmentation in the RAA (*i.e.,* 2.38 km of linear features/km^2). This increase is small because the New ROW avoids or traverses the edges of most large (greater than 200 ha) core patches of intact wildlife habitat in the RAA. Due to the existing levels of fragmentation in the RAA, changes in mortality risk associated with increased hunter and predator access will be minimal. Only two of the eight core patches of habitat traversed by the Project may improve hunter and predator access to game and prey species. These patches, located near Lonesand and Mensino, support less accessible areas of coniferous forest, that when cleared, may facilitate hunter and predator access to wildlife.

Overhead wires present a collision hazard to birds, particularly in areas where birds congregate (*e.g.*, Assiniboine River, Red River, and Deacon Reservoir). The incremental increase in mortality risk from the Project can be mitigated by adding bird diverters to overhead wires at high collision risk sites such as the river crossings and Deacon Reservoir, and through the paralleling portions of existing transmission lines (*e.g.*, M602F, R49R). Applying bird diverters to shield wires has been shown to reduce bird mortality rates by 50% to 80% (Jenkins *et al.* 2010; APLIC 2012). Project's effects on change in mortality risk are anticipated to be adverse, low in magnitude, and limited to the LAA.

9.6 Assessment of Cumulative Environmental Effects on Wildlife and Wildlife Habitat

The Project residual effects in Section 9.5.4 describe the effects of the Project after implementation of mitigation measures and in the context of the current conditions on the landscape. This section identifies and assesses the cumulative effect of those residual effects likely to overlap in time and space with residual environmental effects of other projects and physical activities.

9.6.1 Identification of Project Residual Effects Likely to Interact Cumulatively

Residual Project effects on wildlife and wildlife habitat (*i.e.*, change in habitat availability and mortality risk) have the potential to act cumulatively with the effects from past, present and reasonably foreseeable future projects. These potential interactions are listed in Table 9-13.

The Project is located in a region substantially altered by agriculture (through land clearing and conversion of native vegetation to crop and hayland) and development. Approximately 62%] of the RAA consists of cultivated and developed land while 38% remains as natural wildlife habitat (Map 9-1 – Wildlife Habitat in the Eastern Project Region). Most of the natural wildlife habitat is found in the eastern parts of the RAA near Richer, and areas south of Marchand and Sundown.

All past and current projects and activities listed in Table 9-13 have contributed to a change in wildlife habitat availability through clearing and conversion of natural wildlife habitat within parts of the RAA. In eastern areas of the RAA near Ste. Genevieve, Richer and Marchand, commercial resource use activities, such as forestry activities, peat mines, quarries and other mining operations have contributed to direct (*i.e.*, habitat loss or alteration) and indirect changes (*e.g.*, habitat avoidance due to disturbance or edge effects) in wildlife habitat availability. The primary pathways of these effects are through land clearing and/or operation-related disturbances (*e.g.*, noise). In these areas, recreation activities make small contributions to changes in wildlife habitat availability directly and indirectly through the creation and use of all-terrain vehicle (ATV) and snowmobile trails.

Five reasonably foreseeable future projects and activities listed in Table 9-13 may overlap in time and space with the Project's residual effects on wildlife habitat availability. Effects from ROW clearing along portions of the St. Vital, Bipole III, and Richer South Station to Spruce Station transmission line projects, the St. Norbert highway bypass project, and residential development are anticipated to overlap in time and space with Project effects on wildlife habitat availability (Section 9.5.2).

Table 9-13 Potential Cumulative Environmental Effects on Wildlife and Wildlife Habitat

Other Projects and Physical Activities with Potential for Cumulative Environmental Effects	Potential Cumulative Environmental Effects	
	Change in Habitat Availability	Change in Mortality Risk
Past and Present Physical Activities and Resource Use		
Agriculture (Conversion, Livestock Operations, Cropping and Land Drainage)	✓	✓
Residential Developments	✓	✓
Existing Linear Developments	✓	✓
Commercial Resource Activities (Forestry, Mining, Hunting, Trapping, Fishing)	✓	✓
Recreation Activities	✓	✓
Future Physical Activities		
Bipole III Transmission Project	–	✓
St. Vital Transmission Complex	✓	✓
Dorsey-Portage South 230 kV Transmission Project	–	–
Northwest Winnipeg Natural Gas Pipeline Project	–	✓
Richer South Station to Spruce Station Transmission Project	✓	✓
Energy East Pipeline Project	–	✓
Southend Water Pollution Control Centre Upgrade	–	✓
St. Norbert Bypass	✓	✓
Headingley Bypass	–	✓
Oakbank Corridor	–	–
Residential Development	✓	✓
Natural Gas Upgrade Projects	–	✓
MIT Capital Projects (Highway Renewal)	–	–
Piney-Pinecreek Border Airport Expansion	–	✓

NOTES:

"✓" = Other projects and physical activities whose residual effects are likely to interact cumulatively with project residual environmental effects.

"–" = Interactions between the residual effects of other projects and those of the Project residual effects are not expected.

Residual effects from the Southend Water Pollution Control Centre Upgrade, Manitoba Infrastructure and Transportation (MIT) Capital Projects, Northwest Winnipeg Natural Gas Pipeline Project, Energy East Pipeline Project, Headingly Bypass, Oakbank Corridor, Natural Gas Upgrades, and Piney-Pine Creek Border Airport expansion are not expected to have spatial overlap with the Project's residual effects for change in wildlife habitat. The residual effects of these other projects on wildlife habitat are expected to be local and not overlap spatially with the area where residual effects from the Project may occur (*i.e.,* the LAA).

Due to the lack of spatial overlap with the Project residual effects, cumulative effects on habitat availability are not discussed further for the Bipole III Transmission Project, Dorsey-Portage 230 kV Transmission Project, Southend Water Pollution Control Centre Upgrade, MIT Capital Projects, Northwest Winnipeg Natural Gas Pipeline Project, Energy East Pipeline Project, Headingly Bypass, Oakbank Corridor, Natural Gas Upgrades, and Piney-Pinecreek Border Airport expansion. The Project's contribution to cumulative effects on wildlife habitat availability is discussed in Section 9.6.3.

Many past and current activities have contributed to a change in mortality risk for wildlife inhabiting the RAA. Agricultural practices contribute to wildlife mortality via hazards associated with the operation of farming equipment. Current activities that involve land clearing, such as residential development, linear infrastructure development, forestry and mining, increases the mortality risk to wildlife due to the use of clearing equipment. Animals most susceptible are those with limited ability to disperse quickly (*e.g.*, small mammals, amphibians) or escape from areas being cleared. Current infrastructure development elevates the mortality risk to wildlife through wildlife-vehicle collisions along roads and highways and bird-wire collisions along transmission lines. Residential developments also contribute to wildlife mortality through bird-window collisions and predation by domestic cats. Domestic resource use, such as hunting and trapping, has and continues to be an activity that increases wildlife mortality risk throughout the RAA. The residual effects from these activities overlap with the residual effects of the Project on wildlife mortality risk, which are primarily risk of bird-wire collisions and increased predator and hunter access in previously inaccessible areas of the RAA (Section 9.5.3.3).

Future development of transmission lines, pipelines, roads/bypasses, residential areas, the Natural Gas Upgrade Projects and the Piney-Pinecreek Border Airport Expansion may have residual effects that interact with the Project's residual effects on wildlife mortality risk. The primary pathway for these interactions is through collision with vehicles and/or overhead wires and land clearing in residential developments. The Project's contribution toward cumulative effects on wildlife mortality risk is discussed in Section 9.7.3.

The Oakbank Corridor project is planned to occur during the Project's operation and maintenance phase. Increased construction traffic levels are not expected have effects on mortality risk that would overlap with residual effects from the Project. Due to the lack of temporal overlap of residual effects on mortality risk, cumulative effects on mortality risk are not discussed further for the Oakbank Corridor project. The MIT Capital Project is planned in the northeastern periphery of Winnipeg. Major routes to access this area are different from main routes used to access the

Project. For this reason, residual effects on mortality risk associated with increased construction traffic are not expected to have spatial overlap with residual effects of the Project. Consequently, effects associated with the MIT Capital Project is not discussed further.

9.6.2 Cumulative Effects Assessment for Change in Habitat Availability

The following section describes the contributions of the Project and future projects to direct and indirect changes in habitat availability in the context of existing conditions.

9.6.2.1 Cumulative Effects Pathways for Change in Habitat Availability

Residual effects arising from past, present and reasonably foreseeable future activities have similar pathways as those arising from the Project. These pathways are the direct loss or alteration of natural wildlife habitat through land clearing, and indirect effects on habitat due to forest fragmentation (resulting from land clearing) and sensory disturbance (*e.g.*, noise, activity) generated during Project construction and recreational use of Project areas.

Residual effects from future physical activities listed in Table 9-13 are anticipated to have minimal spatial overlap with the Project's residual effects on wildlife and wildlife habitat due to the localized nature of Project effects.

Although the St. Vital Transmission Complex and the Project share the Southern Loop Transmission Corridor, spatial overlap between these projects' residual effects occurs only at the Assiniboine, La Salle, and Red river crossings. In these areas, ROW clearing and the removal of trees is the pathway of effect for change in habitat availability.

The Richer South Station to Spruce Station Transmission Project may intersect the Project's New ROW near Richer Station. The transmission line routing process for the Richer South Station to Spruce Station Transmission Project has not yet occurred. The potential development area between the starting and endpoint consists of developed areas (*e.g.,* PTH 1), and forest and wetland complexes (*e.g.*, bogs). Depending on the location of the final route, residual effects on wildlife habitat availability may include the long-term alteration and fragmentation of some wildlife habitat. Residual effects from construction noise and activity may lead to temporary wildlife avoidance of the PDA and immediately adjacent areas. Both direct and indirect residual effects resulting from the future Richer South Station to Spruce Station Transmission Project are anticipated to overlap in space and time with residual effects of the Project in the vicinity of Richer Station.

Residual effects on wildlife habitat availability are expected to overlap where the St. Norbert Bypass Project and SLTC cross the La Salle River. Clearing of riparian areas for the St. Norbert Bypass Project would remove habitat and fragment existing riparian habitat. Noise and activity disturbance created during Project construction and operation may cause some wildlife to avoid

the adjacent areas of remaining habitat. Residual effects on wildlife habitat availability may also result from land clearing and habitat fragmentation within future residential developments.

9.6.2.2 Mitigation for Cumulative Effects for Change in Habitat Availability

Mitigation measures that will help avoid, reduce or eliminate Project environmental effects on change in wildlife habitat availability were presented in Section 9.5.2.2. Additional mitigation measures proposed to reduce the cumulative environmental effects on change in wildlife habitat availability include the following:

- For Manitoba Hydro projects occurring in the same geographic area, coordinate access requirements to reduce the need to construct additional access roads in areas of natural wildlife habitat.
- Manitoba Hydro will continue to support wildlife-related research efforts in the region including Manitoba's Breeding Bird Atlas.

9.6.2.3 Residual Cumulative Effects for Change in Habitat Availability

Land clearing is one of the key factors affecting the availability of wildlife habitat in the RAA. Approximately 62% of the RAA has been modified by agriculture and development (*i.e.*, townsites/residential sites, airstrips, linear infrastructure [transmission lines, roads, railroads, pipelines], mining [*e.g.*, gravel pits] and landfills) (Table 9-7).

The reasonably foreseeable future projects and activities anticipated to contribute to changes in wildlife habitat availability in the RAA are the St. Vital and Richer South Station to Spruce Station transmission projects, the St. Norbert bypass and residential development. Conversion of some forested habitat to open shrub and grass-dominated communities is anticipated in some of the areas where transmission projects overlap with the LAA, and riparian vegetation will be removed along the La Salle River during construction of the St. Norbert Bypass. Loss and fragmentation of habitat is possible in areas where residential development is planned. Residual effects from residential development may overlap with those of the Project in areas near Ste-Genevieve, Richer, La Broquerie.

Future projects will have a small contribution to indirect changes in wildlife habitat availability through habitat fragmentation, as most projects occur in heavily fragmented, agriculturally dominated landscapes that support few patches of intact habitat. The exception is the Richer South Station to Spruce Station Transmission Project, which may traverse areas of wetland and forest east of Richer near the TransCanada Highway.

There are no known reasonably foreseeable future projects or activities that would encroach on potentially sensitive wildlife habitats such as Sundown and Caliento bogs, nor are there known

projects that would increase fragmentation effects on large (>200 ha) intact patches of forested habitat.

To date, the cumulative loss of wildlife habitat in the RAA has contributed to reduced abundance of species at risk, most notably the grassland birds such as bobolink (COSEWIC 2010) and short-eared owl (COSEWIC 2008b), but also American badger (COSEWIC 2012a). Although these species are experiencing population declines, most continue to persist in the RAA where suitable habitat remains. Declines in forest birds such as golden-winged warbler and eastern whip-poor-will have been, in part attributed to the cumulative loss and/or fragmentation of suitable habitat throughout their range (Environment Canada 2014a; COSEWIC 2009); however, in Manitoba, eastern whip-poor-will are considered common (*i.e.,* S4S5 MB CDC ranking) (COSEWIC 2009). Some of the existing developments and activities in this area may contribute habitat for these species through the creation and maintenance of open, shrubby areas. For example, vegetation management practices along portions of existing transmission line ROWs such as R49R (230 kV) maintain open areas dominated by shrubs, herbs and grasses. In stands of deciduous or mixedwood forest, these open areas can provide suitable nesting habitat for golden-winged warbler and other species that prefer forest edge habitat. Similar, favorable habitat conditions for golden-winged warbler can also be created through forestry practices (Kubel and Yahner 2008).

The abundance and distribution of ovenbird (an indicator of forest ecosystem health) can be directly affected by changes in deciduous (*i.e.,* hardwood) forest patch size. Past and current developments have reduced forest patch size in areas of the RAA including near Ste. Genevieve and Richer; however, the Project's baseline surveys for breeding birds indicated that ovenbird was common throughout many of the deciduous-dominated forest patches surveyed in the RAA.

The cumulative loss or alteration of wildlife habitat in the RAA has contributed to changes in the distribution of many species such as black bear and wolf. Both species tend to occupy forested areas near Richer, Marchand, Sundown and Piney. In these portions of the RAA, populations of black bear and gray wolf are considered to be stable (Leavesley 2015, pers. comm.). White-tailed deer and coyote have adapted to changes in the landscape resulting from agriculture and development and thus are found throughout the RAA. Like black bear and gray wolf, populations of white-tailed deer and coyote are considered stable in the RAA. Elk have also adapted to changes in habitat, benefiting from forage crops in the RMs of Stuartburn and Piney (Wilcox 2012; Bilawchuk 2014, pers. comm.). The Vita elk herd's range includes the southern part of the RAA, and occupies a core area near Vita and Arbakka. The herd's population is considered stable and influenced primarily by hunting pressure (Leavseley 2015, pers. comm.).

In summary, the cumulative loss of wildlife habitat in the RAA has contributed to changes in the distribution and abundance of many wildlife species. Most wildlife and wildlife habitat occur in the eastern region of the RAA near Ste. Genevieve, Richer, Sundown and Piney. These areas have and continue to be affected by wildfire, a natural process that regenerates habitat for some species, such as moose and golden-winged warbler and removes it for others, such as American marten, and ovenbird. With the exception of SOCC, the populations of many species of wildlife inhabiting the RAA are considered stable despite cumulative effects on habitat availability. The cumulative effect for change in wildlife habitat availability is adverse as some habitat in the RAA

will be lost or altered as a result of the Project and reasonably foreseeable future projects; however, the magnitude of this effect is low due to the location of most projects on previously modified habitat. Residual cumulative effects of change in habitat availability will be continuous and permanent yet reversible upon the removal of infrastructure and rehabilitation of affected areas. The ecological context for the RAA is disturbed because most lands have been substantially disturbed by previous human development and human development is still present.

9.6.3 Cumulative Effects Assessment for Change in Mortality Risk

This section describes the pathways for cumulative effects on wildlife mortality risk, mitigation measures to reduce potential effects, and the residual cumulative effects on wildlife mortality risk once mitigation is considered.

9.6.3.1 Cumulative Effects Pathways for Change in Mortality Risk

The reasonably foreseeable future projects and activities listed in Table 9-13 have the potential to increase mortality risk to wildlife during the construction and operation and maintenance phases. Construction activities for these projects may increase mortality risk through a number of pathways such as ROW clearing which may result in the destruction of dens, burrows, hibernacula. Increased vehicle traffic associated with construction activities may increase the collision risk for wildlife.

The presence and operation of the Bipole III Transmission Project, St. Vital Transmission Complex and Richer South Station to Spruce Station Transmission Project will result in an additive increase in mortality risk to birds due to the potential for bird-wire collisions. Both the St. Vital Transmission Complex (SVTC) and the Project will cross the Red River in the SLTC, and Bipole III less than 20 km south of the SLTC. The Red River is an important corridor used by many species during the breeding and migration periods. Large-bodied birds like waterfowl are particularly vulnerable to bird-wire strikes in these areas.

Operation of new highway bypasses may increase the risk of vehicle collisions with wildlife. The risk is expected to be small for the Headingley Bypass Project, which is planned in a previously disturbed area that provides marginal habitat for wildlife. The St. Norbert Bypass Project may contribute to increased wildlife mortality as it will cross natural wildlife habitat at the La Salle River, less than 2 km upstream from where the Project and SVTC both cross. In residential developments, bird collisions with windows and predation by cats are primary pathways of effects contributing to increased mortality risk to birds.

9.6.3.2 Mitigation for Cumulative Effects for Change in Mortality Risk

Mitigation for Project effects on change in wildlife mortality is presented in Section 9.5.3.2. Manitoba Hydro's transmission projects—MMTP, the Bipole III Transmission Project, St. Vital Transmission Complex and Richer South Station to Spruce Station Transmission Project—have (or will have) designed routing and facilities to reduce potential effects on the environment, including environmentally sensitive sites that support wildlife and wildlife habitat. These projects have (or will have) identified timing windows, setbacks, buffers and beneficial management practices in their CEnvPPs to reduce their footprint and associated effects on wildlife. The key mitigation measure that will be implemented to reduce the cumulative effect of the Project in combination with effects from future projects include collision deterrent measures (*i.e.,* bird flight diverters) to reduce the potential for collisions with wires following wire installation. Bird diverters will be placed at environmentally sensitive sites. To reduce potential for increased hunter and predator access associated with access route and bypass trail development, existing trails and roads will be used to access the New ROW to the extent possible (Chapter 22 – Environmental Protection, Follow-up and Monitoring). The mitigation measures suggested for cumulative effects for change in habitat availability (Section 9.6.2.2) are also applicable for the cumulative effects for change in mortality risk.

9.6.3.3 Residual Cumulative Effects for Change in Mortality Risk

The heavily modified landscape of the RAA has already been and continues to be a source of mortality risk to wildlife. Collectively, the residual effects from agricultural and resource activities, residential developments, and roads and transmission projects have contributed to increasing the mortality risk to wildlife. Consequently, future physical activities and the Project will contribute to existing levels of mortality risk in the RAA. Contributions of future projects to change in mortality risk are anticipated to be small, as Manitoba Hydro's transmission line routing process considered sensitive wildlife habitats, including areas that concentrate wildlife such as wetlands and rivers. Where these areas cannot be avoided, application of appropriate mitigation measures (*e.g.*, bird flight diverters) will be applied.

For most projects included in the cumulative effects assessment, the period when a change in wildlife mortality risk would be most evident is during the operation and maintenance phase. Due to the pathways of effects, wildlife most vulnerable to cumulative effects are birds. Presence of multiple transmission line projects would increase the mortality risk to birds, particularly in areas where bird activity is concentrated (*e.g.,* river corridors). Project routing and application of standard mitigation (*e.g.*, bird flight diverters) are expected to reduce potential increases in mortality risk to birds in these areas where effects overlap with the Project. Future projects are not expected to improve hunter and predator access to wildlife because most projects occur in previously modified wildlife habitats, and/or in highly fragmented areas (including the Richer

South Station to Spruce Station Transmission Project, which is located in an area traversed by the TransCanada Highway). Increased traffic associated with construction and operation and maintenance of future projects may elevate mortality risk to wildlife through wildlife-vehicle interactions. This risk is expected to be small because most of the future projects occur in areas of modified wildlife habitat. For SOCC, cumulative effects contributing to change in mortality risk are expected to be minimal, because most of the future projects have limited overlap with potential SOCC habitats. The exception is the Richer South Station to Spruce Station Transmission Project, which is planned in an area that has potential to support forest and wetland SOCC habitats.

The cumulative effect for change in wildlife mortality risk is adverse as mortality risk will increase for some wildlife in areas of the RAA; however, the magnitude of this effect is low due to the location of most projects on previously modified wildlife habitat. Residual cumulative effects of change in wildlife mortality risk will be continuous and permanent yet reversible upon the removal of infrastructure. The ecological context for the RAA is disturbed because most lands have been substantially previously disturbed by human development and human development is still present.

9.6.4 Summary of Cumulative Effects

This section summarizes the cumulative effects analysis for change in wildlife habitat availability and change in mortality risk. Table 9-14 characterizes the cumulative environmental effects of the Project and other current and future projects and activities on wildlife and wildlife habitat. The determination of significance of the cumulative environmental effects outlined in Table 9-14 is discussed in Section 9.6.2.

Table 9-14 Summary of Cumulative Environmental Effects on Wildlife and Wildlife Habitat

Cumulative Effect	Residual Cumulative Environmental Effects Characteristics						
	Direction	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Context
Cumulative Effect on Change in Habitat Availability							
Cumulative Environmental Effect with the Project	A	L	RAA	P	C	R	D
Contribution from the Project to the overall cumulative environmental effect	The Project is located in an area that has been considerably disturbed from past and current projects and activities. When current and reasonably foreseeable future project effects on wildlife habitat are considered, the Project's contributions to direct change in habitat availability will be low in magnitude. Land clearing along parts of the New ROW will result in the conversion of less than 550 ha (4.8% of the forest cover in the RAA) to open grassland communities. Contributions of indirect effects on habitat availability are also expected to be small as the final preferred route avoids most of the RAA's remaining large (>200 ha) intact forest patches. Indirect effects on habitat resulting from construction noise and activity are expected to be localized and short-term.						
Cumulative Effect on Change in Mortality Risk							
Cumulative Environmental Effect with the Project	A	L	RAA	P	C	R	D
Contribution from the Project to the overall cumulative environmental effect	When current and future project effects on wildlife habitat are considered, the Project's contribution to direct change in mortality risk will be low in magnitude. The final preferred route avoids most of the RAA's remaining large (>200 ha) intact forest patches. The ROW may increase mortality risk to wildlife by improving hunter and predator access to wildlife within two remote areas of forested habitat in the Caliento Bog and Sundown Bog (near Menisino). To reduce mortality risk to wildlife, ROW clearing will occur outside of the sensitive breeding windows for wildlife and bird flight diverters will be installed at high collision risk sites. To the extent possible, existing roads and trails will be used to access the New ROW during construction.						

KEY

See Table 9-4 for detailed definitions.

Direction: *A: Adverse; N:Neutral; P: Positive*

Magnitude: *N: Negligible; L: Low; M: Moderate; H:High*

Geographic Extent: *PDA: ROW/Site; LAA: Local; RAA: Regional*

Duration: ST: Short-term; MT: Medium-term; P: Permanent

Frequency: S: Single event; IR: Irregular event; R: Regular event; C: Continuous

Reversibility: R: Reversible; I: Irreversible

Ecological Context: U:Undisturbed, D:Disturbed

N/A Not applicable

In summary, this Project, in combination with other future projects, will have small contributions to cumulative effects on wildlife and wildlife habitat. The transmission line routing process considered the potential change in habitat availability, and many of the future projects are located in previously disturbed, modified wildlife habitats. There are no known reasonably foreseeable projects or activities that would encroach on potentially sensitive wildlife habitats such as Sundown and Caliento bogs, nor are there known projects that would increase fragmentation effects on large (>200 ha) patches of forested habitat. Mitigation measures implemented for the Project and identified future transmission projects will involve the use of bird flight diverters to reduce mortality risk to birds at high collision risk sites.

9.7 Determinations of Significance

9.7.1 Significance of Environmental Effects from the Project

Most adverse effects on wildlife and wildlife habitat in the LAA were mitigated during the planning and transmission line routing process. This was accomplished by paralleling portions of existing transmission lines, avoiding the Vita elk herd's core range, and minimizing fragmentation of large tracts of intact forests and wetlands. Additionally, the Project will not conflict with the Provinces efforts to protect wildlife and wildlife habitat in WMAs, ecological reserves and other protected and candidate protected areas found within southeast Manitoba.

Land clearing and habitat fragmentation will result in the loss and alteration of some forest habitat. The amount of forest habitat affected by the Project (550 ha or 4.8% of the total amount of forest habitat in the LAA), is well below the 10% benchmark for potentially low magnitude effects on wildlife and wildlife habitat. During operation and maintenance, vegetation will naturally regenerate along parts of the ROW, providing habitat for some wildlife including white-tailed deer, moose, and species at risk such as golden-winged warbler. Changes in critical golden-winged warbler habitat are anticipated to be less than 1%, which is and well below the 5% benchmark for potentially low magnitude effects on species at risk. Changes in grassland and wetland bird SOCC habitat are anticipated to be negligible and limited to tower footprints.

Fragmentation effects are also expected to be small, as the Project will contribute 0.04 km/km^2 of new linear disturbance (approximately 1.3% increase above existing conditions). Species most vulnerable to increased edge effects and reductions in forest patch size are ovenbird (a forest interior species. Following the determination of a final preferred rout, the FPR avoids a large (greater than 90 ha) core patches of ovenbird habitat.

Mortality risk to wildlife was considered and reduced through the transmission line routing process. This was achieved by avoiding protected areas, through consideration of candidate protected areas and natural wildlife habitat in the routing process. Most of the Final Preferred Route traverses modified low quality wildlife habitat such as agricultural lands. While the Project will contribute to a small increase in the mortality risk to wildlife, measurable changes in the

abundance of black bear, white-tailed deer, elk, wolves, American marten, and migratory waterbirds including SOCC, are not expected. Winter clearing outside of the sensitive breeding season is anticipated to reduce risk to most wildlife breeding in the LAA, particularly SOCC such as golden-winged warbler and eastern whip-poor-will. The application of bird flight diverters in areas that concentrate birds are anticipated to reduce wildlife mortality risk to migratory birds such as waterfowl.

Measureable changes in the abundance of black bear, white-tailed deer and elk are not anticipated to result from increased access along the ROW. Within the RAA, populations of harvested species such as black bear and white-tailed deer are generally stable (Leavesley 2015, pers. comm.), despite the current level of fragmentation (2.38 km/km^2). The Vita elk herd is not anticipated to be affected by the Project and ultimately the final preferred route avoids the herd's core area. While the herd's range overlaps with the RAA, evidence to suggest they occur within the LAA is lacking. Despite efforts to detect overlap between this species occurrence and the LAA, none was found. Effects on bats are anticipated to be positive due to increased foraging opportunities along the ROW. The Project is not expected to affect bat hibernacula, as bat hibernacula are not expected to occur in the RAA based on expert knowledge (Willis 2014, pers. comm.), lack of surficial geology conducive to natural cave formations, and absence of historical archaeological excavations such as tunnels or caverns, or mining sites in the area. As defined in Section 9.3.2.4, significant effects on wildlife and wildlife habitat are those that:

- threaten the long-term persistence or viability of wildlife populations, including any effects that would lead to species extinction, extirpation or up-listing to special concern, threatened or endangered status;
- diminish the potential for or prolong threats to species recovery, such as effects that are contrary to or inconsistent with the goals, objectives or activities of federal recovery strategies and action plans; and
- diminish the capacity of critical habitat to provide for the recovery and survival of wildlife at risk.

With the application of mitigation and environmental protection measures, the Project's residual effects on wildlife and wildlife habitat are assessed as not significant. Residual effects are not expected to threaten the long-term sustainability of wildlife and wildlife habitat within the RAA, nor are they expected to diminish species recovery efforts or capacity of critical habitat to provide for the recovery and survival of SOCC.

9.7.2 Significance of Cumulative Environmental Effects

Past and current projects and activities have altered wildlife habitat throughout most of the RAA. Effects have been greatest in the Existing Corridor portion of the RAA. Human disturbances are present in the New ROW, but most of the area is still composed of native vegetation and wetlands. For wildlife, alteration of habitat has had the greatest effect on species dependent on grasslands, such as American badger, short-eared owl, and bobolink. As a result, many of these species have been designated as SOCC due to ongoing population declines throughout their range including in the RAA. The rate of land conversion to agriculture appears to have decreased or stabilized since the oldest large fire, which occurred in 1976 (Natural Resource Canada 2015). The area used for agriculture in southern Manitoba has generally decreased since 1976 and the extent of woodlots and wetlands was unchanged (AAFC and Manitoba Agriculture Food and Rural Initiatives 2009, 2011). The trend in grassland conversion is not clear but the area of grassland has likely decreased, although at a reduced rate.

Despite cumulative effects from past and current projects and activities, habitat for most forest-dwelling wildlife species including white-tailed deer, black bear, elk, moose, wolf, furbearers and bats, continues to be widespread and abundant throughout the eastern areas of the RAA. Forest and forest-edge dwelling SOCC such as golden-winged warbler have experienced declines in populations that are attributed, in part, to changes in habitat availability resulting from past and current projects and activities (Environment Canada 2014a). Habitat for forest and forest-edge dwelling species remains abundant and widespread throughout the eastern areas of the RAA near Ste. Genevieve, Richer and Sundown. In eastern parts of the RAA, past fires have helped shape habitat for species dependent on early successional plant communities, such as moose and golden-winged warbler, while decreasing habitat suitability for species dependent on mature forest, such as American marten and ovenbird. The Project will have small contributions to cumulative effects on forest and forest-edge SOCC and their habitats. For golden-winged warbler, new habitat is anticipated to re-establish along the parts of the ROW that traverse deciduous and mixedwood forest.

Cumulative effects for habitat fragmentation are not expected to affect the sustainability of wildlife in the RAA as many large (larger than200 ha) intact core patches of forest and wetland habitat remain. Landscapes with multiple large patches of core habitat typically have greater potential of maintaining biodiversity of species due to the range of habitats and successional stages capable of supporting a variety of wildlife.

Past and current projects and activities, as described in the current conditions for wildlife and wildlife habitat, have resulted in a change in availability of habitat compared to conditions of the late 19th and early 20th centuries contributing to the listing of some wildlife as species of special concern. Cumulative effects of the Project and reasonably foreseeable future projects are expected to be incremental to those of past and current projects and activities. These effects are not expected to threaten the long-term persistence or viability of wildlife populations, prolong

threats or diminish the potential of species recovery or reduce the capacity of critical habitat to provide for the recovery and survival of wildlife at risk. The cumulative effects of the Project and future projects on current conditions of wildlife and wildlife habitat are assessed as not significant.

9.7.3 Project Contribution to Cumulative Environmental Effects

The contribution of the Project residual effects to cumulative effects are not expected to further threaten the long-term persistence or viability of wildlife and wildlife habitat in the RAA relative to current baseline conditions.

The Project's contribution to cumulative effects on changes in wildlife habitat availability is additive to the residual effects from past, current and future projects and activities. The Project will directly alter 550 ha of natural wildlife habitat (primarily forest), a relatively small proportion (0.1%) of the overall change in wildlife habitat resulting from past, current and future projects and activities. Pathways of direct Project effects on wildlife habitat are associated primarily with ROW clearing along parts of the New ROW. Habitat will be altered as forest cover is removed and replaced by grass, herb and shrub-dominated communities. Some of the large patches of intact core habitats will experience fragmentation effects. The Project's contribution to cumulative levels of habitat fragmentation is 0.04 km/km^2, which is a small increase of 1.3% over existing levels (2.38 km/km^2) in the RAA. The Project is expected to have limited incremental contributions to cumulative effects on grassland habitats because the largest disturbance to grassland will be temporary, and isolated to the tower footprints and along the centre line trail.

The Project's contribution to cumulative effects on wildlife mortality risk is anticipated to be additive to the residual effects from past, current and future projects and activities. The Project may increase hunter, predator, and trapper access to previously intact, less accessible patches of core forested habitat along an overall length of 14 km in two areas. This is a small contribution to existing levels of linear disturbance. The Project's contributions to change in wildlife mortality risk is expected to be small as the Project's transmission line routing process considered natural wildlife habitat, particularly designated lands and protected areas and large intact patches of forested lands. Together this measure, along with commitments to clear outside of the sensitive wildlife breeding periods, the application of bird flight deflectors at sensitive sites, and other environmental protection measures (*e.g.*, no new access routes are planned within core forested habitat), collectively reduces the Project's overall contributions to change in wildlife mortality risk.

The operation of the Project is expected to increase mortality risk to birds through bird-wire collisions. Segments of the transmission line potentially having the highest contributions to mortality risk are along the Assiniboine River crossing (where two existing 230 kV transmission lines cross), the Red River crossing, and near Deacon's Reservoir (Wildlife and Wildlife Habitat TDR). The incremental increase in mortality risk from the Project is expected to be lessened by adding bird deflectors to overhead wires at high collision risk sites such as the river crossings and Deacon's Reservoir, and through paralleling portions of existing transmission lines (*e.g.*, M602F,

R49R). Paralleling existing linear corridors is generally encouraged in project planning to reduce habitat fragmentation effects (Jalkotzy *et al.* 1997).

The Project's contribution to cumulative effects on change in wildlife habitat is small (0.1%) relative to the proportion of the overall change in wildlife habitat resulting from past, current and future projects (over 62% of previously modified wildlife habitat in the RAA). Existing levels of habitat fragmentation will increase by 0.04 km/km^2 with the Project. In a relatively disturbed RAA, this is a small increase of 1.3% over existing levels of habitat fragmentation (2.38 km/km^2). The Project's contribution to cumulative effects is small, and not expected to measurably affect the long-term persistence or viability of wildlife and wildlife habitat in the RAA.

9.7.4 Sensitivity of Prediction to Future Climate Change

According to the climate change scenarios presented in the Manitoba-Minnesota Transmission Project Historic and Future Climate Study, temperature and precipitation are expected to increase in the future. Predicted monthly mean temperatures during the spring and summer months (May through September) are projected to increase by 1.3°C, 2.5°C, and 3.5°C in the 2020s, 2050s and 2080s, respectively. Predicted total precipitation amounts during this period are projected to increase by 2.5%, 1.5%, and 2.8% in the 2020s, 2050s and 2080s, respectively. Although wetter conditions are anticipated, precipitation amounts are projected to be lower than current levels for the month of July based for the 2050s and 2080s scenarios.

Effects of climate change on wildlife are expected to be a function of this anticipated increase in temperature and associated extreme weather events (*e.g.,* flooding, wildfires). Resulting effects on wildlife in the RAA may include:

- change in habitat availability resulting from extreme weather events such as wildfire
- reduced food availability (*e.g.,* shifts in the seasonal timing of insect emergence, rotting of food caches due to warmer temperatures)
- shifts in species ranges

Given the timelines associated with the predicted precipitation and temperature changes, wildlife will likely be able to overcome these challenges through shifts in ranges and the narrowing of the timing imbalance between wildlife breeding seasons (*e.g.,* timing of egg laying, insect emergence, calving) that is already being observed (Both et al. 2006).

The predicted climate change scenarios would not change the significance determinations for wildlife, as they are not anticipated to measurably increase the magnitude of effects of the Project on habitat availability or wildlife mortality.

9.8 Prediction Confidence

Prediction confidence is based on the quantity and quality of information compiled during desktop evaluations, KPIs, feedback received through the public and First Nations and Metis engagement processes, field surveys, data analyses and understanding of Project activities, location, and schedule. Prediction confidence is considered moderate overall, primarily because there is some uncertainty associated with the movement patterns of elk in relation to the LAA, and the suitability of managed ROW habitats for golden-winged warbler.

There is some uncertainty regarding the movements of elk between the core area near Vita (approximately 8 km west of the LAA) and areas supporting rare elk observations near Piney MB (Section 9.4.3). Despite extensive field studies, KPIs and desktop review, elk were not detected within the LAA. To address uncertainty associated with elk movement in relation to the LAA, monitoring and follow-up will focus on ungulates, including elk, during the construction and operation phases (Section 9.9).

Managed utility ROWs (greater than 60m wide) can provide suitable breeding for golden-winged warbler if vegetation control practices retain shrubs, grasses and forbs within the ROW (Confer and Pascoe 2003). The IVMP will have objectives to manage sections of the ROW for golden-winged warbler; however, there is some uncertainty in how golden-winged warbler will respond to management efforts. To address this uncertainty, monitoring and follow-up will focus on golden-winged warbler as one of the SOCC monitored during pre-construction and operation and maintenance phases (Section 9.9).

There is a high level of confidence in the effectiveness of the mitigation measures based on past project experience (*e.g.,* Wuskwatim Transmission Project, Bipole III). Bird flight diverters have been shown to be successful at reducing bird mortality by 50–80% (Jenkins *et al.* 2010; APLIC 2012), which is supported by the Wuskwatim Transmission Project bird mortality monitoring results (Section 9.2.3; Manitoba Hydro 2012c).

9.9 Follow-up and Monitoring

This section describes the monitoring and follow-up programs for wildlife and wildlife habitat and describes how programs will be implemented, and how information resulting from the programs will be applied.

Monitoring programs for wildlife and wildlife habitat will be implemented as part of the Environmental Protection Program (EPP). The Environmental Protection Program is a framework for implementation, management, monitoring and evaluation of protection activities in keeping with environmental effects identified in environmental assessments, regulatory requirements and public expectation. The EPP prescribes measures and practices to avoid and reduce adverse environmental effects on wildlife and wildlife habitat (*e.g.*, wildlife reduced risk work windows, setbacks and buffers for wildlife and sensitive wildlife habitat). The EPP will include an Environmental Monitoring Plan that will provide the detailed methods on how predicted changes

in wildlife habitat availability and mortality risk will be verified and how the effectiveness of mitigation strategies will be evaluated. The Biophysical Monitoring Plan will also identify reporting commitments and schedule.

Reports describing the results of follow-up and monitoring activities for wildlife and wildlife habitat may reveal the need for adaptive management to address unanticipated environmental effects. Unanticipated effects may require the application of additional mitigation or require modifications to existing mitigation measures. Knowledge gained through ongoing monitoring and associated analysis will be used to make recommendations for ongoing improvements to mitigation measures, the monitoring plan, methods, and analysis. Manitoba Hydro conducts its monitoring programs in an integrated fashion across all current projects so that knowledge gained from other project effects monitoring (*i.e.,* Bipole III) is available and applicable to this Project. The Environmental Monitoring Plan will identify the decision triggers or thresholds for when adaptive management action is required for wildlife and wildlife habitat.

The approach and methods used to monitor wildlife and wildlife habitat are consistent with many of those used by Manitoba Hydro on other current projects (*e.g.*, Bipole III) as well as past projects (*e.g.*, Wuskwatim Transmission Project, Keeyask Infrastructure Project). The results of past monitoring efforts and Project baseline studies together influenced the development of Project-specific monitoring programs presented in Table 9-15.

The key Project-related potential effects on wildlife and wildlife habitat are:

- increased bird-wire collision risk due to the presence of overhead wires
- increased wildlife mortality risk due to increased hunter and predator access in previously inaccessible areas
- change in habitat for some SOCC
- reduced habitat intactness (*i.e.*, loss of habitat for forest interior birds due to forest fragmentation)
- potential increased mortality of sharp-tailed grouse where leks occur in proximity to towers
- disturbance to snake hibernacula
- disturbance to mineral licks
- loss of existing raptor nests along the ROW
- disturbance to northern leopard frog breeding and/or overwintering habitat

The intention of monitoring is to evaluate residual effects of the Project in comparison with baseline conditions and address uncertainty in the prediction confidence associated with elk movement patterns and use of ROW habitats by golden-winged warbler (Section 9.8). For example, for the large mammal survey, paired camera traps were located on and adjacent to route segments in order to capture baseline data on wildlife activity. These data will be compared to camera trap data gathered during the operation and maintenance phase to identify any

potential changes in wildlife activity resulting from the Project. Monitoring data gathered from camera traps, aerial surveys and/or other methods will be used to address uncertainty in elk movement patterns in the southern portion of the LAA. The uncertainty associated with the suitability of managed ROW habitats for golden-winged warbler will be addressed through operation monitoring, which will focus on the characteristics of the managed ROW vegetation community and golden-winged warbler occurrence.

Monitoring and follow-up commitments for wildlife and wildlife habitat are summarized in Table 9-15. The primary potential effect on mammals is increased mortality risk resulting from increased hunter and predator access in previously inaccessible, forested areas. To determine whether the New ROW is having an effect on the distribution of predators in the RAA, monitoring and follow-up will target ungulates (*e.g.,* elk, white-tailed deer) and wolf, coyote and bear use of ROW and non-ROW areas during the operation and maintenance phase. Aerial-based winter track surveys and remote camera traps could be used to enhance monitoring efforts for mammals. Another potential effect on mammals is the disturbance of sensitive wildlife features such as mineral licks. Pre-construction surveys for mineral licks will be conducted along parts of the ROW traversing wildlife habitat.

For birds, the primary concern is mortality arising from bird-wire collisions. Bird-wire collision mortality will be monitored to assess the effectiveness of bird flight diverters during the operation and maintenance phase. Monitoring will occur at high-risk sites with bird flight diverters following methods used during baseline studies (*i.e.*, Environment Canada 2007; Lausen *et al.* 2010; ESRD 2011; Wildlife and Wildlife Habitat TDR).

Additionally, some birds, particularly SOCC, may be affected by change in habitat availability. Golden-winged warbler, listed as Threatened by SARA, is particularly sensitive to changes in shrub and herbaceous cover along deciduous and mixedwood forest edge. Monitoring will focus on golden-winged warbler response to habitat changes (*i.e.*, initial removal and subsequent regeneration of shrubs and herbaceous cover) along select segments of the New ROW. Monitoring of other SOCC species in their preferred habitats will also occur.

Sharp-tailed grouse are particularly vulnerable to increased rates of predation by raptors where leks occur in close proximity to transmission towers. In order to determine where the Project might elevate predation risk for grouse, pre-construction surveys for sharp-tailed grouse leks will occur along portions of the New ROW not previously surveyed. Areas targeted will be where towers overlap with potentially suitable grouse habitat (*i.e.*, grassland). The need for bird perch deterrents, such as porcupine wire or triangles on towers to discourage birds of prey from perching will be evaluated based on tower locations and results from baseline and pre-construction lek surveys. The effectiveness of this mitigation will be assessed by monitoring the abundance of sharp-tailed grouse and raptors in areas where perch deterrents are implemented. Another potential effect on birds is the disturbance of sensitive wildlife features such as raptor nests. Pre-clearing surveys for raptor nests will be conducted along parts of the ROW traversing wildlife habitat.

The primary concern for herptiles is disturbance to breeding and overwintering sites during construction. In order to reduce the potential for Project-related disturbance, pre-construction surveys for snake hibernacula will occur at tower locations near Sundown Road and Lonesand Lake. This area has the potential to support snake hibernacula based on observations of snakes crossing the road (see Section 9.4.5 and Wildlife and Wildlife Habitat TDR). If hibernacula are identified, a 200 m setback will be applied as per the CEnvPP. Follow-up monitoring will measure the effectiveness of the setback by assessing snake abundance at hibernacula.

To reduce construction-related disturbance to northern leopard frog, pre-construction wetland amphibian surveys will be conducted to identify any additional sensitive northern leopard frog breeding and/or overwintering sites within PDA. Surveys will target wetlands and watercourses not previously surveyed during baseline environmental surveys (Wildlife and Wildlife Habitat TDR). To establish a benchmark for wetland condition prior to construction, water quality parameters will be measured at wetlands supporting northern leopard frog. A 30 m buffer will be applied to the edges of wetlands as per the CEnvPP. Follow-up surveys for northern leopard frogs and measurement of water quality parameters will occur during the operation and maintenance phase to assess the effectiveness of wetland buffers.

To verify EIS predictions regarding change in habitat availability and mortality risk, and to evaluate the effectiveness of mitigation for wildlife and wildlife habitat, nine monitoring programs will be implemented over the Project's pre-construction, construction and operation and maintenance phases. These monitoring programs are consistent with those used in previous and current Manitoba Hydro transmission projects, including the most recently licensed Bipole III Transmission Project. For this Project, change in habitat use by ungulates and predators, including bears, in response to the New ROW will be monitored in areas of the Final Preferred Route where baseline studies occurred, including in the two areas (*i.e.*, Caliento Bog and Sundown Bog) where new predator and hunter access is created. Pre-construction searches for mineral licks and raptor stick nests will also occur along parts of the ROW traversing wildlife habitat. Change in mortality risk to birds and effectiveness of bird deterrents will be verified through bird-wire collision mortality monitoring at select sites along the ROW, changes in bird SOCC will monitored through point count surveys, and changes in sharp-tailed grouse abundance will be monitored through lek surveys. Snake hibernacula investigations along select portions of the New ROW will occur prior to tower installation. If snake hibernacula are found, the effectiveness of mitigation applied (*i.e.*, setback) will be verified through follow-up monitoring.

Table 9-15 Wildlife Monitoring and Follow-Up Activities

Component	Key Monitoring Activity	Phase	Task Description	Duration	Frequency
Mammals	Change in ungulate and predator habitat use	Construction	Monitor changes in ungulate, coyote and wolf prevalence along the New ROW and in adjacent areas using winter aerial track surveys and remote cameras	1–2 years	Track surveys once per year; continuous monitoring using remote cameras
		Operation and maintenance		2 years	Track surveys once per year; continuous monitoring using remote cameras
	Change in black bear activity	Construction	Monitor changes in black bear prevalence in areas along New ROW and in adjacent areas using and remote cameras	1–2 years	Continuous monitoring using remote cameras
		Operation and maintenance		2 years	
	Mineral lick survey	Pre-Construction	Aerial search for mineral lick	1 year	Once prior to ROW clearing
Birds	Bird-Wire Collision Mortality	Operation and maintenance	Searches for bird carcasses in Environmentally Sensitive Sites (*i.e.*, in areas with bird diverters) and in reference sites (areas without diverters)	2 years	Spring and fall migration periods
	SOCC	Pre-Construction	Point count surveys in select areas of the PDA known to support SOCC	1 year	Breeding period

Component	Key Monitoring Activity	Phase	Task Description	Duration	Frequency
		Operation and maintenance	Point count surveys in select areas of the PDA with potential SOCC habitats	Year 1, 3 and 5	Breeding period
	Sharp-tailed Grouse Lek Survey	Pre-Construction	Searches for grouse leks in potential sharp-tailed grouse habitat located within the PDA	1 year	Once during spring breeding period
		Operation and maintenance	Resurvey known grouse leks found within 500 m of ROW	2 years	Once during breeding period
	Raptor Nest Survey	Pre-Clearing	Aerial survey for raptor nests	1	Once in the fall, prior to clearing
Herptiles	Snake Hibernacula Survey	Pre-Construction	Investigate specific areas of the PDA having high potential to support snake hibernacula	1 year	Once in the spring and once in the fall (September)
		Operation and maintenance	Revisit any identified snake hibernacula to monitor abundance	2 years	Once in the spring and once in the fall (September)
	Wetland Amphibian Survey	Pre-Construction	Assess presence of northern leopard frog at wetland sites located on or adjacent to the PDA	One-time	Once during northern leopard frog breeding period (May) and once during the fall at potential overwintering sites
		Operation and maintenance	Revisit wetland sites to monitor presence of northern leopard and assess whether wetland mitigation was successful.	2 years	Once during northern leopard frog breeding period (May)

9.10 Summary

Wildlife and wildlife habitat is considered a valued component because it is a critical part of a functioning ecosystem and plays a vital role in ecological and biological processes. Sustainable wildlife populations and intact wildlife habitat are often indicative of a healthy ecosystem, as key biological processes and interactions must be in place for some key wildlife species to exist.

Currently, only 38% of the RAA is considered natural wildlife habitat (*e.g.*, forest, grassland, wetland; MCWS 2001). The remainder of the RAA is used for agriculture (47%) or is developed (15%). The predominance of agriculture is particularly evident along the SLTC and in the western part of the RAA near the Glenboro South Station. Natural wildlife habitat is more prominent where the New ROW traverses the RAA.

Key wildlife and wildlife habitat issues raised during the engagement processes were wildlife habitat changes, wildlife mortality, and wildlife disturbance.

During the transmission line routing process (Chapter 5 – Transmission Line Routing), Manitoba Hydro considered interactions between the Project and wildlife and wildlife habitat, as well as any associated adverse agricultural, other biophysical and socio-economic interactions. Considerations were made to reduce potential Project effects on wildlife and wildlife habitat through avoidance or mitigation by design. These considerations were influenced by information received during the engagement processes as well as through recent Manitoba Hydro project experience (*e.g.,* Bipole III and Clean Environment Commission recommendations [MB CEC 2013]), and field studies.

The following avoidance and design mitigation measures were considered particularly important:

- avoidance of proposed and existing protected areas (*e.g.*, Spur Woods and Watson P. Davidson wildlife management areas [WMAs];
- avoidance of large tracts of boreal forest and wetland (*e.g.*, Sandilands Provincial Forest) located east of Marchand; and
- avoidance of the area known to support the Vita elk herd (near Vita).

The residual effects on wildlife and wildlife habitat include:

- a change in the amount and type of wildlife habitat along the New ROW (550 ha of forest cover will be removed along portions of the New ROW and replaced with an open shrub and grass dominated plant community);
- a change in the amount of critical golden-winged warbler habitat;
- a change in the amount of potential American marten habitat within the LAA;
- a change in the level of linear disturbance in the RAA;

- a change in the size and number of core (greater than 200 ha) habitat patches; and
- a change in wildlife mortality risk associated with increased hunter and predator access, overhead wires, and winter construction.

The final preferred route determined resulted in minimal overlap with designated and protected lands and large patches of intact forest, thus reducing potential project effects. Other key Project-specific mitigation that will reduce effects on wildlife and wildlife habitat include conducting ROW clearing activities outside of the reduced-risk timing windows for wildlife species, sighting towers outside of wetlands, maintaining 30 m buffer zones around wetlands, and buffering active dens and stick nests from construction activity until unoccupied. In sensitive areas of critical golden-winged warbler habitat, the Integrated Vegetation Management Plan (Chapter 22 – Environmental Protection, Follow-up and Monitoring) will contain objectives to manage ROW vegetation to enhance suitability for golden-winged warbler. Bird mortality risk will be reduced at environmentally sensitive sites using bird flight diverters on overhead wires, and construction activities will be restricted to established roads, trails and cleared construction areas to limit the creation of new predator and hunter access.

To verify EIS predictions and address uncertainty regarding change in habitat availability and mortality risk, as well as evaluate the effectiveness of mitigation for wildlife and wildlife habitat, nine monitoring programs will be implemented over the Project's pre-construction, construction and operation and maintenance phases. These monitoring programs are consistent with those used in previous and current Manitoba Hydro transmission projects, including the most recently licensed Bipole III. For the Project, change in habitat use by ungulates and predators, including bears, in response to the New ROW will be monitored in areas where predator access is enhanced. Pre-construction searches for mineral licks and raptor stick nests will also occur along parts of the ROW traversing wildlife habitat. Change in mortality risk to birds and effectiveness of bird deterrents will be verified through bird-wire collision mortality monitoring at select sites along the ROW, changes in bird SOCC will monitored through point count surveys, and changes in sharp-tailed grouse abundance will be monitored through lek surveys. Snake hibernacula investigations along select portions of the New ROW will occur prior to tower installation. If snake hibernacula are found, the effectiveness of mitigation applied (*i.e.*, setback) will be verified through follow-up monitoring.

In summary, the Project will have adverse, low in magnitude effects on wildlife and wildlife habitat that are limited to the PDA or LAA. The frequency and duration of effects range from short-term to permanent and a single event to continuous. All Project effects on wildlife and wildlife habitat are predicted to be reversible and not significant.

Projected climate changes will not alter the significance determinations for wildlife and wildlife habitat because they are not expected to measurably increase the magnitude of Project effects.

Past and current projects and activities, as described in the current conditions for wildlife and wildlife habitat, have resulted in a change in availability of habitat compared to conditions of the late 19th and early 20th centuries contributing to the listing of some wildlife as species of special concern. Cumulative effects of the Project and reasonably foreseeable future projects are

expected to be incremental to those of past and current projects and activities. These effects are not expected to threaten the long-term persistence or viability of wildlife populations, prolong threats or diminish the potential of species recovery or reduce the capacity of critical habitat to provide for the recovery and survival of wildlife at risk. The cumulative effects of the Project and future projects on current conditions of wildlife and wildlife habitat are assessed as not significant.

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9.11.2 Personal Communication

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