MANITOBA-MINNESOTA TRANSMISSION PROJECT

Biophysical Technical Data Reports

1.3 Wildlife and Wildlife Habitat

Manitoba-Minnesota Transmission Project
Wildlife and Wildlife Habitat – Technical Data Report

Final Report

Prepared for:
Manitoba Hydro
360 Portage Avenue
Winnipeg, MB R3C 0G8

Prepared by:
Stantec Consulting Ltd.
603-386 Broadway
Winnipeg, MB R3C 3R6

111420050

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Sign-off Sheet

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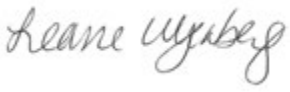
Prepared by  (signature)

Leane Wyenberg, M.Sc.

Reviewed by  (signature)

Marcel Gahbauer, Ph.D., B.Sc.

Approval to transmit:  (signature)

George Rempel, P.Eng.

Stantec

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Abbreviations

AIC	Akaike Information Criterion
ASI	Areas of Special Interest
ATK	Aboriginal Traditional Knowledge
BCI	Bat Conservation International
CLI	Canadian Land Inventory
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DUC	Ducks Unlimited Canada
EC	Electrical Conductivity
EIS	Environmental Impact Statement
ESRD	Environment and Sustainable Resource Development
FPR	Final Preferred Route
FRI	Forestry Resource Inventory
GHA	Game Hunting Areas
HSI	Habitat Suitability Index
IBA	Important Bird Area
KPI	Key Person Interviews
LAA	Local Assessment Area
LCC	Land Cover Classification
MASC	Manitoba Agricultural Services Department
MB CDC	Manitoba Conservation Data Centre
MESEA	Manitoba *Endangered Species and Ecosystems Act*
MMTP	Manitoba-Minnesota Transmission Project
MN DNR	Minnesota Department of Natural Resources
NCC	Nature Conservancy Canada
NRO	Natural Resource Officer

PDA	Project Development Area
PFRA	Prairie Farm Rehabilitation Administration
PPR	Prairie Pothole Region
PTH	Provincial Trunk Highway
RAA	Regional Assessment Area
RM	Rural Municipality
ROW	Right-of-Way
RPA	Route Planning Area
SARA	*Species at Risk Act*
SK MOE	Saskatchewan Conservation Data Centre
SLTC	Southern Loop Transmission Corridor
SOCC	Species of Conservation Concern
SOP	Standard Operating Procedures
TDR	Technical Data Report
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
USGS	United States Geologic Survey
VES	Visual Encounter Surveys
WMA	Wildlife Management Area

Glossary

Aboriginal Traditional Knowledge	Information that is based on cultural heritage and resource use that is unique to First Nations Peoples.
Bait station	A site where food and attractants are used to lure in wildlife, particularly for the purposes of bear hunting.
Bycatch	Incidental capture of non-target wildlife species.
Camera trap	A motion-detecting camera that is used that collect data on wildlife passing by.
Critical habitat	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]).
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.
Herptile	Reptiles and amphibians.
Hibernacula	Habitat used by reptiles and amphibians for overwintering.
Hibernate	A period of dormancy when heart, breathing, and metabolic rates slow drastically.
Local Assessment Area (LAA)	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.
Project Development Area (PDA)	The footprint of the Project where physical disturbance is expected to occur.
Refined alternate routes	Transmission line routing options that remain after other, less desirable routes have been removed from consideration.
Regional Assessment Area (RAA)	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.
Route planning area	The larger planning area in which alternative routing options were considered. It was used for the alternative route evaluation and preferred route selection process only.
Snag	A dead tree.
Species richness	The number of species in a given community.
Ungulates	Hooved animals such as deer, elk and moose.
White Nose Syndrome	An often fatal fungal infection of the nasal and wing membranes of hibernating bats.

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this TDR is to describe the existing conditions for wildlife and wildlife habitat in the region that would support the Project. Wildlife and wildlife habitat was selected as a VC as many different types of wildlife species, species guilds, and the habitats they depend upon are valued for cultural, spiritual, ecological and regulatory reasons. Information on wildlife and wildlife habitat is primarily presented and discussed in three broad ecological groupings: mammals, birds and herptiles (*i.e.,* amphibians and reptiles).

This TDR contains information that was used to guide the transmission line route selection process and inform EIS predictions of potential Project-related effects on wildlife and wildlife habitat. It describes how desktop information was gathered, and how information gaps were identified and addressed through additional desktop research, KPIs and field studies. Results of the studies are reported and summarized to provide an overview of existing conditions for wildlife and wildlife habitat.

Information gathering was guided by the key wildlife and wildlife habitat issues identified during an examination of Project linkages. Table 1-1 summarizes the key issues that were identified by the Project team, stakeholders, regulators, input from First Nations and Metis, and the public for wildlife and wildlife habitat located in the RAA.

Table 1-1 Key Issues Identified for Wildlife and Wildlife Habitat

Key Issues	Comments
Habitat loss and alteration	Removal of habitat through clearing and grubbing in areas where grasslands, wetland and or forests occur (*e.g.*, changes to critical golden-winged warbler habitat). Habitat fragmentation (*e.g.*, **edge effects**), particularly in areas supporting intact forest such as found within the Sandilands Provincial Forest. Sensory disturbances (*e.g.*, noise) that would make the remaining habitat less suitable for certain wildlife. Loss of traditional First Nations hunting areas (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).
Collisions with Transmission Lines	Bird mortality is expected to primarily result from collisions with shield wires and conductors, especially in areas where birds concentrate (*e.g.*, wetlands).
Disturbance to nesting birds	Disturbance to nesting birds could occur throughout the Project.

Table 1-1 Key Issues Identified for Wildlife and Wildlife Habitat

Key Issues	Comments
Herptile mortality	Herptile mortality could occur in construction areas that support breeding and/or overwintering habitat (*e.g.*, snake hibernacula). Winter construction in wetlands could endanger overwintering amphibians and reptiles if exposed at tower locations.
Change in mammal and/or herptile movement patterns	Construction noise and activity and/or changes in landscape connectivity may alter movement patterns of some species.
Increased access	Linear ROWs are known to increase access for both human and animal predators. This may lead to increased risk of wildlife mortality.
Disturbance to wildlife	Concerns raised that Project construction activities and post-construction recreational use of the ROW would disturb wildlife.
Elk, deer, and moose mortality	Some of the preliminary route options were located in the areas inhabited by the Vita elk herd. There was concern that a transmission line in this area could lead to increased elk mortality as a result of increased hunter and predator access. Concern that increased access along the New ROW could lead to increased elk mortality if the herd moves its core area to areas east near Piney. Concerns of how the New ROW will impact traditional First Nations hunting of elk, deer, and moose (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

1.2 BACKGROUND

1.2.1 Project Overview

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

1.2.2 Project Area

In Canada, stratification has been used to delineate areas of unique ecological characteristics into hierarchical ecological units, from the broadest (ecozone) down to ecoregion and finally ecodistrict as the most localized unit (Smith *et al.* 1998). The Project is located in an area of southern Manitoba that spans three ecozones, four ecoregions, and five ecodistricts (Table 1-2).

From east to west, the Project lies within the humid, transitional mixedwood forests of the Lake of the Woods Ecoregion (Piney, MB), the transitional Interlake Plain Ecoregion consisting of mixedwood and coniferous forests interspersed with fens, bogs, and meandering streams (Ste.-Genevieve and Ross, MB) and an agriculturally-dominated portion of the Aspen Parkland and Lake Manitoba Plain Ecoregions (Glenboro, MB; Map 1-1 Ecoregions and Ecozones Traversed by the Project Area and Map 1-2 – Ecoregions and Ecodistricts at the Glenboro South Station) (Smith *et al.* 1998).

Table 1-2 Hierarchical Ecological Units Traversed by the Project

Unit	Designation				
Ecozone	Boreal Shield		Boreal Plains	Prairies	
Ecoregion	Lake of the Woods		Interlake Plain	Lake Manitoba Plain	Aspen Parkland
Ecodistrict	Piney	Stead	Steinbach	Winnipeg	Stockton

Agriculture is the predominant land use within the Project area (Appendix A, Map 1-3 – Landcover in the Project Area and Appendix A, Map 1-4 Landcover near the Glenboro South Station; Vegetation and Wetland TDR). Most of the lands surrounding Winnipeg to Anola, MB, and Glenboro, MB, have been converted to agriculture, although some small patches of wildlife habitat remain along the Red River, Assiniboine River, La Salle and Seine River. Undeveloped lands provide wildlife habitat in eastern parts of the Project area near Richer, Sundown and Piney, where large bog complexes, fens, marsh, and forest habitat occur. These areas provide habitat for a diversity of wildlife such as white-tailed deer, black bear, coyote, wolf, **furbearers**, migratory birds, frogs, turtles and snakes. The largest open-water habitats in the region are the Red River, Assiniboine River, Deacon Reservoir (a four-celled storage reservoir for municipal water supply), Lonesand Lake, Sundown Lake, and the Richer Lakes (Appendix A, Map 1-5 – Notable Waterbodies in the Project Area). These waterbodies provide habitat for waterbirds, particularly waterfowl during the spring and fall migration periods. The Red River is a travel corridor for birds, particularly raptors (HMANA 2015), and other wildlife.

A number of designated lands and protected areas exist within the Project area. The largest are the Provincial forests, which extend west and south of Marchand, MB, and encompass the Watson P. Davidson Wildlife Management Area (WMA), Spur Woods WMA, Areas of Special Interest (ASI), and proposed protected areas (Appendix A, Map 1-6 – Designated Lands and Protected Areas in the Project Area). The Spruce Woods Provincial Park, Spruce Woods WMA

and Assiniboine Corridor WMA exist north of the Glenboro South Station (Appendix A, Map 1-7 – Designated Lands and Protected areas near the Glenboro South Station). The Project area supports a large urban centre (*i.e.,* Winnipeg), a number of small towns, railways, roads, highways and existing transmission lines (*e.g.*, M602F, 230 kV R49) (Appendix A, Map 1-1 – Ecoregions and Ecozones traversed by the Project and Appendix A, Map 1-2 – Ecoregions and Ecodistricts at the Glenboro South Station). Four 230 kV transmission lines (*i.e.,* D14S, D15Y, D55Y, D11Y) are located within an existing transmission corridor that loops west and south along the outskirts of Winnipeg. These lines originate at the Dorsey Converter Station and cross the Assiniboine River at Headingly, MB. A 500 kV transmission line (M602F) extends east from the Riel Station before turning southwards near Vivian, MB to the Manitoba border (Appendix A, Map 1-1 – Ecoregions and Ecozones traversed by the Project). A 230 kV (R49R) line traverses areas near Ste-Genevieve and Richer, MB. This line parallels M602F through the Sandilands Provincial Forest (Appendix A, Map 1-6 – Designated Lands and Protected Areas in the Project Area).

The Project consists of three components: the existing transmission corridor, New ROW and Glenboro South Station. Initial studies, including desktop review, Key Person Interviews (KPIs), and field programs (Section 2) were undertaken to develop an understanding of wildlife and wildlife habitat within areas traversed by these components. Data collection associated with the New ROW occurred within the **Route Planning Area** (RPA), a broad area that supported a number of routing options between Steinbach and Sprague, MB (Appendix A, Map 1-8). Information gathered in the RPA provided input to the evaluation of alternative route segments during the route selection workshops. Data gathered for the RPA were also used and applied towards the Final Preferred Route (FPR) determined in May of 2015.

1.2.2.1 Existing Transmission Corridor (Existing Corridor)

Manitoba Hydro has been planning, acquiring and easing land for dedicated transmission corridors that contain multiple transmission lines since the early 1960s in an effort to minimize the effects of multiple independent ROWs in an area subject to extensive development surrounding the City of Winnipeg. The purpose of this is to form a corridor that would house multiple transmission lines connecting stations around Winnipeg for the purposes of enhanced reliability and movement of power into and out of the Winnipeg centered grid. Manitoba Hydro will utilize two existing corridors; the SLTC which traverses from Dorsey Converter Station to southeast Winnipeg and the Riel – Vivian Transmission Corridor which traverses from Riel Converter Station eastward to south of Vivian, MB.

The Existing Corridor lies within the Winnipeg ecodistrict which is part of the Lake Manitoba Plain ecoregion. Prior to human settlement, the Lake Manitoba Plain ecoregion consisted of tall grass prairie with trembling aspen (*Populus tremuloides*) and bur oak (*Quercus macrocarpa*) groves. Currently, the Lake Manitoba Plain ecoregion is dominated by agricultural development. Within the Existing Corridor, lands are highly impacted by residential, industrial, and agricultural development.

Except for sparse aspen stands and oak-treed margins of the Assiniboine, LaSalle, Red and Seine Rivers that may be used by breeding migratory birds, very little cover exists for wildlife. The rivers, however, are important habitat for staging waterfowl, fish and overwintering northern leopard frogs. White-tailed deer, coyote, hairy woodpecker, and black-billed magpie are also characteristic wildlife species of the area. The cropland-dominated landscape provides high-quality feeding opportunities for migrating waterfowl, particularly Canada geese. This, combined with roosting sites on the rivers and retention ponds within Winnipeg, results in large influxes of birds during spring and fall migrations. The greatest threats to wildlife in the Existing Corridor include the degradation, fragmentation, and loss of habitat, due to agricultural conversion and forestry, unregulated hunting, and mortality associated with human structures (*e.g.*, vehicle collision, towers, power lines, buildings).

1.2.2.2 New Right-of-Way (New ROW)

From the Existing Transmission Corridor south of Anola, MB, the D604I transmission line will proceed south-east within a New ROW for approximately 121 km to the Manitoba-Minnesota Border. This New ROW has been selected using selection criteria that balance the three perspectives of Built, Natural and Engineering. This proposed ROW is between 80 to 100 m wide to accommodate self-supporting and guyed towers.

A large portion of the New ROW is located within the Steinbach Ecodistrict, which varies from low-lying mixedwood forests interspersed with clearings for agricultural crops, pastures, and hay fields to sandy ridges of jack pine forest. Infertile or poorly drained soils limit agricultural development due to poor soil productivity and cost of clearing. The Steinbach Ecodistrict exists as a narrow transitional zone between the Prairie Ecozone to the west and the Boreal Shield Ecozone to the east. The mix of forest and clearings in this transitional zone provide a diversity of habitats for species such as white-tailed deer, black bear, gray wolf, ruffed grouse, sandhill crane, pileated woodpecker, eastern whip-poor-will, golden-winged warbler, ovenbird, and northern leopard frog (Smith *et al.* 1998). Less common species include elk near Vita and Arbakka, MB. The greatest threat to wildlife in the Steinbach Ecodistrict is the degradation and loss of aquatic and terrestrial habitats.

The southern part of the New ROW is located in the Stead and Piney Ecodistricts, which are characterized by humid, mixedwood and black spruce forests that are low-lying and dotted with bogs, rocky outcrops, and meandering streams. There is little agriculture in the area but some forestry exists. Large patches of undisturbed habitat support species such as white-tailed deer, black bear, gray wolf, marten, fisher, spruce grouse, great gray owl, and yellow-rumped warbler. Less common species include moose. The greatest threat to wildlife in the Stead and Piney Ecodistricts is fragmentation of habitat by human disturbance.

1.2.2.3 Stations

The Dorsey and Riel Stations are located in areas dominated by agriculture (*i.e.,* cropland). The Riel Station is surrounded by agricultural fields to the north and east, the Red River floodway to the west, and the Deacon Reservoir to the south. Both the Red River Floodway and Deacon Reservoir attract waterbirds (*e.g.*, geese, ducks, gulls) during the spring and fall migration periods. The Dorsey Station however, is completely surrounded by open farm fields that offer little minimal habitat for wildlife.

The Glenboro South Station is located approximately 137 km west of the Existing Corridor. It lies within the Stockton Ecodistrict which is part of the Aspen Parkland Ecoregion, within the Prairie Ecozone.

The local area surrounding the station is noticeably altered into a crop-dominated landscape divided by treed windrows and farmyards (Appendix A, Map 1-4 – Landcover near Glenboro South Station). Suitable habitat for wildlife in the ecodistrict exists in the form of several pothole wetlands and the Assiniboine River and associated aspen stands. Characteristic wildlife species include white-tailed deer, coyote, striped skunk, raccoon, mallard, and black-billed magpie. The greatest threats to wildlife in this region include the degradation of aquatic habitats and mortality associated with human made structures (*e.g.*, highways, towers, power lines).

1.2.3 Spatial Boundaries

The planning and implementation of wildlife field studies occurred in 2014 and early 2015. Field investigations focused on the multiple **refined alternate routes** (as well as the Existing Corridor and stations) that were being considered at the time spring 2014, summer, and fall 2014 field work occurred. These refined alternate routes existed within the broader RPA (Appendix A, Map 1-8). Following the selection of the FPR in May 2015, data on wildlife and wildlife habitat were analyzed at three spatial scales: the Project Development Area (PDA), Local Assessment Area (LAA) and Regional Assessment Area (RAA).

- **Project Development Area (PDA):** The 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 Appendix A, Map 1-9 – Project Infrastructure).
- **Local Assessment Area (LAA):** The 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):** The RAA includes the PDA, LAA and a 15 km buffer around all components of the PDA (Appendix A, Map 1-9 – Project Infrastructure). The RAA is large enough to encompass the home ranges or dispersal distances of the most wide-ranging species in this assessment, including black bear (5-25 km^2 [females; Government of British Columbia 2001]), white-tailed deer (89 km^2 [Fisher *et al.* 2013]), elk (12-52 km^2 [Jones 1997]) and red-sided garter snake (up to 18 km dispersal from breeding grounds to hibernacula [Gregory and Stewart 1975]). The RAA is supported by the baseline field studies and KPIs. It is used to determine the significance of project-specific effects on wildlife and wildlife habitat and assess cumulative effects.

2.0 WILDLIFE AND WILDLIFE HABITAT

2.1 GENERAL APPROACH

Wildlife and wildlife habitat is a broad VC that focuses primarily on three groups of animals: mammals, birds and herptiles, and three native habitat types: forest, grassland and wetland (including streams and rivers). Within the animal groups, focus has been given to particular species or species assemblages in response to key issues identified in Section 1.1. Species of Conservation Concern (SOCC) have been given focus throughout this report and are discussed under the animal group in which they belong. SOCC are defined as those species listed under the provincial Manitoba *Endangered Species and Ecosystems Act* (MESEA) (Government of Canada 2015a), the federal *Species at Risk Act* (SARA) (2002), recommended by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) for listing under SARA, or provincially ranked by the Manitoba Conservation Data Centre (MB CDC) as rare (*i.e.*, S1 and S2 ranks) or uncommon (*i.e.*, S3 ranks).

Table 2-1 identifies the focal species or species assemblages discussed in this report and the rationale for their selection.

Table 2-1 Focal Species or Species Assemblages Identified to Focus Discussions on Wildlife and Wildlife Habitat in the RAA

Animal Group	Species or Species Assemblage	Rationale for Selection
Mammal	Elk	The Vita elk herd in southeastern Manitoba is small, and generally restricted to a limited area overlapping the eastern part of the RAA (see Section 2.3.3.2). There is public concern that the Project may increase this herd's vulnerability to mortality through increased hunter and predator access.
	White-tailed Deer	White-tailed deer are highly valued by resource users, First Nations and Metis. They are an important livelihood for local outfitters. There is public concern that the Project may increase white-tailed deer vulnerability to mortality resulting from increased hunter and predator access (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).
	Moose	Moose are rare in the region, but First Nations and Metis communities 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).

Table 2-1 Focal Species or Species Assemblages Identified to Focus Discussions on Wildlife and Wildlife Habitat in the RAA

Animal Group	Species or Species Assemblage	Rationale for Selection
	Black Bear	Black bear is a furbearing predator that is valued by resource users, First Nations and Metis Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015. It is an important livelihood for local outfitters.
	Other Furbearers	Furbearers are an important component of the ecosystem, and some species (*e.g.*, American marten) are valued by resource users, First Nations and Metis Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015. 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 the *Species at Risk Act and* Manitoba's *Endangered Species and Ecosystems Act*
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.*, bobolink, sharp-tailed grouse)	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.

Information provided in this document focuses on the natural wildlife habitat that exists in the eastern part of the RAA near Ste-Genevive, Richer, Lonesand and Piney, MB. Less focus is given to the existing corridor and stations because wildlife habitat in these areas has been modified by agriculture and/or development.

Existing wildlife and wildlife habitat-related sources of information were reviewed and synthesized to form an understanding of the existing condition for wildlife and wildlife habitat in the RAA. The review of existing information revealed a number of information gaps that were subsequently addressed through additional desktop research, public engagement, First Nation engagement, KPIs and wildlife-related field studies. Sections 2.2 through 2.6 describe the methods and results of the desktop and field studies, and provide a synthesis of all available information gathered for each of the focal species or species assemblages.

2.2 WILDLIFE HABITAT

2.2.1 Desktop

2.2.1.1 Methods

General wildlife habitats and important areas were identified (Table 2-2) using:

- Forestry Resource Inventory (FRI) (Manitoba Conservation and Water Stewardship [MCWS] 1979 and 1999) is the primary source of geospatial data used to provide broad terrestrial and aquatic habitat classification.
- Government of Manitoba, Lands and Geomatics Branch, topographic mapping was used to create a background for mapping layers and enhance land and resource analysis capabilities.
- Provincial fire history data (1965-2013) (MCWS 2000) was mapped to show fire history for the RAA.
- Land Cover Classification (LCC) (EOSD-NRCAN 2001) is a secondary source of geospatial data used to provide broad terrestrial and aquatic habitat classification.
- CanVec (EOSD-NRCAN 2001) is a secondary source of geospatial data used to provide supplemental aquatic habitat identification and topographical data.
- RM maps and Manitoba's Protected Areas Initiative, provide geospatial information on the location and extent of:
  - crown lands (Manitoba Hydro 2014a);
  - Prairie Farm Rehabilitation Administration (PFRA) and other community pastures (MCWS 1997);
  - wildlife management areas, wildlife refuges, ecological preserve (MCWS 2013a); and
  - NGO lands (*e.g.*, Nature Conservancy Canada [NCC], Ducks Unlimited Canada [DUC], Nature Manitoba [formerly Manitoba Naturalists Society]), and other designated lands (*e.g.*, Tall Grass Prairie Preserve, Manitoba heritage marshes) (NCC 2010).

- Interdepartmental Operational Crown Land Use Database (Government of Manitoba 2015b). The operational land use code classifies Crown lands using an open-ended, comprehensive coding system which dictates land use(s), permissible level of development, length of commitment, requirements for multiple uses, and nature of permissions required. The distribution of Crown lands coded as 'wildlife lands' were mapped and used to support the identification of important wildlife areas within the RAA (see Section 3).
- National Topographic Data Base (Government of Canada 2012) provided spatial information on roads, highways, cart tracks, and oil and gas pipelines in the RAA. This, together with spatial data for transmission lines (Manitoba Hydro 2015a) and FRI land cover information (MCWS 1979 and 1999), were used to identify core patches (greater than 200 ha; Environment Canada 2013a) of natural wildlife habitat within the RAA. A conservative approach was taken to account for existing disturbance effects associated with existing linear developments. All high use linear features (roads, highways) were given a buffer of 200 m and all low use linear features (trails, pipelines, transmission line ROWs) were given a buffer of 100m. Core areas supporting more than 200 ha of natural wildlife habitat (*i.e.*, grassland, forest, wetland) were identified in remaining, unbuffered areas. Results were used to inform the degree of habitat intactness within the RAA.
- Google Earth Pro (Google 2014) provides remotely-sensed satellite imagery (generally low-resolution) that is used to visually examine wildlife habitats.
- Habitat Suitability Index (HSI) Model for Manitoba Elk (TAEM 1998) was used to better understand the habitat preferences for elk throughout the year.
- HSI Model for White-tailed Deer (The Manitoba Forestry/Wildlife Management Project 1996) was used to better understand the habitat requirements for white-tailed deer throughout the year.
- Manitoba Conservation Data Centre (MB CDC 2014) 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
- A map of the Prairie Pothole Region (PPR) of Manitoba (Ducks Unlimited 2015) was reviewed to identify if the RAA overlapped with this important waterfowl breeding region.
- Important Bird Areas of Canada (Bird Studies Canada and Nature Canada 2015), which was reviewed to determine whether any Important Bird Areas (IBAs) are located within and/or adjacent to the RAA.
- **Aboriginal Traditional Knowledge** (ATK) sources were reviewed to identify sensitive wildlife habitats and identify concerns as they relate to wildlife habitat in southeastern Manitoba (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

Table 2-2 Forest Resource Inventory (FRI) Cover Classes used to Estimate Wildlife Habitat Availability

Habitat Type	Class	Sub-class	Description
Wildlife Habitat	Forest	Hardwood	Stands with ≥ 75% basal area containing deciduous tree species.
		Softwood	Stands with ≥ 75% basal area containing coniferous tree species.
		Mixedwood	Stands with < 75% basal area entirely deciduous or coniferous tree species.
	Grassland / Meadow	Dry upland ridge	Greater than 50% of the area covered by grass species.
		Moist prairie	
		Wet meadow	
		Sand prairie	
	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 t grass, rushes, or sedges but unsuitable for hay.
		Willow/Alder	Low lying areas with a saturated water table presently supporting willow or alder growth.
	Water	Rivers, lakes	Rivers, lakes measured at the high water mark
Non-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, oil fields, etc.
		Dugout	
		Gravel pit / mine / dump	
		Road / railway	
		Town / residential	
		Transmission / pipeline	

2.2.1.2 Results

Results of the desktop review provided insight to the current condition of wildlife and wildlife habitat within the RAA. Approximately 62% (4,515 km^2) of the Project RAA comprises non-wildlife habitats (Table 2-3) while the remaining 38% (2,718 km^2) is considered valuable wildlife habitat (*i.e.*, forest, grassland, and wetland habitats [Table 2-2]). The wildlife habitat contains approximately 43% hardwood forest, 20% softwood forest, 4% mixedwood forest, 8% grassland, and 25% wetland. A full summary of the wildlife habitat composition relative to the various spatial scales (*i.e.*, ROW, LAA, and RAA) and project components (*i.e.*, Existing Corridor, New ROW, Glenboro South Station, Dorsey Station, Riel Station) is available in Table 2-3.

Managed wildlife lands include: Sandilands, Wampum and Cathills Provincial Forests; Pocock Lake and Wampum Ecological Reserves; and Watson P. Davidson and Spur Woods Wildlife Management Areas (Appendix A, Map 1-6 – Designated Lands and Protected Areas in the Project Area) and Spruce Woods Provincial Park, Spruce Woods WMA and the Assiniboine Corridor WMA near Glenboro South Station (Appendix A, Map 1-7 – Designated Lands and Protected Areas near the Glenboro South Station). Notable water bodies and wetlands include: the Red, Assiniboine, Seine and Rat Rivers, the Caliento, Sundown, and Carrick bogs; the Richer (south of Richer on Hwy 302), Lac Bosse, Lonesand (south of Lonesand) and Sundown Lakes; Deacon Reservoir; and Oak Bluff Lagoon (Appendix A, Map 2-1 Notable waterbodies and wetlands in the RAA) All designated lands and protected areas were mapped and used to guide field study site selection.

Forest fires are a natural part of ecosystem succession and have the ability to change flora and fauna communities over time. Understanding the historic patterns of forest fires in southeastern Manitoba (Appendix A, Map 2-2 – Forest Fire History) aided in understanding patterns of habitat use by wildlife. For example, dense forests that provided important wintering habitat for white-tailed deer become of little value for many years post-burn. Understanding these patterns helps to identify key relationships between wildlife and habitat within the RAA such as determining suitable forage, breeding and over-wintering habitat requirements.

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, MB. 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.

Table 2-3: Summary of Wildlife Habitat at Various Spatial Scales

Project Component	Habitat	PDA		LAA		RAA	
		km²	%	km²	%	km²	%
Existing Corridor	Hardwood Forest	0.4	2.1	6.3	3.0	245.4	7.3
	Softwood Forest	0.0	0.0	0.0	0.0	8.5	0.3
	Mixedwood Forest	0.0	0.0	0.0	0.0	1.8	0.1
	Grassland	0.0	0.2	2.3	1.1	59.1	1.7
	Wetland	0.1	0.3	0.6	0.3	59.8	1.8
	Water	0.1	0.3	0.8	0.4	20.4	0.6
	Total Wildlife Habitat	0.6	2.9	10.0	4.7	395.1	11.7
	Total Modified Habitat	19.3	97.0	200.3	95.3	2987.5	88.3
New ROW*	Hardwood Forest	3.2	29.6	69.1	27.3	998.6	25.9
	Softwood Forest	1.7	15.5	33.8	13.4	476.3	12.4
	Mixedwood Forest	0.1	1.3	5.4	2.1	106.7	2.8
	Grassland	0.9	8.0	16.0	6.3	172.7	4.5
	Wetland	1.6	14.8	39.7	15.7	617.3	16.0
	Water	0.0	0.1	0.3	0.1	1.9	0.0
	Total Wildlife Habitat	7.6	69.4	164.3	64.9	2373.6	61.6
	Total Modified Habitat	3.3	30.6	88.9	35.1	1482.7	38.4
Glenboro South Station	Hardwood Forest	0.0	0.0	0.0	0.0	94.9	12.9
	Softwood Forest	0.0	0.0	0.0	0.0	1.6	0.2
	Mixedwood Forest	0.0	0.0	0.0	0.0	3.3	0.5
	Grassland	0.0	0.0	0.3	5.1	79.0	10.8
	Wetland	0.0	0.0	0.0	0.7	19.5	2.7
	Water	0.0	0.0	0.2	3.8	16.6	2.3
	Total Wildlife Habitat	0.0	0.0	0.5	9.6	214.9	29.3
	Total Modified Habitat	0.1	100.0	4.5	90.8	517.9	70.7
Dorsey Station	Hardwood Forest	0.0	0.0	0.0	0.0	17.1	2.4
	Softwood Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Mixedwood Forest	0.0	0.0	0.0	0.0	0.0	0.0
	Grassland	0.0	0.0	0.0	0.0	8.2	1.1
	Wetland	0.0	0.0	0.0	0.0	5.0	0.7
	Water	0.0	0.0	0.0	0.0	4.1	0.6
	Total Wildlife Habitat	0.0	0.0	0.0	0.0	34.4	4.8
	Total Modified Habitat	0.0	0.0	3.8	100.0	681.8	95.2

Table 2-3: Summary of Wildlife Habitat at Various Spatial Scales

Project Component	Habitat	PDA		LAA		RAA	
		km²	%	km²	%	km²	%
Riel Station	Hardwood Forest	0.0	0.0	0.0	0.0	20.7	2.7
	Softwood Forest	0.0	0.0	0.0	0.0	0.1	0.0
	Mixedwood Forest	0.0	0.0	0.0	0.0	1.0	0.1
	Grassland	0.0	0.0	0.0	0.3	8.8	1.2
	Wetland	0.0	0.0	0.0	0.0	1.3	0.2
	Water	0.0	0.0	0.0	0.0	5.8	0.8
	Total Wildlife Habitat	0.0	0.0	0.0	0.3	37.6	4.9
	Total Modified Habitat	0.7	100.0	7.6	100.0	724.5	95.1
Project Total	Hardwood Forest	3.7	11.6	73.9	15.8	1162.6	16.1
	Softwood Forest	1.7	5.4	33.8	7.2	479.1	6.6
	Mixedwood Forest	0.1	0.5	5.4	1.2	111.0	1.5
	Grassland	0.9	2.9	18.0	3.8	277.7	3.8
	Wetland	1.7	5.3	40.2	8.6	648.6	9.0
	Water	0.1	0.2	1.2	0.3	39.0	0.5
	Total Wildlife Habitat	8.1	25.8	172.6	36.9	2718.0	37.6
	Total Modified Habitat	23.5	74.2	295.2	63.1	4514.7	62.4
	Total Project Area	31.6	100.0	467.8	100.0	7232.7	100.0

2.2.1.3 Synthesis of Wildlife Habitat

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 1979 and 1999). 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. 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, MB, which currently supports 77% of the total amount of wildlife habitat in the RAA. 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.

Wildlife habitat occurs in designated lands and protected areas, but also in areas of crown land and as smaller fragments on privately-owned lands. 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, MB. 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.

The RAA does not include any IBAs (IBA Canada 2015), and the existing corridor and New ROW are located outside of the 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, MB. 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. In the case of large mammals, for example, Forman *et al.* (1997) suggest that linear disturbance (particularly road) densities > 0.6 km/km^2 begin to impact naturally sustainable populations by increasing disturbance and mortality.

2.3 MAMMALS

Information on mammals potentially inhabiting the RAA is provided based on a variety of information sources including desktop data, KPI's, and field Studies. Data collection focused on the species and species assemblages identified in Table 2-1 (*i.e.,* elk, white-tailed deer, moose, black bear, other furbearers, and bats). The methods utilized in accessing each information source are described, along with results of each program. An overall synthesis of mammal information is provided at the end of Section 2.3.

2.3.1 Desktop

2.3.1.1 Methods

Desktop information on mammals and/or mammal habitat was gathered from:

- The Species at Risk Public Registry (Government of Canada 2015), which was reviewed to identify mammals listed under SARA with potential to occur within the RAA
- The COSEWIC list of Canadian Wildlife Species at Risk (COSEWIC 2015), which was reviewed to identify listed mammals with potential to occur within the RAA.
- MESEA which was reviewed to identify provincially-listed mammals with potential to occur in the RAA (MCWS 2014a; Government of Manitoba 2015a).
- The Manitoba Conservation Data Centre (MB CDC 2014), which 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.
- The Mammals of Canada (Banfield 1974), which was consulted to determine mammals with potential to occur in the RAA.
- Bat Conservation International (BCI 2014), which was consulted to determine mammals with potential to occur in the RAA.
- The HSI Model for Manitoba Elk (TAEM 1998), which was used to better understand the habitat preferences of elk throughout the year.
- The HSI Model for White-tailed Deer (The Manitoba Forestry/Wildlife Management Project 1996), which was used to better understand the habitat requirements of white-tailed deer throughout the year.
- Terrestrial Ecozones, Ecoregions, and Ecodistricts of Manitoba (Smith *et al.* 1998), which was consulted to determine what mammal species assemblages could be expected to occur within the RAA given the existence of appropriate habitat.
- Manitoba Mineral Resources – Mines Branch (Manitoba Mineral Resources 2013) listing of existing or abandoned mines, which was reviewed to identify potential for human made sources of bat hibernacula within the RAA.
- Heritage Resources Branch Inventory of Archaeological Sites (Heritage Resources Branch 2014), which was reviewed to identify potential for human made sources of bat hibernacula within the RAA.
- Manitoba Agricultural Services Department (MASC) (Wilcox 2013a, 2013b), which provided data to identify rural municipalities that have reported crop insurance claims as a result of wildlife damage.
- The 2013 and 2014 Manitoba Hunting Guides (MCWS 2013b and 2014b), 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 2013c and 2014c), provided information on the trapping system and regulations in the RAA.

- Manitoba Hydro government (Manitoba Conservation and Water Stewardship) and public engagement records.
- Canadian Land Inventory (CLI) land capability for **ungulates** was used to better understand the habitat suitability and expected distribution of ungulates (CLI 2002a).
- ATK sources were reviewed to identify traditional hunting areas and identify concerns as they relate to mammal populations in southeastern Manitoba (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

2.3.1.2 Results

Approximately 57 mammal species are expected to occur in the RAA, 5 of which are SOCC: American badger, little brown myotis, northern myotis, grey fox and star-nosed mole (Appendix B, Table B.1 - Wildlife SOCC with Potential to Occur in the RAA).

The results of the mammal desktop research and review are organized by the six focal mammal species or mammal species assemblages outlined in Table 2-1. As such, American badger, grey fox and star-nosed mole are discussed in Section 2.3.1.2.5 and little brown myotis and northern myotis are discussed in Section 2.3.1.2.6.

2.3.1.2.1 White-tailed Deer

White-tailed deer range across southern Manitoba from the Bloodvein River in the southeast to Flin Flon in the northwest (Banfield 1974, MCWS 2014d). White-tailed deer inhabit a wide variety of habitat types but in general prefer an interspersion of habitats such as forests adjacent to grassland, stream, or agricultural field edges and avoid mature, late-successional forests where food resources are more limited (Banfield 1974). Large stands of closed-canopy forest provide thermal cover during cold winter months (Moen 1978; CLI 2002a; e.g., eastern portion of the RAA and near Piney, MB.) while other areas have more limited utility for white-tailed deer (CLI 2002a). Overall, the capability of lands to support ungulates in the RAA is moderate to severly limited (CLI 2002a).

There are approximately 150,000 white-tailed deer throughout Manitoba (minimum 60,000 in1974 and maximum 250,000 in 1995) and exist throughout the RAA which encompasses seven GHAs (25B, 30, 31A, 33, 34A, 35, and 35A) that all permit hunting (MCWS 2014d). In 2014, hunters (29,371 tags sold province-wide) were restricted to harvesting "bucks only" in an effort to increase below-average white-tailed deer populations (MCWS 2014d). There are three deer hunting outfitters that operate guided white-tailed deer hunts in the RAA (Headwater Ranch Outfitter, KC's Outfitting, and Silver Birch Resort & Outfitting Ltd.).

2.3.1.2.2 Elk

Elk are flexible in their choice of habitat but in Manitoba suitable habitat is generally characterized by a mosaic of habitat types that includes dense forest and shrubby cover for security and protection, and is adjacent to open grasslands and hayfields for foraging (Banfield 1974; TAEM 1998).

There are over 7,000 elk in Manitoba, located primarily in the Riding Mountain, Porcupine Hills, and Spruce Woods areas (MCWS 2014e). Some smaller satellite herds exist in Manitoba, including near the town of Vita, approximately 3 km from the RAA. This herd is often referred to as the Caribou-Vita herd (hereafter "Vita elk herd") because the core area they generally occupy is near the towns of Caribou, Minnesota and Vita, Manitoba. The core area is defined by the survey extent and general pattern of elk observations during aerial surveys by MCWS (2011 and 2014f). The larger elk range is defined by the larger stratification survey extent used during aerial surveys and the pattern of elk observations (MCWS 2011 and 2014f). The elk range in Minnesota was recreated from the Minnesota Department of Natural Resources (MN DNR) (MN DNR 2009).

Elk were present throughout most of Minnesota in the early 1900s but are now limited to the northwestern corner of the state (MN DNR 2009). It is likely that the Vita elk herd became established in Manitoba from Minnesota during the mid-late 1980s, although some individuals may have originated from herd in Spruce Woods and Pembina Valley (Rebizant 2015, pers. comm.).

Area Wildlife Manager Ruth Anne Franke (Franke 2014, pers. comm.) of the MN DNR and Regional Wildlife Manager Kelly Leavesley of MCWS (Leavesley 2015, pers. comm.) provided insight into the number, distribution and management of elk in Minnesota and Manitoba. Currently there are approximately 100-150 individuals in the Vita herd that spends a portion of the year in both Canada and the United States. Minnesota has a Strategic Elk Management Plan for Elk (MN DNR 2009) and operates an annual lottery-based hunt when populations are high enough (in 2014, six of nine tags issued were known to have been filled). There is no regulated hunting season on this herd in Manitoba (rights-based harvesting is permitted; MCWS 2013b and 2014c); however MCWS occasionally conducts aerial surveys to monitor the Vita elk herd in Manitoba. First Nations report elk as being a traditional game species (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015).

Although the core elk range may be relatively limited, some evidence suggests that the elk range is large, potentially extending from the Tolstoi border crossing, north to Saint Malo, and southeast towards Piney (Leavesley 2015, pers. comm.). The core area of the elk range may now contain elk year-round, and over the years the herd has benefited from tolerant landowners (*i.e.*, crop and hay bale depredation) that provide protective habitats and active, supplemental feeding (Leavesley 2015, pers. comm.).

In 2011, MCWS observed 97 elk in the core elk area and two additional elk approximately 6 km northwest of Piney via aerial survey. In 2014, MCWS and MN DNR conducted simultaneous aerial surveys in their respective jurisdictions to obtain a total herd count for the first time. As a result, MCWS observed 106 elk in the core elk area while MN DNR observed 51 elk in Minnesota; suggesting a total population of at least 157 individuals (MCWS 2011; Franke 2014, pers. comm.).

According to MASC, annual crop insurance claims filed from 1993 to 2011 as a result of elk damages (including hay bales) were between 1-34 and 35-103 in the RMs of Piney and Stuartburn, respectively (Wilcox 2013a, 2013b). Data regarding the specific locations of claims are unavailable; therefore it is difficult to relate claims in relation to the refined alternate routes. However, the information provides general insight that suggests elk are most heavily concentrated in the RM of Stuartburn where there is a greater mix of agriculture and deciduous forests as opposed to coniferous forest habitats.

The elk HSI developed from elk herds in the Duck Mountains (western Manitoba) (TAEM Consultants 1998) and CLI's land capability mapping for ungulates (2002) was used to better understand suitable summer and winter elk habitat types within the RAA. Results suggest that suitable habitat for elk (*e.g.*, hardwood forest) is not limiting in southeastern Manitoba, a notion supported by MCWS (Leavesley 2015, pers. comm.). Threats to elk in the area include a combination of factors, including unregulated hunting and habitat fragmentation (primarily by increasing the density of linear features which provide access).

2.3.1.2.3 Moose

Moose in Manitoba occur in small numbers in pockets of habitat from the Manitoba-Minnesota border in the east, north to the southern end of Lake Manitoba, and west to Riding Mountain Park (Banfield 1974; MCWS 2014f). Generally a forest species, moose primarily inhabit younger successional forests and shrubby habitats where food is readily available and retreat to dense closed-canopy forests during the cold winter months (Banfield 1974). With the exception of areas surrounding Piney, MB, the capability of lands to support ungulates in the RAA is moderate to severly limited (CLI 2002a). Lands surrounding Piney have great importance to overwintering ungulates (CLI 2002a).

In the RAA, the moose range includes GHA 30, 31A (Glenboro Station), 35 and 35A (FPR). Currently only GHA 31A permits regulated hunting through a draw system (MCWS 2014b). The population of moose in GHA 35 and 35A is considered to have collapsed and there is currently no regulated hunting season in this area (Leavesley 2015, pers. comm.). In the 1980s, however, moose were common in the area (several hundred individuals; Rebizant 2015, pers. comm.) and the final licensed hunting season for this area was in 2000 (Hristienko 2015, pers. comm.). First Nations report moose as being a traditional game species hunted within the RAA (particularly in the Piney, MB area) and have expressed concern about the impact a the proposed transmission line will have on moose populations (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

Suitable habitat is not thought to be limiting in eastern portions of the RAA (Leavesley 2015, pers. comm.; CLI 2002a). Instead, a combination of factors such as habitat fragmentation, predation by wolves, parasites, fires suppression, and unregulated harvest contribute to low moose densities in southeastern Manitoba (MCWS 2014f, Leavesley 2015, pers. comm. and Rebizant 2015, pers. comm.).

2.3.1.2.4 Black Bear

Black bears are an omnivorous mammal that exists throughout the entire province of Manitoba (25,000 - 30,000 individuals) but are rare in the southwestern corner (MCWS 2014h). As such, black bears are found in a wide variety of habitats including deciduous and coniferous forests, swamps and bogs, and in wooded areas adjacent to agricultural fields (Banfield 1974). Black bears **hibernate** in late fall in "dens" which are also not well defined and range from caves and rock crevasses to the low-sweeping branches of a coniferous tree (Banfield 1974; Crook and Chamberlain 2010).

Black bears exist throughout much of the RAA (Banfield 1974, MCWS 2014h) which encompasses seven GHAs (25B, 30, 31A, 33, 34A, 35, and 35A) but two do not permit black bear hunting (31A and 33) (MCWS 2013b). Black bear provide tourism and economic benefits as there are five hunting outfitters that operate guided black bear hunts in the RAA (Birch Point Outfitters, Blackjack Outfitters, Headwater Ranch Outfitter, KC's Outfitting and Silver Birch Resort & Outfitting Ltd.). First Nations report black bear as being a traditional game species hunted within the RAA (mentioned the Woodridge, MB area) (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

Black bear is a generalist species that uses a variety of habitats (Banfield 1974) which are not limited in the RAA. The density of black bears in southern Manitoba is expected to be moderate to high (Rebizant 2015, pers. comm.) with densities being highest where agricultural areas are adjacent to forested habitats (*i.e.*, near forage and cover) (Hristienko 2015, pers. comm.).

2.3.1.2.5 Furbearers and Other Mammals

The range of American badger in Manitoba extends diagonally from the very southeast corner of the province to Swan River in the west. Although the American badger range overlaps the Project, it is considered at the edge of its range in the easternmost portion of the RAA (near the FPR) (COSEWIC 2012a). American badger is listed as *special concern* by the COSEWIC (COSEWIC 2012a; 2015), but is not yet protected under SARA (Government of Canada 2015). A search of the MB CDC database did not reveal any records of this species occurring in the RAA (MB CDC 2014).

American badger is associated with open grassland and non-forested habitats, and is often found along linear corridors, including roads, shelterbelts, field edges, and hedgerows (COSEWIC 2012a). Badgers are well adapted for digging, creating burrows and tunnels in areas supporting suitable soils and a prey base. They do not typically inhabit cultivated fields, but may use uncultivated field edges where loose soils are conducive for digging. Their distribution is driven more by the availability of prey populations, rather than presence of specific vegetation communities (COSEWIC 2012a). While badgers are not generally targeted by trappers, there is a potential for **bycatch**. A key risk factor listed by COSEWIC (2012a) is traffic-related mortality, while soil compaction and tilling are listed as threats to habitat quality. The RAA is not expected to provide a significant amount of suitable habitat for American badger and is considered a rare inhabitant.

Grey fox has two, non-contiguous populations in Canada, with the western population thought to have a range that extends from the Rainy River District of Ontario (west of Lake Superior) into southeastern Manitoba (COSEWIC 2002, 2014a; Government of Ontario 2014). Thus, grey fox may occur within the RAA wherever deciduous forest and scrub habitat is available, especially where they occur near a water source (Government of Ontario 2014). Grey fox is listed as a threatened species (Schedule 1) (Government of Canada 2015) and at least two occurrences of grey fox near Sprague, MB are known to MCWS (Berezanski 2015, pers. comm.) and the Manitoba Trappers Association (MCWS 2002). Sightings often go unreported as they can easily be mistaken for a "cross phase" red fox (MCWS 2002).

Grey foxes den under rock outcrops or boulders, inside hollow trees or logs, under brush piles, or in burrows dug by other animals. They are also known to use abandoned buildings (COSEWIC 2002). Regardless of microhabitat, grey fox dens are usually located in an area of dense brush and within 0.4 km of a water source (COSWEIC 2002). Harvesting by humans and deforestation are listed as the main threats to grey fox populations, while road mortality is also a risk factor (COSWIC 2002).

The star-nosed mole occupies open forest habitats, predominantly in wet meadows and riparian areas, throughout eastern Canada (Banfield 1974). Although widespread in eastern Canada and not federally listed by SARA, southeastern Manitoba represents the western extent of the species' range and is designated as 'uncommon' by MB CDC (MB CDC 2014). A single record of star-nosed mole exists approximately 3 km north of Piney, MB (MB CDC 2014).

Beavers range across Canada (Banfield 1974). Beaver dams and lodges are a common site in association with creeks and wetlands throughout the province, including in the RAA. While no longer the staple of the fur industry, beaver are still trapped throughout their range and are often exterminated due to the nuisance their structures can create for human infrastructure (Banfield 1974; Environment Canada 2005).

Other mammals present in the RAA include cougar, bobcat, lynx, gray wolf, coyote, red fox, porcupine, American marten, fisher, muskrat, woodchuck, northern pocket gopher, Richardson's ground squirrel, thirteen-lined ground squirrel, Franklin's ground squirrel, least chipmunk, deer mouse, southern-red-backed vole, eastern cottontail, and snowshoe hare (Banfield 1974 and Smith *et al.* 1998). While wolves and coyote are important species for regulating the population of white-tailed deer (Banfield 1974) both species are often regarded as nuisance species by landowners, especially those that raise livestock (Carbyn 1987). Both coyote and gray wolf can be hunted legally in all GHAs within the RAA. Marten are more tolerant of fragmented landscapes (Cheveau *et al.* 2013), whereas fishers tend to use more contiguous forest blocks (Zielinski *et al.* 2013).

Smaller mammals in the RAA include least weasel, striped skunk, red fox, marten, and fisher. These species are typically associated with wooded areas but also make use of adjacent open habitat.

The RAA is located within open trapping area zones (no registered trap lines) (MCWS 2013c, 2014d) that span seven GHAs (25B, 30, 31A, 33, 34A, 35, and 35A). All of the furbearer and mammal species above are potentially affected by trapping pressures in the RAA as even species at risk may accidentally be caught in traps intended for other species.

First Nations report a variety of furbearers and small mammal species as being a traditional game species hunted within the RAA (including beaver, lynx, fisher, gray wolf, red fox, and coyote; Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

2.3.1.2.6 Bats

Six species of insectivorous bats are found in the prairie and boreal plains ecozones, all of which have ranges that include the RAA (Banfield 1974 and BCI 2014). Migratory species are hoary bat (*Lasiurus cinereus*), silver-haired bat (*Lasionycteris noctivagans*), and eastern red bat (*Lasiurus borealis*), while little brown myotis (*Myotis lucifugus*), big brown bat (*Eptesicus fuscus*) and northern (aka long-eared) myotis (*Myotis septentrionalis*) are considered residents.

Little brown myotis and northern (long-eared) myotis are both listed as endangered under the Species at Risk Act (Government of Canada 2015). **White Nose Syndrome** is believed to be the biggest threat to bat populations across North America. White Nose Syndrome does not yet appear to have reached Manitoba, but is prevalent in Ontario (OMNR 2011), and has been found at two state parks in Minnesota (MN DNR 2013).

The hoary, silver-haired and eastern red bats have the potential to mate and rear young within the RAA, however they are migrants and overwinter in areas south of the RAA (Gonzales 2008; Arroyo-Cabrales 2008). Resident species (*i.e.,* little brown myotis, big brown bat and northern myotis) remain in the province but overwinter in karst landforms (*i.e.,* caves), many of which are located in Manitoba's Interlake region (Bilecki 2003). Some species of myotis bats overwinter in underground caverns and occasionally human constructions such as abandoned mine shafts (BCI 2014). Outside of the hibernation period, myotis bats roost in forests, but hunt over nearby fields or wetlands (COSEWIC 2012b, 2013a). Young are reared in separate nursery colonies which may be in hollow trees, old buildings or caves (Miller *et al.* 2008).

There are no known bat hibernacula within the RAA (MB CDC 2014). A review of mineral resources and mining maps provided by Manitoba Mineral Resources – Mines Branch, and historical archaeological sites (*e.g.*, excavations such as tunnels or caverns or historical mine or excavation sites), did not reveal the presence of potential human made sources of bat hibernacula within the RAA (Manitoba Mineral Resources 2013). A review of mapping provided by Manitoba Mineral Resources reveals the presence of limestone outcrops that could be conducive to natural cave formation in the RAA.

2.3.1.3 Data Gaps

A data gap analysis was conducted following the desktop review of available mammal information. Gap analysis considered the key issues, and the availability and reliability of existing wildlife and wildlife habitat-related information. Gaps identified were addressed through KPIs (Section 2.3.2) and targeted field programs (Section 2.3.3).

2.3.2 Key Person Interviews (KPIs)

2.3.2.1 Methods

Key persons (17) were identified as potentially having information that would be pertinent to understanding the mammal community in the RAA and surrounding region and were interviewed via telephone using questionnaires developed by the Project Team (Appendix C.1.1). Due to the broad group of interviewees, several questionnaires were developed.

Interviews were conducted between July 2014 and March 2015 and involved the following persons:

- One bear outfitter from Sundown, MB (K. Holme of KC's Outfitting). The interview questions dealt primarily with wildlife that the outfitter has a hunting allocation for (*i.e.,* black bear and white-tailed deer).
- One Manitoba Conservation Natural Resource Officer (NRO) from Piney (D. Cooper).
- One NRO from Steinbach (T. Kuzenko).
- The Manitoba Conservation and Water Stewardship Big Game Manager (K. Rebizant). The interview was conducted to obtain information on big game populations, etc. in southeastern Manitoba. Mr. Rebizant provided input on most non-game species.
- Two Manitoba Conservation and Water Stewardship Big Game Biologists (H. Hristienko, H. Dettman). Interviews were conducted to obtain information on Big Game populations, etc. in southeastern Manitoba. Mr. Hristienko provided input regarding black bear, moose and wolf, while Mr. Dettman commented on elk and white-tailed deer.
- One Manitoba Conservation and Water Stewardship Regional Wildlife Manager (K. Leavesley). The interview was conducted to obtain information on Big Game populations, etc. in SE Manitoba. Ms. Leavesley provided input on most big game species.
- One regional wildlife supervisor from the MN DNR (R. Franke). Ms. Franke was contacted to obtain information on the status of the elk herd which ranges from the Vita, MB area down into Minnesota.
- Craig Willis at University of Winnipeg (Willis 2014, pers. comm.), who was consulted to determine the likelihood of bat hibernacula existing within the RAA.
- Carl Liske, Chief Mining Engineer from Manitoba Mineral Resources – Mines Branch, Winnipeg (Liske 2014, pers. comm.) was consulted to help identify any anthropogenic sources of potential bat hibernacula.

- Robert Barclay of the University of Calgary (Barclay 2006, pers. comm.) was consulted to provide insight into the general habitat use of bats in southern Manitoba.
- One landowner located southeast of Arbakka, MB known to have lands that support the Vita elk herd (W. Bilawchuk).
- Five presidents from Game & Fish Associations in southeastern Manitoba (those near the Project or in the area occupied by the Vita elk herd):
  - W. Single represented Eastlands (area encompassing Anola, MB and Dugald, MB)
  - Y. Legal represented Taché (area encompassing St Anne, MB)
  - B. Bennett represented Seine River (area encompassing La Broquerie, MB)
  - O. Paciorka represented Vita (area encompassing Vita, MB)
  - G. Hildebrandt represented Southeast Border (area encompassing Vita, MB, and Tolstoi, MB

Information gathered was used to inform the route selection process and support the understanding of current conditions for mammals within the RAA.

2.3.2.2 Results

The following is a summary of the seven key topics discussed during the interviews.

2.3.2.2.1 White-tailed Deer

White-tailed deer is an important game species to resource users (Bennet 2014, pers. comm.; Legal 2014, pers. comm.; Single 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Cooper 2014, pers. comm.; Kuzenko 2014, pers. comm.; Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Dettman 2015, pers. comm.). Most respondents felt deer populations are declining, although some regarded them as cyclic (Bennet 2014, pers. comm.; Legal 2014, pers. comm.; Cooper 2014, pers. comm.). KC's Outfitting indicated that deer in his area had hit a low point in 1992 and that the population has been rebounding ever since (Holme 2014, pers. comm.).

When asked about reasons for populations changes, KPI interviewees suggested that harsh winters (*i.e.*, long periods of extreme cold and above-average snowfall), increased rights-based harvesting, and increase in predation (wolf and coyote) were affecting white-tailed deer (Legal 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Single 2014, pers. comm.).

In response to a question regarding the potential effect of transmission line development on white-tailed deer populations, MCWS respondents indicated that the increased access for hunters and wolves would likely have a negative effect on deer populations. As well, habitat loss was mentioned as another negative effect (Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Dettman 2015, pers. comm.).

2.3.2.2.2 Elk

Three elk herds reside in NW Minnesota (Franke 2014, pers. comm.). The largest of the three herds moves between Manitoba and Minnesota (*i.e.,* Vita herd) and consists of approximately 100-150

animals (Franke 2014, pers. comm.). Respondents thought that elk populations were in decline (Hildebrandt 2014, pers. comm.; Paciorka 2014, pers. comm.), or believed the elk population was stable (Bilawchuk 2014, pers. comm.; Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Dettman 2015, pers. comm.).

Bilawchuk (2014, pers. comm.) indicated that elk are present on his land year-round, and that there were a few more at this time of year (December). The elk generally come from the east (up from Minnesota) and move through the back country toward Vita, MB. Some stay on his land, as he provides feed for them, but a lot of the elk are constantly on the move. Elk can travel in excess of 50 km to avoid human made disturbances and hunting pressure, or to seek out alternate food and water sources (Leavesley 2015, pers. comm.). Ken Holme (KC's Outfitting) reported that the Vita elk herd is located further west from his area near Sundown, MB, and individuals are only occasionally observed (Holme 2014, pers. comm.). When asked about reasons for population changes, KPI interviewees suggested that harsh winters, increased hunting pressure from rights-based harvesting and predation (by gray wolf and coyote) were affecting elk (Legal 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Single 2014, pers. comm.; and Leavesley 2015, pers. comm.). As well, it was indicated that agricultural and other development can put pressure on the elk herd (Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Dettman 2015, pers. comm.).

2.3.2.2.3 Moose

Most respondents indicated that they did not see moose in their areas. Some respondents indicated they were rare or present in low numbers (Bennet 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Cooper 2014, pers. comm.; Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Hristienko 2015, pers. comm.). The bear outfitter reported seeing only one moose in the last four years (Holme 2014, pers. comm.). Moose are predominantly located in areas that are isolated and protected from access by persons and/or wolves (Hristienko 2015, pers. comm.).

Reasons listed for the absence of moose were development, access, forest fire suppression and parasites (brain worm, liver fluke) (Paciorka 2014, pers. comm.; Rebizant 2015, pers. comm.; Leavesley 2015, pers. comm.; Hristienko 2015, pers. comm.).

2.3.2.2.4 Black Bear

Black bear is a species valued by resource users. When commenting about black bear population trends, some respondents indicated that populations were stable (Paciorka 2014, pers. comm.; Legal 2014, pers. comm.; Kuzenko 2014, pers. comm.; Rebizant 2015, pers. comm.; Hristienko 2015, pers. comm.) while others indicated it had decreased at a local level; (Bilawchuk 2014, pers. comm.), or was cyclic (Cooper 2014, pers. comm.). Based on 25 years of monitoring bears at bait stations, Holme (2014, pers. comm.) indicated that bear populations were increasing. In Minnesota, bear numbers were thought to be stable (Franke 2014, pers. comm.).

Bear populations are thought to be cyclical due to changes in the quality and quantity of berry crops (Cooper 2014, pers. comm.) whereas increases are believed to be a direct result of the improved feed at bear baiting stations (positively affecting sow to cub ratio) and an increase in survival rate of cubs (due to hunters preference for larger bears which may prey on the cubs; Holme 2014, pers. comm.). The presence of agricultural crops to supplement natural foods is also a benefit to bear populations. Having a diversity of foods is important (Hristienko 2015, pers. comm.)

When asked about bears denning in the region, the bear outfitter indicated that he knew of places where male bears denned in the area (often at the base of a tree) but he had not found any female's dens (which are generally more inconspicuous; Holme 2014, pers. comm.).

Threats to the species include hunting, although resident bear hunting is considered minimal next to other game species hunted in the area (*e.g.*, white-tailed deer; Holme 2014, pers. comm., Rebizant 2015, pers. comm.). Shooting of nuisance bears by farmers, due to crop predation, has reduced in recent years (Rebizant 2015, pers. comm.). In general, bears can adapt to a variety of conditions (Hristienko 2015, pers. comm.).

2.3.2.2.5 Furbearers and Other Mammals

Although most furbearers (*e.g.*, American marten) and other mammals are considered important by resource users (Paciorka 2014, pers. comm.; Legal 2014, pers. comm.; Cooper 2014, pers. comm.; Leavesly 2015, pers. comm.; Manitoba Hydro 2013), some like coyote, beaver and raccoon, are sometimes considered nuisance species (Paciorka 2014, pers. comm.; Legal 2014, pers. comm.; Cooper 2014, pers. comm.; Kuzenko 2014, pers. comm.). Grey fox, a species listed as threatened (SARA Schedule 1), was mentioned by a hunting outfitter as an incidental wildlife species observed 3 times over the last 20 years, generally perched in trees (Holme 2014, pers. comm.). Cougars are reported in southern areas of the RAA near the Manitoba-Minnesota border (Manitoba Hydro 2014b).

Many of the respondents commented that gray wolf populations were increasing in the area (Legal 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Single 2014, pers. comm.; Manitoba Hydro 2014c). Some respondents indicated that the gray wolf population was stable (Hristienko 2015, pers, comm.; Leavesley 2015, pers. comm.). Gray wolf populations are related to the abundance of their prey species (Hristienko 2015, pers. comm.).

2.3.2.2.6 Bats

Although bats are using the RAA for foraging and roosting, especially where woodlands meet wetlands and open agricultural lands, there are no known bat hibernacula in the RAA (Willis 2014, pers. comm.) Liske (2014, pers. comm.) confirmed that there are no known historical mining or archaeological sites (*e.g.*, excavations such as tunnels or caverns or historical mine or excavation sites), that would indicate the presence of potential human made sources of bat hibernacula within the RAA.

Knowledge about the specific routes used by the migratory species as they migrate through southern Manitoba is generally lacking (Willis 2014, pers. comm.; Barclay 2006, pers. comm.). Migration of bats through the RAA is likely, especially in eastern portions of the RAA where wetland and forested regions are more prevalent.

2.3.2.2.7 Important Habitat Features

There were a number of important environmental features identified within the region:

- the Caliento Bog
- the tributaries of the Seine River, the Brokenhead River, Fish Creek, and Edie Creek
- Lonesand Lake
- Sundown Lake
- the ecological reserves (Pocock Lake near Marchand, MB)

Other important areas include those that support pine ridges (important for furbearers), cedar swamps, and beaver floods. Corn fields were indicated as areas that concentrated bears (Hildebrandt 2014, pers. comm.).

2.3.2.2.8 Proposed Development

The following broad issues were raised by KPIs with regard to wildlife and wildlife habitat:

- Changes in wildlife behavior near the New ROW may occur due to creation of a travel corridor allowing wildlife access to new areas and potentially create effects on rare species.
- Increased traffic rates may affect wildlife by causing disturbance from vehicle presence and from the associated noise, and raised the potential for vehicle/wildlife collision. Development of new access trails creates access for hunting in areas that may have been difficult to access previously.
- Increased ATV use/ ATV traffic may, in turn, lead to:
  - increased hunting pressure. ROWs allow access to remote hunting areas and provide an advantage to those hunting on the ROWs themselves);
  - noise disturbance;
  - forest fires; and
  - trail damage, which in wet conditions may affect wildlife use of trails and ROWs.
- Forest fires may have both negative and positive effects on wildlife. In the short term, while forest fires degrade habitat that provides security and thermal cover for wildlife, they provide increased foraging opportunities for wildlife. In the longer term, fires promote vigor in the forest.

2.3.2.3 Summary of Results

The general comment from all parties interviewed was that regional big game populations are stable or in decline. Perceived threats to wildlife and wildlife habitat included: unregulated

hunting, road development, ATV use, forestry operations, land clearing, and aggregate and peat extraction. Fires were mentioned as having both negative and positive effects on wildlife.

White-tailed deer, black bear and other furbearers are important to resource users, FN and Metis.

Although most respondents had some concerns with development of a new transmission line ROW, apparent opposition to the project was limited. Almost all persons interviewed indicated that resource users can and would utilize the ROW for their pursuits, most often to improve access to certain areas.

The environmental feature most often mentioned as important to wildlife or resources users was the significant wetland complexes located in southeastern Manitoba. Whitemouth and Sundown Lakes were also listed as important. Rivers and streams provide "ribbons" of habitat which can be especially important in the agricultural lands where habitat can be limited.

2.3.3 Field Studies

The mammal field studies were designed to provide information on key habitats used by elk and to help understand the distribution and habitat associations of mammal species, particularly black bear, elk and white-tailed deer. Field studies included conducting a camera trap study, an elk breeding survey, and winter track surveys.

2.3.3.1 Camera Trap Study

The **camera trap** study was designed to provide information on mammal species richness per habitat type and/or area, and to investigate mammal distribution and relative abundance (especially elk, white-tailed deer and black bear) along the refined alternate routes in comparison with the existing M602F transmission line.

Additionally, a separate camera trap study utilizing black bear **bait stations** for hunting was conducted by Manitoba Hydro and KC's Outfitting at locations throughout the RAA to better understand the distribution of black bears in the area.

2.3.3.1.1 Methods

Survey Design

Using remotely-sensed imagery (*e.g.*, FRI) (MCWS 1979 and 1999) and an elk habitat suitability model (TEAM Consultants 1998), the camera trap study focused on areas having the highest potential to support elk and that would be in close proximity to the refined alternate routes. Within this area, sites were distributed proportionally relative to the abundance of dominant habitat types crossed by the refined alternate routes.

Two study designs were used. First, along the preferred and alternative routes, 36 cameras were deployed in a paired configuration with one camera directly on the route and one 500-800 m away from the route in the same habitat type (Appendix A, Map 2-3 – Mammal Camera Trap Locations 2014). The paired configuration provided information on habitat use within the LAA as well as baseline information that can aid in future post-construction monitoring efforts.

Second, along the existing 500 kV transmission line (M602F) 20 cameras were deployed at 22 sites (two cameras were relocated in July to ease future access by ATV) 0.5-12 km apart along the line in areas that supported game trails (Appendix A, Map 2-3 – Mammal Camera Trap Locations 2014). The purpose of this was to determine usage of the existing ROW by mammals and other wildlife. Data collected by the cameras can provide information on the general activity on the M602F line and allow comparison of species richness and detection rate (number of observations per unit of time) estimates (a proxy for relative abundance; Rovero and Marshall 2009) between the MMTP and M602F routes.

Timing

Cameras were deployed between April 25 and May 2, 2014. On July 2-5, 2014, crews returned to all camera locations to download the images and maintain the cameras and sites (*e.g.*, replace batteries, remove vegetation if necessary, or redirect cameras tampered with by black bears).

On October 6-7, crews returned to all camera locations to download the images and remove the cameras from the field.

Field Methods

Following guidance from Manitoba Hydro and experienced biologists, cameras were attached to trees at approximately 1 m from the ground level and all vegetation that might falsely trigger or obscure the camera view was removed within at least 5 m (Appendix D, Photo 1). Reconyx™ cameras were used in continuous photo capture mode (*i.e.,* 5 picture burst with no time delay) and using compact flash type I/II cards (generally 2 GB Sandisk™ Ultra I/II).

Data Processing/Analysis

All photographs were classified using Manitoba Hydro's Camera Trap Data Classification Guide (Manitoba Hydro 2014d) to identify the number, age, sex, and species involved in each camera event. A camera event is considered to be any number of individuals of a particular species captured on camera within a one-hour time period. For each camera, ArcGIS (ESRI 2012) was used to calculate percent wildlife habitat composition, as described by the FRI, within a 250 m radius. This distance represents an area (20 ha) that adequately characterizes the dominant habitat types at each camera location while maintaining independence between paired cameras or between M602F cameras located a minimum of 500 m apart.

Certain species (*e.g.*, furbearers and small mammals) were encountered infrequently and formal species-specific analyses were not always possible due to small sample sizes and therefore only general descriptive statistics are shown for these events. However, for species with adequate data (*i.e.*, white-tailed deer and black bear), generalized linear regression models were run in R (R Core Development Team 2014) to examine relationships between detection rate (used as a proxy for abundance [number of events / number of days camera was in operation]; Rovero and Marshall 2009) and combinations of FRI habitat variables (hardwood, mixedwood, and softwood forest, grassland, wetland, and burned [1994-2013]) (MCWS 1979 and 1999). Akaike Information Criterion (AIC) was used to rank competing models and identify the best approximating model. Variables in competing models were considered not statistically significant if the 85% confidence intervals overlapped 0 (Arnold 2010). The best approximating model was used to examine beta coefficients (β) which describe the positive or negative detection rate-habitat relationships (*i.e.*, slope of the regression line). The relative size of the β indicated the magnitude of the relationship with 0 indicating no relationship (*i.e.*, -1 > 0 < 1).

A two-tailed t-test (significance level $\alpha = 0.05$) was used to compare both rates of detection and species richness, between the paired cameras along the refined alternate routes or the cameras along the existing M602F 500 kV transmission line. Prior to conducing the t-tests, an F-test was used to determine equal or un-equal variances between samples (significance level $\alpha = 0.05$). Note: If no statistically significant difference in detection rates was observed between the refined alternate route cameras and the M602F cameras, data were pooled for testing the species-habitat relationships described above.

2.3.3.1.2 Results

A total of 58 cameras (refined alternate routes: 36; M602F: 22) were deployed in 2014 with a study total of 7,022 camera-days (mean: 121 camera-days per camera) and 3,440 wildlife events (Appendix A, Map 2-3 – Mammal Camera Trap Locations 2014).

The study yielded no elk observations. White-tailed deer and black bear events comprised 78% and 11% of all events, respectively. Other mammals observed included rabbit species (5%), red fox (2%), moose, gray wolf, coyote, lynx, American marten, skunk, porcupine, woodchuck, red squirrel, least chipmunk (≤ 1%, each). Additionally, bird species (red-tailed hawk, American crow, sandhill crane, great blue heron, ruffed grouse, and spruce grouse) comprised < 2% of all events; see Appendix B, Table B.2 for a detailed summary of events per camera.

White-tailed deer events were recorded at 57 of 58 camera locations (Appendix D, Photos 2 and 3). There was no statistically significant difference ($p > 0.10$) in detection rates between the refined alternate route cameras ($\bar{x} = 0.35 \pm 0.05$ SE) and the M602F cameras ($\bar{x} = 0.46 \pm 0.05$ SE). There was, however, a lower observable detection rate in softwood forest habitats ($\beta = -0.33 \pm 0.10$ SE). The best approximating model included only the softwood habitat variable, suggesting there was no observable effect from all other habitat types (Appendix B, Table B.3).

Black bear events were recorded at 46 of 58 camera locations (Photo 4). There was a statistically significant difference ($p < 0.01$) in detection rates between the refined alternate route cameras ($\bar{x}$ = 0.07 ± 0.01 SE) and the M602F cameras ($\bar{x}$ = 0.02 ± 0.01 SE). The best approximating species-habitat model for the refined alternate route cameras included the grassland (β = 0.17 ± 0.07 SE) and wetland (β = 0.25 ± 0.12 SE) habitat variable, suggesting black bear detection rates are higher in areas including grassland and wetland habitats (Appendix B, Table B.3). The best approximating model for the M602F cameras included the mixedwood habitat variable (β = 0.04 ± 0.02 SE); suggesting a small increase is detection rates in areas with greater mixedwood forest habitat. Despite black bear events at 12 of 22 cameras along the M602F transmission line, rates were overall 3.5 times lower than along the refined alternate route, which may suggest black bear are hesitant to travel along existing transmission lines in the study area.

Manitoba Hydro (2015b) reported bear activity at all bait stations (12) monitored by camera traps, suggesting this species is widespread and abundant in the south eastern part of the RAA.

For species richness, there was a statistically significant difference ($p < 0.05$) in the mean number of species detected between the refined alternate route cameras ($\bar{x}$ = 3.94 ± 0.25 SE) and the M602F cameras ($\bar{x}$ = 3.18 ± 0.26 SE). This reflects the several small mammals and furbearers (*i.e.*, coyote, lynx, rabbit species, woodchuck, red squirrel, and least chipmunk) observed on the refined alternate route cameras that were absent on the M602F cameras. It is not likely that these species are absent from the area, rather they are likely hesitant to travel along more open habitats.

One moose observation was documented along the M602F ROW northeast of Piney, MB in July 2014. Additionally, two sets of moose tracks were incidentally observed. The first 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. The second set of tracks consisted of one cow and one calf moose observed in the Watson P. Davidson Wildlife Management Area, east of the Sandilands Provincial Forest.

2.3.3.1.3 Summary of Results

There was no observable effect of the M602F transmission line on the relative abundance of white-tailed deer. White-tailed deer thrive on edge habitats and may be exploiting the habitats in otherwise contiguous forested areas. Despite observing black bears at 79% of camera locations, lower than expected detection rates were observed on the M602F transmission line. This suggests that bears are widespread in all areas, but may hesitant to travel along existing transmission lines.

2.3.3.2 Elk Breeding Survey

Elk surveys were designed to identify whether elk breeding or rutting activity occurs within the vicinity of the refined alternate routes, and confirm elk presence in areas known to contain elk at other times of the year.

2.3.3.2.1 Methods

Reports from provincial authorities, local knowledge and previous research suggested the Vita elk herd typically resides in an area away from the FPR, from Vita east to Caliento and south to the Manitoba-Minnesota border; often spending a portion of the year in the U.S. (see Section 2.3.1.2.2).

Study Design

A series of road-based call-broadcast surveys was 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 RAA, as identified by HSI analysis (TAEM Consultants 1998). This method aimed to take advantage of a period when elk are approaching peak-breeding activity and are most vocal and most likely to be detected; a common method used for breeding birds (Conway and Gibbs 2005) and more recently for mammals (Hansen *et al.* 2015).

During the elk breeding season, three road-based survey routes (two along the D604I ROW and one in the area south of Vita) were surveyed. New anecdotal information obtained after all surveys were completed suggested that elk may reside north of Vita and near Piney; prompting the addition of two more survey routes to provide coverage near Piney (Appendix A, Map 2-4 – Elk Breeding Survey Locations 2014).

Timing

Surveys were repeated three times on the original routes between September 3-24, 2014, with the additional routes being surveyed once on September 29-30. Surveys were conducted between 0.5 hours before sunrise to 2 hours after sunrise when calling rates are elevated (Michels 2014), and during periods of good weather (wind ≤ 20km/h, and precipitation not exceeding a light, intermittent drizzle).

Field Methods

Survey points (12-15 per route [160 surveys at 70 survey points]) were located approximately 1.6 km apart to reduce the risk of double-counting and optimize spatial survey coverage. 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

Data Processing / Analysis

Conducting multiple surveys allows for the potential to simultaneously calculate detection and occupancy probabilities, where occupancy is defined as the probability of detecting the presence of a species given that at least one individual is located within the sample unit (Thompson 2004). However, due to the lack of elk observations, modeling efforts were not possible. Instead, the elk breeding survey data provided detection / non-detection data at points surveyed along the preferred routes and in areas where elk are known to occur. These data were mapped to show the distribution of elk within the RAA and identify potential Project interactions.

2.3.3.2.2 Results

The only response to the call-broadcast survey was one bull bugling in response on the survey route south of Arbakka on September 5 (Appendix A, Map 2-4 – Elk Breeding Survey Locations 2014). Elk tracks were also visible on the gravel road at this location. Two additional observations of elk sign were noted incidentally along the route south of Arbakka. One included several tracks in mud on September 5 and the other was a single elk track on a gravel road on September 16. All observations were less than 1 km apart from each other and 20 km from the final preferred route.

One incidental observation of an adult great egret was recorded 800 m east of the FPR, located 16 km south of Marchand, MB.

2.3.3.2.3 Summary of Results

No elk breeding activity was observed in the RAA in 2014; however, one bull elk was heard bugling near Arbakka, 20 km to the southeast of the final preferred route.

2.3.3.3 Winter Track Surveys

Winter mammal track surveys were designed to provide information on winter distribution, density and habitat associations of species such as deer, elk, and furbearers, relative to the refined alternate routes and M602F. Other survey objectives were to provide information on species richness per habitat type and to determine whether mammals, particularly small furbearers, are crossing existing transmission lines within the study area. Surveys were conducted in 2014 and 2015.

2.3.3.3.1 Methods

Survey Design

In 2014, preferred winter habitats for white-tailed deer and elk (*e.g.*, hardwood forests) were identified using habitat suitability indices (The Manitoba Forestry/Wildlife Management Project 1996 and TAEM Consultants 1998) and Manitoba's FRI (MCWS 1979 and 1999) vegetation classification data. This information, along with input from MCWS on the location of wintering elk (Leavesley 2014, pers. comm.), was used to determine the placement of five 20 x 20 km (400 km^2) survey blocks in areas of the refined alternate routes (Appendix A, Map 2-5 – Aerial Mammal Track Survey Block Results 2014 and Appendix A, Map 2-6 – White-tailed Deer Aerial Observations 2014). Criteria for locating survey blocks included stratification by habitat type (*e.g.*, hardwood or softwood forest) while maximizing spatial coverage in areas of suitable habitat along all refined alternate routes. Additionally, to provide information on the activity of big game and furbearer species along existing transmission lines, the 230 kV (R49) and 500 kV (M602F) transmission lines were surveyed (Appendix A, Map 2-7 – Aerial Mammal Track Survey Results for the 230 kV and 500 kV Transmission Lines).

In 2015, winter track surveys were conducted on four spatially-adjusted survey blocks that maximized spatial coverage of the newly-defined final preferred route while still employing a design that stratified survey blocks by habitat type (Appendix A, Map 2-8 – White-tailed Deer Aerial Winter Observations 2015; Appendix A, Map 2-9 – Gray Wolf and Coyote Aerial Winer Observations 2015; and Appendix A, Map 2-10 – Furbearers and Other Mammals Aerial Winter Observations 2015). The existing 230 kV and 500 kV transmission lines were not surveyed, but the areas covered were searched more intensively.

Timing

In 2014, aerial surveys were conducted on February 14 and 15 following a heavy snowfall on February 12. In 2015, aerial surveys were also conducted on January 19 to 23 following a light snowfall three days previous.

Field Methods

In 2014, surveys were conducted by pilots and wildlife trackers Harley McMahan and Jerry Lee, 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. A custom GPS program allowed for quick and efficient recording of both species and locational data while allowing the observer to maintain visual contact with both sides of the survey transect at all times. All tracks within 200 m of either side of the aircraft were recorded. For white-tailed deer, only tracks were noted. The existing 230 and 500 kV transmission lines were surveyed from the US border to the Winnipeg city limits, counting tracks along the ROW during a single pass. Many factors are involved in determining which species a

track belongs to, including track size, distance between steps, track pattern, overall movement pattern, and habitat type.

In 2015, surveys were conducted using a Jet Ranger helicopter with one pilot and a team of three biologists to allow for intensive searching for tracks. Surveys were conducted at flight heights of approximately 100 m above ground and at ground speeds of approximately 100 km/h. Again, all tracks (ungulate, furbearer, and small mammal tracks) within 200 m of either side of the aircraft were recorded.

Data Processing / Analysis

For species with sufficient data (*i.e.*, white-tailed deer and coyote in 2014 and white-tailed deer, gray wolf, coyote, and lynx in 2015), linear regression methods were used to relate winter track densities to dominant FRI habitat types (MCWS 1979 and 1999), including the incorporation of 1994-2013 burn data. To do this, data from the 400 km^2 survey blocks were subdivided into 16 km^2 (4 x 4 km) km sub-blocks using GIS software and the number of track observations per sub-block were calculated (each sub-block contained four 0.4 km x 4 km transects).

Generalized linear regression models were run to examine relationships between track density and combinations of FRI habitat variables. AIC was used to rank competing models and identify the best approximating model. Variables in competing models were considered not statistically significant if the 85% confidence intervals overlapped 0 (Arnold 2010). The best approximating model was used to examine beta coefficients (β) which described the positive or negative track density-habitat relationships (*i.e.*, slope of the regression line). The relative size of the β value indicated the magnitude of the relationship, with 0 indicating no relationship (*i.e.*, -1 indicated negative relationship and 1 indicating positive relationship.

For many other species observed (*e.g.*, elk, American marten, red fox, and gray wolf and lynx in 2014) there was an insufficient number of observations (< 30 observations) to allow for formal analyses. Instead, observations were plotted to illustrate the distribution of observations within the study area and comparisons of relative track counts are provided between the survey blocks and the existing transmission lines (Appendix A, Map 2-9 – Gray Wolf and Coyote Aerial Winter Observations 2015).

Results

A total of 800 km^2 (100 - 0.4 km x 20 km transects) and 640 km^2 (80 – 0.4 x 20 km transects) were surveyed in 2014 and 2015, respectively. Table 2-4 describes the habitat composition of the survey blocks in 2014 and 2015. Table 2-5 summarizes all mammal observations from the survey blocks (2014 and 2015) and existing 230 and 500 kV transmission lines (2014).

The locations of all wildlife observations along the existing transmission line (except for white-tailed deer) are illustrated on Maps 2-7 – Aerial Mammal Track Survey Results for the 230 kV and 500 kV Transmission Lines and 2-8 – White-tailed Deer Aerial Observations. Based on track

evidence, white-tailed deer, American marten (n=4) and fisher (n=2) appeared to be using snowmobile tracks to ease movement along the ROW (Lee 2014, pers. comm.). For the survey blocks, the locations of all wildlife species observations for which insufficient data precluded formal analyses are shown in Appendix A, Map 2-6 – White-tailed Deer Aerial Observations 2014 and Appendix A, Map 2-9 – Gray Wolf and Coyote Aerial Winer Observations 2015 for 2014 and 2015, respectively. Model selection results for all species analyzed are located in Appendix B, Table B.4.

In 2014, 21 elk were observed in a survey block (plus an additional 6 individuals outside of the survey block) south of Arbakka, MB, and approximately 21 km southwest of the Final Preferred Route and outside the RAA. In 2015, a reconnaissance flight identified 14 individuals (11 cows and 3 bulls) located in the same approximate region 18 km from the preferred route and outside of the RAA (Appendix D, Photo 5).

The species-habitat modeling indicates that different mammal species occupy different habitat types at varying rates in the RAA (Table 2-4). For white-tailed deer, densities (tracks and individuals) were highest in hardwood forests followed by softwood forests and burned forest areas (1994-2013) while a negative relationship was observed in grassland and wetland (*e.g.*, treed muskeg) habitats (Table 2-6). Results did not differ markedly between years. Although densities are concentrated in some areas, white-tailed deer are wide-spread, with observations appearing in 123 of 125 sub-blocks in 2014 and 100 of 100 sub-blocks in 2015.

Coyote density varied more between years but showed a consistent, positive relationship to agricultural habitats. Although coyotes are widespread throughout much of the RAA, appearing in 36 of 125 sub-blocks in 2014 and 86 of 100 sub-blocks in 2015, their distribution was concentrated on the interface between dense forested habitats and agricultural habitats (Appendix A, Map 2-10 – Furbearers and Other Mammals Aerial Winter Observations 2015; Table 2-6).

Gray wolf was positively associated with mixedwood habitat and negatively associated with agricultural habitats (Table 2-6). The density of gray wolf was greatest in southeastern regions where more dense vegetative cover exists; wolves appeared in 9 of 125 sub-blocks in 2014 and 40 of 100 sub-blocks in 2015.

Lynx was positively associated with both hardwood and softwood forest habitat and negatively associated with grassland and other (*e.g.*, human made disturbance) habitats (Table 2-6). Like gray wolf, lynx density was greatest where vegetative cover was high and human disturbances were scarce; lynx appeared in 2 of 125 sub-blocks in 2014 and 30 of 100 sub-blocks in 2015.

Mixedwood forests likely provide important habitat for many species. However, due to the limited amount that exists within the RAA there was generally insufficient data to provide a strong correlation.

Three black bear dens were observed during aerial surveys (one with a black bear sitting on the den; Appendix D, Photo 6). All dens occurred in forested habitats ranging between 4 and 12 km from the preferred route (Appendix A, Map 2-11 – Black Bear Den Observations).

Table 2-4: Habitat Composition of the Survey Blocks

FRI Habitat Type	Percent of Total 2014 (800 km^2)	Percent of Total 2015 (640 km^2)
Softwood Forest	24	17
Mixedwood Forest	5	3
Hardwood Forest	21	25
Wetland	18	12
Grassland	2	4
Burned	12	15
Agricultural	13	18
Other	5	6

Table 2-5: Observations of Individuals and Tracks on Survey Blocks and Existing Transmission Lines

Year	Species	Blocks		Existing Transmission Lines	
		No. Individuals	No. Tracks	No. Individuals	No. Tracks
2014	White-tailed Deer *	-	2862	-	146
	Elk	24	2	-	-
	Gray Wolf	5	15	-	12
	Coyote	11	53	3	13
	Red Fox	-	-	-	19
	Lynx	-	2	-	-
	Fisher	-	-	-	2
	American Marten	-	5	-	4
	River Otter	-	-	-	1
2015	White-tailed Deer	526	4534	-	-
	Elk	-	-	-	-
	Gray Wolf	2	166	-	-
	Coyote	8	479	-	-
	Red Fox	2	18	-	-
	Lynx	-	48	-	-
	Fisher	-	-	-	-

Table 2-5: Observations of Individuals and Tracks on Survey Blocks and Existing Transmission Lines

Year	Species	Blocks		Existing Transmission Lines	
		No. Individuals	No. Tracks	No. Individuals	No. Tracks
	American Marten	-	3	-	-
	River Otter	-	1	-	-

NOTE:
*only tracks counted

Table 2-6: Beta Estimates (and Standard Error) from Respective Species-Habitat Analysis

Species	Year	Hardwood Forest	Soft-wood Forest	Mixed-wood Forest	Grass-land	Wetland	Burned	Cropland	Other
White-tailed Deer	2014	+0.67 ± 0.06	+0.43 ± 0.04		-0.19 ± 0.09	-0.25 ± 0.05	+0.08 ± 0.04		
White-tailed Deer	2015	+0.71 ± 0.10	+0.35 ± 0.05			-0.46 ± 0.08	+0.12 ± 0.05		
Coyote	2014		-0.06 ± 0.03					+0.08 ± 0.03	
Coyote	2015	+0.16 ± 0.10					+0.13 ± 0.05	+0.15 ± 0.06	
Gray wolf	2015			+0.27 ± 0.08				-0.17 ± 0.05	
Lynx	2015	+0.12 ± 0.05	+0.13 ± 0.03		-0.08 ± 0.05				-0.15 ± 0.06

NOTE:
Reported values were found to be statistically significant and in the best approximating model for each respective species, all others had no observable effect.
(+) indicates a positive relationship; (-) indicates a negative relationship

2.3.3.3.2 Summary of Results

Furbearers and other mammals are shown to use and cross the existing 230 and 500 kV transmission line ROWs.

For most mammal species, results followed a similar general pattern: higher densities occur in areas with greater forested habitats and in some cases reduced human sources of disturbance. Coyote was the only species to show an inverse response, where densities coincided with an increase in agricultural habitats.

2.3.4 Synthesis of Mammal Results

Based on a review of available data, 57 mammal species are known to occur in the RAA. During field surveys, tracks or individuals of 22 species were observed, with white-tailed deer recorded in greatest numbers. Mammal observations were most concentrated in the forested habitats in the southeastern portion of the RAA between La Broquerie and Piney. Among the mammals found in the RAA are 5 SOCC, but none were observed during field surveys.

2.3.4.1 SOCC

Five mammal SOCC have the potential to inhabit the RAA: grey fox, American badger, star-nosed mole, little brown myotis, and northern myotis (Appendix B, Table B.1 Wildlife SOCC with Potential to Occur in the RAA). No mammal SOCC species were observed during 2014 or 2015 field surveys.

Grey fox is listed as Threatened (SARA 2015). The western population of grey fox is thought to have a range that extends from the Rainy River District of Ontario (west of Lake Superior) into southeastern Manitoba. Thus, grey fox may occur within the RAA wherever deciduous forest and scrub habitat is available, especially near water sources. Occasional sightings in southern Manitoba have been reported, but this species is considered rare in the RAA.

American badger is listed as Special Concern (COSEWIC 2012a, 2014a). It inhabits open grassland and other non-forested habitats and occurs up to the boreal forest in southeastern Manitoba (COSEWIC 2012a). The RAA is not expected to provide a significant amount of suitable habitat for American badger and is considered a rare inhabitant.

Star-nosed mole is listed as Uncommon (S3) (MB CDC 2014). It occurs in open forests, wet meadows, and riparian habitat. Although southern Manitoba represents the western limit of its range, it inhabits areas throughout the RAA.

Little brown myotis and northern myotis are both listed as Endangered by SARA (COSEWIC 2012b, 2015; Government of Canada 2015). Both species inhabit open forested areas, particularly those adjacent to riparian areas for foraging, throughout southeastern Manitoba. Although the RAA provides suitable habitat for bats to breed and forage, desktop review and KPIs revealed no evidence or likelihood of any hibernacula within the RAA; as such, no field surveys were undertaken to search for them.

2.3.4.2 White-tailed Deer

White-tailed deer is widespread throughout the RAA and is an important game species to resource users, First Nations and Metis. Regional white-tailed deer populations are thought to have declined in recent years, primarily due to consecutive harsh winters, but also increased hunting pressure from rights-based hunting and predation by wolves and coyotes. Despite recent population declines, long term population trends remain stable.

White-tailed deer tracks were abundant throughout the areas surveyed including along existing transmission lines M602F (500 kV) and R49 (230 kV). Aerial surveys indicated that deer cross and follow existing transmission lines, particularly in areas where the snow had been packed by snowmobiles or ATVs (Lee 2014, pers. comm.). Hardwood and softwood forests provide important over-wintering habitat for deer as evidenced by the highest density of deer and deer tracks observed in these habitats during winter aerial track surveys.

2.3.4.3 Elk

The Vita elk herd is estimated to comprise approximately 100-150 individuals, and is currently believed to be stable after a long-term increasing trend since the herd's establishment in the mid-late 1980s.

Evidence suggests that the Vita elk herd has a large range extending from the Tolstoi border crossing, north to Saint Malo, and southeast towards Piney. Suitable habitat is thought to be not limiting, yet a core area of generally consistent habitat use by elk exists between Vita and the Canada-US border. In this core area, the elk herd benefits from tolerant landowners (*i.e.*, crop and hay bale depredation) that provide protective habitats and active, supplemental feeding. Elk can travel in excess of 50 km to avoid human sources of disturbance and hunting pressure, or to seek out alternate food and water sources.

Currently the MN DNR operates a management plan for elk which includes a hunting season while MCWS currently monitors the population with occasional aerial surveys and does not provide a licensed hunting season. The greatest threat to elk is a combination of 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.).

No elk were observed in the RAA during 2014 and 2015 field studies.

2.3.4.4 Moose

Moose were common in southeastern Manitoba prior to the 1990s but populations in the region have since collapsed, and although suitable moose habitat (*e.g.*, shrubby wetlands, alder swamps, sub-climax deciduous forest) remains in southeastern Manitoba, moose are now rare due to a combination of factors such as habitat fragmentation, predation by wolves, parasites, fire suppression, and unregulated harvest.

Moose tracks were incidentally observed on two occasions during 2014 field studies, once in a mixedwood forest interspersed with low-lying shrubby habitat between Lonesand Lake in the east and the Rat River in the west, and once in the Watson P. Davidson Wildlife Management Area, east of the Sandilands Provincial Forest; a camera trap on M602F also captured evidence of a moose walking along the existing ROW in July 2014. There are also a few other scattered reports of recent moose sightings within the RAA. Moose are an important resource for First

Nations and concern has been expressed regarding the creation of the New ROW and the resulting impact on moose in the area.

2.3.4.5 Black Bear

Black bears are widespread and common throughout forested parts of Manitoba. They are an important species to resource users, FN and Metis. Guided black bear hunting is am established tourism and economic activity within southern parts of the RAA (5 hunting outfitters in the RAA), and is highly regulated by the provincial government. Within the RAA, black bear is considered common and widespread throughout areas supporting forest habitat; particularly at the forest-agricultural habitat interface. Field studies identified bear activity within the vicinity of the refined alternate routes, along existing transmission line M602F, 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. Bears are known to hibernate in the RAA; one adult bear was observed sitting on a den during late aerial mammal track surveys in January 2015.

2.3.4.6 Furbearers and Other Mammals

Furbearers such as beaver, bobcat, coyote, and gray 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 fields.

Smaller mammals in the RAA include least weasel, striped skunk, red fox, marten, and fisher. These species are typically associated with wooded areas but also make use of adjacent open habitat. Marten are more tolerant of fragmented landscapes, whereas fishers tend to use more contiguous forest blocks. Both were most commonly observed in the southern portions of the LAA where large blocks of intact forest persist.

Desktop review identified a variety of rodent and small mammal 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. 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 2015; Manitoba Hydro 2014/2015, pers. comm.).

2.3.4.7 Bats

Six bat species are expected to occur within the RAA, based on the availability of suitable roosting and foraging habitat along the Assiniboine and Red River, and in the forest and wetland areas found along parts of the FPR. The presence of natural or human made bat hibernacula habitat within the RAA is not expected due to the absence of abandoned mines or

other human made underground caverns. Karst landforms (limestone caverns) do exist in the RAA, but none are known to support hibernating species.

White Nose Syndrome, an often fatal fungal infection of the nasal and wing membranes of hibernating bats, is believed to be the biggest threat to bat populations across North America. White Nose Syndrome does not yet appear to have reached Manitoba, but is prevalent in Ontario (OMNR 2011), and present in Minnesota as well (MN DNR 2013).

2.4 BIRDS

Information on birds potentially inhabiting the RAA is provided based on a variety of information sources including desktop data, KPI's, and field Studies. Data collection focused on the species assemblages identified in Table 2-1 (*i.e.,* forest interior birds, open forest birds, grassland birds and, wetland birds). The methods utilized in accessing desktop data sources, conducting KPIs and field studies are described. Results of each program are provided followed by an overall synthesis of bird information at the end of Section 2.4**.**

2.4.1 Desktop

2.4.1.1 Methods

A number of desktop sources of information were obtained and reviewed for information pertinent to birds and the RAA:

- The Species at Risk Public Registry (Government of Canada 2015), which was reviewed to identify birds listed under SARA with potential to occur within the RAA; recovery strategies and management plans for SARA-listed species (common nighthawk [*Chordeiles minor]*, olive-sided flycatcher [*Contopus cooperi*], Canada warbler [*Cardellina Canadensis]*, golden-winged warbler [*Vermivora chrysoptera*]) were also consulted (Environment Canada 2014a, 2015a, b, and c).
- The COSEWIC list of Canadian Wildlife Species at Risk (COSEWIC 2015), which was reviewed to identify listed birds with potential to occur within the RAA.
- MESEA which was reviewed to identify provincially-listed birds with potential to occur in the RAA (MCWS 2014a; Government of Manitoba 2015a).
- The Birds of North America Online (2015), which was reviewed to identify key life history attributes for birds breeding in the RAA and to identify birds with potential to occur within the RAA.
- Important Bird Areas of Canada (Bird Studies Canada and Nature Canada 2015), which was reviewed to determine whether any IBAs are located within and/or adjacent to the RAA.
- Manitoba Breeding Bird Atlas (MB BBA 2015), which was reviewed to identify breeding records of SOCC. 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.

- eBird (eBird 2015), which was reviewed to identify occurrence of SAR within the RAA.
- St. Adolphe Hawkwatch Data Summaries (HawkCount 2015), which were used to understand spring raptor migration along the Red River.
- North American Breeding Bird Survey (2010) data for Vita (BBS Route 45302) and Sandilands (BBS Route 45402) (USGS 2012a), which were used in development of a species list for the RAA.
- Manitoba Conservation Data Centre records of SOCC and sensitive wildlife habitat features (MB CDC 2014), which were mapped and used to inform development of a Project-specific list of SOCC and to contribute to survey.
- Manitoba Peregrine Falcon Monitoring Project Progress Reports (Martinez-Welgan 2011, 2012, 2013), including GPS tracking data from young peregrines, which were used to understand the distribution and range of this species in southern Manitoba and whether they are actively using the RAA. Mortality events were also monitored to understand the effect human factors.
- ATK sources were reviewed to identify traditional game bird hunting areas and identify concerns as they relate to bird populations in southeastern Manitoba (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).
- Potential breeding habitats for common nighthawk and eastern whip-poor-will were mapped within the RPA by querying the FRI land cover database with species-specific breeding habitat attributes. Species-specific breeding habitat attributes were identified from status reports (COSEWIC 2007a, 2009d) and other published literature. Mapping was used to guide field studies.
- Site-specific land cover mapping developed for the PDA was used to augment habitat mapping for bird SOCC dependent upon grassland and/or wetland habitat types (*e.g.*, short-eared owl) (Veg and Wetlands TDR).
- Canadian Land Inventory (CLI) land capability for waterfowl was used to better understand the habitat suitability and expected distribution of waterfowl (CLI 2002b).

Additionally, available data on habitat selection and land cover were analyzed to generate a map of golden-winged warbler habitat suitability in the RAA (Appendix C.2)

2.4.1.2 Results

There are no IBAs identified within the RAA (Bird Studies Canada and Nature Canada 2015); however, the Red River is considered an important movement corridor for raptors, particularly during the spring migration period (*i.e.*, March/April) (Hawkwatch 2014).

Based on evidence from North American Breeding Bird Surveys (NA BBS 2010; USGS 2012a), Manitoba Breeding Bird Atlas surveys (MB BBA 2015), and HawkCount data (Appendix B, Tables B.5 and B.6; HawkCount 2015, 225 bird species are known to occur in the RAA (Appendix B, Table B.7). The majority of these species (*i.e.*, 170 of 225 species) are migrants that breed in the area; 23 species migrate through the RAA, and 28 species are year-round residents.

A review of MB BBA, eBird, and MB CDC data revealed the presence of 27 bird SOCC in the RAA. Twenty of these species were detected within or near Winnipeg, or near Ste-Genevieve,

Richer, Marchand and Piney, MB. Six species were only found in the Glenboro RAA (all of them outside of the LAA): burrowing owl, ferruginous hawk, Sprague's pipit, chestnut-collared longspur, Baird's sparrow, grasshopper sparrow (eBird 2015; MB BBA 2015; MB CDC 2015).

The discussion of these and other key species is organized by broad habitat preferences identified in Table 2-1 (*i.e.*, open forest birds, forest interior birds, grassland birds, and wetland birds).

2.4.1.2.1 Open Forest Birds

There are 68 open forest species known to occur in the RAA, of which 66 breed or are permanent residents in the RAA, and two are migrant or winter resident species (Appendix B, Table B.7). Open forest species are those that require forest edges or forest openings for breeding. Typical open forest species inhabiting the RAA include great horned owl, northern saw-whet owl, white-throated sparrow, Cooper's hawk and ruffed grouse (MB BBA 2015). First Nations report ruffed grouse as being a traditional game species (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

There are six open forest SOCC known to breed within the RAA: red-headed woodpecker, common nighthawk, eastern whip-poor-will, eastern wood pewee, olive-sided flycatcher and golden-winged warbler (Appendix B, Table B.8).

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 primarily reported 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). MB CDC data indicate 27 red-headed woodpecker observations have been reported in the RAA, including one observation in the LAA (MB CDC 2014).

Eastern whip-poor-will is listed as threatened by MESEA and SARA, and its abundance throughout its range is thought to be declining by approximately 3.5% per year (COSEWIC 2009a). Breeding habitat for eastern whip-poor-will occurs throughout the RAA where deciduous or mixedwood forest with little or no underbrush is prevalent (DeGraaf and Rudis 1986; . Eastern whip-poor-will observations in the RAA are widespread in habitat northwest of Richer, south of Richer to Marchand, and in the southern part of the RAA near Sandilands and Sundown (eBird 2015; MB BBA 2015; MB CDC 2014). MB CDC data indicate 12 eastern whip-poor-will observations in the RAA, including three observations in the LAA.

Common nighthawk is listed as threatened by MESEA and SARA, and its abundance in Canada is thought to be declining by as much as 6.6% per year (COSEWIC 2007a). Common nighthawks nest on the ground in areas with little to no vegetation, such as in regenerating forests, cleared areas, and rock outcrops (COSEWIC 2007a). Breeding habitat for common nighthawk exists

primarily in the eastern part of the RAA from Richer to Marchand, and near Sundown where open forest, edge habitat, and woodland clearings are prevalent . 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 wood-pewee is listed as special concern by COSEWIC (2012c), and Canadian populations have declined by as much as 25% in the last 10 years (COSEWIC 2012c). Eastern wood-pewee breeding habitat is similar to that of golden-winged warbler although it favours forested components more; as such it occurs throughout most portions of the RAA where deciduous and mixedwood forest edges and clearings are prevalent (Carey *et al.* 2003; Burke *et al.* 2011). Eastern wood-pewee observations in the RAA are widespread and common, particularly along riparian corridors northwest of Richer, east of Marchand, and Sandilands south to the border (eBird 2015; MB BBA 2015; MB CDC 2014). Observations of eastern wood-pewee have also been reported in the Glenboro South Station RAA (MB BBA 2015).

Olive-sided flycatcher is listed as threatened by SARA, and Canadian populations are thought to be declining by as much as 4% per year (COSEWIC 2007b). Olive-sided flycatcher is often associated with forest edges and clearings in the boreal forest. They 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). Observations of olive-sided flycatchers in the RAA 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). MB CDC data indicate four olive-sided flycatcher observations have been reported in the RAA, including one observation in the LAA near Lonesand Lake, southeast of the town of Lonesand (MB CDC 2014).

Golden-winged warbler is the only species to have defined **critical habitat** within the RAA (Environment Canada 2014a). Critical habitat for golden-winged warbler is defined as places where golden-winged warblers are consistently present (Environment Canada 2014a). Critical habitat is important for sustaining current breeding distribution, and particularly important for expanding the population into adjacent areas. Within the RAA, critical habitat exists along the transitional area of the Interlake Plain Ecoregion, near the towns of Ste-Genevieve and Ross in the north, south through Richer, La Broquerie, Marchand, to the border near Sundown and Piney (Environment Canada 2014a). Golden-winged warblers require early successional deciduous or mixedwood and forest edge habitats that are widespread throughout the eastern part of the RAA and are often created by disturbance, particularly logged areas, along utility and road ROW, recently burned areas, and natural forest gaps (Environment Canada 2014a; Aldinger *et al.* 2015).

Results of the golden-winged warbler habitat suitability mapping (Appendix A, Map 2-12 – Golden-winged Warbler Habitat in the RAA) indicate that the LAA contains 3981 ha of high, 2421

ha of moderate, and 2649 ha of low suitable breeding habitat. This is approximately 7% of the total potential golden-winged warbler habitat within the RAA.

The abundance and range of golden-winged warblers in Manitoba is thought to be increasing, primarily in the south and southeast, with range expansion northwest to the Manitoba Escarpment (Confer *et al.* 2011). Observations of golden-winged warblers in the RAA have been reported near Ross, Richer, La Broquerie, areas east of Marchand, near Sundown, and Piney in the south (eBird 2015; MB BBA 2015; MB CDC 2014). The highest frequency of observations has been reported northwest of Richer (eBird 2015; MB BBA 2015; MB CDC 2014).

2.4.1.2.2 Interior Forest Birds

There are 37 forest interior species known to occur within the RAA, of which 36 breed or are permanent residents in the RAA and one is a migrant species (Appendix B, Table B.7). Forest interior species are those that require core areas of forest habitat for breeding. Core areas are generally located greater than 100m from forest edges (Environment Canada 2013a). Typical forest interior species inhabiting the RAA include great gray owl, boreal owl, red-eyed vireo, and ovenbird (MB BBA 2015). Among this group are two forest interior SOCC known to breed in the RAA: pine warbler and Canada warbler (Appendix B, Table B.8).

Observations of great gray owl and boreal owl typically occur along the eastern edge of the RAA, in areas east of Marchand, and in Sandilands Provincial Forest (eBird 2015; MB BBA 2015). Red-eyed vireo is widespread throughout the RAA where deciduous forest exists (MB BBA 2015). Ovenbird is also widespread, occurring in mature deciduous and mixedwood forests north of Richer, south through La Broquerie, Marchand, and Sundown, including Winnipeg and areas north of Glenboro South Station (eBird 2015; MB BBA 2015). Ovenbird is considered an interior forest specialist dependent upon large, uninterrupted tracts of forest (Burke and Nol 2000; Burke *et al.* 2011). For this reason, ovenbird is the focal species for forest interior birds.

Pine warbler is ranked as "rare" in Manitoba by the MB CDC (MB CDC 2014) and observations have been limited to the eastern part of Manitoba where their preferred pine and mixed-pine forest is prevalent (MB BBA 2015). The highest frequencies of pine warbler observations in the RAA have been reported in Winnipeg, and east of Marchand (eBird 2015; MB BBA 2015; MB CDC 2014). MB CDC data indicate one pine warbler observation reported in the RAA, and none in the LAA (MB CDC 2014).

Canada warbler is listed as endangered by MESEA and threatened under SARA. Populations in Manitoba and throughout its range are declining by as much as 4.5% per year (COSEWIC 2008a). The mixedwood forest with wet, dense understory preferred by breeding Canada warblers is uncommon in the RAA, becoming more prevalent towards the Ontario border and Manitoba's Interlake area (Carey *et al.* 2003; MB BBA 2015). Reports of Canada warblers breeding in the RAA are rare, with possible breeding evidence observed northeast of Richer, south of Woodridge and south of Piney (MB BBA 2015; MB CDC 2014). eBird data indicate a high frequency of migrant Canada warblers along the riparian corridors in Winnipeg, but few

observations elsewhere in the RAA (eBird 2015). MB CDC data indicate two Canada warbler observations in the RAA, and no observations in the LAA (MB CDC 2014).

2.4.1.2.3 Grassland Birds

There are 34 grassland species known to occur within the RAA, of which 29 breed or are permanent residents in the RAA, and three are migrant species (Appendix B, Table B.7). Grassland species are those that require grassland habitat for breeding. Typical grassland species inhabiting the RAA are: northern harrier, sharp-tailed grouse, savannah sparrow, and western meadowlark (MB BBA 2015). The 10 grassland SOCC known to breed in the RAA are: ferruginous hawk, short-eared owl, burrowing owl, loggerhead shrike, barn swallow, Sprague's pipit, chestnut-collared longspur, grasshopper sparrow, Baird's sparrow, and bobolink (Appendix B, Table B.8).

Northern harrier, savannah sparrow and western meadowlark are widely dispersed throughout the RAA where grassland, hayland, and pasture exist (MB BBA 2015). Sharp-tailed grouse is an upland gamebird species that occurs in open grassland, agriculture, and open parkland habitat throughout the RAA (Connelly *et al.* 1998). Observations of sharp-tailed grouse in the RAA are most commonly reported near the Glenboro South Station, Marchand, west of Woodridge, and Sundown (eBird 2015; MB BBA 2015). Sharp-tailed grouse is an important recreational gamebird species in Manitoba and sharp-tailed grouse hunting is permitted in all GHAs within the RAA (MCWS 2014b); it is also important First Nations (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015) .

Ferruginous hawk is listed as endangered by MESEA and threatened under SARA. It breeds in grassland habitat and is at the edge of its range in Manitoba, with an average of fewer than 50 nesting pairs per year (COSEWIC 2008b). Observations of ferruginous hawk in the RAA are limited to areas near the Glenboro South Station but outside the LAA (MB CDC 2014).

Short-eared owl is listed as threatened by MESEA and special concern under SARA, and populations in Manitoba and throughout its range have been declining at a rate of 3% per year (COSEWIC 2008c). Short-eared owls utilize 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).

Burrowing owl is listed as endangered under MESEA and SARA. It breeds in grassland habitat with short vegetation and small mammal burrows, and may be extirpated from Manitoba (COSEWIC 2006a). Observations of burrowing owl in the RAA are limited to areas near the Glenboro South Station, but outside the LAA (MB CDC 2014).

Loggerhead shrike is listed as endangered by MESEA and threatened under SARA, and populations in the prairies have declined by 47% over the past decade (COSEWIC 2014). Loggerhead shrike breeds in a variety of open habitats in the RAA, including shrubby grasslands

and pastures but observations have been rare (Carey *et al.* 2003; MB BBA 2015). Loggerhead shrike observations in the RAA have been reported near the Glenboro South Station, Winnipeg, Ste. Anne, and Steinbach (eBird 2015; MB BBA 2015; MB CDC 2014).

Barn swallow is designated as threatened by COSEWIC (2014a) and although still common and widespread, populations are declining throughout its range by as much as 3.6% per year (COSEWIC 2011). Barn swallow breeding habitat is extensive in the RAA, primarily in areas of open grassland, pastures, agricultural crops, and ROWs with artificial structures nearby for nesting (Carey *et al.* 2003). Barn swallows widespread throughout the RAA, including Glenboro Station South, the SLTC, Winnipeg, and rural areas to the east (eBird 2015; MB BBA 2015; MB CDC 2015).

Sprague's pipit is listed as threatened by MESEA and under SARA, and populations throughout its Canadian range have been declining at a rate of 7.1% per year (COSEWIC 2010a). Sprague's pipit breeding habitat in Manitoba occurs primarily in the southwest corner of the province where native mixed grass prairie and large, open grasslands are more common (Carey *et al.* 2003). Observations of Sprague's pipit in the RAA are limited to areas outside of the LAA near the Glenboro South Station (MB BBA 2015; eBird 2015; MB CDC 2014).

Chestnut-collared longspur is listed as endangered by MESEA and threatened under SARA. It breeds in native grassland habitat and in Manitoba is largely limited to southwest of Carberry (COSEWIC 2009b). Observations of chestnut-collared longspur in the RAA are limited to areas near the Glenboro South Station but outside the LAA (MB CDC 2014).

Grasshopper sparrow is ranked as "rare" in Manitoba by the MB CDC (16 to 20 occurrences, may be vulnerable to extirpation) (MB CDC 2014) and breeding habitat occurs primarily in the southwest corner of the province where open grassland and prairie is common (Birds of North America Online 2015; MB BBA 2015). Grasshopper sparrow observations in the RAA have only been reported near the Glenboro South Station (eBird 2015; MB BBA 2015; MB CDC 2014). MB CDC data indicate one grasshopper sparrow observation has been reported in the RAA, with no observations in the LAA (MB CDC 2014).

Baird's sparrow is listed as endangered by MESEA and designated as special concern by COSEWIC. It breeds in native grassland habitat and is at the northeast limit of its range in southern Manitoba (COSEWIC 2012d). Observations of Baird's sparrow in the RAA are limited to areas near the Glenboro South Station but outside the LAA (MB CDC 2014).

2.4.1.2.4 Wetland Birds

There are 80 wetland species known to occur within the RAA, of which 68 breed in the RAA, and 12 are migrants or transient species (Appendix B, Table B.7). Wetland species are those that require wetland or riparian habitat for breeding. Typical wetland species inhabiting the RAA are: sandhill crane, Wilson's snipe, common yellowthroat, and red-winged blackbird (MB BBA 2015). First Nations report ducks and geese as being traditional game species (Black River First Nation,

Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015). Based on the Canadian Land Inventory (CLI), land capability for waterfowl production is moderate to severely limited in the RAA (CLI 2002b).

The 6 wetland SOCC known to breed in the RAA are: trumpeter swan, horned grebe, least bittern, great egret, yellow rail, and bank swallow (Appendix B, Table B.8).

Trumpeter swan is ranked as threatened by MESEA and typically breeds in freshwater marshes, ponds, and lakes (Carey *et al.* 2003). Trumpeter swan observations in the RAA have primarily been reported near Richer, Marchand, Sandilands, and Sundown (eBird 2015; MB BBA 2015; MB CDC 2014). There are no observations of breeding trumpeter swans reported in the LAA (MB CDC 2014; eBird 2015) and typically breed in the boreal forest.

Horned grebe is designated as species of special concern by COSEWIC (COSEWIC 2009c, 2015) and it is believed that populations are declining throughout its range at a rate of 1.5% per year (COSEWIC 2009c). Although horned grebes have occasionally been observed in the RAA (eBird 2015; MB BBA 2015), their primary breeding habitat occurs in the PPR 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). 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).

Least bittern is listed as endangered by MESEA and threatened under SARA, and it is believed that populations have declined throughout its range by as much as 30% since 1999 (COSEWIC 2009d). Least bitterns breed in wetlands, marshes, and shrubby swamps dominated by emergent vegetation (*i.e.*, dense stands of cattails) adjacent to areas of open water (Carey *et al.* 2003). Since this specific habitat type is relatively limited in the RAA, least bittern observations are rare (eBird 2015; MB BBA 2015; MB CDC 2014). The highest frequencies of 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 2014). There are no observations of least bittern reported in the LAA (MB CDC 2014).

Great egret is listed as rare throughout its range and rare throughout its range in Manitoba by MB CDC (2014). This species is a colonial breeder (in mature trees) near a wide variety of waterbodies, including streams and wetlands (Mccrimmon *et al.* 2011). Although wetland and forested habitats are abundant within the RAA, there is only 1 observation within the RAA near the Glenboro Station (14 km north along the Assiniboine River) while observations throughout the remainder of the RAA remain rare (eBird 2015; MB CDC 2014).

Yellow rail is a small, secretive, marsh bird listed as a species of special concern under SARA. Little is known about yellow rail population sizes and trends, but it is believed that populations are declining due to habitat loss and degradation (COSEWIC 2009e). Yellow rails breed in sedge-dominated shallow wetlands and wet meadow habitat widespread along the boreal forest

transition zone in the eastern part of the RAA (Van Dam *et al.* 1998; Carey *et al.* 2003). The highest frequencies of yellow rail observations in the RAA have been reported near Ross and Richer in the north, and near Caliento and Sundown in the south (eBird 2015; MB BBA 2015; MB CDC 2014).

Bank swallow is listed as threatened by COSEWIC (2014a) and although widespread, Canadian populations have been declining at a rate of 8.8% per year (COSEWIC 2013b). Bank swallows breed in a variety of natural and artificial sites with vertical banks, including riverbanks, lake bluffs, quarries, and road cuts (Garrison 1999; Carey *et al.* 2003). Bank swallow observations in the RAA are widespread and have been reported near Glenboro Station South, the SLTC, east of Winnipeg, north of Richer, La Broquerie, and near Sundown (eBird 2015; MB BBA 2015; MB CDC 2014). The highest frequency of observations was reported northwest of Richer (eBird 2015, MB BBA 2015).

Sandhill crane is a common migrant and widespread breeder in the province, including in the southeast, where populations are increasing (Carey *et al.* 2003). Confirmed breeding records of sandhill cranes have been reported throughout the RAA, especially near Sundown and along the United States border, where extensive marshes, bogs, fens, and open wetlands exist (Carey *et al.* 2003; MB BBA 2015). First Nations have expressed concern about the loss of sandhill crane breeding habitat as a result of the proposed ROW (Black River First Nation, Long Plain First Nation and Swan Lake First Nation 2015; Peguis First Nation 2015).

2.4.1.2.5 Urban Birds

There are two urban species known to occur in the RAA (Appendix B, Table B.7). Urban species are those that have adapted to nesting on or in human infrastructure (*e.g.*, buildings) found in urban environments such as Winnipeg. Chimney swift and peregrine falcon are the only two urban species known to breed within the RAA (Appendix B, Table B.8).

Chimney swift is listed as threatened by MESEA (COSEWIC 2007c) and SARA (Government of Canada 2015) and populations in Manitoba and throughout its range are declining by as much as 7.8% per year (COSEWIC 2007c). Chimney swift breeding habitat is rare in the RAA and is confined to areas of urban and industrial development (Carey *et al.* 2003; MB BBA 2015). The majority of chimney swift observations in the RAA are concentrated in and around Winnipeg and the SLTC, but observations have also been reported near Steinbach, La Broquerie, and Marchand (eBird 2015; MB BBA 2015; MB CDC 2014). MB CDC data indicate 61 chimney swift observations have been reported in the RAA, with no observations in the LAA (MB CDC 2014).

Peregrine falcon is listed as endangered by MESEA (COSEWIC 2007d) and special concern under SARA (Government of Canada 2015; Environment Canada 2015c), but recent surveys have indicated Canadian populations are recovering steadily since the ban on organochlorine pesticides in the 1970s (COSEWIC 2007d). In southern Manitoba, peregrine falcons may be observed during the migration periods, as they make their way to and from northern breeding grounds. Peregrine falcon has been known to nest on the ledges of tall buildings and bridges in

downtown Winnipeg (PFRP 2015). Peregrine falcon observations in the RAA are most commonly reported in Winnipeg, near Ste. Anne, and St. Adolphe, and most observations can likely be attributed to a confirmed breeding pair which nests on top of a skyscraper in Winnipeg, or the release of young falcons from the Parkland Mews captive breeding centre near St. Norbert (eBird 2015; MB BBA 2015; MB CDC 2014; PFRP 2015). GPS tracking data from young falcons marked during a joint monitoring program between the University of Manitoba, Manitoba Hydro, MCWS, and Parkland Mews, indicates that peregrines hatched from downtown Winnipeg ventured widely throughout southern Manitoba, to the Interlake, and east to Ontario (including the RAA) (Martinez-Welgan 2013). Movements of peregrines reared from Parkland Mews did not range as far, and were observed primarily in and around Winnipeg (Martinez-Welgan 2013).

2.4.1.3 Data Gaps

A review of existing bird-related information revealed the following data gaps with respect to the birds and bird communities inhabiting the RAA:

- The density and distribution of breeding birds (including diurnally active species of SOCC) relative to major habitat types (*e.g.*, grassland, deciduous forest).
- Presence and distribution of bird SOCC active at dusk or at night (*i.e.*, common nighthawk, eastern whip-poor-will, yellow rail).
- Seasonal movement of migratory birds, particularly waterbirds, and use of key habitats (*e.g.*, the number, flight heights, and flight directions of waterbirds on wetlands near the preferred route).
- The location of sharp-tailed grouse breeding sites (*i.e.*, leks).
- Estimate of bird mortality rate for transmission lines existing in the region.

Data gaps were addressed through development of bird field survey programs and KPIs. Bird surveys were designed to gather information on breeding birds including SOCC in grassland, wetland and forest habitats. Surveys were also designed to evaluate the waterbird use of permanent and semi-permanent water bodies in the RPA, with a focus on areas where the refined alternate routes crossed over or near rivers, wetlands and reservoirs. Surveys for grouse leks targeted potential sharp-tailed grouse breeding habitat, and local data was gathered on bird mortality rates under existing transmission lines located in the RPA.

2.4.2 Key Person Interviews

KPIs were conducted with key people having knowledge about birds inhabiting the RPA. Communications with others having knowledge about birds also occurred, but in a less formal manner.

2.4.2.1 Methods

KPIs were conducted with six individuals with knowledge of birds and bird habitat in southeastern Manitoba. Those willing to participate were interviewed via telephone using questionnaires

developed by the Project Team (Appendix C.1.1). Interviews were conducted between April 2014 and April 2015 and involved the following people:

- The leading authority on Manitoba birds and current Bird Studies Canada manager of the Manitoba Breeding Bird Atlas (C. Artuso).
- The Game Bird manager with MCWS (F. Baldwin).
- The Founding Director of Parkland Mews Falconry and Bird of Prey Education Centre located south of Winnipeg (R. Wheeldon). Parkland Mews specializes in the captive breeding and release of peregrine falcons to assist with the provincial recovery effort of this endangered species.
- The Director of the Wildlife and Fisheries Branch of Manitoba Conservation and Water Stewardship and coordinator of Manitoba's annual Nocturnal Owl Survey (J. Duncan).
- A Canadian Wildlife Service Wildlife Biologist, Ron Bazin, was contacted to provide information on the distribution of yellow rail and least bittern in the Project Area.
- Owner and operator of KC's Outfitting in Sundown, MB (K. Holme). The interview questions dealt primarily with wildlife that the outfitter has a hunting allocation for (*i.e.,* black bear and white-tailed deer; Section 2.3.2); however, comments on other wildlife were provided.

2.4.2.2 Results

2.4.2.2.1 Important Habitat Features

Concern was raised about the portion of the FPR that passes through the length of the aspen parkland transition zone, from south of Anola to areas east of Zhoda. This transition zone is a relatively narrow, ecologically rich area situated between the prairie/agriculturally dominated landscape to the west and boreal forest to the east (Artuso 2015, pers. comm.). The diversity of habitats in this area provides critical habitat for golden-winged warbler, a species that occupies forest edges. Concern was raised regarding the development of a transmission line ROW through areas known to support golden-winged warbler (Artuso 2015, pers. comm.). ROW clearing and follow-up vegetation management practices tend to promote hard forest edges (*i.e.*, abrupt edges without transitional shrubs and herbs) that have limited suitability as golden-winged warbler nesting habitat. It was recommended that after the initial ROW clearing, shrubs and herbs should be replanted in areas of the ROW traversing critical golden-winged warbler habitat (Artuso 2015, pers. comm.). Following this, ROW vegetation should be managed in a manner that retains herbs and shrubs (Artuso 2015, pers. comm.).

A number of bogs were identified as important areas for wildlife. The St. Labre Bog northeast of Woodridge (east of the RAA) is an ecologically important area for great gray owls and many other wildlife species (Artuso 2015, pers. comm.). The large Sundown/Caliento bog complex is known to support breeding yellow rail and is likely to be important habitat for other marsh birds such as least bittern (Artuso 2015, pers. comm.). Sundown Lake and Lonesand Lake were both identified as habitat for sandhill cranes and swans (Holme 2014, pers. comm.; Artuso 2015, pers. comm.).

2.4.2.2.2 Open Forest Birds

Input on open forest birds was provided for golden-winged warbler , eastern wood pewee, common nighthawk, eastern whip-poor-will, boreal owl and northern saw-whet owl. Most of the concern raised about the Project and open forest birds was focused on golden-winged warbler (Section 2.4.2.1). There was less of a concern for eastern wood pewee, as this species is more tolerant of forest fragmentation (Artuso 2015, pers. comm.). Eastern whip-poor-will uses open habitats for both foraging and nesting; however recreational use along the ROW may deter this species from using otherwise suitable habitat (Artuso 2015, pers. comm.). Spring 2014 field surveys for common nighthawk yielded low detections despite the presence of potential common nighthawk habitat in areas surveyed (Section 2.4.3.2.2). When asked about the occurrence of common nighthawk in the RPA, Mr. Artuso indicated that 2014 common nighthawk observations in southeast Manitoba were lower than normal (Artuso 2015, pers. comm.).

Loss of nesting trees resulting from ROW clearing was raised as a concern for open forest owls (Duncan 2015, pers. comm.). The retention of large diameter snags can mitigate for the potential loss of nesting cavities built by woodpeckers and used by some species such as boreal owls, and northern saw-whet owls (Duncan, 2015 pers. comm.).

2.4.2.2.3 Forest Interior Birds

To protect forest birds such as owls, it was recommended that the project avoid large tracts of contiguous forest in favor of routing options that traverse habitat already impacted by human activities (Duncan 2015, pers. comm.). Forest indicator species such as great gray owls may experience increased mortality along straight forest edges (*e.g.*, by great horned owls)(Duncan 1987). However, recent research indicates that great gray owls do not avoid linear features through forests (Duncan, J.R. unpublished data) and in some cases may benefit from more open habitat with the retention of hunting perches. Creating scalloped or non-linear habitat edges similar to those created by natural disturbance, will reduce straight, line-of-sight distances along the transmission line ROW. This is recommended to mitigate effects on forest owls inhabiting the area (Duncan 2015, pers. comm.). The retention of large diameter snags can mitigate for the potential loss of nesting cavities built by woodpeckers and used by some species such as barred owls (Duncan 2015, pers. comm.).

2.4.2.2.4 Grassland Birds

Short-eared owls are known to migrate through the RAA (Artuso 2015, pers. comm.). Pairs have been observed nesting near the Brady Landfill, located north of the SLTC. Short-eared owls have also been reported near Assiniboine Downs, located approximately 5 km east of the SLTC near the western outskirts of Winnipeg (Artuso 2015, pers. comm.).

Migration patterns of snowy owls vary depending on prey availability, but in some years grassland, agricultural, and open wetland habitat in the RAA may be important to the habitat needs of migrating snow owls (Duncan 2015, pers. comm). Snowy owls have been known to overwinter throughout southeastern Manitoba until spring, when they migrate north to the tundra to breed (Duncan 2015, pers comm.)

Isolated reports of grasshopper sparrow (typically a bird of the southwestern grasslands) in the southeastern part of the RAA have been confirmed on small parcels of remnant native tall-grass prairie near the Sundown/Caliento Bog. Although the historical range of the Sprague's pipit extends into the southeastern RAA, reports of this species in the area are either unconfirmed or likely historical (Artuso 2015, pers. comm.).

Information on the location of sharp-tailed grouse leks is lacking throughout most of southeast Manitoba (Baldwin 2015 pers. comm.). MCWS records indicated two lek sites exist east of Highway 12, in areas north of Caliento and vita, MB (Baldwin 2015, pers. comm.). Both leks are located over 4 km from the FPR. Four other sharp-tailed grouse leks are located within the RAA of the Glenboro South Station (Baldwin 2015, pers. comm.). All four leks are located over 3 km from the Glenboro South Station PDA.

2.4.2.2.5 Wetland Birds

Breeding sandhill cranes are common in southeastern Manitoba and important breeding areas exist near Ste-Genevieve, Badger, and throughout the Sandilands Provincial Forest (Artuso 2015, pers. comm.). Due to the high numbers of sandhill cranes and other waterfowl known to breed near Sundown, bird deflectors are highly recommended on segments of the transmission line traversing this area to help reduce collision risk (Artuso 2015, pers. comm.). Sandhill cranes are also known to nest in Lonesand Lake located north of Sundown, MB (Holme 2014, pers. comm.).

Due to reintroduction efforts in Minnesota, trumpeter swans are reestablishing themselves in Manitoba and a confirmed breeding pair has been reported on Mud Lake near Piney, and unconfirmed breeding has been reported in the Richer area (*e.g.*, Richer Lake, Lac Bosse) (Artuso 2015, pers. comm.). Trumpeter and tundra swans have also been observed on Lonesand Lake, located north of Sundown, MB (Holme 2014, pers. comm.).

Least bittern prefer breeding wetland habitats with extensive emergent vegetation and are not expected to be widespread or abundant in southeastern Manitoba. Yellow rail breeding habitat exists throughout southeastern Manitoba where suitable conditions exist, particularly near the Sundown and Caliento Bogs.

2.4.2.2.6 Urban birds

Some concerns regarding the proximity of the SLTC to the Parkland Mews complex (a breeding facility for peregrine falcons) and the potential for increased mortality to falcons due to increased collision risk (Wheeldon 2015, pers. comm.). Mr. Wheeldon is currently working closely with Manitoba Hydro to study the impact of transmission lines in Manitoba on peregrine falcons and how best to mitigate the risk (Wheeldon 2015, pers. comm.).

2.4.3 Field Studies

2.4.3.1 Breeding Bird Surveys

Breeding bird surveys were designed to:

- Establish baseline species richness and density estimates for breeding birds using broad habitats (*e.g.*, grassland, wetland, forest) representative of the RAA.
- Test for differences in species richness and density between the refined alternate routes and the existing M602F ROW to assess how bird communities differ on and off a transmission line ROW.
- Provide baseline breeding bird density estimates for future effects monitoring.

2.4.3.1.1 Methods

Survey Design

Using a stratified random design, survey points were selected randomly within the representative broad habitat types potentially affected by the Project (*i.e.*, grassland, wetland, hardwood forest and softwood forest) as identified by the FRI habitat data (MCWS 1979 and 1999)(Appendix D, Photo 7). Survey plots were distributed by major habitat type relative to the overall amount of the respective habitat types within the RAA to ensure proportional representation. Surveys also occurred in modified wildlife habitat located along the South Loop. Sample plots were located on, and adjacent to (within 100 m) the refined alternate routes, and in reference areas (within 1 km). Locations of plots were randomly chosen; however, due to access limitations, the locations of some plots were modified. This design not only enables robust estimates of species richness and bird density per habitat but provides information on focal species like ovenbird and bobolink and other diurnally active species at risk (*e.g.*, golden-winged warbler), 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 structure on an established transmission line. Once again, survey plots were distributed by major habitat type relative to the overall amount of the respective habitat types within the RAA to ensure proportional representation.

Timing

Breeding bird surveys were conducted from June 10 to July 7, 2014. 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) (Ralph *et al.* 1995).

Field Methods

Surveys were conducted by a two-person team using the point-count method described by Ralph *et al.* (1995). One biologist identified 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 min listening period, beyond 100 m, or flying over the plot, were recorded as incidental observations. The second crew member primarily assisted with navigation and habitat assessment, but did not contribute bird observations to the survey.

Data Processing / Analysis

Species richness was calculated to estimate the mean number of species in each habitat and for the preferred and M602F routes. This is simply the number of species observed per habitat type or route, divided by the number of samples (Begon *et al.* 1996). A two-tailed t-test was conducted using Microsoft Excel to compare between habitat types or routes and assess statistical differences between means.

Shannon entropy (H) is a commonly used diversity index that accounts for both abundance and evenness of the species present. It is calculated as:

$$H = - \Sigma (p_i * \ln p_i)$$

where, p_i is the proportion of the entire population made up of species *i* (proportion of a species *i* relative to total number of species present) and ln is the natural logarithm (Jost 2006). This is then averaged across each habitat type and t-tests are used to assess statistical differences between the M602F transmission line and refined alternate routes. Additionally, since indices are often difficult to interpret, the effective number of species (exp^H) is calculated to provide a realistic representation of the expected number of species in the community (Jost 2006).

Hierarchical distance sampling models were run (Royle *et al.* 2004) using the 'unmarked' package (Fiske and Chandler 2011) in R (R Core Development Team 2014). Modelled covariates include the FRI (MCWS 1979 and 1999) habitat classification of each site (grassland, hardwood forest, softwood forest, or wetland) and route location (refined alternate routes or the existing M602F transmission line). Since the detection probability of birds varies relative to the distance from the observer, detection functions were also modeled to provide unbiased density estimates (Somershoe *et al.* 2006). AIC was used to rank models with the best approximating model having the lowest AIC value. AIC and 85% confidence intervals (Burnham and Anderson 2002; Arnold 2010) were used to compare models and assess covariates. The best approximating model was then used to derive breeding density estimates.

Some bird species select breeding habitats based primarily on forest structure (*i.e.*, open or interior) as opposed to forest composition (*i.e.*, hardwood or softwood). Open forest species are those that prefer forest edges or forest openings for breeding while interior forest species are those that prefer core areas of forest habitat for breeding (generally located > 100 m from forest edges [Environment Canada 2013a]). Data are summarized for open and interior forest species including the proportion of individuals observed per structural category.

2.4.3.1.2 Results

A total of 182 point-count surveys were conducted in the RPA in 2014. Forty one percent of these points fell within the LAA, and all but eight were located in natural wildlife habitat (Table 2-7); Appendix A, Map 2-13 – Breeding Bird Survey Locations 2014). The eight sites surveyed in modified wildlife habitat (*i.e.*, the hayland-dominated Red River Floodway) were located along

the SLTC. Since the focus of the analysis is on breeding birds in natural habitats, data gathered in modified wildlife habitat are discussed separately.

Table 2-7: Summary of 2014 Breeding Bird Survey Plots

Habitat	M602F Transmission Line	Refined Alternate Routes	Total
Grassland	9	47	56
Hardwood	10	42	52
Softwood	10	31	41
Wetland	6	19	25
Total	**35**	**139**	**174**

Ten SOCC were observed during BBS surveys, including least bittern, yellow rail, short-eared owl, bank swallow, barn swallow, bobolink, olive-sided flycatcher, eastern wood-pewee, golden-winged warbler, and pine warbler(Appendix A, Map 2-14 – Species of Conservation Concern Detected During Field Surveys 2014). Least bittern were detected in a large sedge and cattail dominated wetland located northwest of Ross and in the Lonesand wetland, southeast of the town of Lonesand. Yellow rail were detected in wetlands located northwest of Ross and in the Sundown and Caliento bogs north of PTH 201. One short-eared owl was observed foraging over an open field near the Sundown Bog. Bank swallows were detected in a sand and gravel pit southeast of Anola. A colony of bank swallows was found incidentally in the same gravel pit. Barn swallows were detected in agricultural and pasture habitat northeast of La Broquerie and east of Richer. Bobolink were detected in grassland, pasture and mowed habitat located northeast of La Broquerie, southeast of Anola, south of Richer, and along the Red River floodway south of Winnipeg. An olive-sided flycatcher was detected in hardwood forest habitat bordering a wetland located east of Marchand. Eastern wood-pewee was detected in hardwood and mixedwood forest habitat southwest of Piney, in several locations near Marchand and La Broquerie, south of Richer, southeast of Anola, and in riparian habitat along the Red River south of Winnipeg. Golden-winged warbler was detected along the existing 230 kV line east of La Broquerie, and southwest of Sandilands. Pine warbler was detected in forest habitat located southeast of Lonesand

The following sections focus on bird density and diversity results for surveys conducted along the refined alternate routes and existing M602F transmission line.

2.4.3.1.2.1 Breeding Bird Density

Overall density estimates (number of birds/ha; $\hat{D}$) indicate that grassland habitats contained the highest density of birds (6.21 ± 0.33 SE), followed by wetland habitats (5.26 ± 0.37 SE), hardwood habitats (4.82 ± 0.28 SE), and softwood habitats (4.24 ± 0.37 SE) (Table 2-8).

Table 2-8: Bird Density (birds/ha) along the Refined Alternate Routes and Existing Transmission Line M602F

Habitat	M602F Transmission Line		Refined Alternate Routes		All Survey Areas	
	$\hat{D}$	SE	$\hat{D}$	SE	$\hat{D}$	SE
Grassland	7.03	0.48	5.48	0.29	6.21	0.33
Wetland	5.96	0.48	4.64	0.33	5.26	0.37
Hardwood	5.47	0.38	4.26	0.25	4.82	0.28
Softwood	4.81	0.36	3.74	0.24	4.24	0.37
All Habitat Types	5.76	0.34	4.49	0.20	5.08	0.23

Breeding Bird Density along the Refined Alternate Routes (excluding M602F)

Overall density estimates for the refined alternate routes indicate that grassland habitats contained the highest density of birds (5.48 ± 0.29 SE), followed by wetland habitats (4.64 ± 0.33 SE), hardwood habitats (4.26 ± 0.25 SE), and softwood habitats (3.74 ± 0.24 SE; Table 2-8).

The most abundant bird species in grassland habitat during breeding bird surveys were western meadowlark (0.89 birds/ha; Appendix B, Table B.9), Wilson's snipe (0.39 birds/ha), savannah sparrow (0.33 birds/ha) and song sparrow (0.19 birds/ha). Red-winged blackbirds (0.50 birds/ha) were also common in grassland habitats; however they were generally associated with wetted areas supporting cattails, including roadside ditches.

The most abundant birds in wetland habitat during breeding bird surveys were common yellowthroat (0.60 birds/ha), sedge wren (0.25 birds/ha), swamp sparrow (0.22 birds/ha), red-winged blackbird (0.15 birds/ha) and yellow warbler (0.13 birds/ha).

The most abundant birds in hardwood habitat during breeding bird surveys were red-eyed vireo (0.28 birds/ha), ovenbird (0.25 birds/ha), least flycatcher (0.17 birds/ha), white-throated sparrow (0.17 birds/ha) and veery (0.14 birds/ha).

The most abundant birds in softwood habitat during breeding bird surveys were white-throated sparrow (0.35 birds/ha), Nashville warbler (0.21 birds/ha), yellow-rumped warbler (0.20 birds/ha), cedar waxwing (0.09 birds/ha) and chipping sparrow (0.09 birds/ha).

Breeding Bird Density along an Existing Transmission Line ROW (M602F)

Overall density estimates for M602F indicate that grassland habitats contained the highest density of birds (7.03 ± 0.48 SE), followed by wetland habitats (5.96 ± 0.48 SE), hardwood habitats (5.47 ± 0.38 SE), and softwood habitats (4.81 ± 0.36 SE; Table 2-8).

Grassland habitats surveyed along M602F were typically wetter than those surveyed along the refined alternate routes. These wet grasslands tended to support more wetland species than grassland species. The most abundant grassland species was western meadowlark (0.14 birds/ha; Appendix B, Table B.9).

The most abundant birds in wetland habitat during breeding bird surveys were swamp sparrow (0.96 birds/ha), common yellowthroat (0.74 birds/ha), red-winged blackbird (0.21 birds/ha) and sora (0.11 birds/ha).

The most abundant birds in hardwood habitat during breeding bird surveys were red-eyed vireo (0.57 birds/ha), white-throated sparrow (0.51 birds/ha), chestnut-sided warbler (0.41 birds/ha), and ovenbird (0.32 birds/ha).

The most abundant birds in softwood habitat during breeding bird surveys were white-throated sparrow (0.51 birds/ha), Nashville warbler (0.45 birds/ha), yellow-rumped warbler (0.19 birds/ha) and Connecticut warbler (0.14 birds/ha).

Bird Abundance along the Refined Alternate Routes versus an Existing Transmission Line (M602F)

To understand if and how an existing transmission line affects bird abundance, bird density data were compared between the refined alternate routes and M602F. Results of this analysis indicated that overall breeding bird density was significantly lower ($p < 0.05$) on the refined alternate routes (4.49 birds/ ha ± 0.20 SE) compared to M602F ($\hat{D}$ = 5.76 / ha ± 0.34 SE; Table 2-8). This may be due to a number of factors such as an overall lower sampling effort along M602F compared to the refined alternate routes (n= 35 and 139 respectively), differences in the existing levels of habitat fragmentation, which appear to decrease from west to east through the region, and variability of habitat types within the broad habitat groupings.

The best model included the *habitat* and *route* covariates (AIC w^i = 0.99; hazard-rate detection function; Appendix B, Table B.10) further supporting a significant differences in bird densities between habitat types and between the refined alternate routes and M602F. There was no model selection uncertainty as the next best model had a ΔAIC ≥ 2.0 and support for the top model had an AIC w^i = 0.99 (AIC w^i = 0 means no support while AIC w^i = 1 means full support and no uncertainty; Burnham and Anderson 2002).

Of note is the presence of ovenbird, a focal species representative of forest interior birds (Table 2-1). It prefers large patches of intact, hardwood forest for breeding (Porneluzi *et al.* 2011). The density of ovenbird in hardwood was similar between the two areas (0.25 birds/ha along the refined alternate routes and 0.32 birds/ha along M602F; Appendix B, Table B.9). Presence of brown-headed cowbird, a species that parasitizes the broods of other species, was also similar between the two areas (0.8 birds/ha in hardwood forest along refined alternate routes and 0.6 birds/ha in hardwood forest along M602F; Appendix B, Table B.9).

2.4.3.1.2.2 Species Richness

Species richness estimates ($\hat{R}$) indicate that grassland habitats contained the highest density of birds (7.41 ± 0.34 SE), followed by hardwood habitats (7.06 ± 0.34 SE), softwood habitats (6.07 ± 0.20 SE), and wetland habitats (5.30 ± 0.65 SE; Table 2-9). Overall mean $\hat{R}$ for the refined alternate routes ($\hat{R}$ = 6.47 ± 0.23 SE) and the M602F route ($\hat{R}$ = 7.37 ± 0.39 SE) were not statistically different (p = 0.08). Habitat-specific species richness however, was higher along the M602F route for both hardwood and softwood forest habitats while there was no difference for grassland and wetland habitats.

Table 2-9: Species Richness for each Habitat on the MMTP and M602F Routes

Habitat	M602F Transmission Line		Refined Alternate Routes		All Survey Areas	
	Mean	SE	Mean	SE	Mean	SE
Grassland	6.78	0.62	7.53	0.38	7.41	0.34
Wetland	6.67	1.69	4.96	0.69	5.30	0.65
Hardwood	8.40*	0.48	6.74*	0.39	7.06	0.34
Softwood	7.30*	0.58	5.68*	0.37	6.07	0.33
All Habitat Types	7.37*	0.39	6.47*	0.23	6.64	0.20

NOTE:
*statistically significant difference ($p < 0.05$)

The **Shannon entropy** (species diversity index) follows the same pattern where species richness indices for hardwood and softwood habitats were higher along M602F (Table 2-10) while grassland and wetland habitats show no statistically significant difference ($p > 0.05$).

Table 2-10: Shannon Entropy and the Effective Number of Species for each Habitat on the MMTP and M602F Routes

Habitat	Shannon Entropy				Effective No. of Species	
	M602F Transmission Line		Refined Alternate Routes		M602F Transmission Line	Refined Alternate Routes
	Mean	SE	Mean	SE		
Grassland	2.51	0.13	2.70	0.08	12.35	14.81
Wetland	2.32	0.39	2.55	0.09	10.19	12.84
Hardwood	2.96*	0.09	2.59*	0.08	19.25*	13.30*
Softwood	2.73*	0.13	2.34*	0.09	15.30*	10.39*

NOTE:
*statistically significant difference

In the hardwood habitat a total of 66 bird species were observed with 27 bird species observed on both the refined alternate routes and M602F routes, 35 bird species only observed on the refined alternate routes, and 4 bird species observed only along M602F (Appendix B, Table B.11). In the softwood habitat a total of 50 bird species were observed, with 23 species found on both the refined alternate routes and M602F, 20 bird species only found on the refined alternate routes, and 7 bird species only found along M602F (Appendix B, Table B.12).

The observed difference in the number of bird species along the refined alternate routes versus M602F may suggest many species are selecting contiguous patches of forest free from transmission line disturbances despite species richness and diversity indices suggesting otherwise. In both cases there is evidence to suggest bird community composition differs along the existing transmission line. However, the observed patterns may be driven by a relatively small sample size in habitats along M602F and heterogeneity amongst habitat types between the D604I and M602F routes. This result would support previous research by Niemi and Hanowski (1984) who found that inherent habitat difference between treatment types and the creation of different habitat types under transmission lines contributed to differences in bird community structure.

2.4.3.1.3 Forest Structure

The dominant open and interior forest species were consistent between the refined alternate route and the existing M602F transmission line (Table 2-11). White-throated sparrow and ovenbird comprised 26% of all open forest bird observations while red-eyed vireo and ovenbird comprised 61% of all interior forest bird observations.

Table 2-11: Proportions of Open and Interior Forest Birds Observed on Refined Alternate Route

Habitat	Refined Alternate Route	Percent	M602F Transmission Line	Percent
Open Forest	White-throated Sparrow	13	White-throated Sparrow	24
	Nashville Warbler	9	Nashville Warbler	14
	American Robin	8	Chestnut-sided Warbler	10
Interior Forest	Red-eyed Vireo	35	Red-eyed Vireo	44
	Ovenbird	25	Ovenbird	19
	Veery	13	Veery	15

2.4.3.1.4 Summary of Results

Baseline species richness and density estimates have been established for breeding birds in the dominant habitats traversed by the refined alternate routes, including the identification of dominant open and interior forest species. Densities are highest in grassland habitats, followed by wetland, hardwood, and softwood habitats and shown, in general, to be higher on the existing M602F transmission line versus the refined alternate routes. The fragmented forest

habitats along the ROW provide a wider range of habitats (*e.g.*, shrub, forested, and edge habitats) which results in altered bird communities.

2.4.3.2 Nightjar Surveys

Nightjar surveys were designed to establish an estimate of relative abundance and distribution of common nighthawk and eastern whip-poor-will (both listed as *Threatened* under SARA) within their preferred habitats.

2.4.3.2.1 Methods

Study Design

Survey locations were selected within common nighthawk habitat (*e.g.*, dry upland ridge, mature softwood, pasture; Appendix A, Map 2-15 – Common Nighthawk Observations Spring 2014) and eastern whip-poor-will habitat (*e.g.*, open deciduous forest; Appendix A, Map 2-16 – Eastern Whip-Poor-Will Observations Spring 2014), based on road access along the refined alternate route alignment. Nightjar surveys consisted of road-based point-counts located 800 m apart along pre-determined routes (Ralph *et al.* 1993; British Columbia Resource Inventory Committee 1998). Four survey routes were established, each containing 10 points, totaling 40 point-count locations.

Timing

Surveys were conducted on four nights between June 16 and June 23, 2014, between 1h before and 0.5h after sunset, under good environmental conditions (*i.e.*, wind ≤20 km/h, temperature ≥7°C, and precipitation not exceeding a light, intermittent drizzle; British Columbia Resource Inventory Committee 1998).

Field Methods

Following standard nightjar survey protocols described by Brigham and Barclay (1992), BC RIC (1998), and the Saskatchewan Ministry of Environment (SMOE 2014a), nightjars heard or observed during a six-minute point count were recorded by a team of two biologists. One biologist identified the nightjars, estimating the distance and direction to all detections, while the other biologist recorded the observations.

Data Processing / Analysis

Location data for nightjar (common nighthawk and eastern whip-poor-will) observations were overlaid with potentially suitable breeding habitat mapped as part of the survey design process. Information was used to augment existing datasets and enhance understanding of the occurrence of nightjars along the refined alternate routes. This information was used to evaluate alternate routes during the route selection workshops.

2.4.3.2.2 Results

No common nighthawks were observed during surveys, but one was documented incidentally along a nightjar survey route outside of the survey period. Twelve eastern whip-poor-wills were detected at 10 of 40 nightjar survey locations.

Incidental observations of 23 common nighthawks and five eastern whip-poor-wills were recorded during mid-May amphibian surveys (Section 2.5.3.4). An additional two common nighthawks and seven eastern whip-poor-wills were observed during other fieldwork surveys in June and July (Appendix A, Map 2-15 – Common Nighthawk Observations Spring 2014 and Appendix A, Map 2-16 – Eastern Whip-Poor-Will Observations Spring 2014). Common nighthawk and eastern whip-poor-will were most commonly observed near Richer, La Broquerie, Sundown, and Sandilands.

2.4.3.3 Yellow Rail Surveys

Yellow rail surveys were designed to establish an estimate of relative abundance and distribution of yellow rail (listed as *Special Concern* under SARA).

2.4.3.3.1 Methods

Study Design

Preferred yellow rail habitat (*e.g.*, wet meadow, muskeg) in the RAA was mapped using FRI data and past breeding evidence from the MB Breeding Bird Atlas to identify potential breeding habitat that overlapped with the refined alternate route. Road-based point-counts were conducted at thirteen sites identified as potential yellow rail breeding habitat (Appendix D, Photo 8).

Remote audio recording units (Wildlife Acoustics SongMeter™) were deployed at six additional sites identified as potential yellow rail breeding habitat to provide additional incidental data for nocturnal species.

Timing

Point-count surveys were conducted on four nights from June 16 to June 23, 2014. Remote recording units were deployed over three days from July 7 to July 9, 2014.

Field Methods

Following methods adapted from Bazin and Baldwin (2012) and the SMOE (2014b), road-based point-counts were conducted from approximately 2300 h to 0030 h following the completion of evening nightjar surveys. Surveying occurred 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) (SMOE 2014c, 2014d). Yellow rails heard during the six-minute point count were recorded, along with the estimated distance and direction of all detections.

Recording units were deployed at two sites each day for three days (six sites total) and programmed to record for 10 minutes each hour starting 0.5 h after sunset and continuing to 0000 h.

Data Processing/Analysis

Location data for yellow rail observations were overlaid with potentially suitable breeding habitat mapped as part of the survey design process. Information was used to augment existing datasets and enhance understanding of the occurrence of yellow rails along the refined alternate routes. This information was used to evaluate alternate routes during the route selection workshops, and to identify important areas for wildlife along the FPR (Section 3).

2.4.3.3.2 Results

Nine yellow rails were detected during 2014 bird surveys: five during yellow rail surveys and the remaining four were made incidentally during other field surveys. Three yellow rail observations were in the northern portion of the RAA near Richer, while the remaining six were observed east and west of Sundown in the southernmost portion of the RAA (Appendix A, Map 2-17 – Yellow Rail Observations Spring 2014).

2.4.3.4 Migration Surveys

Migration surveys were designed to:

- gain an understanding of bird use of the RAA (particularly waterbirds and raptors) during spring and fall migration;
- identify the location of sensitive sites (if any), such as habitats or landform features where birds concentrate; and
- collect data on the abundance, distribution and flight patterns of migrating birds to help understand potential interaction with overhead wires (*i.e.*, collision risk).

2.4.3.4.1 Methods

Study Design

Spring surveys consisted of a northern and southern driving route, totaling approximately 185 km (Appendix A, Map 2-18 – Migration Driving Survey Spring 2014). In the fall, the survey routes were modified to provide better coverage of the refined alternate routes; including any potentially sensitive areas identified during spring fieldwork and the SLTC (~330 km; Appendix A, Map 2-19 – Migration Driving Survey Fall 2014).

Timing

Surveys were conducted in the Project Area during the spring and fall migration periods. Spring migration driving surveys occurred over a two-day period each week for three weeks between May 7 and May 23, 2014. Fall driving surveys were conducted over a two-day period each week

for four weeks between September 22 and October 15, 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).

Field Methods

In spring, surveys began in the northern portion of the RAA, and progressed to the south to minimize double counting birds moving northwards. Similarly, fall surveys began in the southern portion of the RAA, and progressed north. Following standard survey protocols outlined in Bibby *et al.* (2000), vehicle speed during the surveys was approximately 50 km/hr. When birds were observed the vehicle was stopped to aid in accurate identification of species and abundance. Data collected for each observation included UTM 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 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.

Data Processing / Analysis

Survey results were mapped to identify patterns of habitat use by migratory birds and areas of high bird concentration. Information gathered during driving surveys was used to evaluate potential changes to bird mortality risk along the preferred route.

2.4.3.4.2 Results

Spring Migration Survey

A total of 33 bird species were observed during spring driving surveys, including: raptors (10), passerines (6), waterfowl (7), waterbirds (4), shorebirds (3), upland game birds (2), and other birds (2).

A total of 1,367 birds were observed during the three weeks of spring migration driving surveys (Table 2-12). Passerines comprised 68% of total bird observations, followed by waterfowl (20%), other waterbirds (7%), raptors (2%), shorebirds (1%), upland game birds (<1%), and other birds (<1%). Blackbird species were the most abundant (n=701) followed by Canada geese (n=130; Appendix B, Table B.13). Bird observations during spring migration surveys were not concentrated in any single location.

Table 2-12: Bird Counts During Spring Migration Surveys

Birds	Week 1	Week 2	Week 3	Total
Waterfowl	123	93	62	278
Upland Game Birds	0	8	0	8

Waterbirds	38	12	46	96
Raptors	10	5	12	27
Shorebirds	7	1	8	16
Passerines	715	109	110	934
Other Birds	8	0	0	8
Total	**901**	**228**	**238**	**1,367**

Fall Migration Survey

A total of 40 bird species were observed during the fall driving survey, including: raptors (10), passerines (9), waterbirds (8), waterfowl (5), other birds (5), upland game birds (2), and shorebirds (1). A total of 18,690 birds were observed during the four weeks of fall migration driving surveys (Table 2-13). Waterfowl comprised 68% of total bird observations, followed by other waterbirds (18%), passerines (13%), raptors (<1%), other birds (<1%), upland game birds (<1%), and shorebirds (<1%). Bird counts peaked during week three (October 6-8, 2014) of the surveys, with approximately 10,267 birds observed and is consistent with the peak in migration observed at Oak Hammock Marsh on October 8, 2014 (Oak Hammock Marsh 2014).

Table 2-13: Bird Counts During Fall Migration Surveys

Birds	Week 1	Week 2	Week 3	Week 4	Total
Waterfowl	1,347	2,643	8,033	672	12,695
Upland Game Birds	9	0	6	0	15
Waterbirds	303	256	1,313	1,416	3,288
Raptors	40	45	28	25	138
Shorebirds	0	0	1	0	1
Passerines	559	691	877	311	2,438
Other Birds	55	18	9	33	115
Total	**2,313**	**3,653**	**10,267**	**2,457**	**18,690**

There were no notable concentrations of birds observed during the spring driving surveys. In the fall, however, the highest migratory bird concentrations were observed in the area surrounding the Brady Landfill and comprised 51% of all bird observations (83% Canada goose and 14% gull species), followed by areas near Richer Lake (3%; Appendix D, Photo 9), Oak Bluff Lagoon (2%) and the Red River (1%).

Brady Landfill is located directly southwest of Highway 100 and PTH 80 junction, and the SLTC segment of the preferred alternative route passes less than 1 km south of the Brady Landfill in an

east-west orientation. The mean flying height of all birds observed at Brady Landfill was 131 m (± 8 m SE) and 91% of all birds were observed flying in a northeast direction.

Other observations of note included: 1) two golden eagles and two bald eagles perched on a transmission tower approximately 2.5 km southwest of Oak Bluff during week two of the migration survey (less than 500 m from the SLTC segment of the final preferred route); and 2) a flock of 33 tundra swans observed flying approximately 5 km south of Headingley, Manitoba (approximately 2.5 km west of the final preferred route).

2.4.3.4.3 Summary of Results

During spring migration surveys, 1,367 birds of 33 species were observed. Passerines were the most abundant bird group with 68% of total observations, followed by waterfowl (20%). Blackbird species were the most commonly observed birds followed by Canada geese (Appendix B, Table B.13).

During fall migration surveys 18,690 birds of 40 species were observed. Waterfowl were the most abundant bird group with 68% of total observations, followed by other waterbirds (18%). The highest concentrations of migratory birds were observed in the area surrounding Brady Landfill, Oak Bluff Lagoon, and Richer Lake. At these locations, ducks and geese were the most commonly observed birds followed by gulls. Bird counts during fall migration surveys are found in Table B.14 (Appendix B).

2.4.3.5 Bird Movement Surveys

Spring and fall bird movement surveys were designed to provide data on the number, distribution and flight patterns of birds at specific waterbody locations along the refined alternate route to help understand potential interaction with overhead wires (*i.e.*, potential collision risk) and to identify areas that of concentrate migratory birds.

2.4.3.5.1 Methods

Survey Design

Spring surveys were conducted at one open-water wetland (Richer Lake; Appendix A, Map 2-20 – Bird Movement Survey Location 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 Rivers), and one reservoir (Deacon Reservoir; Appendix A, Map 2-21 – Bird Movement Survey Location Fall 2014; Appendix D, Photo 10). All six locations are within the LAA.

Timing

Bird movement surveys were conducted during spring and fall migration periods. Spring surveys occurred once per week over a three-week period from May 7 to May 23, 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 September 22 to October 16, 2014. Surveys were conducted for one hour in the evening (between one hour before sunset to one half hour after sunset), which provided logistical advantages while ensuring each site was surveyed for one hour per week. 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).

Field Methods

Following standard protocols described by Environment Canada (CWS 2007), 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. 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.

Data Processing / Analysis

Bird counts were summarized per week for each waterbody surveyed. Mean flight height was calculated for flying birds and the proportion of birds relative to flight direction was calculated to understand bird movement patterns at each site. This information was used to evaluate alternate routes during the route selection workshops, and to identify important areas for wildlife along the FPR (Section 3).

2.4.3.5.2 Results

Spring Wetland Survey

A total of 18 bird species were observed at the Richer Wetland during the spring 2014 wetland survey, including: waterfowl (9), other waterbirds (7), shorebirds (1), and passerines (1). The bird abundance during weeks 1 and 2 of the survey were similar, with a decline in bird abundance of more than 66% observed during week 3 (Table 2-14).

Table 2-14: Bird Counts at Richer Lake During Spring Wetland Surveys

	Week 1	Week 2	Week 3	Total
Morning Survey	177	176	31	388
Evening Survey	100	92	58	250
Total	**277**	**268**	**89**	**634**

A total of 634 birds were observed during the three weeks of spring wetland surveys at Richer Lake. Waterfowl were the most abundant bird group with approximately 83% of total bird observations, followed by other waterbirds (11%), shorebirds (4%), and passerines (2%; Table 2-15). Scaup species (lesser scaup and greater scaup) were the most abundant bird species observed at Richer Lake (n=107; Appendix B, Table B.16).

Table 2-15: Bird Counts by Group at Richer Lake During Spring Wetland Surveys

Birds	Week 1	Week 2	Week 3	Total
Waterfowl	263	221	45	529
Waterbirds	14	35	19	68
Shorebirds	0	0	25	25
Passerines	0	12	0	12
Total	**277**	**268**	**89**	**634**

The mean flight height of all birds observed at Richer Lake during the spring survey was 30 m. Flight direction was not recorded for Richer Lake during spring bird movement surveys.

Fall Wetland Survey

A total of 39 species were observed at the six water bodies surveyed during the fall movement surveys. Waterbirds were the most abundant bird group observed with 68% of total bird observations, followed by waterfowl (31%), passerines (1%), raptors (<1%), shorebirds (<1%), and other birds (<1%; Appendix B, Table B.16). A total of 11,233 birds were observed during the four weeks of fall migration bird movement surveys with highest concentrations observed at the Red River (42%), Deacon Reservoir (23%), and Assiniboine River (21%) site and relatively low concentrations observed at the Sundown Lake (9%), Richer Lake (4%), and Lonesand Lake (1%) sites (Table 2-16). Despite low concentrations at some sites, one observation of note was the ingress of over 800 Canada geese to Sundown Lake just after sunset during the first week of surveys.

Table 2-16: Bird Counts at Six Waterbodies During Fall Wetland Surveys

Waterbody	Week 1	Week 2	Week 3	Week 4	Total
Red River	987	1,900	1,264	546	4,697
Deacon Reservoir	2,239	206	174	15	2,634
Assiniboine River	283	1,603	75	392	2,353
Sundown Lake	886	32	37	18	973
Richer Lake	190	167	56	49	462
Lonesand Lake	33	43	7	34	117
Total	**4,618**	**3,951**	**1,613**	**1,054**	**11,236**

All sites with high bird concentrations were located within the SLTC, and the Red River and Assiniboine sites are directly intersected by the RoW while the Deacon Reservoir site is within 50 m of the FPR. Mean flying height and the general direction of travel varied among sites: Red River (73 m ± 3 m; northwest direction [70%]); Assiniboine River (41 m ± 5 m; northwest direction [87%]); and Deacon Reservoir (74 m ± 8 m; no obvious pattern in general flight direction).

2.4.3.5.3 Summary of Results

During spring migration wetland surveys 634 birds of 18 species were observed at Richer Lake. Waterfowl were the most abundant bird group with 83% of total observations. Scaup species (lesser and greater scaup) were the most commonly observed bird.

During fall migration wetland surveys 11,233 birds of 39 species were observed at six wetlands identified as possible bird staging locations. Waterbirds were the most abundant bird group with 68% of total observations, followed by waterfowl (31%). Canada geese and ring-billed gulls were the most commonly observed bird species. The highest concentrations of migratory birds were observed at the Red River and Assiniboine River crossings and Deacon Reservoir.

2.4.3.6 Sharp-tailed Grouse Lek Surveys

Sharp-tailed grouse lek surveys were designed to determine whether any lek sites occur on or adjacent to the refined alternate routes.

2.4.3.6.1 Methods

Study Design

Potential sharp-tailed grouse habitats (*e.g.*, grassland, pasture; Appendix D, Photo 11) were identified using FRI data (MCWS 1979 and 1999) and survey sites were subsequently located in suitable habitat near the refined alternate routes where road access was available and in areas containing historical sharp-tailed grouse observations (Artuso 2014, pers. comm.).

Timing

Surveys were conducted between April 26 and May 16, 2014, to coincide with the grouse breeding period in southeastern Manitoba. Surveys took place between one half hour before sunrise and three hours after sunrise, which coincides with the period 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.* 2003; Balderson *et al.* 2013).

Field Methods

Road-based lek surveys were conducted by a team of two biologists. At each survey site, 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.

Data Processing / Analysis

Location data for grouse leks were overlaid with potentially suitable breeding habitat mapped as part of the survey design process. Information was used to augment existing datasets and enhance understanding of the occurrence of sharp-tailed grouse leks along the refined alternate routes. This information was used to evaluate alternate routes during the route selection workshops and to identify important areas for wildlife along the FPR (Section 3).

2.4.3.6.2 Results

Three sharp-tailed grouse leks were found among the 21 sites surveyed (Appendix A, Map 2-22 – Sharp-tailed Grouse Lek Survey 2014). The northern-most lek (n=6 birds) and the southern-most lek (n=7 birds] were identified in pasture habitat, while the third lek (n=12 birds) was identified in hayland habitat. All lek observations in the LAA were over 500 m from the FPR.

2.4.3.6.3 Summary of Results

Three active sharp-tailed grouse leks and 25 sharp-tailed grouse individuals were observed during spring lek surveys along the northern portion of the D604I ROW (between Marchand, MB and Anola, MB. All three leks were observed approximately 500 m from the FPR.

MCWS records indicated two leks over 4 km from the FPR exist east of Highway 12, in areas north of Caliento and Vita, MB. Four other sharp-tailed grouse leks are located over 3 km from the Glenboro South Station PDA (Appendix A, Map 2-23 –Sharp-tailed Grouse Leks Glenboro South Station).

2.4.3.7 Bird Mortality Monitoring

The bird mortality monitoring program was designed to collect information on bird collisions under segments of the existing 500 kV transmission line (M602F), which will serve as a proxy for the MMTP transmission line, and 230 kV lines in the area of the SLTC. M602F was used as a proxy for the FPR because it is similar in size (500 Kv), is local, and traverses landscapes similar to that of the FPR. Since M602F does not cross a major river, alternate 230 KV lines were surveyed at the Assiniboine River crossing (Appendix D, Photo 12) . The objectives of the study were to:

- Develop transmission line-related bird mortality estimates for open areas (grassland/agriculture) and forested areas located near and apart from waterbodies and watercourses.
- Identify bird species susceptible to wire collisions within the RAA.
- Interpret results from M602F to help identify potential high risk areas along the preferred route (*e.g.*, near roosting, foraging, or migration stop-over sites).

2.4.3.7.1 Methods

Study Design

The following factors were considered in the development of the study design:

- Landcover – using FRI (MCWS 1979 and 1999), survey sites were identified within three major landcover types found within the RAA: agriculture, grassland and forest. Waterbodies and watercourses were not surveyed due to the challenges associated with locating carcasses in these areas.
- Collision risk – proximity to waterbodies and watercourses was considered in the selection of sites. Within the three landcover types, sites were identified 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]) and low risk (located in upland habitat).
- Logistics – sites accessible by roads and trails. Access to some sites was dependent upon landowner permission.
- Sample size – 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.
- Transmission line orientation – potential sites selected include route locations that extend east-west and north-south.

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 M602F (survey sites MMSA01 to MMSA18; no surveys occurred at MMSA07 or MMSA08). Based on landcover type availability along M602F, survey sites covered eight forest, six agriculture and two grassland sites. Survey sites were located on east-west and north-south oriented portions of M602F, as well as on a north-south oriented

230 kV line that crossed the Assiniboine River (Appendix A, Map 2-24 – Bird Mortality Monitoring Locations).

Timing

Searches were conducted over a period of three mornings per week for four weeks, between September 24 and October 17, 2014, which coincides with the peak fall migration period in southeastern Manitoba. Each survey site was searched once per week. The order in which the sites were surveyed was generally consistent from week to week. Sites MMSA11 through MMSA18 were added to the mortality monitoring program during the second week of the four week survey program.

Since most collisions tend to occur around dawn and dusk (McNeil *et al.* 1985), surveys began at sunrise and ended at approximately 1330h. Surveys were conducted during the earlier part of day to minimize the loss of carcasses to scavengers (*e.g.*, ravens, skunks) (ESRD 2011). Surveys were not conducted after a snowfall (< 12 h), in heavy rain, or high winds (> 50 km/h).

Field Methods

Environment Canada (2007) and Lausen *et al.* (2010) recommend three types of related surveys to accurately estimate bird mortality rates from collisions:

- Carcass Searches: to document mortalities due to collisions.
- Scavenger Removal Trials: to document effects of scavengers on carcass search results.
- Searcher Efficiency Trials: to determine the effects of searcher bias on carcass search results.

Carcass Searches:

A Canadian Wildlife Service 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. A signed copy of the permit (no. 14-MB-SC008) was on-site with biologists during mortality monitoring activities, September through October 2014.

At each survey site, a team of six trained technicians walked in parallel lines approximately 5-6 m apart, at a slow and steady pace (approximately 2 km/h) along the length of each transect (*i.e.*, 250 m) (Appendix D, Photo 13). 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. A GPS coordinate and photograph were taken for each carcass, and site specific information, including vegetation height, percent vegetation cover, and distance and direction from the centre of the ROW, were recorded.

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 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 (Winnipeg, MB).

Searcher Efficiency Trials:

Searcher efficiency trials were conducted across the different landcover types 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 locations of each test carcass were 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, the total number of carcasses found was compared to the total number of carcasses placed, and any remaining carcasses not found were then collected. Carcasses used in the searcher efficiency testing were those obtained from the Prairie Wildlife Rehabilitation Centre (Winnipeg, MB) and intact carcasses collected during carcass searches.

Data Processing / Analysis Methods

Bird collision risk is assessed by determining the density of bird carcasses found below wires in grassland, agriculture and forested sites (and at high, moderate and low-risk sites). To estimate mortality rate, calculations of scavenger efficiency correction factor, searcher efficiency, proportion of area searched and corrected mortality estimates are required.

Scavenger Removal Correction Factor:

The scavenger removal correction factor incorporates carcass losses due to scavenging into carcass search results (Ponce *et al.* 2010; Huso 2011). Proportions of carcasses remaining after each search interval are pooled to calculate the overall scavenger correction (S_C) factors:

$$Sc = \frac{Nvisit_1 + Nvisit_2 + Nvisit_3}{Nvisit_0 + Nvisit_1 + Nvisit_2}$$

Where:

S_C = proportion of carcasses not removed by scavengers over the search period
n_{visit0} = total number of trial carcasses
n_{visit1} to n_{visit3} = number of carcasses remaining on visits 1 through 3

Searcher Efficiency:

Searcher efficiency (S_e) was calculated for all searchers as follows:

$$Se = \frac{\text{Number of carcasses found}}{(\text{Number of carcasses placed}) - (\text{Number of carcasses scavenged})}$$

Proportion of Area Searched:

It was not always possible to search an entire survey site (250 m x 60 m) due to the presence of thick or tall vegetation or wet, low-lying areas. The actual area searched during bird mortality surveys was determined in the field at each survey site (Table 2-17) and is used to calculate the proportion of area searched (P_s) as follows:

$$P_s = A_s \div lw$$

Where:
A_s = actual area searched
l = length
w = width

Corrected Mortality Estimates:

The minimum estimated rate of mortality (C) is calculated as follows (Huso 2011):

$$C = \frac{c}{Se * Sc * Ps}$$

Where:
C = corrected number of fatalities
c = number of carcasses found

S_e = proportion of carcasses expected to be found by searchers (overall searcher efficiency)
S_c = proportion of carcasses not removed by scavengers over the search period
P_s = proportion of the area searched

2.4.3.7.2 Results

A total of 25 carcasses were detected at 9 of 16 survey sites between September 24 and October 17, 2014 (Table 2-17).

Table 2-17: Number of Carcasses Found and Actual Searchable Areas at All Bird Mortality Monitoring Survey Sites

Site ID	Site Description	Collision Risk	Landcover Type	# of Carcasses	Actual Area Searched (m^2)/week
MMSA01	Mown grass area in riparian habitat adjacent to Assiniboine River	High	Forest	9	15,000
MMSA02	Field north of Deacon's Reservoir	High	Agriculture	3	15,000
MMSA03	Field northeast of Deacon's Reservoir	High	Agriculture	0	15,000
MMSA04	Pasture northwest of unnamed creek	Moderate	Grassland	1	15,000
MMSA05	Open field set back from waterbodies	Low	Agriculture	1	15,000
MMSA06	Field with some areas of heavy vegetation set back from waterbodies	Low	Grassland	1	10,696
MMSA09	Heavily forested area set back from waterbodies	Low	Forest	0	8,588
MMSA10	Heavily forested area north of small wetland	Moderate	Forest	3	8,644
MMSA11	Heavily forested area west of two large wetlands and Hugo Lake	Moderate	Forest	0	9,524
MMSA12	Heavily forested area west of two large wetlands and Hugo Lake	Moderate	Forest	1	10,847
MMSA13	Heavily forested area set back from waterbodies	Low	Forest	0	8,092
MMSA14	Heavily forested area near small clearings set back from waterbodies	Low	Forest	0	9,785
MMSA15	Heavily forested area east of intermittent creek	Moderate	Forest	0	10,182
MMSA16	Open field adjacent to Edie Creek	Moderate	Agriculture	5	11,119
MMSA17	Open field set back from waterbodies	Low	Agriculture	0	15,000
MMSA18	Open field set back from waterbodies	Low	Agriculture	1	15,000
Total				25	

The highest number of carcasses (n=9) was found at site MMSA01, a forest, high collision risk site located adjacent to the Assiniboine River, followed by five carcasses at site MMSA16, an agriculture, moderate collision risk site adjacent to Edie Creek. Three carcasses were found at site MMSA02, an agriculture, high collision-risk site north of Deacon's Reservoir, and at site MMSA10, a forest, moderate collision risk site north of a small wetland. After standardizing the number of carcasses per unit area (total number of carcasses found divided by the total area searched) for each landcover/risk combination, the highest number of carcasses was found at the forest, high collision-risk site (Assiniboine River), followed by the agriculture, moderate collision-risk site. No carcasses were found at the forest, low collision-risk sites (Table 2-18).

Table 2-18: Number of Carcasses Found per Unit Area (100 m²)[1] at Each Landcover/ Collision Risk Combination

Landcover Type[2]	Collision Risk		
	High	Moderate	Low
Forest	1.5	0.3	0
Grassland	n/a	0.2	0.2
Agriculture	0.3	1.5	0.1

NOTES:

1-number of carcasses found within total area searched (all weeks) multiplied by a factor of 10,000

2-forest-high n=1; forest-moderate n=4; forest-low n=3; grassland-high n=0; grassland-moderate n=1; grassland-low n=1; agriculture-high n=2; agriculture-moderate n=1; agriculture-low n=3

Searchers found bird carcasses at site MMSA16 every week it was surveyed (n=3), and at sites MMSA01 and MMSA02 during three of the four weeks they were surveyed (Appendix B, Table B.17).

Bird species collected at the 16 survey sites included two waterfowl, two other waterbirds, one woodpecker and five passerine species. None of the species identified were SOCC. Of those bird species found during carcass searches that could be identified by searchers, all were common residents or migrants in the RAA (Appendix B, Table B.18;) (MB BBA 2015).

Five bird carcasses were incidentally discovered during fall surveys; four were collected near or directly below M602F during carcass searches, but outside the survey site transects, and one was collected directly below M602F during other wildlife surveys.

Correction Factors

Scavenger Removal Trials:

The ground under sites MMSA05 and MMSA17 was tilled sometime between the first and second checks completed by searchers. Consequently, there was no way of determining whether carcasses were scavenged or displaced by the farm machinery following the first check. The data from these scavenger trial birds were therefore omitted from scavenging rate analyses.

The overall average of all scavenger removal correction factors across all landcover/collision risk combinations was calculated as 0.63.

Coyote tracks and scat were noted at several sites where trial carcasses were removed within 7 days.

Searcher Efficiency Trials:

Overall searcher efficiency (S_e) during the bird mortality monitoring program (for all searchers in all landcover/collision risk combinations) was calculated as 0.74.

Proportion of Area Searched:

Due to the presence of thick and/or tall vegetation and low-lying wet areas, it was not always possible to search an entire survey site. 100% of the 15,000 m^2 (250 m x 60 m) search area was searched for sites MMSA01 to MMSA05, MMSA17 and MMSA18, while a percentage of sites MMSA06 to MMSA16 was considered 'non-searchable' and removed from the search area in order to determine the 'actual area searched' (Table 2-17). The proportion of area searched was then calculated for each landcover/collision risk combination (Table 2-19).

Table 2-19: Proportion of Area Searched (P_s) for Each Landcover/Collision Risk Combination

Landcover Type[1]	Collision Risk		
	High	Moderate	Low
Forest	1.00	0.65	1.00
Grassland	n/a	1.00	0.71
Agriculture	1.00	0.74	1.00

NOTE:
1- forest-high n=1; forest-moderate n=4; forest-low n=3 grassland-high n=0; grassland-moderate n=1; grassland-low n=1; agriculture-high n=2; agriculture-moderate n=1; agriculture-low n=3

Corrected Mortality Estimates:

The minimum estimated rate of mortality (corrected number of fatalities) was calculated for each collision risk type. The highest corrected number of bird fatalities was at the high collision-risk sites, with 120.8 carcasses per linear km per year. This number is driven by a single site located adjacent to the Assiniboine River. The corrected number of bird fatalities at the moderate collision-risk sites was 69.3 carcasses per linear km per year, and at the low collision-risk sites was 16.5 carcasses per linear km per year.

2.4.3.7.3 Summary of Results

Twenty-five carcasses and/or evidence of possible collisions were detected at nine of the sites during the monitoring program.

The highest number of carcasses (n=9) was found at site MMSA01, a forest, high collision risk site located adjacent to the Assiniboine River, followed by five carcasses at site MMSA16, an agriculture, moderate collision risk site adjacent to Edie Creek. No carcasses were found at the forest, low collision-risk sites.

Bird species collected at the 16 survey sites included two waterfowl, two other waterbirds, one woodpecker and five passerine species. All bird species found during carcass searches that could be identified by searchers are common residents or migrants moving through the study area.

The estimated mortality rate was calculated for each collision risk category. The highest number of bird fatalities was at the high collision-risk sites (120.8 carcasses per linear km per year), followed by the moderate collision-risk sites (69.3 carcasses per linear km per year) and the low collision-risk sites (16.5 carcasses per linear km per year). Existing literature suggests that the average number of bird carcasses per kilometer of transmission line per year is 42.3 ± 17.1 (Rioux *et al.* 2013).

2.4.4 Synthesis of Bird Results

Based on a review of available data, 225 bird species are known to occur in the RAA, 205 of which breed there. During 2014 field surveys, 163 species were observed, with songbirds comprising the greatest number of species. Among the birds found in the RAA, 27 are listed SOCC. Fourteen bird SOCC were detected during 2014 field surveys.

Along the refined alternate routes, breeding bird densities were highest in grassland habitats, followed by wetland, hardwood, and softwood habitats. Bird densities were generally higher along the existing M602F transmission line versus the refined alternate routes. The fragmented forest habitats along the ROW provide a wider range of habitats (*e.g.*, shrub, forested, and edge habitats) which results in diverse bird communities.

During spring and fall migration surveys, concentrations of migratory birds were observed at the Red River and Assiniboine River crossings, Brady Landfill, Deacon Reservoir, Richer Lake, Lonesand Lake, and Sundown Lake. Most common species observed in these areas were Canada goose and ring-billed gull, although other waterfowl such as ducks, were observed.

Areas adjacent to wetlands and watercourses have above-average mortality estimates. However, these areas form a relatively small amount of the entire transmission line and the overall mean mortality estimate for the existing M602F transmission likely falls within reported nation averages.

2.4.4.1 SOCC

Of the 27 bird SOCC known to occur in the RAA, 14 were detected during 2014 field surveys (Appendix B, Table B.1 Wildlife SOCC with Potential to Occur in the RAA). Based on field results, the most common SOCC in the RAA are bobolink, eastern wood-pewee, common nighthawk, and eastern whip-poor-will.

2.4.4.1.1 Open Forest Species

Seven of the bird SOCC occurring in the RAA are primarily associated with open forest. Five of these species were observed during 2014 field surveys (common nighthawk, eastern whip-poor-will, eastern wood-pewee, olive-sided flycatcher, and golden-winged warbler), while recent (<10 years) observations exist for red-headed woodpecker during the breeding season and rusty blackbird during migration.

Common nighthawk is listed as threatened under MESEA and SARA. Suitable nesting habitat (*i.e.*, open forest, edge habitat, and woodland clearings) is widespread and abundant throughout the eastern portion of the RAA. Common nighthawk was the most abundant of the four open forest bird SOCC observed during 2014 field surveys (26 individuals). However, only three individuals were observed during the breeding season; the others were recorded during migration in mid-May. Field observations were mostly near the towns of Richer, La Broquerie, Sundown, and Sandilands, while other records for the species exist from near Glenboro South Station, around Winnipeg, near Ste. Anne, northwest of Richer, and near Sandilands.

No common nighthawks were observed during surveys, but one was documented incidentally along a nightjar survey route outside of the survey period. Twelve eastern whip-poor-wills were detected at 10 of 40 nightjar survey locations.

Eastern whip-poor-will is listed as threatened under MESEA and SARA. Suitable nesting habitat occurs in eastern parts of the RAA that feature deciduous or mixedwood forests with limited underbrush. During 2014 field surveys 24 individuals were observed, most observations were near the towns of Richer, La Broquerie, Sundown, and Sandilands. The majority of existing records also coincide with these areas.

Red-headed woodpecker is listed as threatened under SARA (COSEWIC 2007e). It nests in open deciduous forest and forest edges with a high density of dead trees. There were no red-headed woodpecker observations recorded during 2014 field surveys, but records exist within the RAA near Glenboro South Station, in Winnipeg, northwest of Richer, east of Steinbach, and near Sundown.

Eastern wood-pewee is listed as special concern by COSEWIC. Suitable nesting habitat occurs in deciduous and mixedwood forests in the RAA, primarily associated with forest edges and clearings. During 2014 field surveys, 21 individuals were observed at locations northwest of Ste-Genevieve, near Marchand, La Broquerie and Lonesand; other records exist from the Glenboro South Station RAA, wooded parts of Winnipeg, and from northwest of Richer south along the RAA to the border.

Olive-sided flycatcher is listed as threatened under SARA. This species primarily nests in boreal forest openings, especially where there are tall trees and snags for perching along the edge of wetlands, burns, or other disturbances. One olive-sided flycatcher was observed during 2014 field surveys east of Marchand, and other records exist within the RAA north of Richer, near Marchand and Piney.

Golden-winged warbler is listed as threatened under SARA, and is the only species for which Environment Canada has defined critical habitat within the RAA, from near Ross south through Richer, La Broquerie, and Marchand, south to the border near Sundown and Piney (Appendix A, Map 2-12 – Golden Winged Warbler Habitat in the RAA) (COSEWIC 2006b). It is a ground-nesting songbird that breeds in shrubby habitats along the edge of mature stands of deciduous and mixedwood forest, and often uses areas regenerating from natural or human disturbances (*e.g.*, logging, ROW development, wildfires). During 2014 field surveys, 8 individuals were observed at locations south of Richer, east of La Broquerie, west of Marchand and northwest of Lonesand. Another 234 records exist for the RAA, including 48 within the LAA; most of these are in suitable habitat within the eastern portion of the RAA, concentrated in the areas surrounding Ste-Geneviève, Ross, and Richer.

Rusty blackbird is listed as special concern under SARA (COSEWIC 2006c). It nests along wetland edges in boreal forest habitat, including bogs, muskeg, and beaver ponds. There were no rusty blackbird observations recorded during 2014 field surveys, nor are there any breeding records for the RAA within the past decade, although there are observations during migration from near Glenboro South Station, Winnipeg, Richer, Sandilands, and Piney.

2.4.4.1.2 Interior Forest Species

Two of the bird SOCC occurring in the RAA are primarily associated with interior forest habitat. One of these birds (pine warbler) was observed during 2014 field surveys, while the other (Canada warbler) was not, but other recent (<10 years) observations exist for it within the RAA (eBird 2015).

Pine warbler is considered a SOCC due to being listed as rare by the MB CDC, with observations limited to pine forests in southeastern Manitoba. Two pine warblers were detected during 2014 breeding bird surveys near Lonesand Lake, southeast of the town of Lonesand. Other records in the RAA are primarily from Winnipeg and east of Marchand.

Canada warbler is listed as endangered by MESEA and threatened under SARA. It is a shrub-nesting songbird that favors mixedwood forest with a dense understory. Although potential Canada warbler habitat is widespread throughout the eastern part of the RAA, the species typically breeds farther northwest (*e.g.*, Interlake area) or east (toward the Ontario border). There is limited breeding evidence inside the RAA northeast of Richer, south of Woodridge, and south of Piney; most records in the RAA are likely of migrants. There were no Canada warbler observations recorded during 2014 field surveys.

2.4.4.1.3 Grassland Species

Six of the bird SOCC occurring in the RAA are primarily associated with grassland habitat. Three of these species were observed during 2014 field surveys (short-eared owl, barn swallow, and bobolink); there are limited recent (<10 years) observations of two other species (loggerhead shrike and grasshopper sparrow), and none within the past decade of Sprague's pipit.

Short-eared owl is listed as threatened by MESEA and special concern under SARA. Breeding habitat includes a variety of open habitat types, including grassland, agriculture, and wetland edges. Observations in the RAA have been reported near Glenboro South Station, along the SLTC, near Ste. Anne, Richer, east of Marchand and Sandilands; a pair of short-eared owls has been confirmed nesting near the Brady landfill south of Winnipeg. One short-eared owl observation was recorded southeast of Caliento during 2014 field surveys.

Loggerhead shrike is listed as endangered by MESEA and threatened under SARA. It nests in shrubs in open landscapes, including grassland, pasture, and agriculture. Observations in the RAA have occurred near the Glenboro South Station, Winnipeg, Ste. Anne, Steinbach, and Sandilands but there have not been any records from within the LAA, and only one record has been reported in the RAA since 2010, in a location east of Sandilands (MB CDC 2014). There were no loggerhead shrike observations recorded during 2014 field surveys.

Barn swallow is listed as threatened by COSEWIC. It nests on artificial structures including barns and other buildings, generally adjacent to open grassland, pastures, crops, or other open habitat including ROWs. During 2014 field surveys, barn swallows were observed at locations east of Ste-Genevieve, west of Richer, north of La Broquerie and east of Marchand. Numerous other records exist in the RAA, including around Glenboro South Station, the SLTC, Winnipeg, and rural areas to the southeast.

Sprague's pipit is listed as threatened under MESEA and SARA. It 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, an isolated sighting south of Sandilands, and a recent sighting east of Lonesand. There were no Sprague's pipit observations recorded during 2014 field surveys.

Grasshopper sparrow is ranked rare in Manitoba by the MB CDC. Like Sprague's pipit, it requires large grasslands and favors native prairie, and is therefore largely restricted to southwestern Manitoba. Observations within the RAA are rare and mostly from around Glenboro South Station, although some have also been reported from grasslands near Sundown and Caliento. There were no grasshopper sparrow observations recorded during 2014 field surveys.

Bobolink is listed as threatened by COSEWIC (COSEWIC 2010b). It breeds in large grassy fields, especially meadows and hayfields. Bobolink was the most commonly encountered grassland bird SOCC during 2014 field surveys (25 observations), but was only found in the SLTC. Records also exist within the RAA from near Glenboro South Station, Winnipeg, Ste. Anne, Steinbach, and La Broquerie, but decline toward Sandilands and Piney.

2.4.4.1.4 Wetland Species

Six of the bird SOCC occurring in the RAA are primarily associated with wetland habitat. Four of these species were observed during 2014 field surveys (least bittern, great egret, yellow rail, and bank swallow); there are a small number of recent (<10 years) breeding season records of the other two species (trumpeter swan and horned grebe).

Trumpeter swan is listed as threatened by MESEA. It typically breeds in freshwater marshes, ponds, and lakes, but the Manitoba population is small and mostly to the north of the RAA in the boreal forest. As such, there are few records from within the RAA, limited to near Richer, Marchand, Sandilands, and Sundown, and a confirmed breeding pair on Mud Lake near Piney. No trumpeter swan observations were recorded during 2014 field surveys.

Horned grebe is listed as special concern by COSEWIC. It breeds primarily in small permanent and semi-permanent ponds and marshes with a mix of open water and emergent vegetation; such wetlands are more common in the PPR of southwestern Manitoba than in the RAA. As such, there are limited records from the RAA, at Deacon Reservoir, north of Richer and near Glenboro South Station. There were no horned grebe observations recorded during 2014 field surveys.

Least bittern is listed as endangered by MESEA, and threatened under SARA. This species breeds primarily in marshes and swamps dominated by emergent vegetation but with patches of open water. While such habitat exists in various parts of the eastern RAA, least bittern records are relatively scarce, and primarily around Zhoda, Caliento, and north of Richer. Two least bittern observations were recorded during 2014 field surveys: one near Lonesand Lake and one northwest of Ross, MB.

Great egret is listed as S2S3B (rare throughout its range and rare throughout its range in Manitoba) by MB CDC (2014). This species 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, no breeding colonies were observed.

Yellow rail is listed as special concern under SARA. It is largely limited to large, shallow sedge wetlands and wet meadows. Within the RAA, the Caliento-Sundown bog complex provides good habitat for yellow rails; observations are most numerous in that area, as well as near Ross and Richer. During field surveys, nine individuals were detected at wetlands northwest of Ross, east of Giroux, and near Richer and Sundown.

Bank swallow is listed as threatened under SARA. It nests primarily in river banks and lake bluffs, but also uses artificial sites including quarries and road cuts. During 2014 field surveys, two individuals were observed near a quarry northwest of Ste-Genevieve. Other records in the RAA are widespread, including near Glenboro South Station, the SLTC, Winnipeg, north of Richer, La Broquerie, and Sundown.

2.4.4.1.5 Urban Species

Two of the bird SOCC occurring in the RAA are primarily associated with urban habitat. Neither species was observed during 2014 field surveys, but there are recent (<10 years) observations of both chimney swift and peregrine falcon.

Chimney swift is listed as threatened under MESEA and SARA. It is primarily associated with urban habitat, given that nesting usually occurs in large chimneys. Records within the RAA are primarily from around Winnipeg and the SLTC, but there are also some from Steinbach, La Broquerie, and Marchand. No chimney swift observations were recorded during 2014 field surveys.

Peregrine falcon is listed as endangered by MESEA and special concern under SARA. There is no natural breeding habitat for peregrine falcons in southern Manitoba, but nesting occurs in Winnipeg where tall buildings are suitable. Most sightings from within the RAA likely pertain to the Winnipeg nesting pair and their offspring, including sightings near Ste. Anne and St. Adolphe; peregrines released from Parkland Mews (location relative to LAA) also account for some records in the RAA. There were no peregrine falcon observations recorded during 2014 field surveys.

2.4.4.2 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. Open forest birds are primarily associated 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. Common passerine species observed during field studies included white-throated sparrow, Nashville warbler, and American robin. Desktop review suggests common raptor species include turkey vulture, great-horned owl, and Cooper's hawk while ruffed grouse and spruce grouse are common upland game bird species and permanent residents of the RAA.

2.4.4.3 Interior Forest Birds

Interior forest birds are primarily associated with the dense, closed canopy mixedwood and coniferous forest most common in the RAA north of Richer, east of Marchand, and near Sandilands. Common passerine species observed during field studies include red-eyed vireo, ovenbird, and veery. Desktop review suggests common raptor species include great gray owl and sharp-shinned hawk while ruffed grouse and spruce grouse are common upland game birds and permanent residents of the RAA.

2.4.4.4 Grassland Birds

The Glenboro South Station, SLTC, and eastern RAA from Ste. Anne to Sundown 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. Common passerine species observed during field studies include savannah sparrow, western meadowlark, and clay-colored sparrow. Desktop review suggests common raptor species include northern harrier and American kestrel while sharp-tailed grouse and gray partridge are common upland game bird species 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, MB and north and south of La Broquerie, MB (Appendix A, Map 2-22 Sharp-tailed Grouse Lek Survey 2014). Six other leks exist within the RAA, two of which are located > 5 km west of the New ROW, just south of the Rat River and four occur in the RAA near Glenboro South Station > 4km from the PDA (Appendix A, Map 2-23 – Sharp-tailed Grouse Leks Glenboro South Station).

2.4.4.5 Wetland Birds

The most common types of wetlands in the RAA are large open water wetlands (*i.e.*, Lonesand Lake, Sundown Lake, Richer Lake), fens, marshes, and bogs. Other aquatic habitats include rivers (*i.e.*, Red River, Assiniboine River), reservoirs (*i.e.*, Deacon Reservoir), and lagoons (*i.e.*, Oak

Bluff Lagoon). Although all of these areas are considered important to waterbirds 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. Another feature known to attract concentrations of waterbirds during the migration season is the Brady Landfill. With the exception of the Brady Landfill, all of these areas are typically used for roosting during fall migration, with birds making daily movements into surrounding agricultural fields to forage.

Common passerine species observed during field studies include common yellowthroat, red-winged-blackbird, swamp sparrow, and sedge wren while common waterbird species include Canada goose, mallard, Wilson's snipe, and ring-billed gull.

2.4.4.6 Urban birds

Several birds occurring in the RAA are primarily associated with urban habitat, and many other species are observed in such areas during migration. Field surveys did not focus on urban habitat, given that species occurring there are already adapted to disturbance, and the final preferred route largely avoids such areas. However, based on desktop review, common urban species in the RAA include rock pigeon, downy woodpecker, American crow, black-capped chickadee, American robin, European starling, and house sparrow.

2.5 HERPTILES

Information on **herptiles** potentially inhabiting the RAA is provided based on a variety of information sources including desktop data, KPIs, and field Studies. The methods utilized in accessing each information source are described, along with results of each program. An overall synthesis of herptile information is provided at the end of Section 2.5.4**.**

2.5.1 Desktop

2.5.1.1 Methods

The following data sources were reviewed to gather information on amphibians and reptiles, SOCC and their habitats within the RAA:

- The Species at Risk Public Registry (Government of Canada 2015), which was reviewed to identify herptiles listed under SARA with potential to occur within the RAA.
- The COSEWIC list of Canadian Wildlife Species at Risk (COSEWIC 2015), which was reviewed to identify listed herptiles with potential to occur within the RAA.
- MESEA which was reviewed to identify provincially-listed herptiles with potential to occur in the RAA (MCWS 2014b; Government of Manitoba 2015a).
- The Saskatchewan Conservation Data Centre (SK MOE), which was consulted for Standard Operating Procedures (SOPs), given that MCWS Wildlife Branch agreed that use of SK MOE SOPs was appropriate and acceptable in light of a lack of Manitoba Wildlife Branch

amphibian and reptile SOPs (Friesen 2014, pers. comm.; Watkins 2014, pers. comm.); the SK MOE SOPs incorporate amphibian monitoring protocols developed by United States Geologic Survey (USGS) Patuxent Wildlife Research Center (USGS 2012b), and SOPs developed by the government of Alberta for rare and at-risk species (ESRD 2013).

- Manitoba Conservation Data Centre records of SOCC and sensitive wildlife habitat features (MB CDC 2014), which were mapped and used to inform development of a Project-specific list of SOCC and to contribute to survey.
- The Manitoba Herps Atlas (MHA 2014), which was reviewed for existing amphibian and reptile records in the RAA.
- The Canadian Amphibian and Reptile Conservation Network (CARCNET 2012), which was used to query for the presence of SOCC within the RAA.
- GIS spatial layers from Manitoba Land Initiative (MCWS 2015) (*e.g.*, national wildlife areas, PFRA, community pasture, wildlife habitat protection, fish and wildlife development fund), orthophotos, FRI data, satellite imagery provided by the client and from publicly available sources such as Google Earth Pro (Google 2014).
- GIS spatial layers from Manitoba Mines Branch were used to model potential snake hibernacula by combining limestone sinks and bedrock layers with garter snake habitat requirements for both feeding/summering and overwintering life stages obtained from literature (Gregory and Stewart 1975; Preston 1982).
- Environment Canada historic climate records were reviewed to provide insight into current water levels within the RAA (Environment Canada 2015e).

2.5.1.2 Results

Twenty herptile species have the potential to occur within the RAA (Table 2-20), including 6 SOCC: common snapping turtle (*Chelydra serpentina*), northern leopard frog (*Lithobates pipiens*), western hognose snake (*Heterodon nasicus*), prairie skink (*Plestiodon septentrionalis*), western tiger salamander (*Ambystoma mavortium*), and eastern tiger salamander (*Ambystomatigrinum*).

Common snapping turtle (*Chelydra serpentina*) is listed as Special Concern by SARA (COSEWIC 2008d; Government of Canada 2015) and is known to occur throughout the RAA, including along the Assiniboine River north of Glenboro Station, along the Red River and Seine River in Winnipeg, MB, and 3 km north of Marchand, MB (MHA 2014; MB CDC 2014). Additionally, one record of a common snapping turtle nest is located along the Red River in St. Norbert, MB. 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.

The northern leopard frog (*Lithobates pipiens*) is listed as species of Special Concern by SARA (Government of Canada 2015) and occurs throughout the RAA, including along the Assiniboine River north of Glenboro, MB and east of Winnipeg, MB, along the La Salle River and Red River south of Winnipeg, MB, along the Seine River near Marchand, MB and La Broquerie, MB, along

the Rat River south of Lonesand, MB, at Sundown Lake east of Sundown, MB, and throughout the RAA in semi-permanent and permanent waterbodies (MHA 2014; MB CDC 2014). Eastern populations, including those in Manitoba, have rebounded since declines in the 1990s and are considered stable (Envirronment Canada 2013b).

Western hognose snake is listed as threatened under MESEA and occurs within the Glenboro RAA. 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 and increase in agricultural fields in the LAA (MHA 2014). Western hognose snakes are also limited in their movements, which typically do not extend beyond 200 m (Platt 1969).

The prairie skink is listed as Endangered by SARA (Government of Canada 2015) and is known to occur in areas within and adjacent to Spruce Woods Provincial Park. One historical record of prairie skink exists within the RAA, approximately 6.5 km northwest of the Glenboro PDA (MHA 2014). With a maximum home range of up to 100 m (Nelson 1963) and specific habitat requirements (*i.e.*, sand prairie) (COSEWIC 2004), this species is not expected to range as far as the Glenboro PDA due to the increase in cultivated fields in the LAA.

The eastern tiger salamander is listed as Endangered by COSEWIC (2013c) and only rare historic records exist within the RAA, including one in the Pocock Lake Ecological Preserve east 12 km northeast of the FPR and one in a tributary of the Rat River 6 km south of Sandilands, MB (MHA 2014). Two additional historic records exist near Marchand, MB 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).

The western tiger salamander (Prairie/Boreal population) is listed as Special Concern by COSEWIC (2012e) and historic records indicate observations near the town of Glenboro (2 km north of Glenboro Station) and an additional 6 observations ranging from 4-15 km north to southeast from Glenboro Station (MHA 2014; MB CDC 2014). The western tiger salamander is known to occur in semi-permanent and permanent waterbodies and watercourses from the Saskatchewan-Manitoba border, east to the Red River (COSEWIC 2012e; MHA 2014).

Based on historical weather data, the spring of 2014 in southeastern Manitoba received above average precipitation (Environment Canada 2015e), creating above average water levels in many wetlands, rivers, and streams.

Table 2-20: Herptile Species with Potential to Occur in the RAA[1]

Common Name	Scientific Name	SARA	COSEWIC	MESEA	MB CDC Rank	Observed in the RAA
Western Painted Turtle	*Chrysemys picta belli*	no status	not at risk	no status	S4	Y
Common Snapping Turtle	*Chelydra serpentina*	Special Concern	Special Concern	no status	S3	Y
Plains Garter Snake	*Thamnophis radix haydenii*	no status	not at risk	no status	S4	Y
Red-sided Garter Snake	*Thamnophis sirtalis parietalis*	no status	not at risk	no status	S4	Y
Eastern Garter Snake	*Thamnophis sirtalis sirtalis*	no status	not at risk	no status	S3S4	N
Northern Red-bellied Snake	*Storeria occipitomaculata*	no status	not at risk	no status	S3S4	Y
Smooth Green Snake	*Opheodrys vernalis*	no status	not at risk	no status	S3S4	N
Western Hognose Snake	*Heterodon nasicus*	no status	not at risk	Threatened	S1S2	N
Prairie Skink	*Plestiodon septentrionalis*	Endangered	Endangered	Endangered	S1	N
Mudpuppy	*Necturus maculosus*	no status	not at risk	no status	S3S4	N
Blue-spotted Salamander	*Ambystoma laterale*	no status	not at risk	no status	S3S4	N
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*	no status	Endangered	no status	S2	Y
Western Tiger Salamander	*Ambystoma mavortium*	no status	Special Concern	no status	S4S5	N
Northern Leopard Frog	*Lithobates pipiens*	Special Concern	Special Concern	no status	S4	Y
Wood Frog	*Lithobates sylvaticus*	no status	not at risk	no status	S5	Y
Boreal Chorus Frog	*Pseudacris maculata*	no status	not at risk	no status	S5	Y
Gray Tree Frog	*Hyla versicolor*	no status	not at risk	no status	S4S5	Y
Cope's Gray Tree Frog	*Hyla chrysoscelis*	no status	not at risk	no status	S4	Y
Spring Peeper	*Pseudacris crucifer*	no status	not at risk	no status	S5	Y

Table 2-20: Herptile Species with Potential to Occur in the RAA[1]

Common Name	Scientific Name	SARA	COSEWIC	MESEA	MB CDC Rank	Observed in the RAA
Canadian Toad	*Anaxyrus hemiophrys*	no status	not at risk	no status	S4S5	Y

NOTES:

[1] Records of species distribution from Manitoba Herps Atlas (2014), CARCNET (2012) and SARA Registry (Government of Canada 2015).

[2] Records of SOCC from Manitoba Conservation Data Centre (2014), Manitoba Herps Atlas (2014).

2.5.1.3 Data Gaps

A review of existing information describing northern leopard frog and other herptile SOCC presence in the LAA and RAA revealed the following data gaps with respect to amphibian and reptile communities:

- The presence and distribution of breeding and overwintering sites for northern leopard frogs, a focal species representative of wetland herptiles.
- Presence and distribution of amphibian and reptile SOCC breeding and overwintering sites.
- The location of high quality herptile habitat (*i.e.*, "sensitive sites", including breeding ponds, turtle nesting sites, snake hibernacula, overwintering ponds).

Data gaps were addressed through development of surveys designed to evaluate herptile use of permanent and semi-permanent water bodies in the RPA, with a focus on areas where the refined alternate routes (see Section 2.5.3.1.1) crossed rivers and other deep wetlands. Criteria for assessing habitat quality (see Section 2.5.3.1.1) were developed based on abundance and species richness of SOCC in the RAA. Spatially clustered sites of high habitat quality were identified as important areas for wildlife (see Section 3.1).

2.5.2 Key Person Interviews

2.5.2.1 Methods

KPIs for herptiles were conducted with Doug Collicutt, a biologist with Manitoba Herps Atlas. Discussions with Doug Collicutt were focused on herptiles within the RPA. Questions were asked about any incidental reptile or amphibian observations that the interviewee might know of, as well as any areas that may support congregations of reptiles or amphibians in any season. KPIs for birds and mammals occasionally provided information about herps and included here.

2.5.2.2 Results

- During KPIs, the following information regarding reptiles and/or amphibians was collected:The northern leopard frog breeding season occurs from late-April to mid-May and the overwintering congregation period occurs from late-August to late-September (Collicutt 2014, pers comm.).
- Doug Collicutt (2015, pers. comm.) is unaware of any known sensitive herptile sites (*i.e.*, hibernacula, nesting area, congregation are) within the RAA. However, to his knowledge, there have been no detailed herpetological surveys in the region.
- Potential threats to herptiles as a result of a transmission line include the loss of habitat, the fragmentation of habitat that can lead to increased predation rates, and the use of herbicides during ROW vegetation maintenance (Collicutt 2015, *pers. comm.*).
- The MHA contains the more up-to-date and accurate records for herptiles in the area, particularly for eastern tiger salamander (Collicutt 2015, pers. comm.).
- Long-term data is required to assess trends in herptile populations, including in relation to wet-dry cycles. However, periods of above-average water levels likely benefit herptile populations (Collicutt 2015, pers. comm.).

Turtles (species unspecified) have a large egg-laying area at Lonesand Lake (behind the cemetery) and even nest along Sundown Road (west of the lake). Although the presence of snake any hibernacula are unknown at this location, there is a seasonal migration of snake across Sundown Road (Holme 2014, pers. comm.).

Three types of surveys designed to detect amphibians and reptiles (*i.e.*, herptiles) were conducted during 2014 in the RAA. Diurnal wetland herptile surveys were conducted at 11 wetlands in the spring, with five of these wetlands revisited, and an additional 21 added during the fall, for a total of 37 wetland surveys. Revisited sites were selected based on their likelihood to contain SOCC and their proximity to the refined alternate route. Nocturnal roadside surveys were conducted in spring along six predetermined road-based survey routes, with 10 stops along each route, for a total of 60 stops. These nocturnal surveys were also conducted at 11 wetlands for a total of 65 nocturnal surveys. Diurnal visual encounter surveys (VES) were conducted in the fall at 26 locations.

2.5.3 Field Studies

2.5.3.1 Wetland Herptile Surveys

Wetland surveys for reptiles and amphibians were designed to characterize baseline habitat conditions (*e.g.*, water quality) for amphibians and reptiles at permanent and semi-permanent ponds located in the RAA, and to identify the location of important wetlands where amphibians and reptiles congregate during the breeding and/or overwintering seasons. Establishing a baseline for water-quality conditions at wetlands located within areas potentially affected by the PDA is essential for future monitoring of potential changes in amphibian and reptile habitat.

2.5.3.1.1 Methods

Timing

Surveys were conducted in the late afternoon and occurred from May 14 to 16, 2014 and from August 28 to September 25, 2014.

Study Design

Survey sites expected to provide potential breeding and/or overwintering habitat for northern leopard frogs, and/or known to support SOCC (based on desktop data) were selected from permanent and semi-permanent waterbodies located along the refined alternate routes. These sites were identified through land cover mapping and ortho-photo interpretation and included wetlands and water bodies within 500 m of the PDA. This buffer represents the maximum activity restriction setback for northern leopard frog breeding ponds (Environment Canada 2009).

To understand amphibian use of wetlands along an existing transmission line, two open-water wetlands were selected as proxy sites within the footprint of M602F. A total of 11 wetlands were surveyed in the spring from May 14 to 16. Five of these spring sites and 21 additional wetlands were also surveyed in the fall, from August 28 to September 25, 2014. Revisited sites were selected based on their likelihood to contain SOCC and their proximity to the refined alternate route. The survey schedule was timed to coincide with northern leopard frog spring breeding season (*i.e.,* from late April to mid-May (MHA 2014), and the overwintering congregation period (*i.e.,* late August to late September (Collicutt 2014, pers. comm.; Appendix A, Map 2-25 – Amphibian Wetland and Roadside Call Count Survey Locations Spring 2014). Wetlands visited in the spring and confirmed as having potential for providing high quality breeding and/or overwintering habitat were included in fall VES (see Section 2.5.3.3). Wetland survey methods described below were also implemented at wetlands revisited for VES in the fall.

Field Methods

A field crew of two biologists visually inspected wetlands using binoculars to search for basking turtles. This inspection was conducted from a vantage point at the wetland that was screened by riparian vegetation or basin topography so that observer presence would not interfere with wildlife activity. Following the visual inspection, biologists stood near the wetland edge listening for calling frogs for five minutes. Herptile species presence was noted and abundance of frogs was estimated using the calling code detailed below.

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 with a digital GIS camera, and weather conditions (*e.g.*, temperature, wind direction and speed, cloud cover and precipitation) were recorded. [Draft Note: will look at including this in Veg TDR]

Data Processing / Analysis

All detections of northern leopard frogs or other SOCC within a 500 m buffer of the PDA were noted and incorporated into identification of sensitive sites. Wetlands surveyed for herptiles were ranked as high, moderate or low quality amphibian habitat based on criteria developed below. Wetland survey locations were mapped, with areas of high-quality habitat identified as sensitive sites.

Habitat quality at each survey site visited in 2014 was ranked based on the presence and abundance of northern leopard frogs and other SOCC, herptile species richness, and intensity of herptile breeding activity at survey sites (*i.e.,* as noted by male frog calling code; see Section 2.5.3.2, Table 2-22). Habitat ranks were assigned to each survey site based the following criteria:

- High:
  - ≥ 10 northern leopard frogs present, or
  - presence ≥ 2 SOCC other than northern leopard frogs, or
  - evidence of breeding/overwintering activity (*i.e.,* turtle nesting site, snake hibernaculum), or
  - amphibian and reptile species richness of ≥ 5 species, or
- Moderate:
  - 2 - 9 northern leopard frogs, or
  - One SOCC present other than northern leopard frog, or
  - amphibian and reptile species richness of 3-4 species.
- Low:
  - ≤ 1 northern leopard frog, and
  - no SOCC other than northern leopard frog, and
  - amphibian and reptile species richness of ≤ 2 species.

Note: for wetlands surveyed multiple times, the highest habitat rank for each wetland is used in cases where they differ between surveys.

Wetland water-quality information provided baseline condition or 'benchmark' data for comparison of pre-Project water quality to future construction phase water quality. Construction phase wetland monitoring would take place during the amphibian breeding period immediately following construction activity with the goal of detecting changes in water quality following construction activity.

2.5.3.1.2 Results

During spring visits, northern leopard frogs were heard calling at three of 11 wetland survey sites (Table 2-21; Appendix A, Map 2-25 – Amphibian Wetland and Roadside Call Count Survey Locations Spring 2014). These wetlands (*i.e.,* D, E, and F) are likely to be breeding sites. Of these, Wetlands D (approximately 2 km west of the town of Marchand) and F (approximately 2 km east of the town of Giroux) are on the Rat River, and Wetland E is a semi-permanent wetland 10 km east-southeast of the town of La Broquerie. None of the sites where northern leopard frogs were heard calling are within 500 m of the PDA. No other herptile SOCC were detected during spring wetland amphibian surveys. However, two snapping turtles were observed incidentally during spring bird surveys near the Rat River south of Lonesand, MB.

During fall visits, northern leopard frogs were observed at ten wetland survey sites, with 56 individuals counted in total (Table 2-21)(Appendix D, Photo 14). Wetland B, located outside the 500 buffer from the PDA, had the most numerous northern leopard frog detections (n=21). All fall sites where northern leopard frogs were observed were permanent water bodies deep enough to avoid freezing to the bottom, and are therefore likely to be suitable overwintering habitat for this species. Three of the sites supporting northern leopard frog occurred within 500 m of the PDA (Table 2-21). One eastern tiger salamander was observed at Wetland 22 (tributary to the Rat River, 10 km west of Woodridge, MB), which is located greater than 500 m from the PDA.

The highest species richness detected during spring wetland survey sites occurred at Wetlands F and M, with three herptile species present. The highest species richness detected during fall wetland surveys occurred at sites 33 and 37, with three herptile species present. Neither of these two wetlands are within 500 m of the PDA.

One incidental observation of an adult great egret was made along the Rat River approximately 2.8 km southwest of the FPR, located 5 km southwest of Lonesand, MB.

Table 2-21: Northern Leopard Frog and SOCC Detections during Spring and Fall Wetland Surveys

Wetland Name	Distance to PDA ≤ 500 m	Habitat Rank[1]	# NLFR Spring	Species Spring[2]	SOCC Spring[2]	# NLFR Fall	Species Fall[2]	SOCC Fall[2]
2	√	High	-	-	-	10	NLFR	NLFR
4	√	High	-	-	-	13	NLFR	NLFR
5	√	Moderate	-	-	-	1	NLFR	NLFR
17	-	Moderate	-	-	-	1	BCFR, NLFR	NLFR
22	-	High	-	-	-	2	NLFR, EATS	NLFR, EATS
33	-	High	-	-	-	4	BCFR,	NLFR

Table 2-21: Northern Leopard Frog and SOCC Detections during Spring and Fall Wetland Surveys

Wetland Name	Distance to PDA ≤ 500 m	Habitat Rank[1]	# NLFR Spring	Species Spring[2]	SOCC Spring[2]	# NLFR Fall	Species Fall[2]	SOCC Fall[2]
							NLFR, SPPE	
37	-	Moderate	-	-	-	1	BCFR, NLFR, CATO	NLFR
A	-	High	-	SPPE	-	2	NLFR, WEPT	NLFR
B	-	High	-	BCFR	-	21	NLFR	NLFR
D	-	Moderate	5	NLFR	NLFR	-	-	-
E	-	High	1	NLFR, WEPT	NLFR	-	-	-
F	-	Moderate	4	BCFR, NLFR, WOFR,	NLFR	-	-	-
M	-	High	-	BCFR, GTFR, WOFR	-	1	NLFR, WOFR	NLFR

NOTES:

[1] Habitat rank is based on survey results across all surveys in 2014 (See Section 2.5.3.1.1).

[2] Species codes: BCFR – boreal chorus frog, GTFR – gray tree frog, NLFR – northern leopard frog, SPPE – spring peeper, WOFR – wood frog, CATO – Canadian toad, EATS – eastern tiger salamander, WEPT – western painted turtle, RSGS – red-sided garter snake

2.5.3.1.3 Summary of Results

Of the 32 waterbodies where spring and fall wetland surveys were conducted, 17 had evidence of amphibian breeding activity (*i.e.*, calling frogs), with northern leopard frogs detected at 13 of these breeding sites. Two western painted turtles and an eastern tiger salamander were detected at three of the sites supporting northern leopard frog. Three of the 13 sites with northern leopard frogs occurred within 500 m of the PDA (recommended activity restriction zone for northern leopard frog breeding and/or overwintering ponds [Environment Canada 2013b]. Habitat ranks were evaluated for each herptile survey site. Based on the presence of northern leopard frogs and other SOCC, as well as species richness and overall breeding activity, habitat ranks were assigned to each survey site. Eight of the wetland survey sites were determined to be high-quality herptile habitat (Table 2-21). Five were determined to be of moderate quality. Wetland sites 2 and 4 were ranked as high-quality herptile habitat and overlap with the PDA, and wetland site 5 was ranked as moderate habitat and overlaps with the PDA. Wetland survey

sites of high and moderate quality were located south of the city of Winnipeg and adjacent to the SLTC, and south of the Trans-Canada Highway. The remaining sites of high and moderate quality occurred at distances outside the 500 m buffer from the PDA, and were scattered within 1 km to10 km of the transmission line ROW, from the town of Giroux south to the town of Sundown. These sites were predominantly small lakes, creeks or rivers with the exception of Wetlands E and M, and sites 17, and 37.

2.5.3.2 Roadside Amphibian Call Count Surveys

Nocturnal roadside amphibian surveys were designed to gather information on amphibian presence (*i.e.*, calling male frogs), relative abundance (*i.e.,* degree to which calls overlapped), species diversity and distribution of calling amphibians within the RAA.

2.5.3.2.1 Methods

Timing

Surveys were conducted between 0.5 hours after sunset and 0100 h, from May 14 to May 16, 2014, to coincide with the breeding period of the northern leopard frog (*i.e.,* May through early June (SK MOE 2014c, 2014d)). This timing overlaps with breeding periods of other amphibians in southern Manitoba, thereby allowing for the detection of multiple species of breeding amphibians.

Study Design

Survey routes for nocturnal roadside call counts were established within the RAA targeting wetlands and water bodies with the potential to be affected by the Project. The number of survey routes sampled was determined by wetland and/or water body prevalence within the RAA. Six survey routes with 10 listening stops spaced at 800 m intervals (n=60 stops) were located along roadways in the LAA, in a broad area extending from the town of Anola to the town of Menisino, MB (Appendix A, Map 2-25 – Amphibian Wetland and Roadside Call Count Survey Locations Spring 2014). Nocturnal call count surveys were also conducted at all Wetland Amphibian survey sites (see Section 2.5.3.1.1). 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. Including wetlands, a total of 65 stops were surveyed during nocturnal roadside call counts.

Field Methods

Roadside amphibian call count surveys were consistent with Species Detection Survey Protocols developed by Saskatchewan Government (SK MOE 2014c, 2014d). Nocturnal surveys were conducted, in weather conditions with winds less than 20 km/h, ambient temperature ≥5°C, water temperature ≥10°C, and/or rain no heavier than a drizzle (Kendell 2002; USGS 2012b). 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 2014c; Table 2-22).

Table 2-22: Nocturnal Amphibian Survey Calling Index

Calling Code	Calling Code Description
0	No amphibians of a given species calling
1	Individual calls, not overlapping (estimate of 1-5 individuals calling)
2	Calls are overlapping, but individuals are still distinguishable (estimate of 6-10 individuals calling)
3	Numerous calls can be heard; chorus is constant and overlapping (estimate of more than 10 individuals)

Data Processing / Analysis

Wetlands with detections of amphibian breeding activity were mapped to illustrate distribution of amphibians and intensity of breeding activity within the RAA. All detections of northern leopard frog or SOCC within a 500 m buffer of the PDA were noted and incorporated into identification of sensitive sites. This buffer represents the maximum activity restriction setback for northern leopard frog breeding ponds (Environment Canada 2013b). These data were used to inform plans for fall survey sites and contributed to habitat quality ranking. Roadside survey sites were ranked as high-, moderate- or low-quality amphibian habitat based on criteria described above in Section 2.5.3.1.1. Roadside survey locations were mapped, with areas of high-quality habitat identified as sensitive sites.

2.5.3.2.2 Results

Breeding amphibians (*i.e.,* calling male frogs) were detected at all stops along each of the six survey routes, and at all of the five wetlands surveyed separately from roadside routes (Appendix A, Map 2-25 – Amphibian Wetland and Roadside Call Count Survey Locations Spring 2014). Northern leopard frogs where heard calling on four of the six survey routes (*i.e.,* 12 of the 60 roadside stops), and at two of the five wetlands located outside of roadside routes. These northern leopard frog detections were made at eight semi-permanent wetlands, one permanent wetland, two lakes and one stop on the Rat River. Of these detections, one northern leopard frog was heard calling within 500 m of the PDA, at stop #1.05 near the town of Sundown (Table 2-23). No other SOCC were detected during roadside calling-count surveys.

Table 2-23: Northern Leopard Frog Detections during Spring Nocturnal Roadside Call Surveys

Roadside Survey Site #	Distance to PDA ≤ 500 m	Habitat Rank[1]	# NLFR Spring	Species Detected[2]
1.05	√	Moderate	1	BCFR, NLFR, SPPE, WOFR
2.09	-	Low	1	BCFR, NLFR
5.04	-	Moderate	2	BCFR, NLFR, SPPE, WOFR
6.02	-	Moderate	1	BCFR, NLFR, SPPE, WOFR
6.03	-	Moderate	1	BCFR, NLFR, SPPE
6.04	-	Moderate	1	BCFR, NLFR, SPPE, WOFR
6.07	-	Moderate	1	BCFR, NLFR, SPPE, WOFR
6.08	-	Moderate	1	BCFR, NLFR, SPPE, WOFR
B	-	High	1	BCFR, NLFR, SPPE, WOFR
C	-	High	1	BCFR, NLFR, SPPE, WOFR
E	-	High	1	BCFR, NLFR, SPPE, WOFR
I	-	Moderate	1	BCFR, NLFR, SPPE, WOFR

NOTES:

[1] Habitat Rank is based on survey results across all surveys in 2014 (See Section 2.5.3.1.1).

[2] Species codes: BCFR – boreal chorus frog, GTFR – gray tree frog, NLFR – northern leopard frog, SPPE – spring peeper, WOFR – wood frog, CATO – Canadian toad, EATS – eastern tiger salamander, WEPT – western painted turtle, RSGS – red-sided garter snake

The greatest number of amphibian species detected at a single roadside survey stop was four, with seven of the 17 routes (*i.e.,* six driving routes and 11 wetlands) supporting this number of species (Table 2-23). Stop 1.05 lies within 500 m of the PDA and was one of the locations with four species present. Four species were also heard at wetlands C and E during roadside call surveys, which, along with wetlands A and M had the highest species richness in the RAA across all survey types (*i.e.,* 5 to 6 species).

Incidental observations of 23 common nighthawks and five eastern whip-poor-wills were recorded during the surveys.

2.5.3.2.3 Summary of Results

Amphibians were heard calling at all roadside survey stops. Fourteen of the 65 stops surveyed included northern leopard frog detections. No other SOCC were detected during roadside surveys. Habitat ranks were evaluated for all of the ponds surveyed in 2014.

Based on the presence of northern leopard frogs and other SOCC, as well as overall species richness and breeding activity at sites surveyed in 2014, habitat ranks were assigned to each

survey site. Three of the stops surveyed along roadside routes were determined to be high quality herptile habitat. Eight were determined to be of moderate quality, and one was of low quality. None of the roadside survey stops identified as high or moderate quality herptile habitat were located within 500 m of the PDA.

Survey stops of high and moderate habitat quality were located south of Highway 1, with the exception of route 8 off Highway 12 at the town of Springfield. Although five of the six survey routes crossed the preferred route, only one of the stops with northern leopard frog detections (1.05) was within 500 m of the PDA. Other species of amphibians detected at the stops within 500 m of the PDA are considered common (MB CDC 2014) and are ubiquitous throughout the RAA and wetlands in southern Manitoba.

2.5.3.3 Visual Encounter Surveys

VES were designed to conduct baseline identification of herptiles at permanent and semi-permanent ponds and water bodies located in the RAA, and to identify sensitive site locations, such as waterbodies where amphibians and reptiles congregate to overwinter.

2.5.3.3.1 Methods

Timing

VES were conducted at 26 sites between August 28 and September 25, 2014 (Appendix A, Map 2-26 – Amphibian Visual Encounter Survey Fall 2014), with a single survey conducted at each water body between 1500 h and 1800 h.

Study Design

Wetlands and watercourses selected for VES were identified on both private and crown lands by GIS analysts using ortho-imagery, FRI and LCC data. Emphasis was placed on water bodies with the highest potential to provide overwintering habitats (i.e., oxygenated water that is greater than 1.5 m deep) such as permanent ponds and lakes, rivers and streams. Where possible, VES were conducted at water bodies with surrounding open grassland upland habitats, which northern leopard frogs are known to use for foraging, juvenile dispersal and migration to overwintering sites. Land access permission was obtained for 26 of the 43 waterbodies identified along the refined alternate routes were. Five of these 26 wetlands wetlands were visited during spring Wetland Amphibian Surveys (see Section 2.5.3.1), 21 were new sites, with two located along the existing M602F transmission line (Appendix A, Map 2-26 – Amphibian Visual Encounter Survey Fall 2014).

Field Methods

VES were conducted diurnally by two biologists walking side by side at a distance of 5 m apart along wetland margins or stream banks while documenting any amphibians observed within the water body 1 m from the shore, in a 1 m strip of the water body shoreline, or within a 3 m strip of

the upland habitat adjoining the water's edge. The VES was conducted for a prescribed amount of time (20 minutes) (Kendell 2002; SK MOE 2014c, 2014d) and under average seasonal air temperatures. Surveys were suspended if precipitation exceeded a light rain or ambient air temperatures dropped below 15°C.

Data Processing / Analysis

Permanent and semi-permanent water bodies surveyed for overwintering congregations of amphibians were ranked as high, moderate or low quality amphibian habitat based on criteria described above in Section 2.5.3.1.1. VES locations were mapped, with areas of high quality habitat identified as sensitive sites. All detections of northern leopard frog or SOCC within a 500 m buffer of the PDA were noted and incorporated into identification of sensitive sites. This buffer represents the maximum activity restriction setback for northern leopard frog breeding ponds (Environment Canada 2013b).

2.5.3.3.2 Results

During visual encounter surveys, detections of two to four species of amphibians and reptiles were made at 22 sites (Table 2-24). A total of 177 northern leopard frogs were observed at 14 of the visual encounter survey sites. Detections of northern leopard frogs observed at VES sites ranged from one to 54 individuals, with ten (77%) of the 14 sites having < 10 northern leopard frog detections per wetland. Eleven of these 14 wetlands were permanent waterbodies, likely deep enough (deeper than 1.5 m) to avoid freezing to the bottom (e.g., Lonesand Lake [Appendix D, Photo 15] and Sundown Lake [Appendix D, Photo 16]). These sites are expected to provide suitable habitat for overwintering frogs of this species and potentially for snapping turtles and western painted turtles (Appendix D, Photo 17), which have similar habitat needs over winter. Of the northern leopard frog detections, four (*i.e.*, VES sites 2, 4, 5 and 8) occurred at wetlands within 500 m of the PDA.

Table 2-24: Northern Leopard Frog Detections during Fall Visual Encounter Surveys

VES Site #	Distance to PDA ≤ 500 m	Habitat Rank[1]	# Northern Leopard Frog	Species Detected[2]
2	√	High	14	BCFR, NLFR
4	√	High	4	BCFR, NLFR
5	√	Moderate	2	BCFR, NLFR
8	√	Moderate	4	NLFR
22	-	High	8	BCFR, NLFR
26	-	High	45	BCFR, NLFR
29	-	Low	-	BCFR, RSGS
33	-	Moderate	8	BCFR, NLFR, SPPE
37	-	Moderate	1	BCFR, NLFR, SPPE, CATO

Table 2-24: Northern Leopard Frog Detections during Fall Visual Encounter Surveys

VES Site #	Distance to PDA ≤ 500 m	Habitat Rank[1]	# Northern Leopard Frog	Species Detected[2]
38	-	Moderate	-	BCFR, GTFR, RSGS
39	√	Low	1	NLFR
D6O2F06	-	High	29	NLFR, CATO, RSGS
A	-	High	1	BCFR, NLFR, SPPE, RSGS
B	-	High	54	BCFR, NLFR, WOFR
C	-	High	5	BCFR, GTFR, NLFR, RSGS
H	-	Moderate	1	BCFR, NLFR

NOTES:

[1] Habitat rank is based on survey results across all surveys in 2014 (See Section 2.5.3.1.1).

[2] Species codes: BCFR – boreal chorus frog, GTFR – gray tree frog, NLFR – northern leopard frog, SPPE – spring peeper, WOFR – wood frog, CATO – Canadian toad, EATS – eastern tiger salamander, WEPT – western painted turtle, RSGS – red-sided garter snake

The highest species richness detected at fall visual encounter survey sites was four species, which occurred at WLC, WLA, and site 37. None of these wetlands lie within 500 m of the PDA.

2.5.3.3.3 Summary of Results

Herptiles were detected at 22 sites visited during diurnal VES in late August and throughout September 2014. Northern leopard frogs were observed at 14 of the 22 sites, with red-sided garter snakes observed at five sites (Appendix D, Photo 18). Habitat ranks were evaluated for each herptile survey site visited in 2014. Based on the presence of northern leopard frogs and SOCC, as well as species richness and overall breeding activity at survey sites, habitat ranks were assigned to each survey site (see Section 2.5.3.3.2 and Appendix B, Table B.19). Eight of the sites where VES were conducted were determined to be high quality herptile habitat (Table 2-24), six were determined to be of moderate quality, and two were of low quality habitat (Appendix A, Map 2-27 – Amphibian and Reptile Habitat Quality Ranking).

Survey stops of high and moderate habitat quality were located south of Highway 1, with the exception of site 8 on Edie Creek, 3 km south of Highway 15. Two sites of high-quality, two of moderate-quality and one of low-quality habitat occur within the 500 m of the PDA. All five of these were sites had northern leopard frog detections.

2.5.3.4 Incidental Detections of Herptile Species

During the field season, five species of amphibians and four species of reptiles were observed incidentally during wildlife and aquatic surveys in the RAA (Appendix A, Map 2-28 – Amphibian and Reptile Incidental Observations 2014). Twenty-six of 72 incidental observations did not

include a count of individuals observed. Where incidental observations did not include a count, a conservative estimate was made that the observation represented one individual. Based on this estimate, the total count of amphibians and reptiles observed incidentally was 76 herptiles. Of these, 56 individuals were SOCC. Incidental SOCC observations were 29 northern leopard frogs and two snapping turtles. In addition, 24 western painted turtles were observed in mid-June, 2014, one of which was excavating a nest. The turtles were observed along a section of sandy unpaved road southwest of Sundown Lake, 1.6 km of which lies within the LAA.

2.5.4 Synthesis of Amphibian and Reptile Results

Based on a review of available data, 13 amphibian and 9 reptile species are known to occur in the RAA. During 2014 field surveys, eight of the amphibian and four of the reptile species were observed, with boreal chorus frogs and northern leopard frogs the most abundant amphibian species, and western painted turtles the most abundant reptile species. High quality sites for amphibians and reptiles were primarily large, permanent waterbodies south of the Trans-Canada Highway (e.g., Lonesand Lake, Sundown Lake). Among the species found in the RAA are 6 SOCC, 3 of which were observed during 2014 field surveys.

Below is a synthesis of the SOCC species present within the RAA and the types of herptile habitats within the RAA (i.e., wetlands and uplands).

2.5.4.1 SOCC

Four amphibian and two reptile SOCC have the potential to occur in the RAA (Table B.1, Appendix B; MHA 2014; MC CDC 2014; Table 2-20). Three of these species (northern leopard frog, eastern tiger salamander, and common snapping turtle) were observed by field crews incidentally or during targeted amphibian surveys in the RAA.

Common snapping turtle is listed as special concern by SARA and typically inhabits slow-moving river or stream edges, ponds, and shallow bays with soft mud bottoms and dense aquatic vegetation. Snapping turtles populations are expected to be relatively stable in southeastern Manitoba.

Western hognose snake and the prairie skink are two SOCC species with specific habitat requirements found only in the RAA around the Glenboro South Station (typically in sandy habitats in and around Spruce Woods Provincial Park), yet are not expected to occur within the LAA.

Eastern tiger salamander inhabits soft-bottomed, semi-permanent or permanent water bodies (COSEWIC 2013c). The distribution of this species in southeastern Manitoba is poorly understood. One eastern tiger salamander was observed during fall VES south of Sandilands near a tributary of the Rat River, in the same location as one historic record.

Western tiger salamander inhabits a variety of open habitats including grasslands and parklands surrounding semi-permanent to permanent water bodies (COSEWIC 2012e). It is found in southwestern Manitoba, east to the Red River; the only records documented in the RAA are from within 2 km of the Glenboro South Station. None were observed during 2014 field surveys.

Northern leopard frog inhabits a variety of wetland types including semi-permanent and permanent wetlands, river and creeks, and flooded meadows. It is widespread within the RAA and populations in Manitoba are considered stable and above-average wetland conditions in recent years may be contributing to an elevated number of field observations.

2.5.4.2 Wetlands

Results of amphibian surveys conducted in 2014 indicate several areas within the RAA ranked "High" for habitat quality that may be classified as important areas for wildlife (see Section 3.1). During fall VES in the SLTC, two sites with high northern leopard frog abundance were determined to be high quality herptile habitat. One site is approximately 2 km east of Beaudry Park, where the Preferred Route crosses the Assiniboine River. The second site is where the PDA crosses the confluence of the La Salle and Red rivers at Winnipeg's southern edge, near St. Germain. The large numbers of frogs seen at these locations in fall is evidence that these are sensitive overwintering sites for northern leopard frogs. Wetlands south of the Trans-Canada Highway supported high abundance of northern leopard frogs and other SOCC, as well as high species diversity. Due to inaccessibility of some private lands located within the PDA, and other wetlands in the LAA and RAA, nine waterbodies with a high potential to support SOCC were not surveyed. Where possible, nearby proxy sites (e.g., a stretch of stream that was accessible) was surveyed; however high quality habitat and SOCC presence in the RAA and LAA may be under-represented in this report.

2.5.4.3 Uplands

Several snake and turtle species use upland habitat within the RAA. Red-sided garter snakes are known to cross roads in the area between Lonesand and Sundown Lake. The presence of surficial limestone formations from east of Marchand south to sundown may indicate the availability of sinkholes or subsurface crevices that could support snake hibernacula, although none are documented within this area; the only known snake hibernaculum in the RAA is within the City of Winnipeg. A group of five red-sided garter snakes observed in fall near the Assiniboine River, approximately 2 km southwest of Headingley, suggests there may be a hibernaculum nearby.

The area around Sundown Lake is also used by western painted turtles. A female was observed excavating a nest along a sandy road between Sundown Lake and Wetland A, while field surveys at Sundown Lake documented another 23 individuals in upland habitat near Sundown Lake. The area between Lonesand Lake and Sundown Road to the west is reported to provide a

significant nesting area for turtles. Snapping turtles were observed west of Lonesand and north of the Rat River near Wetland B.

2.6 TERRESTRIAL INVERTEBRATES

2.6.1 Desktop

The following data sources were reviewed to gather information on terrestrial invertebrate SOCC and their habitats within the RAA:

- The Species at Risk Public Registry (Government of Canada 2015), which was reviewed to identify terrestrial invertebrates listed under SARA with potential to occur within the RAA; recovery strategies and management plans for SARA-listed species (pale yellow dune moth (*Copablepharon grandis*), dusky dune moth (*Copablepharon longipenne*), white flower moth (*Schinia bimatris*), golden-edged gem (*Schinia avemensis*), monarch (*Danaus plexippus),* and Verna's moth (*Schinia verna*)) were also consulted (Environment Canada 2011, 2014b, 2014c, 2015f, 2015g and 2015h).
- The COSEWIC list of Canadian Wildlife Species at Risk (COSEWIC 2015), which was reviewed to identify designated terrestrial invertebrates with potential to occur within the RAA.
- MESEA which was reviewed to identify provincially-listed terrestrial invertebrates with potential to occur in the RAA (MCWS 2014b; Government of Manitoba 2015a).
- MB CDC records of SOCC and sensitive wildlife habitat features (MB CDC 2014), which were mapped and used to inform development of a Project-specific list of SOCC.

2.6.2 Results

A review of MB CDC (2014), COSEWIC (2014a) and the SARA Public Registry (Government of Canada 2015) revealed the presence of seven terrestrial invertebrate SOCC with the potential to occur in the RAA (Table 2-25). The discussion of these is organized into two broad habitat preferences: grassland and dune.

Table 2-25: Terrestrial Invertebrate SOCC with the Potential to Occur Within the RAA

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC Rank[4]
Mottled dusky moth	*Erynnis martialis*	No status	No status	No status	S2
Monarch	*Danaus plexippus*	Special Concern	Special Concern	No status	S3B
Pale yellow dune moth	*Copablepharon grandis*	Special Concern	Special Concern	Endangered	S1
Dusky dune moth	*Copablepharon longipenne*	Endangered	Endangered	Endangered	S1
White flower moth	*Schinia bimatris*	Endangered	Endangered	Endangered	S1

Table 2-25: Terrestrial Invertebrate SOCC with the Potential to Occur Within the RAA

Common Name	Scientific Name	SARA[1]	COSEWIC[2]	MESEA[3]	MB CDC Rank[4]
Verna's flower moth	*Schinia verna*	Threatened	Threatened	Endangered	S1
Golden-edged gem	*Schinia avemensis*	Endangered	Endangered	Endangered	S1

NOTES

[1] Government of Canada 2015

[2] COSEWIC 2015

[3] *Manitoba Endangered Species and Ecosystems Act*

[4] Manitoba Conservation Data Centre Ranks
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).
B = Breeding status of a migratory species.

2.6.2.1 Grassland

Two terrestrial invertebrate species identified as SOCC associated with grassland habitats occur in the RAA: monarch and mottled dusky moth (also known as mottled duskywing). Monarch is potentially widespread in the RAA as it occurs wherever common milkweed (the sole food source for monarch caterpillars) and wildflowers (such as Goldenrod (*Solidago spp.)*, asters, and Purple Loosestrife (*Lythrum salicaria*)) occur, including abandoned farmland, along roadsides, and other open spaces (Environment Canada 2014c). Monarch butterflies were observed incidentally near Sundown Lake during late summer herptile visual encounter surveys (Appendix D, Photo 19). Mottled dusky moth's host plant is prairie redroot (*Ceanothus herbaceus;* also known as narrow-leaved New Jersey tea), which has been observed to occur in scattered, but fairly dense patches over an extensive portion of the Sandilands Provincial Forest (COSEWIC 2012f). Five historical observations of mottled dusky moth have been recorded within the RAA, one approximately 2km south of South Junction, MB and one approximately 14km east of Richer, MB (COSEWIC 2012f). The remaining three are located > 13 km east of the FPR near Pocock Lake Ecological Reserve and two northeast of Sandilands, MB (MB CDC 2014).

2.6.2.2 Dune

Five of these species, pale yellow dune moth, dusky dune moth, white flower moth, golden-edged gem, and Verna's moth are known to occur within the sandy dunes of the border between Spruce Woods Provincial Park and Canadian Forces Base Shilo (Environment Canada 2011, 2014b, 2015f, 2015g, 2015h), which falls within the western part of the RAA, but is more than 13km from the Glenboro PDA.

Critical habitat has been identified by Environment Canada (2011, 2014b, 2015g) "*as the active open sand dunes and/or blowouts, encompassing the area from the crest of the dune to the edge where native vegetation grows and the dune is stabilized*" for golden-edged gem, dusky dune moth, and white flower moth, none of which falls within the LAA. Environment Canada has not identified critical habitat locations for Verna's moth or pale yellow dune moth. Suitable pale yellow moth habitat has been described to occur at the transition between active and stable dunes while Verna's moth have not been observed or collected at the one location they have been observed at since 1979 (Environment Canada 2015f, 2015h).

3.0 IMPORTANT AREAS FOR WILDLIFE

One of the objectives of the desktop, KPIs, field studies and the engagement process was to identify the presence of important areas for wildlife within the RAA, with emphasis on locations traversed by the existing corridor, New ROW and Glenboro South Station PDA. This section describes the methods used to access and synthesize key information, including data presented in Section 2 of this report. Results are listed in Table 3-1 and presented spatially in Appendix A, Map 3-1- Summary of Important Features for Wildlife.

3.1 METHODS

A number of important areas for wildlife were identified within the RAA based on review of desktop information, field data, KPI input, public engagement results, and knowledge shared from First Nations.

In addition to the data sources described in Section 2, the following government and non-government sources of information were reviewed:

- PPR of Manitoba (Ducks Unlimited 2015) was reviewed to identify areas of overlap between the RAA with this important waterfowl breeding region.
- Interdepartmental Operational Crown Land Use Database (Government of Manitoba 2015b). The operational land use code classifies Crown lands using an open-ended, comprehensive coding system which dictates land use(s), permissible level of development, length of commitment, requirements for multiple uses, and nature of permissions required. The distribution of Crown lands coded as 'wildlife lands' were mapped and used to support the identification of important wildlife areas within the RAA.

  > Wildlife lands are defined as "*Crown land important as wildlife habitat, breeding areas, travel corridors, etc. which are best kept from development and long-term commitment to secondary uses…. includes lands for birds, reptiles, and other animals. Crown lands may be coded as wildlife lands even if used only seasonally, such as staging areas for waterfowl, prime deer wintering areas and the like*."

  Lands mapped included: Wildlife Management Area [WW], Ecological Reserve [ER], Protected Area [PA], Special Forest Area [SF], Park Reserve [PR], Significant Riparian Areas or Shoreline [O], Provincial Park [PP], Provincial Forest [PF], Wildlife Non-Agriculture Use [C1],Wildlife No Development/Yearly Use Only Grazing [C3], Wildlife No Development/Yearly Use Only Manager Approval Required Grazing [C7]).
- Manitoba designated lands and Protected Areas (MCWS 2015).

Areas were deemed important for wildlife if desktop, KPI, public engagement results, knowledge shared from First Nations, and /or field data indicated the presence of:

- a wetland complex (*e.g.*, bog, fen, swamp);
- a permanent or semi-permanent landscape feature supporting a concentration of birds;
- a sharp-tailed grouse lek (traditionally used breeding grounds);
- a mineral lick;
- a black bear den site;
- an ungulate calving area;
- a breeding and/or overwintering habitat supporting concentrations of herptiles (*e.g.*, northern leopard frog, turtles); and
- an ecological hotspot supporting a diversity of SOCC and other wildlife not previously captured by any of the above mentioned features/areas.

3.2 RESULTS

Within the RAA, important areas for wildlife exist in designated lands and protected areas, in proposed protected areas, and in crown lands coded for wildlife (Appendix A, Map 3-2 – Crown Lands Coded for Wildlife). The RAA does not include any IBAs (Bird Studies Canada and Nature Canada 2012), and the existing corridor and New ROW are located outside of the 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. The RAA includes critical habitat for golden-winged warbler, some of which is traversed by the New ROW near Ste-Genevieve, Richer, MB and Piney, MB (Environment Canada 2014a).

A total of 30 important areas for wildlife were identified in the RAA in addition to designated lands and protected areas (Table 3-1, Appendix A; Map 3-1 – Summary of Important Features for Wildlife). Of these, seven have permanent or semi-permanent landscape features that concentrate birds (six are waterbodies and one is the area surrounding the Brady Road Resource Management Facility), 10 support high quality herptile habitat, 9 support sharp-tailed leks, four are bear dens, two stick nests, and one eastern tiger salamander observation. Four sites both concentrate birds and provide high quality herptile habitat (Assiniboine River, Red River, Lonesand Lake, and Sundown Lake). One site is noted for overall ecological diversity of wildlife species (ecological hotspot). No mineral licks were identified in the RAA.

Of these important areas, seven are intersected by the Project. The sites intersected by the FPR include: Assiniboine River, Red River, Seine River, Rat River, Caliento Bog, Sundown Bog, and an ecological hotspot southwest of Marchand, MB.

Table 3-1: Important Areas for Wildlife Identified within the RAA

Important Areas for Wildlife	Map Reference	Intersected by the Final Preferred Route	Rationale
Critical habitat for golden-winged	Appendix A, Map 2-	Yes (near Ste-Genevive, MB).	Critical habitat is species-specific, and defined as that which is necessary for the survival or recovery

Table 3-1: Important Areas for Wildlife Identified within the RAA

Important Areas for Wildlife	Map Reference	Intersected by the Final Preferred Route	Rationale
warbler	12		of a listed wildlife species (*SARA* 2002, c.29 [Section 2]). Critical habitat for golden-winged warbler overlaps with the RAA, including the FPR.
Designated Lands and Protected Areas	Maps 1-6 and 1-7	Yes (near Richer and Sundown, MB)	Provide important habitat for a diversity of wildlife; provide interconnected corridors for wildlife.
Assiniboine River	Appendix A, Map 3-1 Site A	Yes (in the SLTC near Headingly, MB).	High levels of bird activity were observed during fall migration surveys. High quality habitat for herptiles at the Assiniboine River (*e.g.*, overwintering; Section 2.5.3).
Area surrounding Brady Road Resource Management Facility	Appendix A, Map 3-1 Site B	Yes (SLTC intersects high use agriculturally-dominated area south of the facility).	High levels of bird activity were observed in the vicinity of the Brady Road Resource Management Facility during fall migration driving surveys.
Red River	Appendix A, Map 3-1 Site C	Yes (SLTC crosses this river south of Winnipeg).	High levels of bird activity were observed during fall migration surveys (Section 2.4.3.4). Some raptors use the Red River as a travel corridor (HawkCount 2015). Herptile high-quality habitat at the Assiniboine River (*e.g.*, overwintering; Section 2.5.3).
Deacon Reservoir	Appendix A, Map 3-1 Site D	No. FPR traverses areas adjacent to the reservoir.	High levels of bird activity were observed at Deacon reservoir during fall migration bird movement surveys (Section 2.4.3.5).
Richer Lake	Appendix A, Map 3-1 Site E	No. FPR traverses areas adjacent to Richer Lake.	Concentrations of waterbirds (*e.g.*, scaup spp.) were observed using Richer Lake during spring and fall baseline studies (Section 2.4.3). Ranked as having moderate quality herptile habitat (*e.g.*, breeding and overwintering; Section 2.5.3).
Seine River	Appendix A, Map 3-1 F	Yes.	Important overwintering habitat for herptiles.

Table 3-1: Important Areas for Wildlife Identified within the RAA

Important Areas for Wildlife	Map Reference	Intersected by the Final Preferred Route	Rationale
Lonesand Lake	Appendix A, Map 3-1 Site G	No. FPR traverses areas adjacent to Lonesand Lake.	Identified as an important area for wildlife (*e.g.*, swans, sandhill cranes, nesting turtles) (Holme 2014, pers. comm.). Lonesand lake is known to support habitat for sandhill cranes and swans (Artuso 2015, pers. comm.; Holme 2014, pers. comm.). Ranked as having high quality herptile habitat (*e.g.*, amphibian breeding, turtle nesting, potential for snake hibernacula based on snake activity in the area [Holme 2014, pers. comm.; Section 2.5.2]).
Caliento Bog	Appendix A, Map 3-1 Site H	Yes (near Lonesand, MB).	Wetland complexes provide important habitat for wildlife (Leavesely 2015. pers. comm.). The Caliento bog is known to support yellow rail and potentially other wetland SOCC species (Artuso 2015, pers. comm.).
Sundown Lake	Appendix A, Map 3-1 Site I	No. FPR traverses areas adjacent to Sundown Lake.	Concentrations of waterbirds (*e.g.*, were observed using Sundown Lake during spring and fall baseline studies (Section 2.4.5). Sundown lake is known to support habitat for sandhill cranes and swans (Artuso 2015, pers. comm.; Holme 2014, pers. comm.). High-quality herptile habitat (*e.g.*, amphibian breeding, turtle nesting (Holme 2014, pers. comm.; Section 2.5.2).
Sundown Bog	Appendix A, Map 3-1 Site J	Yes (near Sundown, MB).	Wetland complexes provide important habitat for wildlife (Leavesely 2015, pers. comm.). The large Sundown bog complex is known to support breeding yellow rail and is likely to be important habitat for other marsh birds such as least bittern (Artuso 2015, pers. comm.).

Table 3-1: Important Areas for Wildlife Identified within the RAA

Important Areas for Wildlife	Map Reference	Intersected by the Final Preferred Route	Rationale
St. Labre Bog	Appendix A, Map 3-1 Site K	No. FPR avoids this area.	Wetland complexes provide important habitat for wildlife (Leavesely 2015, pers. comm.). The large St. Labre bog complex is known to support owls and is likely to be important habitat for marsh birds such as least bittern and yellow rail (Artuso 2015, pers. comm.).
Rat River	Appendix A, Map 3-1, Site L	Yes (north of Sundown, MB in the Caliento Bog).	High-quality breeding and overwintering habitat for herptiles at various points along the Rat River. Contained a wide variety of SOCC including eastern tiger salamander tributary), common snapping turtle, northern leopard frog, and great egret.
Pocock Lake	Appendix A, Map 3-1 Site M	No. FPR avoid this area.	Pocock Lake is located within an Ecological Reserve. High quality breeding habitat and potential overwintering habitat for herptiles. High herptile diversity.
Ecological hotspot	Appendix A, Map 3-1 Site N	Yes (southwest of Marchand, MB).	Candidate protected area. Supports diversity of bird SOCC; incidental bear observations.
Sharp-tailed grouse leks	Appendix A, Map 2-22	None of the identified leks are traversed by the FPR.	Leks are traditional breeding sites for sharp-tailed grouse; Sites identified during spring 2014 baseline field surveys and MCWS data (Baldwin 2015, pers. comm.).
	Appendix A, Map 2-23		MCWS data (Baldwin 2015, pers. comm.).
Bear dens	Appendix A, Map 3-1	None of the known bear den locations are traversed by the FPR.	Some bear dens are used year after year; Three bear den sites were identified during winter 2015 baseline field surveys.
Raptor stick nests	Appendix A, Map 3-1	No. One nest located northwest of Ste-Genevive, approximately 140 m west of the FPR; one nest located southwest of Piney approximately 6 km from the FPR.	Raptor stick nests are often traditionally used year after year.

3.3 SYNTHESIS

A number of important terrestrial and aquatic habitats within the RAA support a variety of wildlife species. The results of desktop research, KPIs, and field surveys indicate that important habitats within the RAA include critical breeding habitat for golden-winged warblers, migratory bird concentration areas, herptile breeding habitat, overwintering habitat for herptiles, bear dens, grouse leks, and stick nests. Although other important wildlife habitat features such as mineral licks and snake hibernacula were not observed or reported, they do have the potential to occur within the RAA.

Six of the seven important areas for wildlife intersected by the FPR are aquatic habitats (the other important area being an ecological hotspot). While four of the six aquatic habitats are linear watercourses spanned by the FPR, Caliento and Sundown bogs are directly traversed by the FPR (approximately 2 km and 14 km, respectively).

4.0 SUMMARY

Currently only 38% of the RAA is considered natural wildlife habitat (*e.g.*, forest, grassland, wetland; MCWS 1979 and 1999). 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, MB, 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 IBAs (IBA Canada 2015), and the existing corridor and New ROW are located outside of the 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, MB. 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 recognized 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. The majority of these species are birds (27 species), however 7 terrestrial invertebrate, 6 herptile, and 5 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 only found 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 critical habitat for golden-winged warbler near Ste-Genevieve, Richer,

MB and Vassar, MB (Environment Canada 2014a). Golden-winged warbler is the only species within the RAA to have defined critical habitat within southern Manitoba (Environment Canada 2014a, 2015c).

Fifty-seven mammals may occur within the RAA, many of which are valued by resource users and First Nations. Elk, white-tailed deer, moose and bear are some of the species harvested in the region (ATKS Community Report 2015; Peguis First Nation 2015). Furbearers such as wolf, coyote, rabbit, beaver, and muskrat are some of the species trapped by First Nations (ATKS Community Report 2015; Roseau River Anishinabe First Nation 2015; 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, MB (ATKS Community Report 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, MB. 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 (Map 9-8 – Elk Range; 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, Section 11.4.4); 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 inhabit 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 2013c); 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, MB, 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.).

Seven terrestrial invertebrates SOCC have the potential to occur in the RAA. Of these, 5 species have limited, habitat-specific distribution north of Glenboro South Station in sand dune habitats. The final two SOCC include the monarch butterfly and the mottled dusky moth. While the monarch butterfly has the ability to occur throughout the RAA where common milkweed and wildflowers occur, the mottle dusky moth is dependent on prairie redroot which occurs in the eastern portion of the RAA from the TransCanada highway to the Canada-US border (particularly in the Sandilands Provincial Forest).

A total of 28 important areas for wildlife were identified in the RAA in addition to designated lands and protected areas (Table 3-1; Appendix A, Map 3-1 – Summary of Important Features for Wildlife in the RAA). Of these, seven have permanent or semi-permanent landscape features that concentrate birds (six are waterbodies and one is the area surrounding the Brady Road Resource Management Facility), 10 support sharp-tailed leks, four are bear dens, 12 are breeding or overwintering sites supporting concentrations of herptiles (*i.e.*, sites having 'high' quality herptile habitat). No mineral licks were identified in the RAA.

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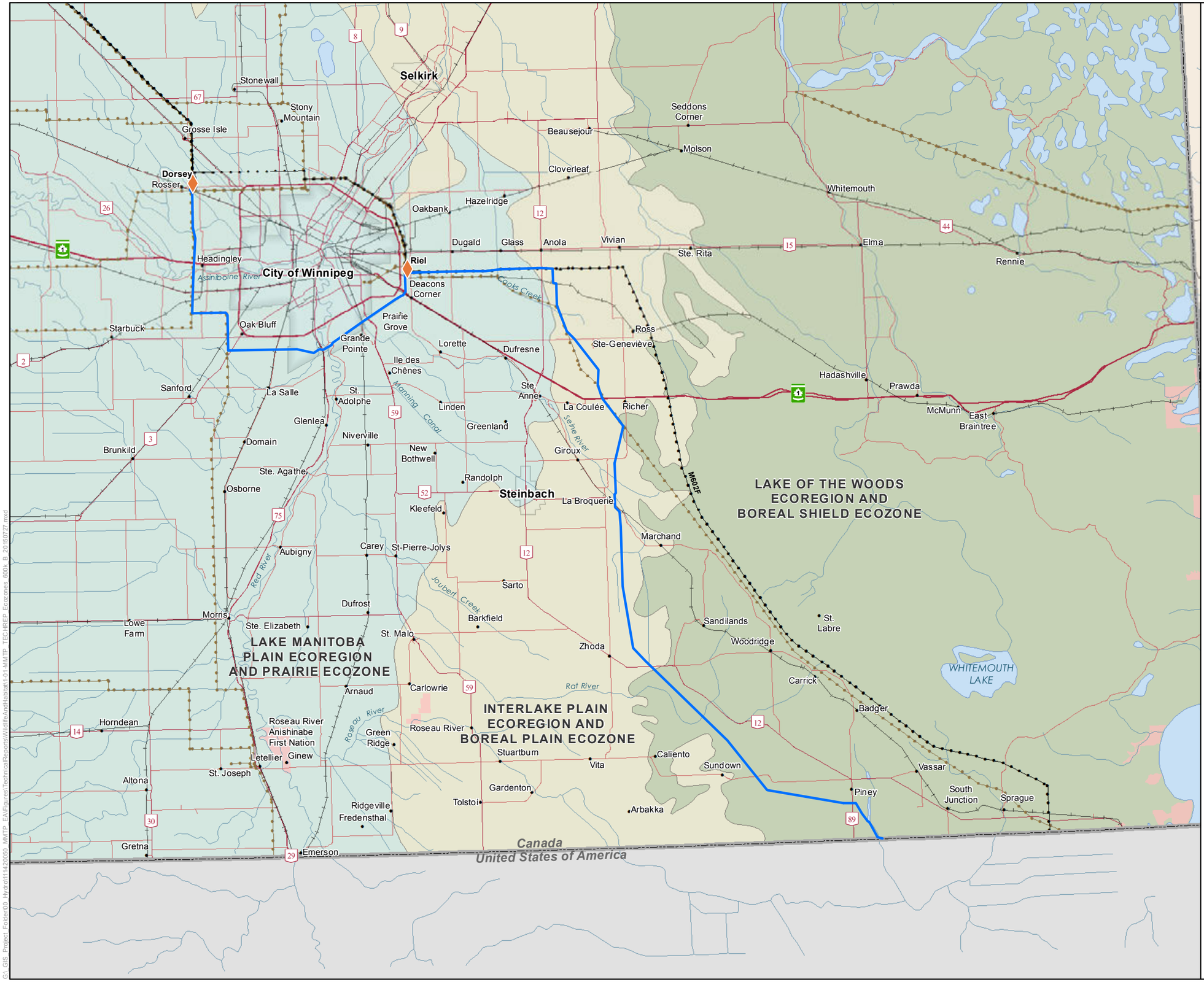
APPENDIX A
MAPS



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Ecological Boundaries

- Interlake Plain Ecoregion / Boreal Plain Ecozone
- Lake Manitoba Plain Ecoregion / Prairie Ecozone
- Lake of the Woods Ecoregion / Boreal Shield Ecozone

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 05, 2015

N

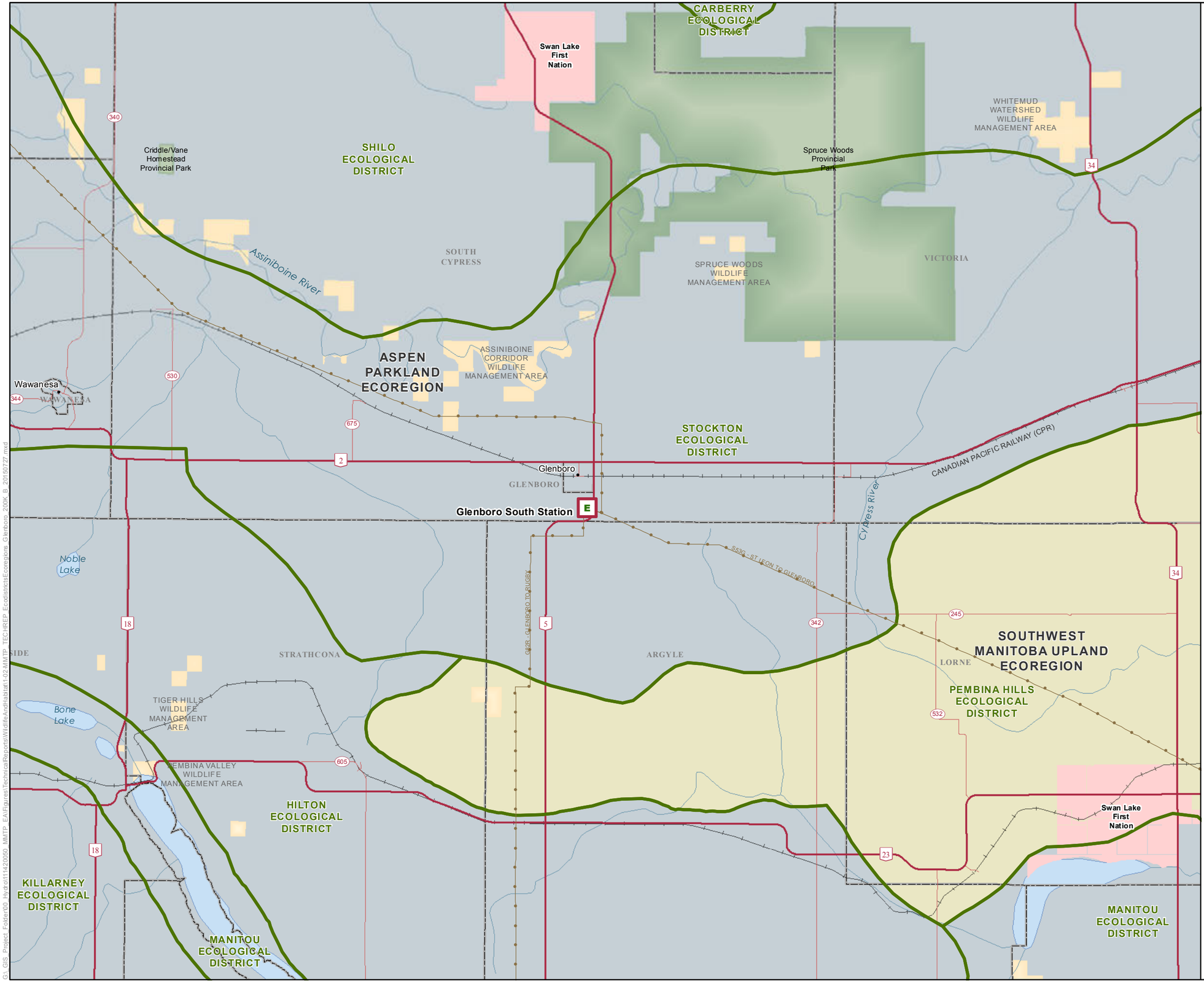
0 10 Kilometres
0 5 10 Miles

1:600,000

Ecoregions and Ecozones Traversed by the Project Area

Map 1-1

G:_GIS_Project_Folder\00_Hydro\111420060_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\1-01-MMTP_TEC-HREP_Ecozones_600k_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Electrical Station

Infrastructure

- Existing Transmission Line

Ecological Boundaries

- Ecodistrict

Ecoregions

- Aspen Parkland
- Southwest Manitoba Upland

Landbase

- Community
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- Wildlife Management Area
- Provincial Park
- Rural Municipality

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 05, 2015

N

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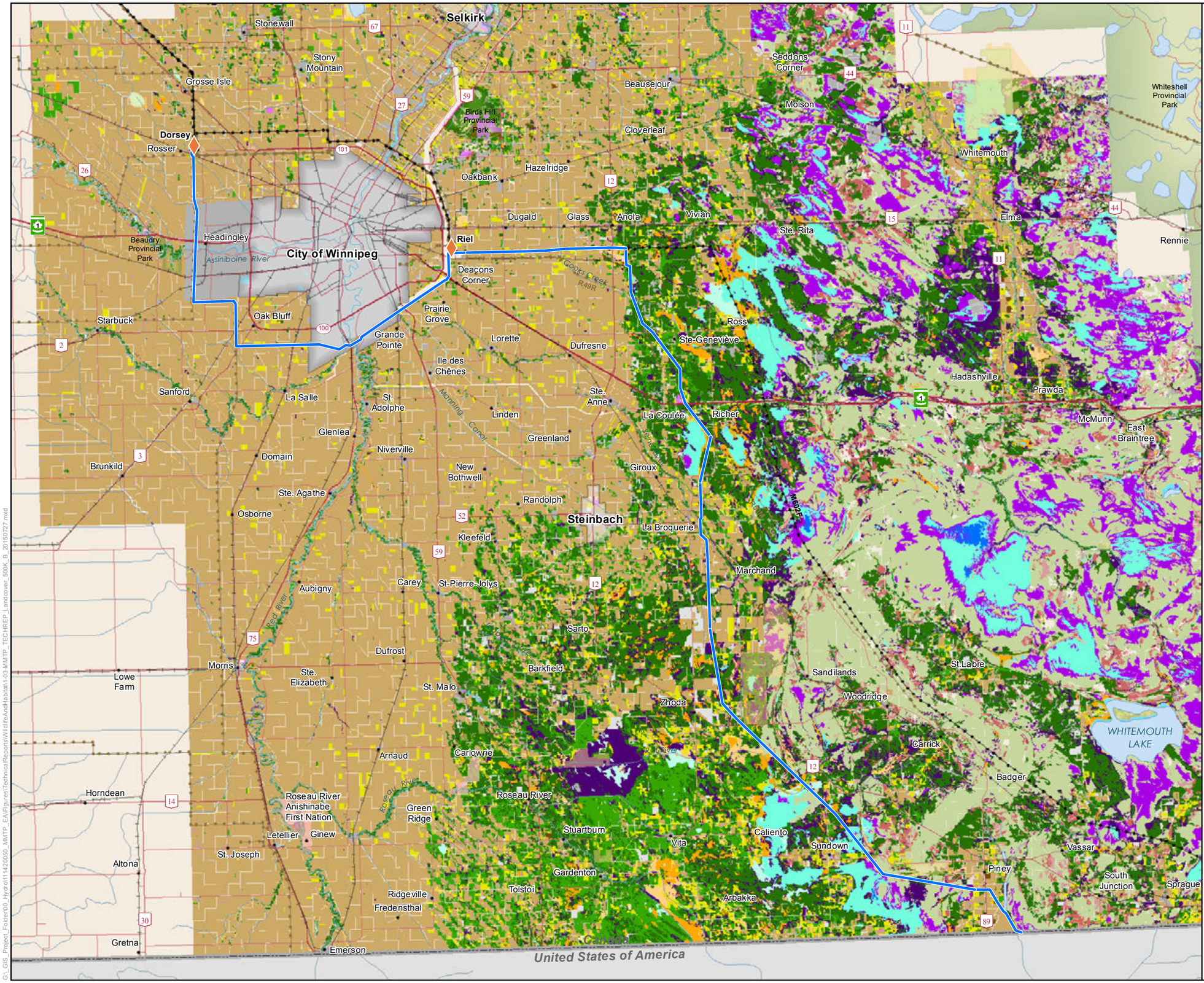
Ecoregions and Ecodistricts at the Glenboro South Station

Map 1-2

G:\GIS_Project_Folder\00_Hydro\111420050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\1-02 MMTP_TEC HREP_EcodistrictsEcoregions_Glenboro_200K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Forest Resource Inventory[1]

Non-Forested - Fields/Agriculture
- Abandoned Land
- Cropland
- Hayland
- Land Clearing
- Pasture

Non-Forested - Meadow
- Dry Upland Ridge Prairie
- Moist Pairie
- Wet Meadow

Non-Forested - Unclassified
- Beaver Floods, Gravel Pits/Mine/Town

Non-Forested, Marsh-Muskeg
- Marsh
- String Bog
- Muskeg
- Water

Non-Productive Forest
- Protection Forest
- Treed Muskeg
- Willow/Alder

Productive Forest
- Hardwood
- Mixedwood - N
- Mixedwood - M
- Softwood

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

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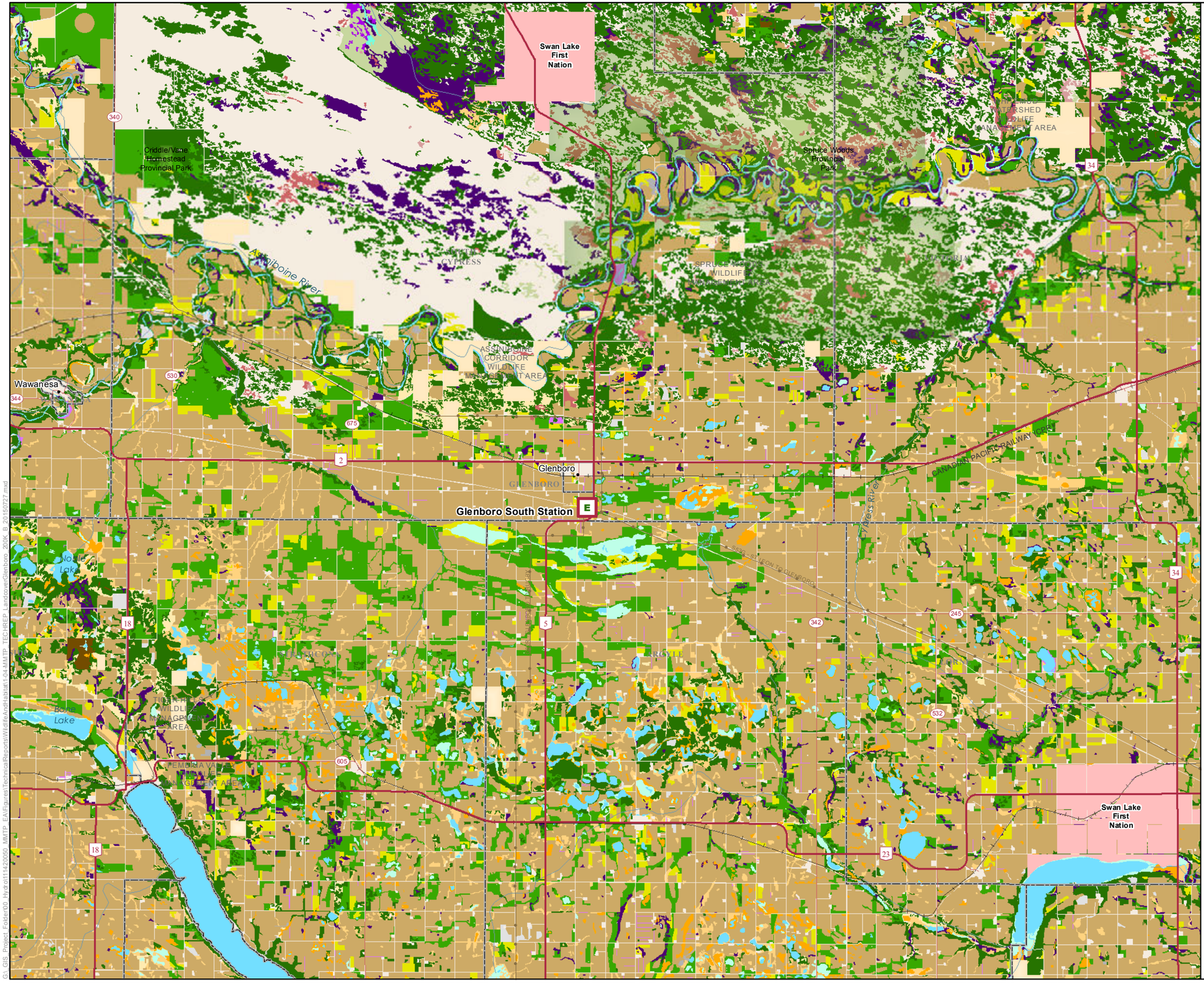
Landcover in the Project Area

Map 1-3

G:\...\Project_Folder\00_Hydro\111420050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\1-03-MMTP_TECHREP_Landcover_500K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Electrical Station

Infrastructure

- Existing Transmission Line

Forest Resource Inventory[1]

Non-Forested - Fields/Agriculture
- Abandoned Land
- Cropland
- Hayland
- Land Clearing
- Pasture

Non-Forested - Meadow
- Dry Upland Ridge Prairie
- Moist Pairie
- Wet Meadow

Non-Forested - Unclassified
- Beaver Floods, Gravel Pits/Mine/Dump

Non-Forested, Marsh-Muskeg
- Marsh
- Muskeg
- Water

Non-Productive Forest
- Protection Forest
- Treed Muskeg
- Willow/Alder

Productive Forest
- Hardwood
- Mixedwood - N
- Mixedwood - M
- Softwood

Landbase

- Provincial Highway
- Provincial Road
- Railway
- First Nation
- Rural Municipality
- Wildlife Management Area
- Provincial Park
- Watercourse
- Waterbody

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

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0 2.5 5 Miles

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Landcover near the Glenboro South Station

Map 1-4

G:\GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\1.04-MMTP_TEC-HREP_LandcoverGlenboro_200K_R_20150727.mxd

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Landbase

- Community
- Trans Canada
- Provincial Highway
- Provincial Road
- Railway
- City
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Watercourse
- Lakes

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 05, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Notable Waterbodies in the Project Area

Map 1-5

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\11-05-MMTP_TECHREP_Wildlife\NotableWaterbodies_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Designated and Protected Lands

- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Privately Owned Tall Grass
- CDC Important Bird Areas
- Community Pastures
- Candidate Protected Areas[1]
- Provincial Forest
- Manitoba Crown Lands

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City

Source:
1. Candidate Protected Areas, 2013, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

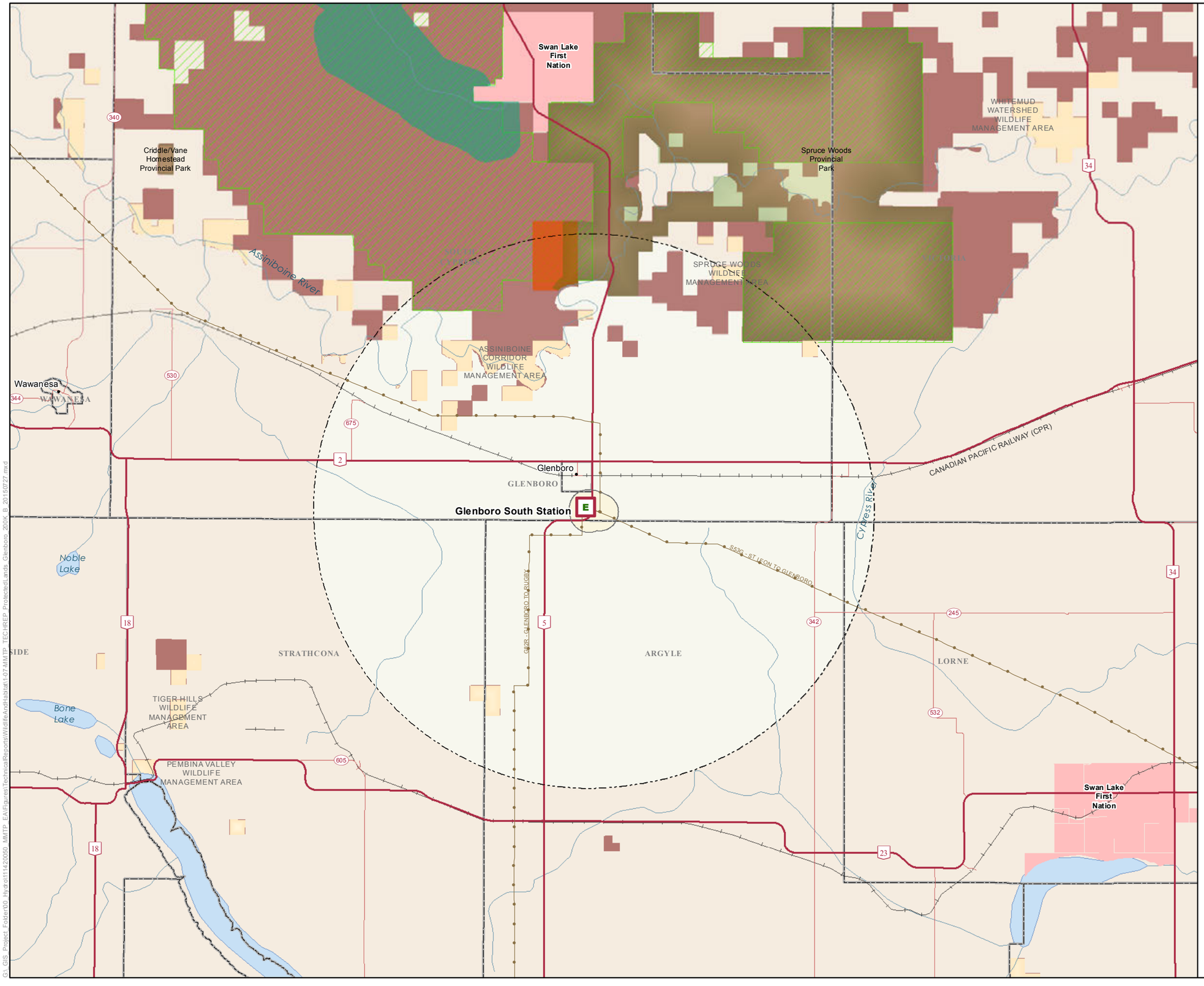
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Designated Lands and Protected Areas in the Project Area

Map 1-6

G:\ GIS_Project_Folder\00_Hydro\111420050_MMTP_EAFigures\TechnicalReports\WildlifeAndHabitat\1-06-MMTP_TECHREP_ProtectedLands_500K_B_20150727.mxd



Manitoba-Minnesota Transmission Project

Project Infrastructure

- Electrical Station

Infrastructure

- Existing Transmission Line

Landbase

- Community
- Provincial Highway
- Provincial Road
- Railway
- CDC Important Bird Areas
- First Nation Lands
- Manitoba Crown Lands
- Provincial Park
- Candidate Protected Areas[1]
- Provincial Forest
- Rural Municipality
- Wildlife Management Area

Source:
1. Candidate Protected Areas, 2013, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 Kilometres
0 2.5 5 Miles

1:200,000

Designated Lands and Protected Areas near the Glenboro South Station

Map 1-7

G:_GIS_Project_Folder\00_Hydro\11420050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\1-07AMMTP_TEC-HREP_ProtectedLands_Glenboro_200K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Route Planning Area

- Route Planning Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Route Planning Area

Map 1-8

Selkirk
Stonewall
Stony Mountain
Grosse Isle
Dorsey
Rosser
Birds Hill Provincial Park
Beausejour
Seddons Corner
Molson
Cloverleaf
Whitemouth
Whiteshell Provincial Park
Oakbank
Hazelridge
Dugald
Glass
Anola
Vivian
Ste. Rita
Elma
Rennie
Beaudry Provincial Park
Headingley
Assiniboine River
City of Winnipeg
Riel
Deacons Corner
Cook's Creek
R49R
Starbuck
Oak Bluff
Prairie Grove
Grande Pointe
Lorette
Dufresne
Ile des Chênes
Ross
Ste-Geneviève
Hadashville
Prawda
McMunn
East Braintree
Sanford
La Salle
St. Adolphe
Manning Canal
Ste. Anne
Linden
La Coulée
Richer
Glenlea
Greenland
Niverville
Seine River
Giroux
Brunkild
Domain
New Bothwell
Ste. Agathe
Osborne
Randolph
Steinbach
La Broquerie
R50M
M602F
Kleefeld
Marchand
Aubigny
Carey
St-Pierre-Jolys
Red River
Grunthal
Sarto
Joubert Creek
Dufrost
Morris
Lowe Farm
Ste. Elizabeth
Barkfield
St.Labre
Sandilands
St. Malo
Zhoda
Woodridge
WHITEMOUTH LAKE
Carlowrie
Rat River
Carrick
Arnaud
Badger
Horndean
Roseau River Anishinabe First Nation
Roseau River
Roseau River
Green Ridge
Stuartburn
Vita
Caliento
Sundown
Vassar
Letellier
Ginew
St. Joseph
Altona
Gardenton
Piney
South Junction
Sprague
Tolstoi
Arbakka
Ridgeville
Fredensthal
Gretna
Emerson
Canada
United States of America

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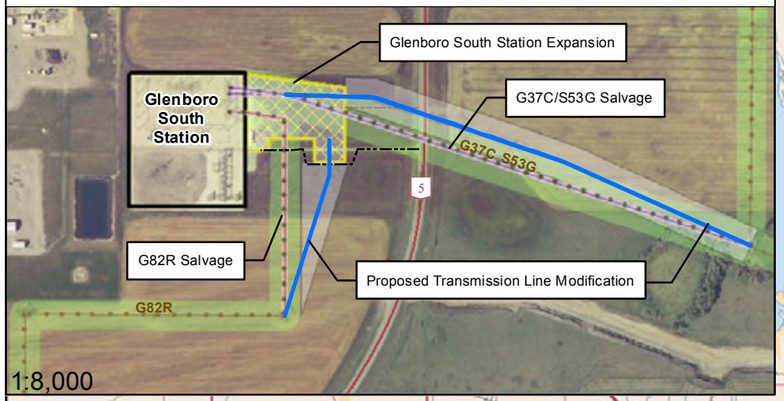
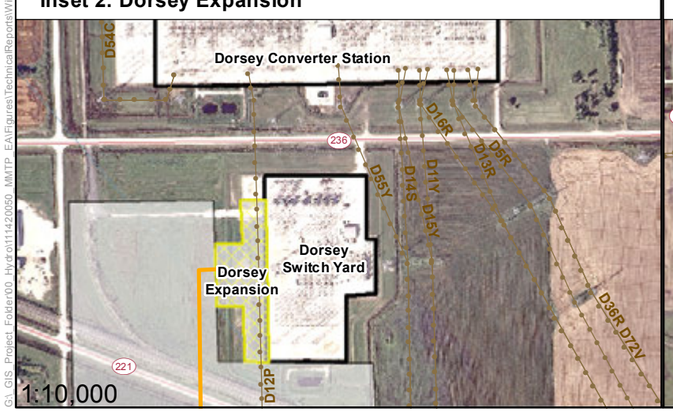
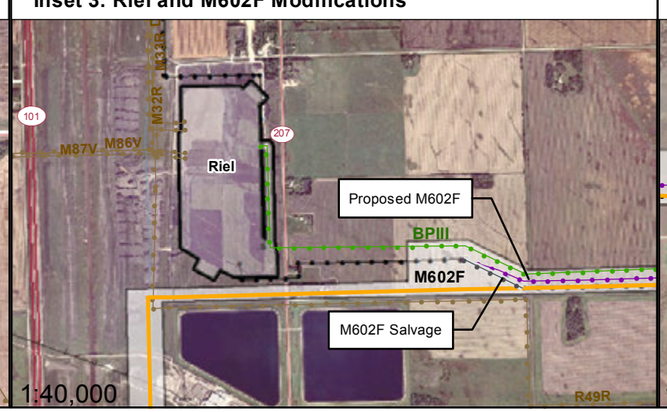
Inset 1: Glenboro South Station Expansion



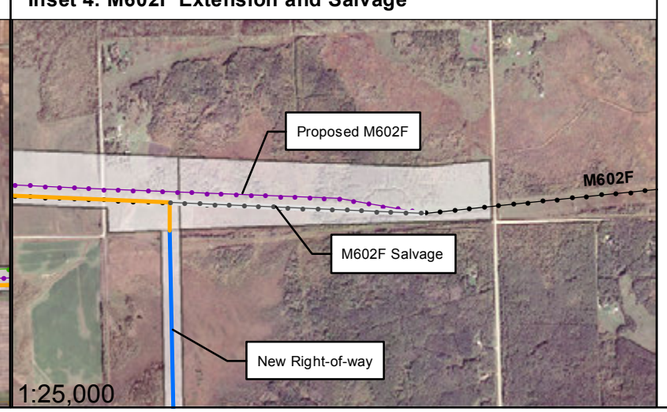
Inset 2: Dorsey Expansion



Inset 3: Riel and M602F Modifications



Inset 4: M602F Extension and Salvage



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure
- Final Preferred Route (Existing Corridor)
- Final Preferred Route (New Right-of-way)
- Transmission Line (Salvage)
- M602F Modification (New)
- Existing/New Glenboro South Station Access
- New Glenboro South Station Access
- G37C Salvage
- G82R Salvage
- Station Expansion
- Existing ROW
- Project Development Area (PDA)

Infrastructure
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Assessment Area
- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase
- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Provincial Boundary

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 10 20 Kilometres
0 5 10 20 Miles

1:1,000,000

Project Infrastructure Wildlife and Wildlife Habitat Assessment Boundaries

Map 1-9

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Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

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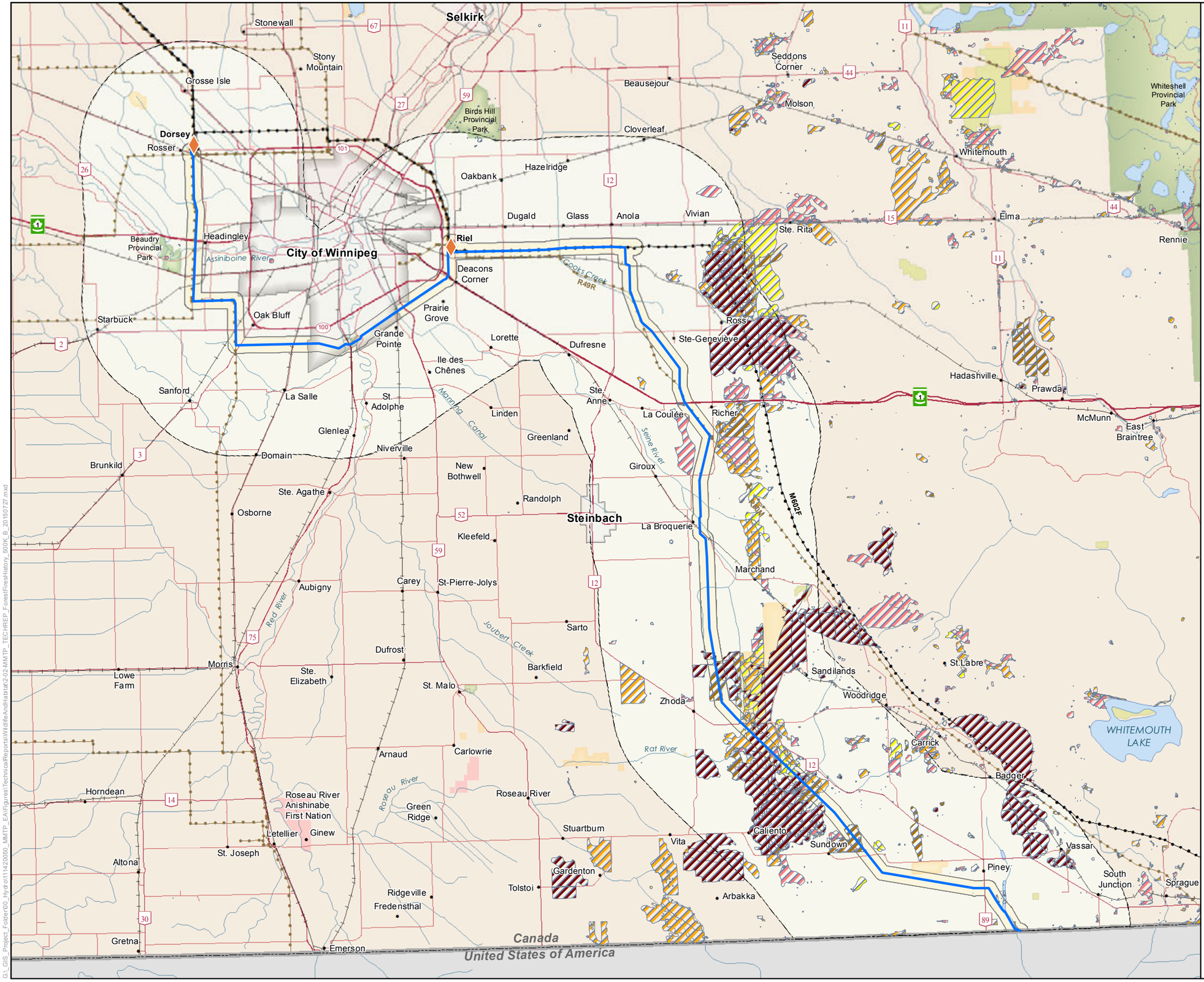
Notable Waterbodies and Wetlands in the RAA

Map 2-1

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EAIFigures\TechnicalReports\WildlifeAndHabitat\2-01-MMTP_TEC-HREP_ProtectedImportantHabitatFeatures_500K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Forest Fire Extent[1]

- Forest Fire 2004-2013
- Forest Fire 1994-2003
- Forest Fire 1984-1993
- Forest Fire 1974-1983
- Forest Fire 1964-1973

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Source:
1. Forest Fires, 1964-2013, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Forest Fire History

Map 2-2

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Trap Locations

- Mammal Camera Trap (April 2014 - October 2014)

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 04, 2015

N

0 5 10 Kilometres
0 5 10 Miles

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Mammal Camera Trap Locations 2014

Map 2-3

G:\ GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-03_MMTP_TECHREP_MammalCameraTraps2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Elk Survey Sites and Habitat

- Route 1
- Route 2
- Route 3
- Route 4
- Route 5
- Potential Elk Habitat[1]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Elk Breeding Survey Locations 2014

Map 2-4

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Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey 2014

Track	Individual
Coyote	Coyote
Elk	Elk
Lynx	Wolf
Martin	
Wolf	

- Aerial Survey Block

Natural Wildlife Habitat[1]

- Grassland
- Hardwood
- Mixedwood
- Softwood
- Wetland

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Road
- First Nation Lands
- Provincial Park
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Aerial Mammal Track Survey Block Results 2014

Map 2-5

G:\...\GIS_Project_Folder\00_Hydro\111420050_MMTP_EAFigures\TechnicalReports\WildlifeAndHabitat\2-05MMTP_TECHREP_AerialMammalTrackSurveyBlockResults2014_500K_B_20150727.mxd

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey February 2014

Track

- White-tailed Deer
- Aerial Survey Block

Wildlife Habitat[1]

- Grassland
- Hardwood
- Mixedwood
- Softwood
- Wetland

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Provincial Park
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

White-tailed Deer Aerial Observations 2014

Map 2-6

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-06MMTP_TEC-HREP_WhiteTailedDeerAerialObservations2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey February 2014

Track		Individual	
	Coyote		Coyote
	Fisher		
	Fox		
	American Marten		
	Otter		
	Wolf		

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 04, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Aerial Mammal Track Survey Results for the 230 kV and 500 kV Transmission Lines 2014

Map 2-7

G:\...\GIS_Project_Folder\00_Hydro\11142050_MMTP_EAFigures\TechnicalReports\WildlifeAndHabitat\2-07.MMTP_TECHREP_AerialMammalTrackSurveyResults1Line_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey January 2015

- White-tailed Deer
- Aerial Survey Block

Wildlife Habitat[1]

- Grassland
- Hardwood
- Mixedwood
- Softwood
- Wetland

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Provincial Park
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

White-tailed Deer Aerial Observations 2015

Map 2-8

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-08MMTP_TEC-HREP_WhiteTailedDeerAerialObservations2015_50K_B_2015\07\27.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey January 2015

Trail
- Coyote
- Gray Wolf

Individual
- Coyote
- Gray Wolf

Track
- Coyote
- Gray Wolf

- Aerial Survey Block

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Gray Wolf and Coyote Aerial Winter Observations 2015

Map 2-9

G:\...\GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-09_MMTP_TECHREP_GrayWolfCoyoteAerialWinterObservations2015_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Aerial Mammal Track Survey January 2015

Track

- Jackrabbit
- Lynx
- Marten
- Muskrat
- Red Fox
- River Otter
- Rabbit spp

Individual

- Porcupine
- Red Fox

Trail

- Rabbit spp

- Aerial Survey Block

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

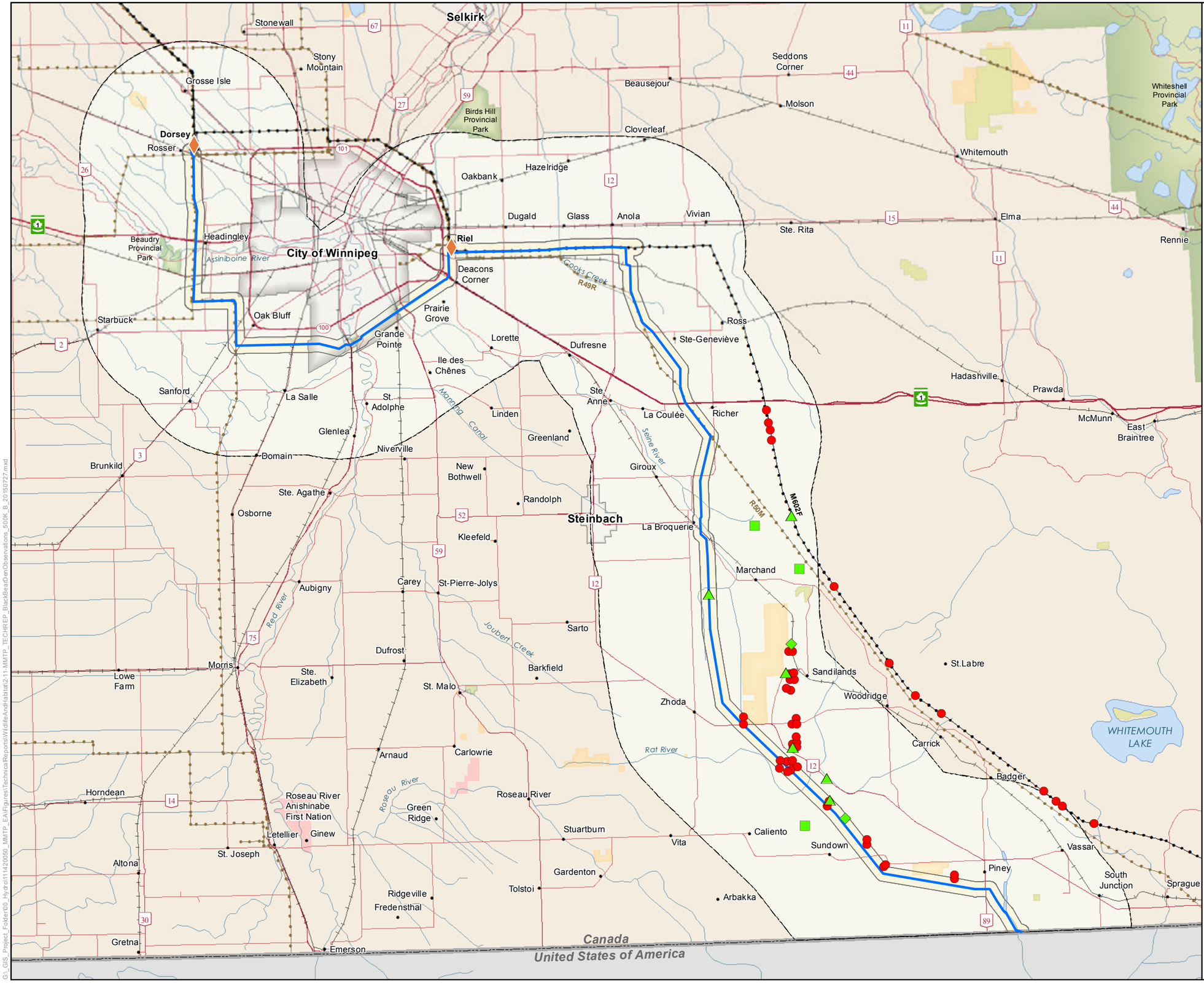
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Furbearer and Other Mammals Aerial Winter Observations 2015

Map 2-10

G:\ GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-10_MMTP_TECHREP_FurbearerOtherMammalsAerialWinterObservations2015_500K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Black Bear Observations

- Incidental Black Bear Tracks
- Incidental Black Bear Observation
- Incidental Black Bear Den
- Camera Trap Bear Observation

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 04, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Black Bear Observations

Map 2-11

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EAIFigures\TechnicalReports\WildlifeAndHabitat\2-11-MMTP_TECHREP_BlackBearObservations_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Potential Golden-winged Warbler Habitat[1]

- High
- Medium
- Low

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Potential Golden-winged Warbler Habitat in the RAA

Map 2-12

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EAI\Figures\TechnicalReports\Wildlife\AndHabitat\2-12AMMTP_TEC.HREP_GoldenWingedWarblerSuitableHabitat_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Location

- Breeding Bird Survey Location

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Breeding Bird Survey Locations 2014

Map 2-13

G:\...\GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-13_MMTP_TECHREP_BreedingBirdSurveyLocations2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Breeding Bird Observations

Species Common Name	Incidental Observations
Bobolink	Yellow Rail
Short-eared Owl	Barn Swallow
Yellow Rail	Golden-winged Warbler
Least Bittern	Eastern Wood-pewee
Bank Swallow	
Barn Swallow	
Olive-sided Flycatcher	
Golden-winged Warbler	
Eastern Wood-pewee	

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Species of Conservation Concern Detected During Field Surveys 2014

Map 2-14

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-14-MMTP_TEC-HREP_SpeciesConservationConcern_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Common Nighthawk Survey Features and Habitat

- Observation
- Incidental Observation
- Nocturnal Survey Site
- Potential Common Nighthawk Habitat[1]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 06, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Common Nighthawk Observations Spring 2014

Map 2-15

G:_GIS_Project_Folder\00_Hydro\11420060_MMTP_EAI\Figures\TechnicalReports\WildlifeAndHabitat\2-15MMTP_TECHREP_CommonNighthawkObservationsSpring2014_600K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Eastern Whip-Poor-Will Survey Features and Habitat

- Observation
- Incidental Observation
- Nocturnal Survey Site
- Potential Eastern Whip-Poor-Will Habitat[1]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

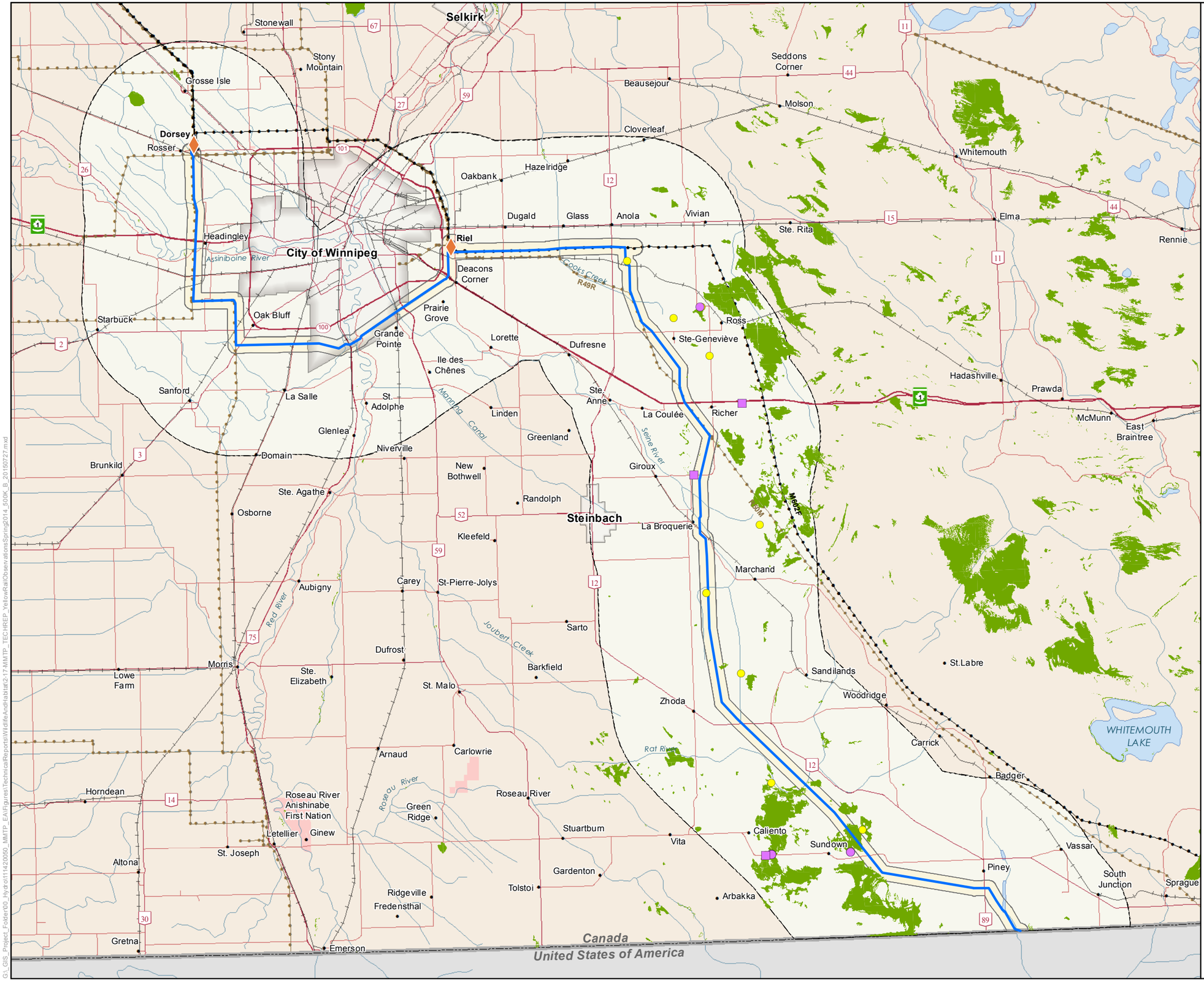
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Eastern Whip-Poor-Will Observations Spring 2014

Map 2-16

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-16-MMTP_TEC-HREP_WhipPoorWillObservationsSpring2014_500K_B_20150727.mxd



Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Yellow Rail Survey Features and Habitat

- Observation
- Incidental Observation
- Yellow Rail Survey Site
- Potential Yellow Rail Suitable Habitat[1,2]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Source:
1. Forest Resource Inventory, 1979-1999, Manitoba Conservation and Water Stewardship
2. Vegetation and Wetlands, 2015, Stantec

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Yellow Rail Observations Spring 2014

Map 2-17

G:_GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-17_MMTP_TECHREP_YellowRailObservationsSpring2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Spring Migration Survey Route

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Migration Driving Survey Spring 2014

Map 2-18

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-18-MMTP_TECHREP_MigrationDrivingSurveySpring2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Fall Migration Survey Route

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Migration Driving Survey Fall 2014

Map 2-19

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-19-MMTP_TECHREP_MigrationDrivingSurveyFall2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Bird Movement Survey Location

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Bird Movement Survey Location Spring 2014

Map 2-20

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-20-MMTP_TECHREP_BirdMovementSurveyLocationSpring2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Assiniboine River
21% (n=2353) of total individuals observed for all bird movement sites over a 4 week period

Deacon Reservoir
24% (n=2634) of total individuals observed for all bird movement sites over a 4 week period

Red River
42% (n=4697) of total individuals observed for all bird movement sites over a 4 week period

Richer Lake
4% (n=462) of total individuals observed for all bird movement sites over a 4 week period

Lonesand Lake
1% (n=117) of total individuals observed for all bird movement sites over a 4 week period

Sundown Lake
9% (n=973) of total individuals observed for all bird movement sites over a 4 week period

Selkirk
Stonewall
Stony Mountain
Grosse Isle
Dorsey
Rosser
Birds Hill Provincial Park
Beausejour
Seddons Corner
Molson
Whiteshell Provincial Park
Cloverleaf
Whitemouth
Oakbank
Dugald
Glass
Anola
Vivian
Ste. Rita
Elma
Rennie
Beaudry Provincial Park
Headingley
Assiniboine River
City of Winnipeg
Riel
Deacons Corner
Cook's Creek
R49R
Starbuck
Oak Bluff
Prairie Grove
Grande Pointe
Lorette
Dufresne
Ile des Chênes
Ross
Ste-Geneviève
Hadashville
Prawda
McMunn
East Braintree
Sanford
La Salle
St Adolphe
Ste Anne
La Coulée
Richer
Seine River
Glenlea
Greenland
Niverville
Domain
Brunkild
New Bothwell
Giroux
Ste. Agathe
Randolph
Osborne
Steinbach
La Broquerie
M602F
R50M
Kleefeld
Marchand
Aubigny
Carey
St-Pierre-Jolys
Red River
Joubert Creek
Sarto
Dufrost
Barkfield
Morris
Lowe Farm
Ste. Elizabeth
St. Malo
Sandilands
St.Labre
Woodridge
Zhoda
WHITEMOUTH LAKE
Carrick
Arnaud
Carlowrie
Rat River
Roseau River
Horndean
Roseau River Anishinabe First Nation
Green Ridge
Roseau River
Stuartburn
Caliento
Vita
Sundown
Vassar
Piney
South Junction
Sprague
Letellier
Ginew
St. Joseph
Altona
Gardenton
Tolstoi
Arbakka
Ridgeville
Fredensthal
Gretna
Emerson
Canada
United States of America

Project Infrastructure
- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure
- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature
- Bird Movement Survey Location

Assessment Area
- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase
- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Bird Movement Survey Location Fall 2014

Map 2-21

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-21-MMTP_TECHREP_BirdMovementSurveyLocationFall2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Grouse Lek Survey Features and Habitat

- Incidental Sharp-tailed Grouse Observation
- Lek Observation
- Grouse Lek Survey Site
- 3 Grouse Leks (MCWS data)
- Potential Grouse Lek Habitat[1]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Source:
1. Federal Land Cover Classification, 1996-2005, Natural Resources Canada

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 11, 2015

N

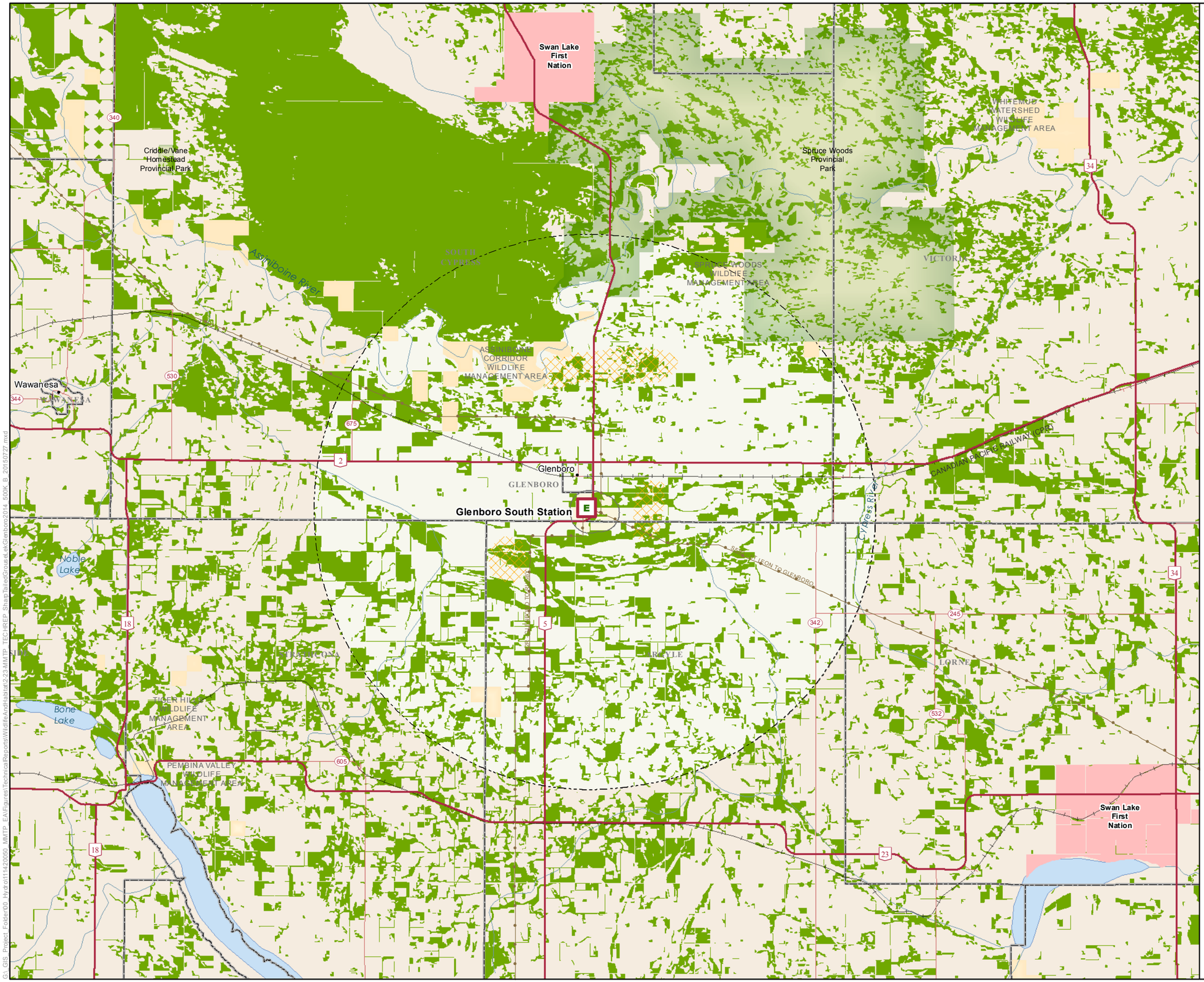
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Sharp-tailed Grouse Lek Survey 2014

Map 2-22

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-22-MMTP_TEC-HREP_SharpTailedGrouseLekSurvey2014_500K_B_20150727.mxd



G:\ GIS_Project_Folder\00_Hydro\1114220050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-23-MMTP_TEC-HREP_SharpTailedGrouseLekGlenboro2014_500K_B_20150727.mxd

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Electrical Station

Infrastructure

- Existing Transmission Line

Grouse Lek Survey Features and Habitat

- 4 Grouse Leks (MCWS data)
- Potential Grouse Lek Habitat[1]

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Provincial Highway
- Provincial Road
- Railway
- First Nation Lands
- Wildlife Management Area
- Provincial Park
- Rural Municipality

Source:
1. Federal Land Cover Classification, 1996-2005, Natural Resources Canada

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 11, 2015

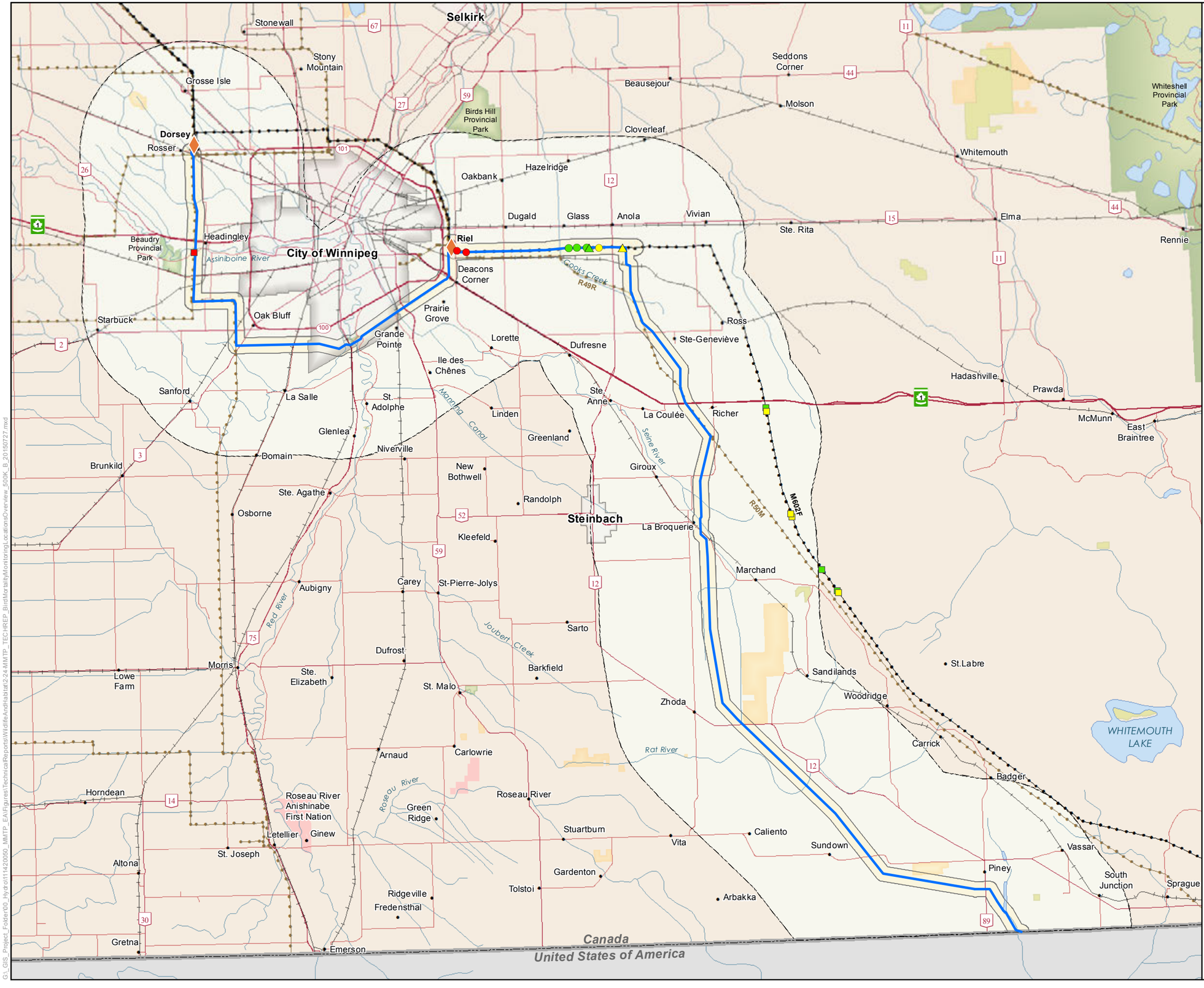
N

0 5 Kilometres
0 2.5 5 Miles

1:200,000

Sharp-tailed Grouse Leks Glenboro South Station

Map 2-23



Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Agriculture (High Collision Risk)
- Agriculture (Moderate Collision Risk)
- Agriculture (Low Collision Risk)
- Forest (High Collision Risk)
- Forest (Moderate Collision Risk)
- Forest (Low Collision Risk)
- Grassland (Moderate Collision Risk)
- Grassland (Low Collision Risk)

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Bird Mortality Monitoring Locations

Map 2-24

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-24-MMTP_TECHREP_BirdMortalityMonitoring_LocationsOverview_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Amphibian Roadside Survey Site

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Amphibian Wetland and Roadside Call Count Survey Locations Spring 2014

Map 2-25

G:\ GIS_Project_Folder\00_Hydro\111420\050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-25-MMTP_TECHREP_AmphibianWetlandRoadsideCallCountSurveyLocations_Spring2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Survey Feature

- Visual Encounter Survey Site

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Amphibian Visual Encounter Survey Fall 2014

Map 2-26

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-26 MMTP_TEC HREP_AmphibianVisualEncounterSurveyFall2014_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Amphibian and Reptile Habitat Quality

- High
- Moderate
- Low

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

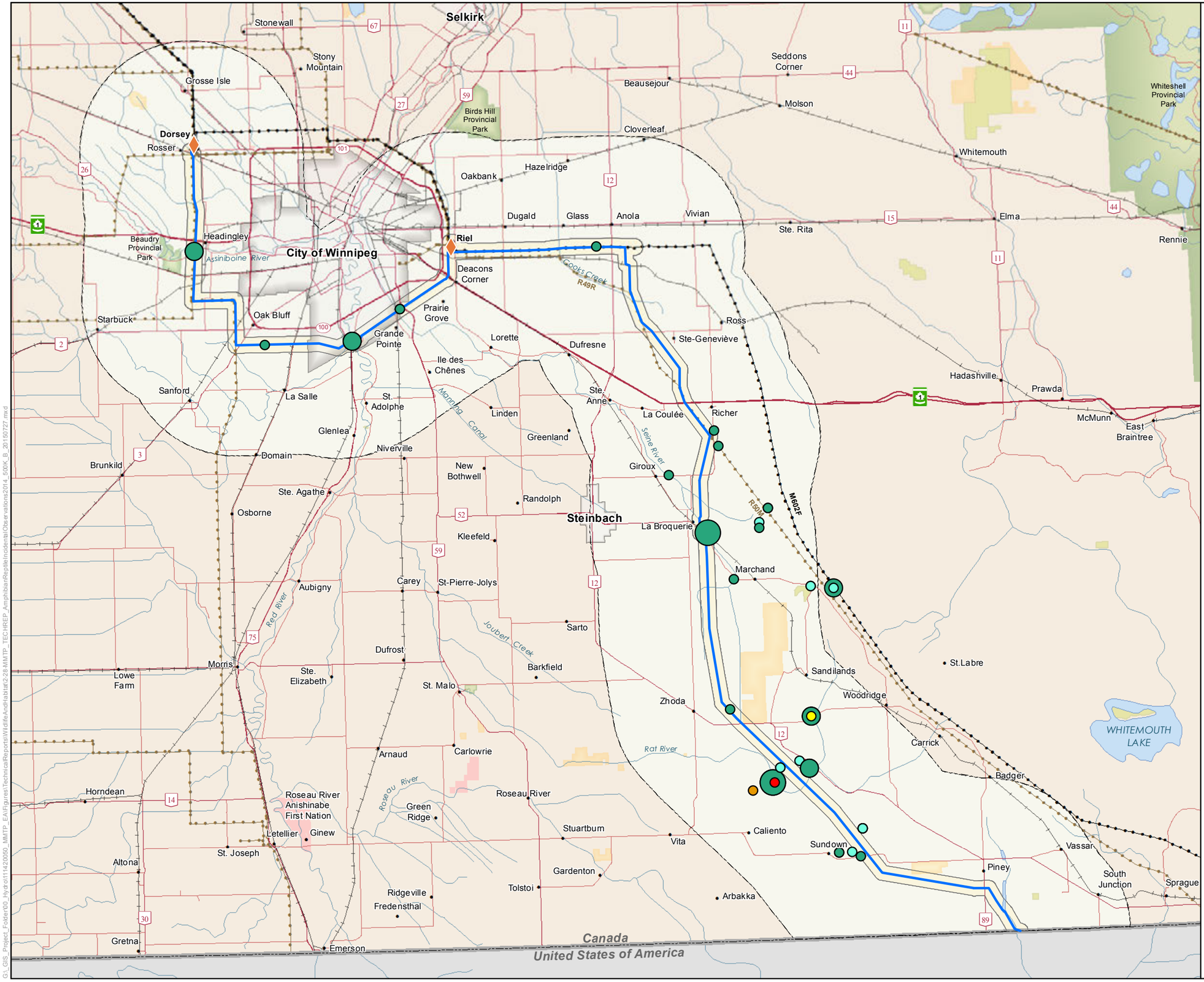
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Amphibian and Reptile Habitat Quality Ranking

Map 2-27

G:\ GIS_Project_Folder\00_Hydro\111420\050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-27-MMTP_TECHREP_AmphibianReptileHabitatRankingSensitiveArea_500K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Amphibian Survey Features

- Common Snapping Turtle: 1 - 8
- Painted Turtle: 1 - 8
- Red-sided Garter Snake: 1 - 8
- Eastern Tiger Salamander: 1
- Northern Leopard Frog: 1 - 8, 9 - 29, 30 - 75

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 07, 2015

N

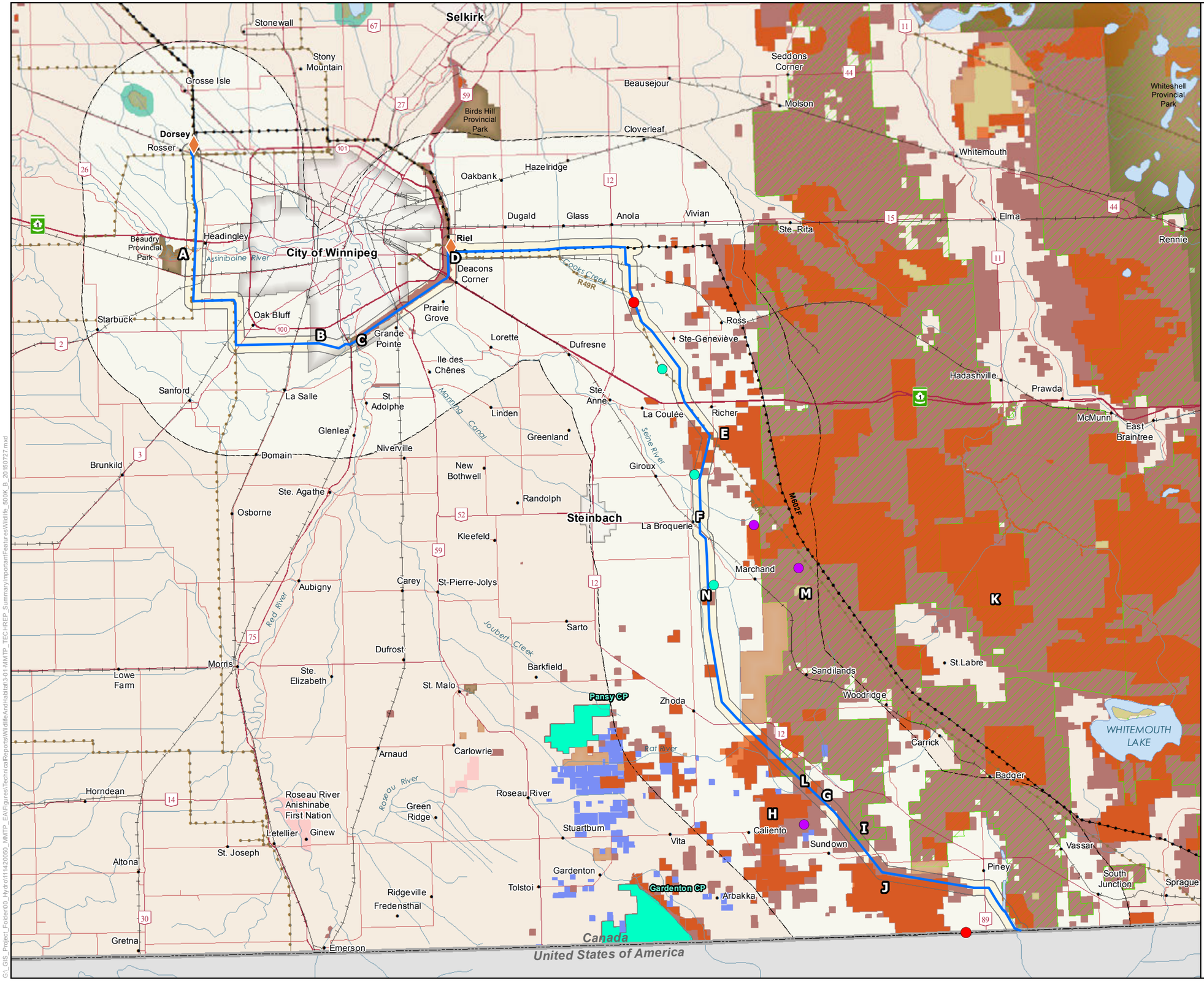
0 5 10 Kilometres
0 5 10 Miles

1:500,000

Amphibian and Reptile Incidental Observations 2014

Map 2-28

G:\ GIS_Project_Folder\00_Hydro\111420\50_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\2-28.MMTP_TECHREP_AmphibianReptileIncidentalObservations2014_500K_B_20150727.mxd



Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Wildlife Features

- Raptor Stick Nest
- Incidental Black Bear Den
- Sharp-tailed Grouse Leks

Other Important Features

- First Nation Lands
- Ecological Reserve
- Wildlife Management Area
- Provincial Park
- Privately Owned Tall Grass
- CDC Important Bird Areas
- Community Pastures
- Candidate Protected Areas[1]
- Provincial Forest
- Manitoba Crown Lands

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- City
- First Nation Lands

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Important Wildlife Features (See Table 3-1):

A. Assiniboine River
B. Bird Concentration site near the Brady Road Resource Management Facility
C. Red River
D. Deacon Reservoir
E. Richer Lake
F. Seine River
G. Lonesand Lake
H. Caliento Bog
I. Sundown Lake
J. Sundown Bog
K. St. Labre Bog
L. Rat River
M. Pocock Lake
N. Ecological hotspot and candidate protected area

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 11, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Summary of Important Features for Wildlife

Map 3-1

G:_GIS_Project_Folder\00_Hydro\11142\0050_MMTP_EAFigures\TechnicalReports\WildlifeAndHabitat\3-01.MMTP_TECHREP_SummaryImportantFeaturesWildlife_500K_B_20150727.mxd

Manitoba Hydro

Manitoba-Minnesota Transmission Project

Project Infrastructure

- Converter Station (Existing)
- Final Preferred Route (FPR)

Infrastructure

- Existing 500kV Transmission Line
- Existing 230kV Transmission Line

Crown Wildlife Lands

- Crown Lands Coded for Wildlife

Assessment Area

- Wildlife and Wildlife Habitat Local Assessment Area
- Wildlife and Wildlife Habitat Regional Assessment Area

Landbase

- Community
- Railway
- Trans Canada
- Provincial Highway
- Provincial Road
- First Nation Lands
- City

Coordinate System: UTM Zone 14N NAD83
Data Source: MBHydro, ProvMB, NRCAN
Date Created: August 10, 2015

N

0 5 10 Kilometres
0 5 10 Miles

1:500,000

Crown Lands Coded for Wildlife

Map 3-2

G:_GIS_Project_Folder\00_Hydro\11420050_MMTP_EA\Figures\TechnicalReports\WildlifeAndHabitat\3-02MMTP_TEC-HREP_CrownWildlifeLands_500K_B_20150727.mxd

APPENDIX B
TABLES

B.1 WILDLIFE SPECIES OF CONSERVATION CONCERN WITH POTENTIAL TO OCCUR IN THE RAA

Table B-1 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 grandis*	Special Concern	Special Concern	Endangered	S1	Dune	
Dusky dune moth	*Copablepharon longipenne*	Endangered	Endangered	Endangered	S1	Dune	
White flower moth	*Schinia bimatris*	Endangered	Endangered	Endangered	S1	Dune	
Verna's flower moth	*Schinia verna*	Threatened	Threatened	Endangered	S1	Dune	
Golden-edged gem	*Schinia avemensis*	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	

Table B-1 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
Common snapping turtle	*Chelydra serpentina serpentine*	Special Concern	Special Concern	No status	S3	Wetland	✓
Prairie skink	*Eumeces septentrionalis*	Endangered	Endangered	Endangered	S1	Sandy Grasslands	
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	✓

Table B-1 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
Eastern wood-pewee	*Contopus virens*	No status	Special Concern	No status	S4S5	Open Forest	✓
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	

Table B-1 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
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	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] *Manitoba Endangered Species and Ecosystems Act*

[4] Manitoba Conservation Data Centre Ranks
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

B.2 2014 MAMMAL CAMERA TRAP STUDY RESULTS

Table B-2 2014 Mammal Camera Trap Study Results

Camera ID	Black Bear	Least Chipmunk	Coyote	Red Fox	Lynx	American Marten	Moose	Porcupine	Rabbit Species	Raccoon	Striped Skunk	Red Squirrel	White-tailed Deer	Gray Wolf	Woodchuck
1	2	0	0	0	0	0	0	0	0	0	0	0	49	0	0
2	8	0	0	0	0	0	0	0	0	0	0	0	29	0	0
3	2	0	0	0	0	0	0	0	0	0	0	0	29	0	0
4	1	0	0	0	0	0	0	0	0	0	0	0	42	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	14	0	0
6	0	0	0	4	0	0	0	0	0	0	1	0	114	6	0
7	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0
8	0	0	0	0	0	0	0	0	0	0	0	0	49	0	0
9	3	0	0	1	0	0	0	0	0	0	0	0	18	0	0
10	0	0	0	0	0	0	0	0	0	0	0	0	23	0	0
11	0	0	0	0	0	0	0	0	0	0	0	0	54	0	0
12	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0
13	0	0	0	4	0	0	0	0	0	1	0	0	90	0	0
14	10	0	0	4	0	0	0	0	0	0	0	0	91	1	0
15	9	0	0	0	0	0	0	1	0	0	0	0	144	0	0
16	2	0	0	0	0	0	0	0	0	0	0	0	73	0	0
17	0	0	0	2	0	0	0	0	0	0	0	0	20	0	0
18	3	0	0	0	0	0	0	0	0	0	0	0	51	0	0
19	3	0	0	0	0	0	0	0	0	0	0	0	47	1	0
20	1	0	0	0	0	1	0	0	0	0	0	0	72	1	0
21	0	0	0	0	0	0	1	0	0	0	0	0	38	0	0
22	1	0	0	0	0	0	0	0	0	0	0	0	48	1	0

Table B-2 2014 Mammal Camera Trap Study Results

Camera ID	Black Bear	Least Chipmunk	Coyote	Red Fox	Lynx	American Marten	Moose	Porcupine	Rabbit Species	Raccoon	Striped Skunk	Red Squirrel	White-tailed Deer	Gray Wolf	Woodchuck
23	12	0	0	0	1	0	0	0	2	0	0	0	10	3	0
24	6	0	0	0	0	0	0	0	1	0	0	0	136	3	1
25	3	0	0	0	0	0	0	0	4	0	0	0	27	1	0
26	31	0	1	7	2	0	0	0	35	0	6	0	73	0	0
27	6	0	0	0	0	0	0	0	0	0	0	1	23	0	0
28	2	0	0	0	0	0	0	0	0	0	0	0	12	2	0
29	8	0	0	2	0	0	0	0	0	0	0	1	108	0	0
30	26	0	0	0	0	0	0	0	0	0	0	4	23	0	0
31	8	0	0	0	0	0	0	0	3	0	0	0	44	0	1
32	4	0	0	0	0	0	0	0	7	0	0	0	40	0	0
33	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0
34	8	1	0	10	0	0	0	0	0	0	2	2	50	0	0
35	4	0	0	6	0	0	0	0	0	0	0	0	33	0	0
36	2	0	0	5	0	0	0	0	0	0	0	0	14	0	0
37	0	0	0	0	0	0	0	0	0	0	0	0	7	0	0
38	16	0	0	0	0	1	0	0	2	0	0	0	29	2	0
39	12	0	0	0	0	0	0	2	17	0	0	0	16	0	0
40	14	0	0	0	0	0	0	0	3	0	0	1	60	6	0
41	13	0	0	0	0	0	0	1	21	0	0	24	15	0	0
42	11	0	0	0	0	0	0	0	6	0	0	0	35	1	0
43	21	0	0	0	0	0	0	0	5	0	1	0	22	0	0
44	27	0	0	0	0	0	0	0	7	0	0	0	31	0	0
45	5	0	0	0	0	0	0	0	26	0	0	0	30	0	0
46	5	0	1	0	0	0	0	0	0	0	0	0	101	0	0

Table B-2 2014 Mammal Camera Trap Study Results

Camera ID	Black Bear	Least Chipmunk	Coyote	Red Fox	Lynx	American Marten	Moose	Porcupine	Rabbit Species	Raccoon	Striped Skunk	Red Squirrel	White-tailed Deer	Gray Wolf	Woodchuck
47	22	0	0	0	0	0	0	0	0	0	0	0	80	0	0
48	34	0	0	0	0	0	0	0	0	0	0	0	37	0	4
49	3	0	0	0	0	0	0	0	4	0	0	0	102	1	0
50	1	0	0	0	0	0	0	0	0	0	0	0	11	0	0
51	8	0	0	0	0	0	0	0	0	0	0	1	108	0	0
52	4	0	1	3	0	0	0	0	13	0	0	0	159	0	0
53	1	0	0	1	0	0	0	3	3	0	0	0	33	0	0
54	6	0	0	3	0	0	0	0	0	0	0	0	20	2	0

B.3 CAMERA TRAP SURVEY MODEL SELECTION RESULTS 2014

Table B-3 Camera Trap Survey Model Selection Results 2014

Model[1]	df	AICc	Delta AIC	AIC wi
White-tailed Deer:				
softwood	3	-125.5	0.00	0.14
softwood + wetland*	4	-123.9	1.60	0.06
null	2	-123.9	1.60	0.06
softwood + burn*	4	-123.3	2.20	0.05
Black Bear:				
grassland + wetland	4	-154.7	0.00	0.11
grassland + wetland + hardwood*	5	-153.7	1.00	0.07
grassland + wetland + softwood*	5	-153.2	1.50	0.05
wetland + softwood	4	-153.2	1.50	0.05
softwood	3	-152.7	2.00	0.04
grassland + hardwood	4	-152.6	2.10	0.04

NOTES:
[1] – Including only relevant models (≤ Δ2AICc; Burnham and Anderson 2002)
* Uninformative parameter (overlapping 85% CI; Arnold 2010)

B.4 AERIAL WINTER TRACK SURVEY MODEL SELECTION RESULTS 2014 AND 2015

Table B-4 Aerial Winter Track Survey Model Selection Results 2014 and 2015

Model[1]	df	AICc	Delta AIC	AIC wi
White-tailed Deer 2014				
burned + grassland + hardwood + softwood + wetland	7	3.7	0.00	0.16
burned + grassland + hardwood + softwood + wetland + mixedwood*	8	3.9	0.20	0.15
grassland + hardwood + softwood + wetland	6	5.3	1.60	0.07
burned + grassland + hardwood + softwood + wetland + cropland	8	5.9	2.20	0.05
Coyote 2014				
cropland + softwood	4	-56.6	0.00	0.07
cropland + softwood + mixedwood*	5	-55.8	0.80	0.05
cropland	3	-55.0	1.60	0.03
cropland + softwood + wetland*	5	-54.9	1.70	0.03
cropland + softwood + burn*	5	-54.6	2.00	0.03
cropland + softwood + other*	5	-54.6	2.00	0.03
cropland + softwood + grassland*	5	-54.5	2.10	0.02
White-tailed Deer 2015				
burn + hardwood + softwood + wetland	6	59.3	0.00	0.14
burn + hardwood + softwood + wetland + other*	7	59.6	0.30	0.12
burn + hardwood + softwood + wetland + mixedwood*	7	59.8	0.50	0.11
burn + hardwood + softwood + wetland + other* + mixedwood*	8	60.1	0.80	0.10
burn + hardwood + softwood + wetland + grassland*	7	61.4	2.10	0.05
burn + hardwood + softwood + wetland + cropland*	7	61.5	2.20	0.05

Table B-4 Aerial Winter Track Survey Model Selection Results 2014 and 2015

Model[1]	df	AICc	Delta AIC	AIC wi
Coyote 2015				
burn + cropland + hardwood	5	70.3	0.00	0.05
burn + cropland + hardwood + softwood*	6	70.5	0.20	0.05
burn + cropland	4	70.7	0.40	0.04
burn + cropland + hardwood + softwood* + wetland*	7	71.1	0.80	0.03
burn + cropland + hardwood + mixedwood*	6	71.3	1.00	0.03
burn + cropland + hardwood + grassland*	6	71.6	1.30	0.03
burn + cropland + mixedwood	5	71.6	1.30	0.03
burn + cropland + hardwood + wetland*	6	71.7	1.40	0.02
burn + cropland + hardwood + other*	6	71.9	1.60	0.02
burn + cropland + softwood	5	72.1	1.80	0.02
burn + cropland + hardwood+ other* + softwood*	7	72.1	1.80	0.02
cropland	3	72.3	2.00	0.02
burn + cropland + hardwood + grassland* + softwood*	7	72.3	2.00	0.02
burn + cropland + hardwood + mixedwood* + wetland*	7	72.4	2.10	0.02
Gray Wolf 2015				
cropland + mixedwood	4	53.4	0.00	0.08
cropland + mixedwood + softwood*	5	54.5	1.10	0.04
cropland + mixedwood + hardwood*	5	55.3	1.90	0.03
cropland + mixedwood + burn*	5	55.4	2.00	0.03
cropland + mixedwood + other*	5	55.5	2.10	0.03
cropland + mixedwood + wetland*	5	55.5	2.10	0.03

Table B-4 Aerial Winter Track Survey Model Selection Results 2014 and 2015

Model[1]	df	AICc	Delta AIC	AIC wi
Lynx 2015				
hardwood + softwood + grassland + other	6	-81.8	0.00	0.05
hardwood + softwood + other	5	-81.4	0.40	0.04
hardwood + softwood + cropland	5	-81.4	0.40	0.04
hardwood + softwood + other + wetland*	6	-81.0	0.80	0.04
hardwood + softwood + grassland + cropland	6	-80.7	1.10	0.03
hardwood + softwood + grassland + other + burn*	7	-80.6	1.20	0.03
hardwood + softwood + other + cropland	6	-80.6	1.20	0.03
hardwood + softwood + burn + cropland	6	-80.6	1.20	0.03
hardwood + softwood + cropland + wetland	6	-80.5	1.30	0.03
hardwood + softwood + grassland + other + cropland*	7	-80.5	1.30	0.03
hardwood + softwood + grassland + other + wetland*	7	-80.4	1.40	0.03
hardwood + softwood + grassland + burn + cropland	7	-80.2	1.60	0.02
softwood + cropland	4	-80.2	1.60	0.02
hardwood + softwood + other + burn	6	-80.1	1.70	0.02
hardwood + softwood + other + cropland + wetland	7	-80.1	1.70	0.02
hardwood + softwood + grassland + other + mixedwood*	7	-79.9	1.90	0.02
hardwood + softwood + burn + cropland + wetland	7	-79.4	2.40	0.02

NOTES:
[1] – Including only relevant models (≤ Δ2AICc; Burnham and Anderson 2002)
* Uninformative parameter (overlapping 85% CI; Arnold 2010)

B.5 APRIL 2014 RAPTOR OBSERVATIONS DURING HAWKWATCH IN ST. ADOLPHE, MANITOBA

Table B-5 April 2014 Raptor Observations During Hawkwatch in St. Adolphe, Manitoba[1]

Species	April 2, 2014	April 4, 2014	April 5, 2014	April 6, 2014	April 7, 2014	April 8, 2014	April 9, 2014	April 10, 2014	April 15, 2014	April 18, 2014	Total
Turkey vulture	0	0	0	1	1	5	11	1	5	2	26
Bald eagle	8	14	28	77	19	135	21	8	18	7	335
Northern harrier	0	0	2	7	0	9	6	2	1	2	29
Sharp-shinned hawk	0	0	0	25	1	19	28	8	4	4	89
Cooper's hawk	0	0	0	4	1	3	3	2	1	1	15
Northern goshawk	0	0	2	0	1	0	0	0	0	0	3
Red-tailed hawk	24	9	55	629	526	1062	312	82	41	5	2745
Rough-legged hawk	0	2	1	2	0	3	4	1	3	5	21
Golden eagle	0	0	0	0	1	1	0	0	0	0	2
American kestrel	0	0	2	8	0	3	4	3	0	1	21
Merlin	0	0	1	2	3	0	1	1	0	1	9
Peregrine falcon	0	0	0	0	0	0	0	0	1	0	1
Total	**32**	**25**	**91**	**755**	**553**	**1240**	**390**	**108**	**74**	**28**	**3296**

NOTE:
[1] – HawkCount 2015

B.6 RATE OF RAPTOR OBSERVATIONS AT ST. ADOLPHE HAWKWATCH STATION, 2001-2014

Table B-6 Rate of Raptor Observations at St. Adolphe Hawkwatch Station, 2001-2014[1]

Year	Survey Effort (hrs)	Raptor Observations	Raptor Observations/Hour
2014	55.5	3296	59
2013	97.75	3045	31
2012	7	155	22
2009	20.5	1320	64
2007	6.5	201	31
2006	73.5	2474	34
2005	7	605	86
2003	8	234	29
2001	7	314	45

NOTE:
[1] – HawkCount 2015

B.7 BIRD SPECIES KNOWN TO OCCUR IN THE RAA

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Waterfowl										
Greater White-fronted Goose	*Anser albifrons*	M	·	·	·	·	·	✓	·	WL
Snow Goose	*Chen caerulescens*	M	·	·	·	✓	·	✓	·	WL
Canada Goose	*Branta canadensis*	B	·	✓	✓	✓	✓	✓	✓	WL
Trumpeter Swan	*Cygnus buccinator*	B	✓	·	·	·	·	·	·	WL
Tundra Swan	*Cygnus columbianus*	M	·	·	✓	✓	·	✓	✓	WL
Wood Duck	*Aix sponsa*	B	·	·	·	·	·	·	·	WL
Gadwall	*Anas strepera*	B	·	·	✓	·	·	✓	·	WL
American Wigeon	*Anas americana*	B	·	·	·	·	·	✓	·	WL
Mallard	*Anas platyrhynchos*	B	·	✓	✓	·	✓	✓	✓	WL
Blue-winged Teal	*Anas discors*	B	·	·	✓	·	✓	✓	·	WL
Northern Shoveler	*Anas clypeata*	B	·	✓	✓	·	✓	✓	·	WL
Northern Pintail	*Anas acuta*	B	·	·	·	·	·	✓	·	WL
Green-winged Teal	*Anas crecca*	B	·	✓	·	·	✓	·	·	WL
Canvasback	*Aythya valisineria*	B	·	·	·	✓	·	✓	·	WL
Redhead	*Aythya americana*	B	·	·	·	·	✓	✓	✓	WL
Ring-necked Duck	*Aythya collaris*	B	·	·	·	✓	✓	·	✓	WL
Lesser Scaup	*Aythya affinis*	B	·	·	·	·	·	✓	✓	WL
Bufflehead	*Bucephala albeola*	B	·	·	✓	·	✓	·	✓	WL
Common Goldeneye	*Bucephala clangula*	B	·	·	·	·	·	✓	·	WL
Common Merganser	*Mergus merganser*	B	·	·	·	·	·	·	·	WL
Hooded Merganser	*Lophodytes cucullatus*	B	·	·	·	·	·	✓	✓	WL
Ruddy Duck	*Oxyura jamaicensis*	B	·	·	·	·	·	✓	✓	WL
Waterbirds										
Common Loon	*Gavia immer*	M	·	·	·	✓	✓	✓	·	WL
Pied-billed Grebe	*Podilymbus podiceps*	B	·	·	·	✓	✓	✓	✓	WL
Horned Grebe	*Podiceps auritus*	B	✓	·	✓	·	·	·	✓	WL
Red-necked Grebe	*Podiceps grisegena*	B	·	·	·	·	✓	✓	✓	WL
Western Grebe	*Aechmophorus occidentalis*	B	·	·	·	·	✓	✓	·	WL

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Eared Grebe	*Podiceps nigricollis*	B	·	·	·	·	✓	·	·	WL
American White Pelican	*Pelecanus erythrorhynchos*	B	·	·	·	·	·	✓	·	WL
Double-crested Cormorant	*Phalacrocorax auritus*	B	·	·	·	·	·	✓	·	WL
American Bittern	*Botaurus lentiginosus*	B	·	✓	·	·	·	·	✓	WL
Least Bittern	*Ixobrychus exilis*	B	✓	✓	·	·	·	·	·	WL
Great Blue Heron	*Ardea herodias*	B	·	·	✓	✓	·	✓	✓	WL
Great Egret	*Ardea alba*	T, N	·	·	✓	✓	·	·	✓	WL
Cattle Egret	*Bubulcus ibis*	T, N	·	·	·	·	·	✓	·	WL
Green Heron	*Butorides virescens*	T, N	·	·	·	·	·	·	·	WL
Black-crowned Night Heron	*Nycticorax nycticorax*	B	·	·	·	✓	·	·	·	WL
American Coot	*Fulica americana*	B	·	·	·	·	·	✓	·	WL
Sandhill Crane	*Grus canadensis*	B	·	✓	✓	✓	·	·	✓	WL
Franklin's Gull	*Leucophaeus pipixcan*	B	·	✓	·	·	✓	·	·	WL
Bonaparte's Gull	*Chroicocephalus philadelphia*	M	·	·	·	·	·	·	·	WL
Ring-billed Gull	*Larus delawarensis*	B	·	·	✓	✓	✓	✓	·	WL
Herring Gull	*Larus argentatus*	B	·	·	·	✓	·	·	·	WL
Common Tern	*Sterna hirundo*	B	·	·	·	✓	·	·	✓	WL
Forster's Tern	*Sterna forsteri*	B	·	·	·	·	·	·	·	WL
Black Tern	*Chlidonias niger*	B	·	✓	·	·	·	·	·	WL
Raptors										
Turkey Vulture	*Cathartes aura*	B,N	·	✓	✓	✓	·	·	✓	OF
Osprey	*Pandion haliaetus*	B	·	·	·	·	·	·	·	WL
Bald Eagle	*Haliaeetus leucocephalus*	B	·	·	·	✓	·	✓	·	WL
Northern Harrier	*Circus cyaneus*	B	·	✓	✓	✓	·	✓	✓	GL
Sharp-shinned Hawk	*Accipiter striatus*	B	·	·	·	·	·	·	·	IF
Cooper's Hawk	*Accipiter cooperii*	B	·	·	✓	·	·	·	✓	OF
Northern Goshawk	*Accipiter gentilis*	B	·	·	·	·	·	·	·	IF
Broad-winged Hawk	*Buteo platypterus*	B	·	✓	✓	·	·	·	·	IF
Swainson's Hawk	*Buteo swainsoni*	B	·	·	✓	✓	·	·	·	GL
Red-tailed Hawk	*Buteo jamaicensis*	B	·	✓	✓	✓	·	✓	·	OF

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Ferruginous Hawk	*Buteo regalis*	B	·	·	·	·	·	·	·	GL
Rough-legged Hawk	*Buteo lagopus*	M	·	·	·	✓	·	·	·	GL
Golden Eagle	*Aquila chrysaetos*	M	·	·	·	✓	·	·	✓	GL
American Kestrel	*Falco sparverius*	B	·	·	✓	✓	·	·	·	GL
Merlin	*Falco columbarius*	B	·	✓	✓	✓	·	·	·	OF
Peregrine Falcon	*Falco peregrinus*	B	✓	·	✓	·	·	·	·	n/a
Prairie Falcon	*Falco mexicanus*	B	·	·	·	✓	·	·	·	GL
Eastern Screech-Owl	*Megascops asio*	P	·	·	·	·	·	·	·	OF
Great Horned Owl	*Bubo virginianus*	P	·	·	✓	·	·	·	✓	OF
Northern Hawk Owl	*Surnia ulula*	P	·	·	·	·	·	·	·	OF
Snowy Owl	*Bubo scandiacus*	M	·	·	·	·	·	·	·	GL
Burrowing Owl	*Athene cunicularia*	B	·	·	·	·	·	·	·	GL
Barred Owl	*Strix varia*	P	·	·	·	·	·	·	✓	IF
Great Gray Owl	*Strix nebulosa*	P	·	·	·	·	·	·	·	OF
Long-eared Owl	*Asio otus*	B	·	·	·	·	·	·	·	IF
Short-eared Owl	*Asio flammeus*	B	✓	✓	·	·	·	·	·	GL
Boreal Owl	*Aegolius funereus*	P	·	·	·	·	·	·	·	IF
Northern Saw-whet Owl	*Aegolius acadicus*	P	·	·	·	·	·	·	·	IF
Shorebirds										
Yellow Rail	*Coturnicops noveboracensis*	B	✓	✓	·	·	·	·	✓	WL
Virginia Rail	*Rallus limicola*	B	·	·	·	·	·	·	·	WL
Sora	*Prozana carolina*	B	·	✓	·	·	·	·	✓	WL
Killdeer	*Charadrius vociferus*	B	·	✓	✓	·	·	✓	·	GL
Greater Yellowlegs	*Tringa melanoleuca*	M	·	·	✓	·	·	·	·	WL
Lesser Yellowlegs	*Tringa flavipes*	M			·	·	·	·	✓	WL
Solitary Sandpiper	*Tringa solitaria*	B	·	·	·	·	·	·	✓	WL
Willet	*Tringa semipalmatus*	B	·	✓	·	·	·	·	·	WL
Spotted Sandpiper	*Actitis macularia*	B	·	·	·	·	·	·	·	WL
Upland Sandpiper	*Bartramia longicauda*	B	·	✓	·	·	·	·	·	WL
Marbled Godwit	*Limosa fedoa*	B	·	·	·	·	·	·	·	GL

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Wilson's Snipe	*Gallinago delicata*	B	·	✓	✓	✓	·	·	✓	WL
American Woodcock	*Scolopax minor*	B	·	·	·	·	·	·	✓	OF
Wilson's Phalarope	*Phalaropus tricolor*	B	·	·	·	·	·	·	·	WL
Passerines										
Olive-sided Flycatcher	*Contopus cooperi*	B	✓	✓	·	·	·	·	·	OF
Eastern Wood-Pewee	*Contopus virens*	B	✓	✓	·	·	·	·	✓	OF
Yellow-bellied Flycatcher	*Empidonax flaviventris*	M	·	✓	·	·	·	·	·	IF
Alder Flycatcher	*Empidonax alnorum*	B	·	✓	·	·	·	·	✓	WL
Least Flycatcher	*Empidonax minimus*	B	·	✓	·	·	·	✓	✓	OF
Willow Flycatcher	*Empidonax traillii*	B	·	✓	·	·	·	·	·	WL
Eastern Phoebe	*Sayornis phoebe*	B	·	✓	·	·	·	·	·	OF
Great Crested Flycatcher	*Myiarchus crinitus*	B	·	✓	·	·	·	·	✓	OF
Western Kingbird	*Tyrannus verticalis*	B	·	·	·	·	·	·	·	GL
Eastern Kingbird	*Tyrannus tyrannus*	B	·	✓	·	·	·	·	✓	GL
Loggerhead Shrike	*Lanius ludovicianus*	B	✓	·	·	·	·	·	·	GL
Northern Shrike	*Lanius excubitor*	M	·	·	·	·	·	·	·	OF
Yellow-throated Vireo	*Vireo flavifrons*	B	·	·	·	·	·	·	·	IF
Blue-headed Vireo	*Vireo solitarius*	B	·	·	·	·	·	·	·	IF
Warbling Vireo	*Vireo gilvus*	B	·	✓	·	·	·	·	✓	OF
Philadelphia Vireo	*Vireo philadelphicus*	B	·	✓	·	·	·	·	·	IF
Red-eyed Vireo	*Vireo olivaceus*	B	·	✓	·	·	·	·	·	IF
Gray Jay	*Perisoreus canadensis*	P	·	✓	·	✓	·	·	·	IF
Blue Jay	*Cyanocitta cristata*	P	·	✓	·	✓	·	·	✓	OF
Black-billed Magpie	*Pica hudsonia*	P	·	✓	·	✓	·	·	·	GL
American Crow	*Corvus brachyrhynchos*	B	·	✓	✓	✓	·	✓	✓	OF
Common Raven	*Corvus corax*	P	·	✓	✓	✓	·	✓	✓	OF
Horned Lark	*Eremophila alpestris*	B	·	✓	·	·	·	·	·	GL
Purple Martin	*Progne subis*	B	·	·	·	·	·	·	·	WL
Tree Swallow	*Tachycineta bicolor*	B	·	✓	·	·	✓	·	✓	WL
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*	B	·	·	·	·	·	·	·	WL

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Bank Swallow	*Riparia riparia*	B	✓	✓	·	·	·	·	·	WL
Cliff Swallow	*Petrochelidon pyrrhonota*	B	·	·	·	·	·	·	·	WL
Barn Swallow	*Hirundo rustica*	B	✓	✓	✓	✓	·	·	✓	GL
Black-capped Chickadee	*Poecile atricapillus*	P	·	✓	·	·	·	·	·	OF
Red-breasted Nuthatch	*Sitta canadensis*	P	·	·	·	·	·	·	·	IF
White-breasted Nuthatch	*Sitta carolinensis*	P	·	✓	·	·	·	·	·	OF
Brown Creeper	*Certhia americana*	B	·	✓	·	·	·	·	·	IF
House Wren	*Troglodytes aedon*	B	·	✓	·	·	·	·	✓	OF
Sedge Wren	*Cistothorus platensis*	B	·	✓	·	·	·	·	·	WL
Winter Wren	*Troglodytes hiemalis*	B	·	✓	·	·	·	·	·	IF
Marsh Wren	*Cistothorus palustris*	B	·	✓	·	·	·	✓	·	WL
Golden-crowned Kinglet	*Regulus satrapa*	B	·	✓	·	·	·	·	·	IF
Ruby-crowned Kinglet	*Regulus calendula*	B	·	✓	·	·	·	·	·	IF
Eastern Bluebird	*Sialia sialis*	B	·	✓	·	·	·	·	·	OF
Veery	*Catharus fuscescens*	B	·	✓	·	·	·	·	✓	IF
Hermit Thrush	*Catharus guttatus*	B	·	✓	·	·	·	·	·	IF
Swainson's Thrush	*Catharus ustulatus*	B	·	✓	·	·	·	·	✓	IF
Wood Thrush	*Hylocichia mustelina*	B	·	·	·	·	·	·	·	IF
American Robin	*Turdus migratorius*	B	·	✓	·	·	·	·	✓	OF
Gray Catbird	*Dumetella carolinensis*	B	·	✓	·	·	·	·	·	OF
Sprague's Pipit	*Anthus spragueii*	B	·✓		·	·	·	·	·	GL
Cedar Waxwing	*Bombycilla cedrorum*	B	·	✓	·	·	·	·	·	OF
Bohemian Waxwing	*Bombycilla garrulus*	W	·	·	·	·	·	·	·	OF
European Starling	*Sturnus vulgaris*	P	·	✓	·	✓	·	·	·	GL
Chestnut-collared Longspur	*Calcarius ornatus*	B	·	·	·	·	·	·	·	GL
Ovenbird	*Seiurus aurocapillus*	B	·	✓	✓	·	·	·	✓	IF
Northern Waterthrush	*Parkesia noveboracensis*	B	·	✓	·	·	·	·	·	WL
Golden-winged Warbler	*Vermivora chrysoptera*	B	✓	✓	·	·	·	·	✓	OF
Black-and-white Warbler	*Mniotilta varia*	B	·	✓	·	·	·	·	✓	OF
Tennessee Warbler	*Oreothlypis peregrina*	B	·	✓	·	·	·	·	·	OF

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Orange-crowned Warbler	*Oreothlypis celata*	B	·	·	·	·	·	·	·	OF
Nashville Warbler	*Oreothlypis ruficapilla*	B	·	✓	·	·	·	·	✓	OF
Connecticut Warbler	*Oporornis agilis*	B	·	✓	·	·	·	·	·	OF
Mourning Warbler	*Geothlypis philadelphia*	B	·	✓	·	·	·	·	·	OF
Common Yellowthroat	*Geothlypis trichas*	B	·	✓	·	·	·	·	✓	WL
American Redstart	*Setophaga ruticilla*	B	·	✓	·	·	·	·	·	OF
Cape May Warbler	*Setophaga tigrina*	B	·	✓	·	·	·	·	·	IF
Northern Parula	*Setophaga americana*	B	·	·	·	·	·	·	✓	IF
Magnolia Warbler	*Setophaga magnolia*	B	·	✓	·	·	·	·	·	OF
Bay-breasted Warbler	*Setophaga castanea*	B	·	·	·	·	·	·	·	IF
Blackburnian Warbler	*Setophaga fusca*	B	·	✓	·	·	·	·	✓	IF
Yellow Warbler	*Setophaga petechia*	B	·	✓	·	·	·	·	·	WL
Chestnut-sided Warbler	*Setophaga pensylvanica*	B	·	✓	·	·	·	·	✓	OF
Palm Warbler	*Setophaga palmarum*	B	·	·	·	·	·	·	·	WL
Pine Warbler	*Setophaga pinus*	B	✓	✓	·	·	·	·	·	IF
Yellow-rumped Warbler	*Setophaga coronata*	B	·	✓	·	·	·	·	✓	IF
Black-throated Green Warbler	*Setophaga virens*	B	·	✓	·	·	·	·	·	IF
Canada Warbler	*Cardellina canadensis*	B	✓	·	·	·	·	·	·	OF
Wilson's Warbler	*Cardellina pusilla*	M	·	✓	·	·	·	·	·	WL
Scarlet Tanager	*Piranga olivacea*	B	·	·	·	·	·	·	·	IF
Eastern Towhee	*Pipilo erythrophthalmus*	B	·	✓	·	·	·	·	·	OF
Chipping Sparrow	*Spizella passerina*	B	·	✓	✓	·	·	·	✓	OF
Clay-colored Sparrow	*Spizella pallida*	B	·	✓	·	·	·	·	·	GL
Field Sparrow	*Spizella pusilla*	B	·	·	·	·	·	·	·	GL
Lark Sparrow	*Chondestes grammacus*	B	·	·	·	·	·	·	·	GL
Vesper Sparrow	*Pooecetes gramineus*	B	·	·	·	·	·	·	·	GL
Savannah Sparrow	*Passerculus sandwichensis*	B	·	✓	·	·	·	·	·	GL
Grasshopper Sparrow	*Ammodramus savannarum*	B	✓	·	·	·	·	·	·	GL
Baird's Sparrow	*Ammodramus bairdii*	B								GL
Le Conte's Sparrow	*Ammodramus leconteii*	B	·	✓	·	·	·	·	✓	WL

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Nelson's Sparrow	*Ammodramus nelsoni*	B	·	✓	·	·	·	·	·	WL
Lincoln's Sparrow	*Melospiza lincolnii*	M	·	✓	·	·	·	·	✓	WL
Song Sparrow	*Melospiza melodia*	B	·	✓	·	·	·	·	✓	OF
Swamp Sparrow	*Melospiza georgiana*	B	·	✓	·	·	·	·	·	WL
White-throated Sparrow	*Zonotrichia albicollis*	B	·	✓	·	·	·	·	✓	OF
Dark-eyed Junco	*Junco hyemalis*	P	·	✓	·	✓	·	·	✓	OF
Northern Cardinal	*Cardinalis cardinalis*	B	·	·	·	·	·	·	·	OF
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	B	·	✓	·	·	·	·	·	OF
Indigo Bunting	*Passerina cyanea*	B	·	·	·	·	·	·	·	OF
Dickcissel	*Spiza americana*	B, N	·	·	·	·	·	·	·	GL
Bobolink	*Dolichonyx oryzivorus*	B	✓	✓	·	·	·	·	·	GL
Red-winged Blackbird	*Agelaius phoeniceus*	B	·	✓	✓	·	·	✓	✓	WL
Western Meadowlark	*Sturnella neglecta*	B	·	✓	·	✓	·	·	·	GL
Yellow-headed Blackbird	*Xanthocephalus xanthocephalus*	B	·	·	·	·	·	·	·	WL
Brewer's Blackbird	*Euphagus cyanocephalus*	B	·	✓	·	·	·	·	·	GL
Rusty Blackbird	*Euphagus carolinus*	B	✓	·	·	·	·	·	·	OF
Common Grackle	*Quiscalus quiscula*	B	·	·	·	·	·	·	·	OF
Brown-headed Cowbird	*Molothrus ater*	B		✓	·	·	·	·	✓	OF
Orchard Oriole	*Icterus spurious*	B	·	·	·	·	·	·	·	OF
Baltimore Oriole	*Icterus galbula*	B	·	✓	·	·	·	·	✓	OF
Purple Finch	*Haemorhous purpureus*	B	·	·	·	·	·	·	✓	OF
House Finch	*Haemorhous mexicanus*	P	·	✓	·	·	·	·	·	n/a
Red Crossbill	*Loxia curvirostra*	P	·	·	·	·	·	·	·	IF
White-winged Crossbill	*Loxia leucoptera*	P	·	·	·	·	·	·	·	IF
Pine Siskin	*Spinus pinus*	P	·	·	·	·	·	·	·	IF
American Goldfinch	*Spinus tristis*	B	·	✓	·	·	·	·	✓	OF
Evening Grosbeak	*Cocothraustes vespertinus*	P	·	·	·	·	·	·	·	IF
House Sparrow	*Passer domesticus*	P	·	·	·	·	·	·	·	n/a
Upland Game Birds										
Gray Partridge	*Perdix perdix*	P,I	·	·	·	✓	·	·	·	GL

Table B-7 Bird Species Known to Occur in the RAA

Common Name	Scientific Name	Potential Occurrence in the RAA[1]	Species of Conservation Concern*	Breeding Bird Survey	Spring Migration Survey	Fall Migration Survey	Spring Wetland Survey	Fall Wetland Survey	Incidental	Broad Habitat Type[2]
Ruffed Grouse	*Bonasa umbellus*	P	·	✓	·	·	·	·	✓	IF
Spruce Grouse	*Falcipennis canadensis*	P	·	·	·	·	·	·	·	IF
Sharp-tailed Grouse	*Tympanuchus phasianellus*	P	·	✓	✓	✓	·	·	✓	GL
Wild Turkey	*Meleagris gallopavo*	P	·	✓	·	·	·	·	·	OF
Other Birds										
Rock Pigeon	*Columba livia*	P	·	✓	✓	✓	·	✓	·	n/a
Eurasian Collared-Dove	*Streptopelia decaocto*	P, I	·	·	·	·	·	·	·	n/a
Mourning Dove	*Zenaida macroura*	B	·	✓	·	✓	·	·	·	OF
Black-billed Cuckoo	*Coccyzus erythropthalmus*	B	·	✓	·	·	·	·	·	OF
Yellow-billed Cuckoo	*Coccyzus americanus*	B	·	·	·	·	·	·	·	OF
Common Nighthawk	*Chordeiles minor*	B	✓	·	·	·	·	·	✓	OF
Eastern Whip-poor-will	*Antrostomus vociferus*	B	✓	·	·	·	·	·	✓	OF
Chimney Swift	*Chaetura pelagica*	B	✓	·	·	·	·	·	·	n/a
Ruby-throated Hummingbird	*Archilochus colubris*	B	·	·	·	·	·	·	·	OF
Belted Kingfisher	*Megaceryle alcyon*	B	·	·	·	✓	·	✓	✓	WL
Red-headed Woodpecker	*Melanerpes erythrocepalus*	B	✓	·	·	·	·	·	·	OF
Yellow-bellied Sapsucker	*Sphyrapicus varius*	B	·	✓	·	·	·	·	·	OF
Downy Woodpecker	*Picoides pubescens*	P	·	✓	·	·	·	✓	·	OF
Hairy Woodpecker	*Picoides villosus*	P	·	✓	·	✓	·	✓	·	OF
Three-toed Woodpecker	*Picoides dorsalis*	P	·	·	·	·	·	·	·	OF
Black-backed Woodpecker	*Picoides arcticus*	P	·	·	·	·	·	·	✓	OF
Northern Flicker	*Colaptes auratus*	B	·	✓	✓	✓	·	·	·	OF
Pileated Woodpecker	*Dryocopus pileatus*	P	·	✓	·	·	·	·	·	OF

B.22NOTES:
*MESEA (2015); SARA (1990); COSEWIC (2012)
[1] B = breeding, M = migrant, P = permanent resident, N = northern extent of range, W = winter range, I = introduced, T=Transient
[2] Broad habitat type: GL = grassland, WL = Wetland, OF = Open Forest, IF = Interior Forest, N/A = not applicable.

SOURCE: Carey *et al.* 2003; Peterson 2002; MB BBA 2015

B.8 AVIAN SPECIES OF CONSERVATION CONCERN KNOWN TO OCCUR WITHIN THE MMTP RAA

Table B-8 Avian Species of Conservation Concern Known to Occur within the MMTP RAA

Species	Status	Authority	MB CDC Rank[1]	General Preferred Habitat
Trumpeter swan (*Cygnus buccinator*)	*Endangered*	MESEA	S1S2B	Migratory waterbird that breeds in freshwater marshes and along ponds and lakes. Beaver ponds are prime nesting sites.
Horned grebe (*Podiceps auritus*)	*Special concern*	COSEWIC	S3B	Migratory waterbird that breeds in open water and shallow wetlands with emergent vegetation. Prefers permanent or semi-permanent freshwater ponds, marshes, and shallow bays on lakes with suitable beds of emergent vegetation.
Least bittern (*Ixobrychus exilis*)	*Threatened*	SARA	S2S3B	Migratory waterbird that nests in freshwater marshes with tall emergent vegetation, of which cattails are the dominant species. Breeding wetlands are chosen which are 50% water, 50% vegetation and water depth of less than 1 m.
	Endangered	MESEA		
Yellow rail (*Coturnicops noveboracensis*)	*Special concern*	SARA	S3S4B	Migratory rail that occupies large, dense marsh habitat with fairly low vegetation and little to no standing water. This habitat occurs in damp fields, meadows, river floodplains, bogs, and the margins of marshes.
Common nighthawk (*Chordeiles minor*)	*Threatened*	SARA & MESEA	S3B	Migratory nightjar that nests on the ground in open habitats (natural or manmade), preferably with rocky or graveled substrate such as recent burns or clear-cuts. Can also be found in mixed and coniferous forests.
Eastern whip-poor-will (*Antrostomus vociferus*)	*Threatened*	SARA & MESEA	S3B	Migratory nightjar that prefers partly open, upland deciduous or mixed-wood forests, especially with clearings, such as those regenerating following major disturbances.
Chimney swift (*Chaetura pelagica*)	*Threatened*	SARA & MESEA	S2B	Migratory bird that is mainly associated with urban and rural areas where it can find chimneys to use as nesting and roosting sites. A small portion of the population may continue to use natural nesting sites (*i.e.*, hollow trees).
Short-eared owl	*Special concern*	SARA	S2S3B	Generally associated with open areas, where they may nest on the

Table B-8 Avian Species of Conservation Concern Known to Occur within the MMTP RAA

Species	Status	Authority	MB CDC Rank[1]	General Preferred Habitat
(*Asio flammeus*)	*Threatened*	MESEA		ground in a variety of habitats such as marshes, grasslands, or hayfields, with dense grassland the preferred choice for nesting sites.
Red-headed woodpecker (*Melanerpes erythrocephalus*)	*Threatened*	SARA & MESEA	S2B	Migratory species whose breeding habitat includes open deciduous forests with clear understories, forest edge, as well as disturbed areas such as treerows in agricultural areas.
Peregrine falcon (*Falco peregrinus*)	*Special concern*	SARA	S1B	Migratory falcon that usually nests on cliff ledges or crevices, but sometimes on the ledges of tall buildings or bridges, near open landscapes for hunting (often near wetlands frequented by shorebirds and waterfowl).
	Endangered	MESEA		
Eastern wood-pewee (*Contopus virens*)	*Special concern*	COSEWIC	S4S5B	Migratory songbird that prefers open, deciduous, mixed or coniferous forest, especially large aspen stands, with little understory. They nest on forest edges and in open interior of forests.
Olive-sided flycatcher (*Contopus cooperi*)	*Threatened*	SARA	S3S4B	Migratory songbird that is most often found in open areas within coniferous or mixed forests that contain large trees or snags.
Loggerhead shrike (*Lanius ludovicianus*)	*Threatened*	SARA	S1B	Migratory shrike that inhabits regions of grasslands with scattered trees and shrubs (especially with thorns or dense interiors) that provide nesting and perching sites. Also observed using cropland and bare ground for foraging.
	Endangered	MESEA		
Bank swallow (*Riparia riparia*)	*Threatened*	COSEWIC	S4B	Migratory swallow that nests in colonies on river banks, lake banks, road cuts, gravel pits, quarries and other sandy substrates. It forages above wetlands and elsewhere where large insect emergences occur.
Barn swallow (*Hirundo rustica*)	*Threatened*	COSEWIC	S4B	Migratory grassland species that forages over meadows, hay, pasture or mown lawn, or over wetlands and open water where insects are abundant. It nests on walls or ledges of barns, as well as other human-made structures.

Table B-8 Avian Species of Conservation Concern Known to Occur within the MMTP RAA

Species	Status	Authority	MB CDC Rank[1]	General Preferred Habitat
Sprague's pipit (*Anthus spragueii*)	*Threatened*	SARA & MESEA	S2B	Migratory songbird that is closely associated with native grassland habitat. Habitats become unsuitable for breeding where livestock activity is intense, when native habitat is harvested as hay or when native grasslands become fragmented.
Golden-winged warbler (*Vermivora chrysoptera*)	*Threatened*	SARA & MESEA	S3B	Migratory warbler that is a habitat specialist of early successional scrub communities (10-30 years old) surrounded by mature forests, but may also be found in utility ROWs, edge habitats, beaver marshes or fallow farmland.
Pine warbler (*Setophaga pinus*)	No status	None	S2B	Migratory warbler that lives in pine or mixed pine-deciduous forest, and is rarely seen away from pines.
Canada warbler *(Cardellina canadensis)*	*Threatened*	SARA	S4B	Migratory warbler found in moist mixed deciduous-coniferous forests with a well-developed understory. In Manitoba, glacial moraines sloping down to water often provide a suitably dense shrub layer.
	Endangered	MESEA		
Grasshopper sparrow (*Ammodramus savannarum*)	No status	None	S2B	Migratory grassland sparrow that prefers open grasslands and prairies with patches of bare ground. In the prairie provinces, it breeds in both native grassland and tame pasture and prefers large grassland areas.
Bobolink (*Dolichonyx oryzivorus*)	*Threatened*	COSEWIC	S4B	Migratory grassland species that nests in hay fields and pastures with dense, tall grasses and forbs. It may also be found on the grassy margins of large wetlands.

Table B-8 Avian Species of Conservation Concern Known to Occur within the MMTP RAA

Species	Status	Authority	MB CDC Rank[1]	General Preferred Habitat
Rusty blackbird (*Euphagus carolinus*)	*Special concern*	SARA	S3S4B	Migrant that nests in the boreal forest and favours the shores of wetlands such as slow-moving streams, peat bogs and beaver ponds. In Manitoba, the main nesting range is in treed muskeg, rarely south of the 55th parallel.

NOTES:

[1] Manitoba Conservation Data Centre Ranks
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.

B.9 ESTIMATED MEAN BREEDING BIRD DENSITIES (BIRDS/HA) FROM THE 2014 BREEDING BIRD SURVEYS

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

Species	Grassland				Wetland				Hardwood				Softwood			
	D604I (n=47)		M602F (n=9)		D604I (n=19)		M602F (n=6)		D604I (n=42)		M602F (n=10)		D604I (n=31)		M602F (n=10)	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Canada Goose									0.01	0.05						
Mallard	0.02	0.08	0.07	0.14	0.02	0.07			0.02	0.1						
Green-winged Teal	0.01	0.05														
Ruffed Grouse									0.01	0.05			0.01	0.06		
Sharp-tailed Grouse	0.01	0.05														
American Bittern					0.02	0.07										
* Least Bittern					0.02	0.07			0.01	0.05						
Turkey Vulture															0.03	0.1
Northern Harrier			0.04	0.11												
Broad-winged Hawk									0.01	0.05						
Red-tailed Hawk	0.01	0.05														
* Yellow Rail					0.03	0.1										
Sora	0.04	0.17	0.18	0.23			0.11	0.26								
Sandhill Crane	0.01	0.05														
Killdeer	0.07	0.13							0.01	0.05						
Willet	0.17	0.43														
Upland Sandpiper	0.02	0.15														

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

Species	Grassland				Wetland				Hardwood				Softwood			
	D604l (n=47)		M602F (n=9)		D604l (n=19)		M602F (n=6)		D604l (n=42)		M602F (n=10)		D604l (n=31)		M602F (n=10)	
	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Wilson's Snipe	0.36	0.53	0.32	0.42	0.08	0.18	0.05	0.13	0.01	0.05	0.03	0.1				
Black Tern							0.05	0.13								
Mourning Dove	0.01	0.05							0.02	0.08			0.02	0.11	0.03	0.1
* Short-eared Owl					0.02	0.07										
Yellow-bellied Sapsucker									0.02	0.07						
Downy Woodpecker	0.01	0.05							0.01	0.05			0.01	0.06	0.03	0.1
Hairy Woodpecker	0.01	0.05			0.03	0.1			0.01	0.05						
Northern Flicker					0.03	0.1			0.01	0.05			0.01	0.06	0.03	0.1
Pileated Woodpecker											0.03	0.1				
Merlin									0.01	0.05						
* Olive-sided Flycatcher					0.02	0.07										
* Eastern Wood-pewee									0.05	0.11	0.06	0.13	0.07	0.14		
Yellow-Bellied Flycatcher	0.02	0.15	0.04	0.11	0.05	0.12			0.02	0.07	0.06	0.13	0.03	0.1		
Alder Flycatcher	0.05	0.14			0.08	0.21			0.04	0.13	0.06	0.2	0.02	0.08		
Willow Flycatcher							0.11	0.16								
Least Flycatcher	0.05	0.12			0.03	0.1			0.17	0.24	0.16	0.23	0.02	0.08		
Eastern Phoebe	0.01	0.05							0.02	0.07	0.03	0.1				
Great Crested Flycatcher	0.01	0.05					0.05	0.13	0.02	0.08			0.02	0.08		
Eastern Kingbird	0.07	0.17	0.11	0.16			0.05	0.13	0.01	0.05	0.06	0.13			0.03	0.1
Warbling Vireo	0.02	0.15	0.04	0.11					0.01	0.05	0.06	0.13				

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

	Grassland				Wetland				Hardwood				Softwood			
	D604l (n=47)		M602F (n=9)		D604l (n=19)		M602F (n=6)		D604l (n=42)		M602F (n=10)		D604l (n=31)		M602F (n=10)	
Species	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**
Philadelphia Vireo	0.01	0.05							0.01	0.05			0.02	0.08		
Red-eyed Vireo	0.03	0.12			0.15	0.19	0.16	0.27	0.28	0.27	0.57	0.2	0.14	0.18	0.19	0.31
Tree Swallow	0.01	0.05	0.04	0.11												
* Bank Swallow									0.02	0.1						
* Barn Swallow	0.02	0.08														
Gray Jay					0.02	0.07							0.02	0.08	0.1	0.15
Blue Jay									0.02	0.08	0.06	0.13	0.08	0.16	0.1	0.15
Black-billed Magpie	0.07	0.18														
American Crow	0.1	0.18							0.03	0.12			0.03	0.1		
Common Raven					0.02	0.07										
Black-capped Chickadee	0.03	0.12			0.07	0.13			0.02	0.07			0.02	0.08	0.03	0.1
White-breasted Nuthatch									0.01	0.05			0.01	0.06		
Brown Creeper									0.01	0.05						
House Wren	0.01	0.05							0.01	0.05			0.02	0.08		
Winter Wren													0.03	0.1		
Sedge Wren	0.27	0.39	0.57	0.79	0.25	0.35	0.05	0.13	0.02	0.15	0.03	0.1				
Marsh Wren			0.21	0.36			0.05	0.13								
Golden-crowned Kinglet													0.03	0.1	0.1	0.21
Ruby-crowned Kinglet					0.02	0.07							0.03	0.13		
Veery	0.02	0.15	0.04	0.11	0.05	0.12			0.14	0.19	0.19	0.27	0.02	0.08	0.06	0.2

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

	Grassland				Wetland				Hardwood				Softwood			
	D604I (n=47)		M602F (n=9)		D604I (n=19)		M602F (n=6)		D604I (n=42)		M602F (n=10)		D604I (n=31)		M602F (n=10)	
Species	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
Swainson's Thrush											0.03	0.1			0.03	0.1
Hermit Thrush					0.02	0.07			0.02	0.07			0.05	0.17	0.03	0.1
American Robin	0.13	0.22	0.07	0.21	0.07	0.17	0.05	0.13	0.11	0.21	0.06	0.2	0.05	0.12		
Gray Catbird	0.02	0.08			0.02	0.07			0.04	0.1						
Brown Thrasher	0.01	0.05			0.02	0.07							0.01	0.06		
Cedar Waxwing	0.01	0.06			0.03	0.1	0.11	0.26	0.08	0.17	0.06	0.13	0.09	0.2	0.1	0.15
Ovenbird					0.03	0.1	0.05	0.13	0.25	0.28	0.32	0.26	0.11	0.19	0.03	0.1
Northern Waterthrush									0.01	0.05						
* Golden-winged Warbler									0.02	0.11						
Black-and-white Warbler					0.07	0.13			0.08	0.17	0.03	0.1	0.03	0.13	0.06	0.13
Tennessee Warbler													0.02	0.08	0.03	0.1
Nashville Warbler					0.25	0.42			0.08	0.17	0.22	0.21	0.21	0.3	0.45	0.27
Connecticut Warbler					0.02	0.07									0.13	0.22
Mourning Warbler									0.03	0.15	0.13	0.22	0.02	0.08		
Common Yellowthroat	0.28	0.3	0.42	0.32	0.6	0.38	0.74	0.26	0.17	0.27	0.1	0.21	0.09	0.24	0.25	0.25
American Redstart					0.02	0.07			0.06	0.14	0.06	0.2				
Cape May Warbler															0.03	0.1
Magnolia Warbler									0.03	0.09			0.05	0.14	0.13	0.22
Blackburnian Warbler											0.03	0.1	0.05	0.14	0.03	0.1
Yellow Warbler	0.23	0.48	0.11	0.23	0.13	0.24			0.11	0.22						

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

	Grassland				Wetland				Hardwood				Softwood			
	D604l (n=47)		M602F (n=9)		D604l (n=19)		M602F (n=6)		D604l (n=42)		M602F (n=10)		D604l (n=31)		M602F (n=10)	
Species	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**
Chestnut-sided Warbler	0.01	0.05			0.02	0.07			0.06	0.14	0.41	0.26	0.04	0.14	0.06	0.13
Pine Warbler									0.02	0.07						
Yellow-rumped Warbler									0.01	0.05			0.2	0.28	0.19	0.27
Black-throated Green Warbler													0.05	0.19		
Wilson's Warbler																
Eastern Towhee									0.02	0.1						
Chipping Sparrow	0.01	0.05			0.02	0.07			0.01	0.05	0.03	0.1	0.09	0.19	0.06	0.2
Clay-colored Sparrow	0.16	0.24	0.04	0.11	0.03	0.1	0.37	0.37	0.04	0.13			0.02	0.08		
Le Conte's Sparrow	0.03	0.1	0.04	0.11												
Nelson's Sparrow	0.01	0.09					0.05	0.13								
Savannah Sparrow	0.33	0.3			0.02	0.07										
Song Sparrow	0.19	0.25	0.04	0.11	0.1	0.19	0.11	0.26	0.06	0.16	0.03	0.1				
Lincoln's Sparrow															0.1	0.15
Swamp Sparrow	0.06	0.2	0.46	0.28	0.22	0.28	0.96	0.45	0.01	0.05					0.1	0.15
White-throated Sparrow	0.06	0.25			0.1	0.19	0.21	0.33	0.17	0.24	0.51	0.34	0.35	0.38	0.51	0.31
Dark-Eyed Junco													0.04	0.11		
Rose-breasted Grosbeak					0.03	0.1	0.05	0.13	0.06	0.13	0.03	0.1	0.01	0.06		
* Bobolink	0.06	0.18														
Red-winged Blackbird	0.5	0.45	0.92	0.37	0.15	0.29	0.21	0.52	0.02	0.08						
Western Meadowlark	0.89	1.01	0.14	0.17												

Table B-9 Estimated Mean Breeding Bird Densities (birds/ha) from the 2014 Breeding Bird Surveys

	Grassland				Wetland				Hardwood				Softwood			
	D604l (n=47)		M602F (n=9)		D604l (n=19)		M602F (n=6)		D604l (n=42)		M602F (n=10)		D604l (n=31)		M602F (n=10)	
Species	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**	$\bar{x}$	**SD**
Brewer's Blackbird	0.01	0.05														
Brown-headed Cowbird	0.02	0.08					0.05	0.13	0.08	0.17	0.06	0.2				
Baltimore Oriole							0.05	0.13	0.01	0.05						
House Finch									0.01	0.05						
American Goldfinch	0.12	0.25	0.04	0.11	0.02	0.07	0.11	0.16	0.02	0.07	0.19	0.31	0.05	0.14		

NOTE:
* Species at risk

B.10 MODEL SELECTION TABLE FOR 2014 BREEDING BIRD SURVEY ANALYSIS

Table B-10 Model Selection Table for 2014 Breeding Bird Survey Analysis

Model[1]	Detection Function[2]	AIC[3]	Δ AIC[4]	w_i[5]	K[6]
habitat + route	Hazard-rate	3066.40	0.00	0.99	7
habitat + route	Half-normal	3075.94	9.54	0.01	6
habitat	Hazard-rate	3083.96	17.56	0.00	6
habitat	Half-normal	3093.49	27.10	0.00	5
route	Hazard-rate	3099.06	32.66	0.00	4
route	Half-normal	3108.60	46.20	0.00	3

NOTE:
N = 174
[1] – where 'habitat' is the FRI habitat classification and 'route' is the survey location (either MMTP refined alternate route or M602F)
[2] – Hazard Rate: non-linear 'S' shaped curve where detection probability peaks at 0 m, decreases as distance increases and plateaus as it nears 100 m. Half-normal: non-linear curve where detection probability peaks at 0 m and decreases as distance increases to 100 m.
[3] – Akaike Information Criterion
[4] – Difference in AIC relative to smallest value
[5] – Akaike's weight of models
[6] – Number of parameters.

B.11 BREEDING BIRD SPECIES FOUND IN HARDWOOD HABITATS DURING THE 2014 BREEDING BIRD SURVEYS

Table B-11 Breeding Bird Species found in Hardwood Habitats during the 2014 Breeding Bird Surveys

Found on both	D604I only	M602F only
Eastern Wood-pewee	Canada Goose	Pileated Woodpecker
Alder Flycatcher	Mallard	Yellow-bellied Flycatcher
Least Flycatcher	Ruffed Grouse	Swainson's Thrush
Eastern Phoebe	Least Bittern	Blackburnian Warbler
Eastern Kingbird	Killdeer	
Warbling Vireo	Wilson's Snipe	
Red-eyed Vireo	Broad-winged Hawk	
Blue Jay	Mourning Dove	
Sedge Wren	Yellow-bellied Sapsucker	
Veery	Downy Woodpecker	
American Robin	Hairy Woodpecker	
Cedar Waxwing	Northern Flicker	
Ovenbird	Merlin	
Black-and-white Warbler	Great Crested Flycatcher	
Nashville Warbler	Philadelphia Vireo	
Mourning Warbler	American Crow	
Common Yellowthroat	Bank Swallow	
American Redstart	Black-capped Chickadee	
Chestnut-sided Warbler	White-breasted Nuthatch	
Wilson's Warbler	Brown Creeper	
Chipping Sparrow	House Wren	
Song Sparrow	Hermit Thrush	
White-throated Sparrow	Gray Catbird	
Rose-breasted Grosbeak	Northern Waterthrush	
Brown-headed Cowbird	Golden-winged Warbler	
American Goldfinch	Magnolia Warbler	
	Yellow Warbler	
	Pine Warbler	
	Yellow-rumped Warbler	
	Eastern Towhee	
	Clay-colored Sparrow	

Table B-11 Breeding Bird Species found in Hardwood Habitats during the 2014 Breeding Bird Surveys

Found on both	D604I only	M602F only
	Swamp Sparrow	
	Red-winged Blackbird	
	Baltimore Oriole	
	House Finch	

B.12 BREEDING BIRD SPECIES FOUND IN SOFTWOOD HABITATS DURING THE 2014 BREEDING BIRD SURVEYS

Table B-12 Breeding Bird Species found in Softwood Habitats during the 2014 Breeding Bird Surveys

Found on both	D604I only	M602F only
Mourning Dove	Ruffed Grouse	Turkey Vulture
Downy Woodpecker	Yellow-bellied Flycatcher	Eastern Kingbird
Northern Flicker	Alder Flycatcher	Swainson's Thrush
Red-eyed Vireo	Least Flycatcher	Connecticut Warbler
Gray Jay	Eastern Wood-pewee	Cape May Warbler
Blue Jay	Great Crested Flycatcher	Lincoln's Sparrow
Black-capped Chickadee	Philadelphia Vireo	Swamp Sparrow
Golden-crowned Kinglet	American Crow	
Veery	White-breasted Nuthatch	
Hermit Thrush	House Wren	
Cedar Waxwing	Winter Wren	
Ovenbird	Ruby-crowned Kinglet	
Tennessee Warbler	American Robin	
Nashville Warbler	Brown Thrasher	
Black-and-white Warbler	Mourning Warbler	
Common Yellowthroat	Black-throated Green Warbler	
Magnolia Warbler	Clay-colored Sparrow	
Blackburnian Warbler	Dark-eyed Junco	
Chestnut-sided Warbler	Rose-breasted Grosbeak	
Yellow-rumped Warbler	American Goldfinch	
Wilson's Warbler		
Chipping Sparrow		
White-throated Sparrow		

B.13 BIRD COUNTS DURING SPRING MIGRATION SURVEYS

Table B-13 Bird Counts during Spring Migration Surveys

Birds	Week 1	Week 2	Week 3	Total
Waterfowl	**123**	**93**	**62**	**278**
Canada goose	71	31	28	130
Tundra swan	4	0	0	4
Gadwall	2	0	0	2
Mallard	25	22	24	71
Blue-winged teal	2	0	2	4
Northern shoveler	7	0	0	7
Bufflehead	2	0	0	2
Scaup sp.	4	0	0	4
Duck sp.	6	40	8	54
Upland Game Birds	**0**	**8**	**0**	**8**
Sharp-tailed grouse	0	5	0	5
Grouse sp.	0	3	0	3
Waterbirds	**38**	**12**	**46**	**96**
Horned grebe	1	0	0	1
Great blue heron	3	0	0	3
Sandhill crane	1	12	46	59
Ring-billed gull	3	0	0	3
Gull sp.	30	0	0	30
Raptors	**10**	**5**	**12**	**27**
Turkey vulture	0	1	0	1
Northern harrier	2	0	3	5
Cooper's hawk	0	0	2	2
Broad-winged hawk	0	0	2	2
Swainson's hawk	1	0	1	2
Red-tailed hawk	2	0	1	3
American kestrel	0	1	2	3
Merlin	1	1	0	2
Peregrine falcon	0	0	1	1
Great horned owl	1	0	0	1
Raptor sp.	3	2	0	5

Table B-13 Bird Counts during Spring Migration Surveys

Birds	Week 1	Week 2	Week 3	Total
Shorebirds	**7**	**1**	**8**	**16**
Killdeer	4	1	7	12
Greater yellowlegs	1	0	0	1
Wilson's snipe	1	0	1	2
Shorebird sp.	1	0	0	1
Passerines	**715**	**109**	**110**	**934**
American crow	4	0	0	4
Common raven	1	0	0	1
Barn swallow	2	0	0	2
Ovenbird	0	1	0	1
Chipping sparrow	0	0	45	45
Red-winged blackbird	35	10	7	52
Corvid sp.	0	3	0	3
Sparrow sp.	0	40	0	40
Blackbird sp.	673	0	28	701
Passerine sp.	0	55	30	85
Other Birds	**8**	**0**	**0**	**8**
Rock dove	4	0	0	4
Northern flicker	4	0	0	4
Total	**901**	**228**	**238**	**1,367**

B.14 BIRD COUNTS DURING FALL MIGRATION SURVEYS

Table B-14 Bird Counts during Fall Migration Surveys

Birds	Week 1	Week 2	Week 3	Week 4	Total
Waterfowl	**1347**	**2643**	**8033**	**672**	**12695**
Snow goose	88	140	264	14	506
Canada goose	984	2383	7727	656	11750
Tundra swan	4	33	0	0	37
Canvasback	0	0	2	0	2
Ring-necked duck	0	0	0	2	2
Duck sp.	271	87	40	0	398
Upland Game Birds	**9**	**0**	**6**	**0**	**15**
Gray partridge	8	0	0	0	8
Sharp-tailed grouse	1	0	6	0	7
Waterbirds	**303**	**256**	**1313**	**1,416**	**3,288**
Common loon	1	0	0	0	1
Pied-billed grebe	2	4	0	8	14
Great blue heron	1	0	1	0	2
Black-crowned night heron	1	0	0	0	1
Sandhill crane	71	12	0	0	83
Ring-billed gull	84	0	1	0	85
Herring gull	0	0	0	2	2
Common tern	8	0	0	0	8
Gull sp.	135	240	1311	1406	3092
Raptors	**40**	**45**	**28**	**25**	**138**
Turkey vulture	7	3	0	0	10
Bald eagle	6	4	5	4	19
Northern harrier	4	10	7	4	25
Swainson's hawk	3	0	1	0	4
Red-tailed hawk	11	15	4	16	46
Rough-legged hawk	0	0	1	0	1
Golden eagle	0	4	0	0	4
American kestrel	4	9	0	0	13
Merlin	3	0	0	0	3
Prairie falcon	0	0	1	0	1

Table B-14 Bird Counts during Fall Migration Surveys

Birds	Week 1	Week 2	Week 3	Week 4	Total
Raptor sp.	2	0	9	1	12
Shorebirds	**0**	**0**	**1**	**0**	**1**
Wilson's snipe	0	0	1	0	1
Passerines	**559**	**691**	**877**	**311**	**2,438**
Gray jay	0	1	0	1	2
Blue jay	0	10	0	0	10
Black-billed magpie	9	9	11	9	38
American crow	41	0	0	0	41
Common raven	28	133	142	35	338
Barn swallow	0	4	0	0	4
European starling	0	100	227	0	327
Dark-eyed junco	0	98	350	48	496
Western meadowlark	0	0	0	12	12
Blackbird sp.	421	241	82	145	889
Passerine sp.	60	95	65	61	281
Other Birds	**55**	**18**	**9**	**33**	**115**
Rock pigeon	36	3	7	32	78
Mourning dove	11	5	0	0	16
Belted kingfisher	1	1	1	0	3
Hairy woodpecker	0	2	0	0	2
Northern flicker	7	7	1	1	16
Total	**2313**	**3653**	**10267**	**2,457**	**18,690**

B.15 BIRD COUNTS DURING SPRING WETLAND SURVEYS

Table B-15 Bird Counts during Spring Wetland Surveys

Birds	Week 1	Week 2	Week 3	Total
MORNING SURVEY	**177**	**176**	**31**	**388**
Waterfowl	**163**	**151**	**15**	**329**
Canada goose	2	0	0	2
Mallard	0	0	6	6
Blue-winged teal	12	0	0	12
Bufflehead	16	0	0	16
Scaup sp.	47	0	2	49
Duck sp.	86	151	7	244
Waterbirds	**14**	**25**	**13**	**52**
Red-necked grebe	0	0	6	6
Western grebe	0	0	2	2
Franklin's gull	0	0	5	5
Ring-billed gull	1	0	0	1
Gull sp.	0	25	0	25
Grebe sp.	13	0	0	13
Shorebirds	**0**	**0**	**3**	**3**
Shorebird sp.	0	0	3	3
EVENING SURVEY	**100**	**92**	**58**	**250**
Waterfowl	**100**	**70**	**30**	**200**
Canada goose	22	2	0	24
Mallard	6	1	3	10
Blue-winged teal	4	0	0	4
Green-winged teal	0	0	1	1
Northern shoveler	4	1	0	5
Redhead	2	0	0	2
Ring-necked duck	0	0	2	2
Scaup sp.	52	0	6	58
Duck sp.	10	66	18	94
Waterbirds	**0**	**10**	**6**	**16**
Common loon	0	1	1	2
Pied-billed grebe	0	0	2	2
Red-necked grebe	0	0	2	2

Table B-15 Bird Counts during Spring Wetland Surveys

Birds	Week 1	Week 2	Week 3	Total
Eared grebe	0	7	0	7
Western grebe	0	2	1	3
Shorebirds	**0**	**0**	**22**	**22**
Shorebird sp.	0	0	22	22
Passerines	**0**	**12**	**0**	**12**
Tree swallow	0	12	0	12
Total	**277**	**268**	**89**	**634**

B.16 BIRD COUNTS DURING FALL WETLAND SURVEYS

Table B-16 Bird Counts during Fall Wetland Surveys

Waterbody	Week 1	Week 2	Week 3	Week 4	Total
RED RIVER	**987**	**1900**	**1264**	**546**	**4695**
Waterfowl	**177**	**205**	**135**	**462**	**979**
Greater white-fronted goose	0	0	0	1	1
Canada goose	177	205	135	461	978
Waterbirds	**808**	**1692**	**1126**	**72**	**3698**
Great blue heron	0	0	1	0	1
Cattle egret	0	0	0	1	1
Ring-billed gull	808	1209	410	71	2498
Gull sp.	0	483	715	0	1198
Raptors	**0**	**0**	**0**	**1**	**1**
Bald eagle	0	0	0	1	1
Passerines	**2**	**3**	**3**	**2**	**8**
Common raven	0	3	1	2	6
Passerine sp.	2	0	2	0	4
Other Birds	**0**	**0**	**0**	**9**	**9**
Rock pigeon	0	0	0	9	9
DEACON RESERVOIR	**2239**	**206**	**174**	**15**	**2634**
Waterfowl	**296**	**200**	**149**	**14**	**659**
Canada goose	296	198	149	14	657
Duck sp.	0	2	0	0	2
Waterbirds	**1942**	**5**	**18**	**0**	**1965**
American white pelican	0	0	3	0	3
Western grebe	0	0	4	0	4
Ring-billed gull	1471	5	4	0	1480
Gull sp.	471	0	7	0	478
Raptors	**1**	**1**	**2**	**1**	**5**
Raptor sp.	1	1	2	1	5
Shorebirds	**0**	**0**	**2**	**0**	**2**
Killdeer	0	0	2	0	2
Passerines	**0**	**0**	**3**	**0**	**3**
American crow	0	0	3	0	3
ASSINIBOINE RIVER	**283**	**1603**	**75**	**392**	**2353**

Table B-16 Bird Counts during Fall Wetland Surveys

Waterbody	Week 1	Week 2	Week 3	Week 4	Total
Waterfowl	**98**	**277**	**32**	**1**	**408**
Snow goose	9	0	0	0	9
Canada goose	85	268	28	0	381
Duck sp.	4	9	4	1	18
Waterbirds	**113**	**1320**	**41**	**381**	**1855**
Great blue heron	0	0	0	1	1
Ring-billed gull	113	1320	41	380	1854
Raptors	**2**	**2**	**1**	**4**	**9**
Bald eagle	0	1	0	4	5
Northern harrier	0	0	1	0	1
Red-tailed hawk	2	1	0	0	3
Passerines	**70**	**4**	**1**	**6**	**81**
Least flycatcher	0	1	0	0	1
Red-winged blackbird	0	1	0	2	3
Blackbird sp.	17	0	0	0	17
Passerine sp.	53	2	1	4	60
SUNDOWN LAKE	**886**	**32**	**37**	**18**	**973**
Waterfowl	**878**	**29**	**36**	**16**	**959**
Snow goose	27	0	0	0	27
Canada goose	844	2	10	0	856
American wigeon	0	1	0	0	1
Mallard	2	0	0	0	2
Blue-winged teal	0	3	0	0	3
Redhead	0	2	0	0	2
Lesser scaup	0	20	0	8	28
Ruddy duck	0	0	1	0	1
Scaup sp.	0	0	2	0	2
Duck sp.	5	1	23	8	37
Waterbirds	**6**	**0**	**1**	**2**	**9**
Pied-billed grebe	4	0	1	0	5
Red-necked grebe	0	0	0	2	2
Grebe sp.	2	0	0	0	2

Table B-16 Bird Counts during Fall Wetland Surveys

Waterbody	Week 1	Week 2	Week 3	Week 4	Total
Raptors	**1**	**1**	**0**	**0**	**2**
Bald eagle	1	1	0	0	1
Other Birds	**1**	**2**	**0**	**0**	**3**
Belted kingfisher	1	0	0	0	1
Downy woodpecker	0	1	0	0	1
Hairy woodpecker	0	1	0	0	1
RICHER LAKE	**190**	**167**	**56**	**49**	**462**
Waterfowl	**125**	**163**	**45**	**43**	**376**
Snow goose	0	23	0	0	23
Canada goose	73	115	0	0	188
Gadwall	2	0	0	0	2
Mallard	1	0	0	0	1
Northern shoveler	0	0	1	0	1
Northern pintail	0	0	2	0	2
Canvasback	1	0	0	0	1
Lesser scaup	0	0	0	2	2
Common goldeneye	8	8	0	0	16
Hooded merganser	0	0	2	0	2
Ruddy duck	0	2	0	0	2
Swan sp.	0	1	0	0	1
Scaup sp.	0	2	7	0	9
Duck sp.	40	12	35	41	128
Waterbirds	**61**	**4**	**9**	**5**	**79**
Common loon	0	0	2	0	2
Pied-billed grebe	20	2	4	2	28
Red-necked grebe	0	2	0	0	2
Western grebe	0	0	0	1	1
American white pelican	0	0	0	1	1
Double-crested cormorant	1	0	1	1	3
American coot	40	0	0	0	40
Shorebirds	**0**	**0**	**0**	**1**	**1**
Shorebird sp.	0	0	0	1	1

Table B-16 Bird Counts during Fall Wetland Surveys

Waterbody	Week 1	Week 2	Week 3	Week 4	Total
Passerines	**4**	**0**	**2**	**0**	**6**
American crow	4	0	0	0	4
Marsh wren	0	0	2	0	2
LONESAND LAKE	**33**	**43**	**7**	**34**	**117**
Waterfowl	**16**	**22**	**6**	**30**	**74**
Canada goose	1	0	0	0	1
Tundra swan	4	4	2	0	10
Mallard	1	4	0	0	5
Blue-winged teal	0	0	0	4	4
Scaup sp.	2	0	0	0	2
Duck sp.	8	14	4	26	52
Waterbirds	**17**	**21**	**0**	**2**	**40**
Common loon	2	4	0	0	6
Pied-billed grebe	2	8	0	2	12
American coot	13	9	0	0	22
Raptors	**0**	**0**	**1**	**0**	**1**
Bald eagle	0	0	1	0	1
Passerines	**0**	**0**	**0**	**1**	**1**
Common raven	0	0	0	1	1
Other Birds	**0**	**0**	**0**	**1**	**1**
Downy woodpecker	0	0	0	1	1
Total	**4618**	**3951**	**1613**	**1054**	**11233**

B.17 NUMBER OF CARCASSES FOUND PER WEEK AT ALL SURVEY SITES

Table B-17 Number of Carcasses Found per Week at All Survey Sites

Site ID	Week 1	Week 2	Week 3	Week 4	Total
MMSA01	2	5	2	0	9
MMSA02	0	1	1	1	3
MMSA03	0	0	0	0	0
MMSA04	0	0	0	1	1
MMSA05	0	1	0	0	1
MMSA06	1	0	0	0	1
MMSA09	0	0	0	0	0
MMSA10	3	0	0	0	3
MMSA11	not searched	0	0	0	0
MMSA12	not searched	0	1	0	1
MMSA13	not searched	0	0	0	0
MMSA14	not searched	0	0	0	0
MMSA15	not searched	0	0	0	0
MMSA16	not searched	3	1	1	5
MMSA17	not searched	0	0	0	0
MMSA18	not searched	1	0	0	1
Total	6	11	5	3	25

B.18 ALL CARCASSES FOUND DURING 2014 BIRD MORTALITY MONITORING

Table B-18 All Carcasses Found During 2014 Bird Mortality Monitoring

Date	Site ID	Species Name	Scientific Name	Easting	Northing
24-Sep-14	MMSA01	White-throated sparrow	*Zonotrichia albicollis*	612761	5524784
24-Sep-14	MMSA01	Yellow-bellied sapsucker	*Sphyrapicus varius*	612752	5524646
25-Sep-14	MMSA06	Green-winged teal	*Anas crecca*	666562	5525436
25-Sep-14	MMSA10	Unknown	Unknown	690881	5503054
25-Sep-14	MMSA10	Unknown	Unknown	690865	5503084
25-Sep-14	MMSA10	Unknown	Unknown	690848	5503094
1-Oct-14	MMSA01	Unknown	Unknown	612779	5524702
1-Oct-14	MMSA01	Savannah sparrow	*Passerculus sandwichensis*	612748	5524605
1-Oct-14	MMSA01	Unknown	Unknown	612799	5524662
1-Oct-14	MMSA01	Unknown	Unknown	612791	5524686
1-Oct-14	MMSA01	Sora	*Porzana carolina*	612798	5524772
1-Oct-14	MMSA02	Canada goose	*Branta canadensis*	648623	5524966
1-Oct-14	MMSA05	Unknown	Unknown	666303	5525388
3-Oct-14	MMSA16	Unknown	Unknown	667961	5525468
3-Oct-14	MMSA16	Unknown	Unknown	668047	5525475
3-Oct-14	MMSA16	Unknown	Unknown	668054	5525469
3-Oct-14	MMSA18	Fox sparrow	*Passerella iliaca*	663911	5525337
8-Oct-14	MMSA01	Cedar waxwing	*Bombycilla cedrorum*	612758	5524671
8-Oct-14	MMSA01	White-throated sparrow	*Zonotrichia albicollis*	612768	5524616
8-Oct-14	MMSA02	Unknown	Unknown	648696	5524969
9-Oct-14	MMSA12	Unknown	Unknown	694391	5488591
10-Oct-14	MMSA16	Unknown	Unknown	668038	5545441
15-Oct-14	MMSA02	Unknown	Unknown	648736	5524993
16-Oct-14	MMSA04	Great blue heron	*Ardea herodias*	671218	5525446
16-Oct-14	MMSA16	Dark-eyed junco	*Junco hyemalis*	667994	5525438

B.19 HABITAT RANKING FOR AMPHIBIAN SURVEY SITES WITH NORTHERN LEOPARD FROG DETECTIONS

Table B-19 Habitat Ranking for Amphibian Survey Sites with Northern Leopard Frog Detections

Site	Habitat Rank	Habitat Type	Survey Type	Rationale for Habitat Rank
1.05	Moderate	Creek outflow from Sundown Lake	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=4)
2.09	Low	2.3 km west of Rat River	Spring Roadside Call Count	Northern leopard frog presence (n=1) Low species diversity (n=2)
5.04	Moderate	Wetland complex; 3 water bodies; Class 3-4; 300 m x 90 m; headwaters of Seine River	Spring Roadside Call Count	Northern leopard frog presence (n=3) Moderate species diversity (n=3)
6.02	Moderate	Wetland; Class 4; 85 m x 25 m	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=4)
6.03	Moderate	Wetland; Class 3; 51 m x 15 m	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=3)
6.04	Moderate	Large bog in partially forested, uncultivated land	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=4)
6.07	Moderate	Large bog in partially forested, uncultivated land	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=4)
6.08	Moderate	Large bog in partially forested, uncultivated land	Spring Roadside Call Count	Northern leopard frog presence (n=1) Moderate species diversity (n=4)
2	High	Assiniboine River	Fall Wetland, VES	Northern leopard frog presence (n=24 [including10 incidental])
4	High	Red River	Fall Wetland, VES	Northern leopard frog presence (n=17; including 13 incidental])
5	Moderate	Seine River; adjacent to Hwy 59 at SE edge of Winnipeg	Fall Wetland, VES	Northern leopard frog presence (n=3)

Table B-19 Habitat Ranking for Amphibian Survey Sites with Northern Leopard Frog Detections

Site	Habitat Rank	Habitat Type	Survey Type	Rationale for Habitat Rank
8	Moderate	Edie Creek; channelized	Fall Wetland, VES	Northern leopard frog presence (n=4)
17	Moderate	Wetland complex 200 m SW of Lake Phaneuf	Fall Wetland, VES	Northern leopard frog presence (n=1); Moderate species diversity (n=3)
22	High	Tributary to Rat River	Fall Wetland, VES	Northern leopard frog presence (n=1) SOCC presence (1 eastern tiger salamander)
26	High	Seine River	Fall Wetland, VES	Northern leopard frog presence (n=45)
29	Low	Wetland; Class 4; 85 m X 25 m	Fall Wetland, VES	Low species diversity (n=2)
33	High	Rat River	Fall Wetland, VES	Northern leopard frog presence (n=12)
37	Moderate	Bog 4.5 km SW of Sundown Lake	Fall Wetland, VES	Northern leopard frog presence (n=3) Moderate species diversity (n=4)
38	Moderate	Bog 3.5 km SW of Sundown Lake	Fall Wetland, VES	Moderate species diversity (n=4)
39	Low	Oak Bluff lagoon (artificial)	Fall Wetland, VES	Northern leopard frog presence (n=1)
D6O2F06	High	Beaver pond on a dammed creek	Fall Wetland, VES	Northern leopard frog presence (n=29)
WLA	High	Sundown Lake	Spring Wetland, Spring Roadside Call Count, Fall Wetland, VES	High species diversity (n=5)
WLB	High	Oxbow channel on Rat River	Spring Wetland, Spring Roadside Call Count, Fall Wetland, VES	Northern leopard frog presence (n=75)
WLC	High	North basin of Pocock Lake	Spring Wetland, Spring Roadside Call Count, Fall Wetland, VES	High species diversity (n=6)
WLD	Moderate	Rat River; area of high sinuosity	Spring Wetland, Spring Roadside Call Count	Northern leopard frog presence (n=5)

Table B-19 Habitat Ranking for Amphibian Survey Sites with Northern Leopard Frog Detections

Site	Habitat Rank	Habitat Type	Survey Type	Rationale for Habitat Rank
WLE	High	Wetland; Class 4; 115 m X 16 m	Spring Wetland, Spring Roadside Call Count	High species diversity (n=5)
WLF	Moderate	Oxbow channel on Seine River	Spring Wetland, Spring Roadside Call Count	Northern leopard frog presence (n=4)
WLH	Moderate	Richer Lake	Spring Wetland, Spring Roadside Call Count, Fall Wetland, VES	Northern leopard frog presence (n=1) Moderate species diversity (n=3)
WLI	Moderate	Lac Bossé	Spring Wetland, Spring Roadside Call Count, Fall Wetland, VES	Moderate species diversity (n=4)
WLM	High	St. Labre bog; headwaters of the Seine River	Spring Wetland, Spring Roadside Call Count	High species diversity (n=5)

APPENDIX C
SUPPLEMENTAL INFORMATION

C.1 KPI QUESTIONNAIRES

MCWS Wildlife and Wildlife Habitat Questionnaire

Provided to: Dettman 2015, pers. comm., Hristenko 2015, pers. comm., Leavesley 2015, pers. comm., Rebizant 2015, pers. comm.
friesen

Species	What is the **current** population trajectory (increasing, stable, or decreasing)?	What is the magnitude of the change (small, moderate, or large)?	How does this compare with **longer-term** trends (increasing, stable, or decreasing)?	What are the contributing factors and threats to the population?
White-tailed deer	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle
Elk	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle
Moose	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle
Black Bear	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle
Wolves	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle
Other Furbearers	☐ Increasing ☐ Stable ☐ Decreasing	☐ Small ☐ Moderate ☐ Large	☐ Increasing ☐ Stable ☐ Decreasing	☐ Environmental ☐ Overharvest ☐ Predation ☐ Parasites ☐ Natural Cycle

General

In your opinion, what is the overall state of wildlife and wildlife habitat in the area that the preferred route traverses?

Are there any specific areas or parcels of land that your organization interested in protecting?

Are there any specific habitats types that your organization interested in protecting?

Are there any areas with important wildlife habitat (e.g., calving, breeding, overwintering, dens, mineral licks)?

In the last 10 years, how has resource development affected wildlife habitat in the area?

Has regulated hunting activity increase, decreased, or remained constant over the last 10 years? If increase or decrease, please explain.

Has rights-based harvesting activity increase, decreased, or remained constant over the last 10 years? If increase or decrease, please explain.

What big game species are important to local resource users, FN and Metis? Which, if any, are considered a nuisance species?

White-tailed Deer

Do white-tailed deer use transmission line corridors in SE Manitoba? Is it at an elevated level or is there avoidance?

Do you think the proposed transmission line could impact the deer population?

If so, please explain.

Elk

How and when did the Vita-Caribou elk herd become established in Manitoba?

(i.e., how many to start, did they come from Minnesota?)

Approximately how many individuals are in the Vita-Caribou herd?

Can you describe annual movements of the herd in Manitoba and Minnesota?

Using results from field studies, maps obtained from Minnesota DNR, and data from MCWS aerial survey data, we have delineated an area though to be used by the Vita-Caribou herd. Can you comment on the accuracy of this delineation and suggest any changes based on your knowledge of the herd?

Field study results and KPIs suggest elk do not regularly reside east of of Sundown, MB (i.e., where MCWS observed elk during 2011 aerial flights [eastern bubble on map]). Can you provide any additional information about elk in this eastern area (i.e., how do they get there [from south or from west], are they there regularly [we didn't see them in 2014 and 2015 flights])? Are they part of the Vita-Caribou herd or is there another herd?

In 2011, the Minnesota Outdoor News reported MCWS and MN DNR were attempting to survey the Vita-Caribou herd simultaneously. What was the outcome of these surveys?

What factors limit the distribution of the Vita-Caribou herd (i.e., is habitat limited, are the Sundown/Caliento bogs an obstacle, hunting pressure)?

Do you think the proposed transmission line could impact the elk population?

If so, please explain.

Moose

What is the general distribution of moose in SE Manitoba? Are there any particularly high density areas?

Have moose ever occurred in greater densities than the present time?

If Yes:

- When?
- What factors contributed to the decline?

Do you think suitable moose habitat is limited in the southeast corner of the province?

Do you think the proposed transmission line could impact the moose population?

If so, please explain.

Black bear

What is the general distribution of black bears in SE Manitoba? Are there any particularly high density areas? Preferred habitats?

Do you think the proposed transmission line could impact the bear population?

If so, please explain.

Gray Wolf

What is the general distribution of wolves in SE Manitoba? Are there any particularly high density areas?

Do you think the proposed transmission line could impact the wolf population?

If so, please explain.

How have previous transmission line corridors in Manitoba impacted wolf populations?

Do wolves pose a significant threat to ungulate populations in SE Manitoba?

Do wolves currently use transmission line RoWs in SE Manitoba? Is this something MCWS is concerned about?

Cougar

What is the general distribution of cougars in SE Manitoba?

Do you think the proposed transmission line could impact the cougar population?

If so, please explain.

Other Furbearers

What species are particularly important to resource users, FN and Metis?

What species are particularly important to MCWS?

Do you think the proposed transmission line could impact furbearer populations?

If so, please explain.

How have previous transmission line corridors in Manitoba impacted furbearer populations?

Follow-up

Does MCWS have any additional data on the distribution and abundance of big game and furbearers in SE Manitoba?

If so, can it be made available to Stantec?

Do you have any other species-specific information not covered above, that you would like to add now?

Development-related Questions

How have past development projects affected wildlife and wildlife habitat in SE Manitoba?

How were impacts mitigated, if any?

Please identify any areas of concern along the proposed route as they relate to wildlife and wildlife habitat.

In general, what are the main wildlife and wildlife habitat-related concerns you and/or MCWS have in regards to the proposed development?

Do you foresee any benefits or opportunities for resource users with the development of a transmission line?

General Wildlife Questionnaire

Provided to: Bilawchuk 2014, pers. comm.; Cooper 2014, pers. comm.; Hildebrandt 2014, pers. comm.; Kuzenko 2014, pers. comm.; Legal 2014, pers. comm.; Paciorka 2014, pers. comm.; Single 2014, pers. comm.

From your observations, have Big Game (Bear/Deer/Moose/Elk) populations changed in the past 10 or more years?

If so, have these changes been a trend in one direction, or a fluctuation, or a combination of both? Please describe (i.e., size of fluctuation, general trend up or down, is it a cycle with predictable length?).

Do you feel that changes are in response to an external influence (i.e., extreme weather events, climate change, loss of habitat, increased hunting pressures, traffic related mortalities etc.) or a natural cycle?

Has the hunting increased, decreased or remained constant in the area over the last 10 years?

To your knowledge what game species are important to local resource users? What species are considered nuisance?

Do Resource Users currently utilize any existing MH ROW for their recreational pursuits?

Do you have any concerns regarding transmission line development in the area (SE Man.)?

Do you foresee any benefits or opportunities for Resource Users with the development of a transmission line?

What land uses are best suited to be in proximity to Hydro Transmission Line Corridors?

Do you have any suggestions for mitigating change to the Bear/Deer population in regards to Resource User's utilization of the area?

Was there any other disturbance in the area that proved to be negative to Resource User's utilization of the area (i.e., forestry operations, mining, fires, etc.)? Are there any disturbances that would be considered favorable to resource users?

Can you tell us of any incidental observations of elk, elk calving areas, rutting areas, moose, wolf dens, sharp-tailed grouse leks, snake hibernacula, turtle breeding areas, or other areas of wildlife significance?

What environmental features are important to your organization (e.g. water quality, wetlands)?

Have past development projects affected environmental features important to resource users?

How were impacts mitigated, if any?

Are there any areas with important wildlife habitat (spawning, calving, breeding and nesting areas) in the Study Area?

Are there any areas that consistently support large concentrations or gatherings of wildlife in the Study Area?

Are there any important rivers, streams or wetlands in the Study Area that provide wildlife habitat or fishing opportunities?

Note: Resource Users is intended to be a generic representation of the various user groups. Eg. For a wildlife association we would use your members. For an NRO interview we might say resource users or hunters if appropriate.

Hunting Outfitter Questionnaire

Provided to: Holme 2014, pers. comm.

What is your current allocation for Bear and Deer?

What about what proportion of your operation is on crown/private land?

How much of your allocation do you use in most years? Do you keep records of this?

Has your allocation changed over the years?

Was this change in allocation due to a change in bear populations or a change in economics?

From your observations, have Bear/Deer populations changed in the past 10 or more years?

If so, have these changes been a trend in one direction, or a fluctuation, or a combination of both? Please describe (i.e., size of fluctuation, general trend up or down, is it a cycle with predictable length?).

Do you feel that changes are in response to an external influence (i.e., extreme weather events, climate change, loss of habitat, increased hunting pressures, traffic related mortalities etc.) or a natural cycle?

What do you feel are currently the strongest forces driving change to Bear/Deer numbers according to your business?

Have you noticed a change in bear demographics (male/female ratio, number of cubs per sow, etc.)?

Have you participated in any provincial studies (submission of reproductive tracts, etc.)?

Do you currently utilize any existing MH ROW for your operation?

Do you have any concerns regarding transmission line development in the area near your allocation?

Do you foresee any benefits or opportunities for your business with the development of a transmission line?

Do you feel there will be any negative aspects to transmission line development?

Do you have any suggestions for mitigating change to the Bear/Deer population in regards to your business?

Was there any other disturbance in the area that proved to be negative to your operation (i.e., forestry operations, mining, fires, etc.)?

Are you aware of any habitually used Bear den sites?

Would you be willing to provide us the locations?

Can you tell us of any incidental observations of elk, elk calving areas, rutting areas, moose, wolf dens, sharp-tailed grouse leks, snake hibernacula, turtle breeding areas, or other areas of wildlife significance?

Is there resident Bear/ Deer hunting in the area?

Has the resident hunting increased, decreased or remained constant in the area over the last 10 years?

Amphibian-specific Questionnaire

Provided to: Collicutt 2015, pers. comm.

Do you know of any sensitive herp sites (e.g., hibernacula, nesting areas, other congregations) that might be within 15 km of the transmission line right-of-way? If so, could you please specify a location.

How important are Caliento and Sundown bogs for herp habitat? Any species specifically?

Do transmission lines pose any threats to herp species? If so, please specify.

The 2013 COSEWIC report for eastern tiger salamander shows two locations of eastern tiger salamander east of the Red River and north of the Rat River. They appear to be associated with the Seine River. Can you confirm?

During our 2014 field studies we encountered an abundance of herps (mostly frogs, such as northern leopard frog) at nearly all wetlands surveyed. Can you comment on the status of herp populations in southeastern MB? Given that we are in a particularly wet period in the wet-dry cycle, do you think that herp populations are currently at somewhat of a peak or are they more average.

Bird-specific Questionnaires

Duncan 2015, pers. comm.

Is the project area an important migration corridor for snowy owls?

To what degree do great grey owls breed in the project area?

Are there any specific areas that you feel could be an issue related to owls?

Are there any areas of high owl concentration in the project area?

Baldwin 2015, pers. comm.

Do you know of any sharp-tailed grouse lek's within the project area?

Does MB Conservation have a recommendation in place for the size of buffers around sharp-tailed grouse leks during construction activities? If not, do you recommend activity restriction guidelines developed by Saskatchewan Ministry of Environment (400 m)?

Wheeldon 2015, pers. comm.

Do you have any general concerns regarding raptors in the study area relative to the proposed transmission line?

Artuso 2015, pers. comm.

Have you observed any negative effects of transmission lines on birds (i.e. collisions) (if he doesn't mention it, ask specifically about the "100 sandhill cranes in the wires" MB Hydro references)? If so, are you aware of any specific area that has a high potential for collisions?

Are there any locations within the RAA that stand out as important bird areas, either for breeding, migration, or SOCC?

In general, eBird and MB BBA data indicates a high frequency of SOCC observations in and around Winnipeg, is it reasonable to assume most of these are migrants and/or the high number of birdwatchers in Winnipeg misrepresents actual breeding SOCC?

Are you aware of any SOCC that are known to breed in Winnipeg?

Many of the SOCC that occur in the RAA have been observed north of Richer near Ross, MB (including forest and wetland birds). Can you tell us anything about the habitat composition or features of the area that seem to make it important?

The Caliento/Sundown bog complex is a large difficult to access (and survey) wetland containing significant tracts of wetland bird habitat (including yellow rail), can you comment on its significance/insignificance as yellow rail and wetland bird habitat? Are you aware of yellow rail observations in the Caliento/Sundown Bog?

Have you noticed any general trends in bird communities in south eastern MB? Specifically with SOCC or large flocks of migrating birds?

According to 2014 Hawkwatch data from St. Adolphe, MB, 3,296 raptors from 12 species were observed during spring migration (red-tailed hawk made up 2745 observations, bald eagle 335 observation). Any general comments on the 2014 spring raptor migration, was it typical/atypical?

Have you noticed any general effects that the last two harsh winters/late springs had on bird communities/migration in southeast MB?

Canada warbler is an interior forest bird whose habitat may be impacted by the proposed project. eBird and MB BBA data indicates its primary range is east and north of the RAA but multiple observations have been reported in Winnipeg, and isolated observations near Richer and Woodridge. Are these Canada warbler observations migrant birds or can we expect this species to be breeding in the RAA? Are you aware of any specific areas in the RAA where a breeding population of Canada warbler occur?

The golden-winged warbler's range is thought to be increasing in southeastern MB as logging and other activities increases suitable habitat, have you noticed any trends in golden-winged warbler populations and range? If so, where?

We surveyed for common nighthawk in mid-June and detected none, but 23 were detected incidentally in mid-May. Is it reasonable to assume these birds were migrants and not breeding in the RAA?

According to the MB BBA a confirmed observation of Sprague's pipit was reported near Sandilands, the only observation east of Glenboro South Station. Accidental migrant or breeder?

Are you aware of Sprague's pipit breeding in the RAA?

There have been observations of loggerhead shrike reported near Winnipeg and Ste. Anne. Are they confirmed breeders in the RAA or accidental migrants from the southwest?

Trumpeter swans were observed several times on Lonesand Lake (the large wetland south of Lonesand with the campground/trailer park around the edge), are you aware of other locations in the RAA where observations are commonly reported?

Three sharp-tailed grouse leks were identified during spring surveys, one northwest of Richer, one north of La Broquerie, and one south of La Broquerie. Are you aware of other grouse leks in the RAA? If so, approximately how many and where?

C.2 GOLDEN-WINGED WARBLER MAPPING METHODS

Golden-winged Warbler Habitat Suitability Mapping Methods

Golden-winged warbler breeding habitat is relatively specific, typically characterized by the transition between mature hardwood forests and adjacent early successional or shrubby habitats, and is outlined in Environment Canada's golden-winged warbler Recovery Strategy. Using FRI data, suitable breeding habitat within the LAA was mapped to identify suitability categories (*i.e.*, high, medium, low). Habitat suitability was assessed using the following criteria:

High:

- 200 m buffer into hardwood and mixedwood forest (cutclass 3, 4 and 5) when next to grassland, shrub, and willow.
- 50 m periphery into grassland when next to hardwood and mixedwood forest (cutclass 3, 4 and 5).
- 200 m periphery into shrub and willow when next to hardwood and mixedwood forest (cutclass 3, 4 and 5).

Medium:

- 200 m buffer into hardwood and mixedwood forest (cutclass 0, 1 and 2) when next to grassland, shrub, and willow.
- 50 m periphery into grassland when next to hardwood and mixedwood forest (cutclass 0, 1 and 2).
- 200 m periphery into shrub and willow when next to hardwood and mixedwood forest (cutclass 0, 1 and 2).

Low:

- All other hardwood and mixedwood forest (cutclass 0, 1, 2, 3, 4, 5 and 6) neighboring any other class.

APPENDIX D
PHOTOS

Photo 1. Mammal camera trap.

Photo 2. Camera trap photo of a white-tailed deer and fawn travelling along M602F.

Photo 3. Camera trap photo of two male deer interacting during the fall rut (breeding period).

Photo 4. Camera Trap photo of a family of black bears

Photo 5. Elk observed near Arbakka, Mb, during 2015 winter aerial track surveys.

Photo 6. Black bear on top of den during January 2015 aerial winter track surveys.

Photo 7. Breeding bird survey in a wetland.

Photo 8. Yellow rail survey site in the Caliento Bog.

Photo 9. Fall migration driving survey near Richer Lake.

Photo 10. Deacon Reservoir.

Photo 11. Sharp-tailed grouse survey site near pasture.

Photo 12. South Loop Transmission Line Corridor and 230 kv line crossing the Assiniboine River.

Photo 13. Bird mortality monitoring under M602F.

Photo 14. Northern Leopard Frogs in sluggish wetland.

Photo 15. Two tundra swans loafing on Lonesand Lake.

Photo 16. Sundown Lake looking east.

Photo 17. Eastern painted turtle near Sundown Lake.

Photo 18. Red-sided garter snake in St. Labre Bog northeast of Marchand.

Photo 19. Monarch butterfly feeding on milkweed near Sundown Lake.