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Lake Manitoba Outlet Channels: Wildlife Technical Report

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GLOSSARY OF TERMS

Alluvial* - Loose soil or sediment that is eroded, deposited, and reshaped by water.

Brunisols - Soil formed under forest and is brown in color and may have either clay or aluminum and iron compounds, or both.

Calcareous – Soil containing sufficient calcium carbonate (or magnesium carbonate) to effervesce visibly when treated with hydrochloric acid.

Chernozems – Well to imperfectly drained soil with dark surface horizons comprised of decomposed organic matter from grassland or grassland-forest communities.

Dolomite - Sedimentary carbonate rock, which is composed predominantly of the mineral dolomite (calcium magnesium carbonate).

Ericaceous* – Plants in or related to the heather family (Ericaceae), typically found on acid soils.

Fibrosol - Organic soil contains mostly un-decomposed fibric organic material and occurs in peat deposits of Sphagnum mosses.

Glacial Till – unstraitified glacial deposits consisting of clay, sand, gravel, and boulders intermingled in any proposition.

Glaciolacustrine* – Pertaining to glacial lakes.

Gleysol - Soil developed under wet conditions and has a layer of mixed peat or a layer of fibric moss peat on the surface.

Luvisol - Well to imperfectly drained soil in sandy to loamy sites with a layer of silicate clay and are the base saturated parent material under forest vegetation.

Mesic - Organic material in an intermediate stage of decomposition with fibers present that can be identified to their botanical origin.

Mesisol – Organic soil found in peatlands at an intermediate stage of decomposition.

Organic Cryosol – Developed primarily from organic material and are underlain by permafrost within 1 m of the surface.

Physiography* – Pertains to the factors that influence the development of landforms or a landscape, such as relief and topography, bedrock geology and structure, and geomorphological history.

Surficial geology* – The geology of surficial materials.

*All definitions have been described in Dunster and Dunster (1996), the remainder as described in Smith et al. (1998).

1 INTRODUCTION

Manitoba Infrastructure (MI) is currently developing options to address ongoing flood issues in the Assiniboine River and Lake Manitoba watershed basins. As part of this endeavour, MI initiated the *Assiniboine River & Lake Manitoba Basins Flood Mitigation Study*. This study, which was completed in 2011, included several components. In particular, the "*Assiniboine River & Lake Manitoba Basins Flood Mitigation Study Lake Manitoba & Lake St. Martin Outlet Channels Conceptual Design - Stage 1 - Deliverable No: LMB-01*" (KGS Group 2014) and the "*Assiniboine River & Lake Manitoba Basins - Flood Mitigation Study LMB & LSM Outlet Channels Conceptual Design - Stage 2*" (KGS Group 2016) were key to identifying future flood protection initiatives for the Assiniboine River and Lake Manitoba watershed basins.

The Stage 1 and Stage 2 Conceptual Designs prepared by KGS and MI included the three following components:

- further development of the Lake St. Martin Outlet Channel (LSMOC), which involves development of a channel in the area referred to as Reach 2 and completion of the channel referred to as Reach 3;
- construction and operation of a new channel from Lake Manitoba (LM) to Lake St. Martin (LSM) to increase flow capacity and expedite movement of flood waters between these waterbodies; and
- construction and operation of an All Season Road (ASR) in the area of the Lake St. Martin Outlet Channels to facilitate year-round vehicle, crew and equipment access to the Lake St. Martin Outlet Channels.

These three main components formed the overall MI Lake Manitoba and Lake St. Martin proposed ASR and Outlet Channels Project (the Project) at the time of this writing.

MI later engaged M. Forster Enterprises (MFE) and a team of professional consultants to conduct desktop and field investigations at varying spatial scales near the Project to provide information on the existing environmental conditions for each of the three Project components listed above. The intent of these investigations was to describe the baseline conditions in vicinity of the Project to support a future Environmental Impact Assessment (EIA). While the overall Project will require approval and licensing under the federal *Canadian Environmental Assessment Act* (CEAA) and the Manitoba *Environment Act*, the realignment and construction of an ASR for construction access will require regulatory approval and licensing from the Province of Manitoba.

This Wildlife Technical Report outlines the baseline desktop, field studies, and associated analysis conducted to describe existing environmental conditions specific to wildlife populations and their habitat near the LMOC Routes (Route C and D).

2 Background

Prior to this assignment, MI had evaluated a number of different conceptual route options for the LMOC. At the time of this writing, MI had selected two preferred route options for the LMOC, referred to as the LMOC Route C and LMOC Route D. As such, the examination of existing environmental conditions for the LMOC was completed for these two preferred route options identified by MI.

The LMOC Route C would be located south of the Fairford River and run roughly parallel to the southern border of the Pinaymootang First Nation (FN). The LMOC Route D would run from an inlet on Watchorn Bay in Lake Manitoba to the outlet of Birch Creek on Lake St. Martin (KGS Group 2016). The Stage 2 Conceptual Design for Route C is presented on Plate 2 in KGS Group 2016, and the Stage 2 Conceptual Design for Route D is presented on Plate 5 in KGS Group 2016. Map 01 in Appendix G illustrates the LMOC Project Study Area and the proposed locations for LMOC Route C and LMOC Route D. Information on the boundaries selected for the Project study area is provided below in Section 3.

Based on the analysis conducted by KGS Group, the LMOC will be designed to convey a flow of 212 cubic metres per second (m^3/s) (7,500 cubic feet per second [cfs]) (KGS Group 2016). In addition to the design, excavation, construction and operation of the LMOC, selection of either route would require changes to existing roads and highways in the area of the channel, as well as the design, installation and operation of new bridges and new culvert crossings. At the time of this writing, the conceptual design of the LMOC included the construction and operation of a gated water control structure to manage flows within the LMOC; a permanent groyne to be constructed in Lake Manitoba at the LMOC inlet; and the use of temporary cofferdams at the Lake Manitoba inlet and Lake St. Martin outlet areas during construction (KGS Group 2016).

Environmental studies, including those detailed in this report, are being conducted to assess these two outlet channel routes. Map 1 illustrates the various Project Components.

3 ABORIGINAL TRADITIONAL KNOWLEDGE

It is recognized that there are many plant species, wildlife species, fish species and areas of cultural significance to many First Nations peoples, and that these plants, wildlife, fish and areas of significance will vary by the practices of each First Nation, and their gathering locations. It is recognized that First Nations people have a special relationship with the earth and all living things in it. This relationship is based on a profound spiritual connection to the environment that guided indigenous peoples to practice reverence, humility and reciprocity. First Nations people have relied on many species of plants, wildlife and fish for subsistence needs and cultural values that extend back thousands of years. In regard to the collection and use of Aboriginal Traditional Knowledge (ATK) for the baseline investigations, MI and First Nations consultations were ongoing at the time of this writing, and ATK for plants, wildlife, fish and areas of cultural significance in the Project Study Area had yet to be compiled.

4 STUDY OBJECTIVES

The wildlife baseline desktop and field studies were conducted to:

1) gather and assess data derived from past studies conducted in the vicinity of the Project to provide historical mammal, avian, reptile, and amphibian distribution data;

2) determine mammal, avian, reptile, and amphibian habitat availability near, and potentially affected by, the Project;

3) gather and assess current mammal, avian, reptile, and amphibian distribution data and habitat use near the Project;

4) assess for the presence of invasive species (example: white-tailed deer);

5) determine the presence of Species At Risk and their habitat use in vicinity to the Project; and

6) inventory the presence and location of Ecologically Sensitive Sites in vicinity to the Project.

5 METHODS

5.1 Desktop Studies and Analysis

Historical and current wildlife (mammalian, avian, reptile, and amphibian) distribution data were obtained from Manitoba Sustainable Development (MBSD, The Manitoba Herps Atlas, Important Bird Area (IBA) databases, the Manitoba Breeding Bird Atlas, and through field studies. Spatial layers utilized for analysis include but are not limited to; the National Road Network (NRN), National Hydro Network (NHN), Forest Resource Inventory (FRI), and the Canadian Soil Info Services (CanSIS). These layers were acquired through the publicly available Manitoba Lands Initiative (MLI) website. For additional habitat analysis, the Land Cover Classification of Canada (LCC) was obtained from the Geobase online data ware house. All spatial layers, other than the project features were obtained from publicly available data sources. Information collected was utilized for:

- The selection of spatial Study Area boundaries and selection of key species for assessment;

- Detailed listing of all wildlife species near the Project using available Provincial databases;

- Detailed literature reviews of life cycle and habitat requirements for key species;

- Review of species listings; Manitoba Endangered Species and Ecosystems Act (MESEA), Federal Species at Risk Act (SARA), Committee on the Status of Endangered Wildlife in

Canada (COSEWIC) and the Manitoba Conservation Data Center (MBCD) listing of species of conservation concern;

- Produce a spatial database of known locations for Species At Risk;
- Historical fire analysis;
- Habitat mapping and spatial analysis using Land Cover Classification Enhanced to select habitat and assess for high quality habitat for key wildlife species;
- Linear density analysis;
- Review of provincial historical records of wildlife distribution data based on Manitoba Sustainable Development past surveys conducted near the Project;
- Interviews with Resource Managers, Species Specialists (example: Dr. Craig Willis – Bat Specialist), and other information holders for important presence and absence information on key species; and
- Data collation with the development of a GIS database through acquisition of existing and available information. All spatial analysis and GIS data is compatible with ArcGIS 10.3. This database includes but is not limited to the following:
    - LCC;
    - Anthropogenic development inventories (nearby roads, transmission lines, communities);
    - Elevation data; and
    - Known wildlife distribution (terrestrial and aquatic wildlife include large mammals as well as small furbearers, avian (birds, bats), reptiles (snakes), and amphibian).

A detailed description of each of the desk top methods executed is provided within the related section of this Wildlife Technical Report.

5.2 Field Studies

Geospatial habitat modelling and species locational information were used to plan for field studies. Numerous field studies were conducted, each with a specific methodology, which are described in detail within the related section of this Wildlife Technical Report. The following is a list of the field studies conducted:

- Aerial moose (*Alces alces*), elk (*Cervus elaphus manitobensis*), and white-tailed deer (*Odocoileus virginianus*) survey;
- Aerial multispecies survey;

- Aerial shoreline survey (piping plover survey);
- Avian Point Count survey;
- Bird nest (egg) searches;
- Raptor nest and heron rookery survey;
- Amphibian Point Count survey;
- Reptile Hibernacula survey;
- Bat Hibernacula survey; and
- Ecologically Sensitive Site investigations (mammal dens, mineral licks etc.).

The data gathered from these surveys were used to validate the habitat modelling conducted and were analyzed to provide a better understanding of existing environmental conditions specific to wildlife near the Project prior to construction.

6 STUDY AREA

Given that the information collected for the baseline studies will be used in the environmental assessment for the Project, the study design for the wildlife studies included the establishment of appropriate study area spatial boundaries. For the purposes of environmental assessment, the spatial boundaries of a project are typically described at three spatial scales: a Project Footprint (PF), a Local Study Area (LSA) and a Regional Study Area (RSA). PF is the physical space or directly affected area in which the Project components or activities are located; the LSA is the area beyond the Project footprint in which potential Project effects are measurable; and the RSA is the area beyond the LSA within which most potential indirect and cumulative effects will occur (CEAA 2015).

The conceptual design information provided in KGS Group (2016) indicated that the LMOC Route C would have a total length of 11.6 km and a RoW width of about 400 m, and that the LMOC Route D would have a total length of 24.0 km and a RoW of about 400 m.

As such, the PF area for the LMOC Route C was designated as the area encompassed by the total length of the route and the total width of the route, including the RoW and areas within Lake Manitoba and Lake St. Martin that will be affected by the temporary cofferdams and permanent groyne; and the PF area for the LMOC Route D was designated as the area encompassed by the total length of the route and the total width of the route, including the RoW and areas within Lake Manitoba and Lake St. Martin that will be affected by the temporary cofferdams and permanent groyne.

As noted above in Section 4, a desktop review of the wildlife species and wildlife habitat potentially present in the Project Study Area was conducted as part of the wildlife baseline studies; this information was used to establish spatial boundaries that would be linked to the Project Study Area wildlife, their habitat and their movements in the Project Study Area. The desktop review showed that there was the potential for the presence of large ungulates such as moose and elk. These species typically range throughout a large area, as opposed to other wildlife species identified to be potentially present in the Project Study Area. As such, the boundaries for the LSA and RSA were selected to reflect the seasonal movements and home ranges of these large ungulates.

The LSA for the proposed LMOC Route C was designated as the total length of the proposed channel with a width of 5 km from either side of the centreline of the proposed channel, and the LSA for the proposed LMOC Route D was designated as the total length of the proposed channel with a width of 5 km from either side of the centreline of the proposed channel. This 5 km width was selected based on literature on the potential local disturbance effects of roads on moose (Laurian et al., 2008; Silverberg et al., 2003; Wasser et al., 2011; Yost et al., 2001). The rationale was that this area was large enough to capture the potential measurable effects on moose and their habitat, as well as the other wildlife species and their habitat in the Project Study Area, i.e., other mammals, reptiles, amphibians and birds.

The RSA for the proposed LMOC Route C was designated as the total length of the proposed channel with a width of 20 km from either side of the centreline of the proposed channel, and the RSA for the proposed LMOC Route D was designated as the total length of the proposed channel with a width of 20 km from either side of the centreline of the proposed channel. This size for the RSA was selected based on a typical moose home range size of 40 square kilometres (km²) (Hundertmark, 1997). The rationale was that a 40 km^2 RSA would account for the potential indirect and cumulative effects on moose, and would also account for the potential indirect and cumulative effects on a broad range of wildlife species. Elk, for example, have home range sizes that vary substantially, with small home ranges of approximately 50 km² and large home ranges in the hundreds of km² (Frair et al., 2005). Having a larger home range size offers elk more landbase within their home range to disperse to when disturbance events occur, thereby diminishing the impact of disturbance on elk in comparison to moose. As such, it was considered that the potential indirect and/or cumulative effects on elk would be effectively captured within the 40 km² RSA.

As noted in Section 1, the overall Project has three components and includes further development of the LSMOC; construction and operation of the LMOC; and the construction and operation of the proposed ASR. Although this report is focussed on the baseline information for the proposed LMOC, the need to include the movements and spatial range of moose resulted in the 5 km LSA and 20 km RSA described above. The use of a 5 km LSA and 20 km RSA resulted in some overlap with the areas potentially affected by the existing and planned LSMOC, LMOC and the proposed ASR. Map 01 shows the designated PF, LSA and RSA for the ASR component of the

Project, and illustrates the overlap in study areas that occurred due to the proximity of the other two Project components.

6.1 Environmental Setting

The RSA is located within the Boreal Plains Ecozone, which extends as a wide band from the Peace River, British Columbia to the southeast corner of Manitoba (Map 2). In Manitoba, it extends from the southeast and north to encompass the entire east shore of Lake Winnipeg, curving up through the southern Interlake to the Manitoba-Saskatchewan borders (Smith et al., 1998). The ecozone is dominated by gently rolling uplands and lowlands including wetland and peatland areas.

The **surficial geology**[1] is deep, tending to mask the underlying bedrock layers of Cretaceous shales and Palaeozoic limestones and **dolomites** (Smith et al., 1998). The climate is continental, characterized by relatively warm but short summers and cold, snowy winters. Soils are dominated by **luvisols,** grading to **chernozems** in the south and **brunisols** and **organic cryosols** in the north (Zoladeski et al., 1995).

The RSA lies within the Mid-Boreal Lowland and Interlake Plain Ecoregions. A majority of the RSA lies within the Interlake Plain Ecoregion, which extends from the USA-Canada border at the southeastern edge of the Manitoba Plain in a broad arc northwestward to the Saskatchewan border at Red Deer Lake (Smith et al., 1998). The RSA traverses three ecodistricts: Sturgeon Bay (676); Gypsumville (720); and Ashern (723), which are described below.

6.1.1 Gypsumville Ecodistrict (720) Ecodistrict

The Gypsumville (720) Ecodistrict is located within the RSA (Map 2). This ecodistrict occupies a small area surrounding Lake St. Martin between Lake Winnipeg and Lake Manitoba (Smith et al., 1998). The mean annual temperature is 1.3 degrees Celsius (°C) with an average growing season of 173 days. The mean annual precipitation is approximately 520 mm, of which about one-quarter falls as snow (Smith et al., 1998).

The **physiography** of the region is mostly level to ridge till plain, partly covered with thin, **glaciolacustrine** clay deposits. Soils are typically imperfectly-drained, dark grey chernozems developed on strongly **calcareous**, loamy to clay **glacial till**; poorly-drained **gleysol** and black chernozem soils occur on shallower areas (Smith et al., 1998).

Vegetation is dominated by forest stand mixtures of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white spruce (*Picea glauca*), while Jack pine (*Pinus*

[1] Words in bold are defined in the Glossary of Terms

banksiana) prevails on drier sites (Smith et al., 1998). The principal sources of water in the ecodistrict are groundwater and surface water from Lake St. Martin.

6.1.2 Ashern Ecodistrict (723) Ecodistrict

The Ashern (723) Ecodistrict is located within the RSA (Map 2). The ecodistrict is between Lake Manitoba to the west and Lake Winnipeg to the east in the Interlake region (Smith et al., 1998). The mean annual temperature is 1.2°C with an average growing season of 175 days. The mean annual precipitation is approximately 510 mm, of which about one-quarter falls as snow (Smith et al., 1998).

The ecodistrict is slightly higher topographically than the surrounding area and slopes very gently eastward toward Lake Winnipeg and westward toward Lake Manitoba (Smith et al., 1998). The physiography is the outcome of Glacial Lake Agassiz's retreat; wave action and iceberg scouring resulted in ridges of coarse-textured small rock (cobble and gravel) and finer-textured depressions (Smith et al., 1998). Dominant soils in the higher ridges are imperfectly-drained, dark chernozems developed on strongly calcareous, loamy to clay loam glacial till, while the low areas are dominated by poorly-drained gleysols to shallow, slightly decomposed organic soils (Smith et al., 1998).

Forest stand vegetation is dominated by trembling aspen in the ridge areas, but often associated with balsam poplar and white spruce, whose distribution is much affected by forest fires (Smith et al., 1998). Willow (*Salix* spp.), sedge (e.g., *Carex* spp.) and meadow grass (e.g., *Poa* spp.), often occur in the poorly-drained depressions. Groundwater, the principal source of water in the ecodistrict, is from shallow sand and gravel aquifers associated with the glacial till deposits (Smith et al., 1998).

6.1.3 Sturgeon Bay (676) Ecodistrict

The Sturgeon Bay (676) Ecodistrict is located within the RSA (Map 2). The ecodistrict encompasses most of the North Basin of Lake Winnipeg (Smith et al., 1998). The mean annual temperature is 0.3°C with an average growing season of 166 days. The mean annual precipitation is approximately 510 mm, of which slightly above one-quarter falls as snow (Smith et al., 1998).

The ecodistrict slopes gently northeastward toward Lake Winnipeg (Smith et al., 1998). The physiography is the outcome of Glacial Lake Agassiz's retreat; wave action and iceberg scouring resulted in ridges of coarse-textured small rock (cobble and gravel) and finer-textured depressions (Smith et al., 1998). Soils of very poorly-drained shallow to deep moderately-decomposed **mesisols** dominate, but local areas of very poorly-drained sphagnum **fibrosols** and imperfectly-drained brunisols on glacial till ridges also occur (Smith et al., 1998).

Black spruce *(Picea mariana*) dominates forest stands due to extensive bogs/fens (peatlands) and poorly-drained mineral soils (transitional areas) (Smith et al., 1998). Associated vegetation varies from mosses (e.g., *Sphagnum* spp.), **ericaceous** shrubs (e.g. Labrador Tea

[*Rhododendron groenlandicum*]), swamp birch (*Betula pumila*), sedge, willow, and tamarack (*Larix laricina*) depending if characterized as a peatland or as a transitional area. Groundwater, the principal source of water in the ecodistrict, is from shallow sand and gravel aquifers associated with the glacial till deposits (Smith et al., 1998).

6.1.4 Surficial Geology and Physiographic Setting

Geologic events during Manitoba's Paleozoic Era, which influenced many of the landforms in the Project Study Area, were less dramatic than those events that shaped the older bedrock-forming Precambrian Era (Bannatyne and Teller, 1984). Shallow seas periodically covered the continent, depositing many layers of limestone and other sediments (Bannatyne and Teller, 1984). The geology of the Interlake and specifically the Lake St. Martin region can be further subdivided by age of the rocks; the late Ordovician and early Silurian periods resulted in layers of shale and dolomitic limestone. The Paleozoic boundaries mainly encompass the Interlake Plain (155), Mid-Boreal Lowlands (148), and a small portion of the Lake Manitoba Plain (162) Ecoregions, as defined by Smith et al. (1998).

The RSA is located just south of the localized permafrost zone (Lockery, 1984). The surficial geology can be described as very calcareous, stony (cobble or gravel), water-worked glacial till that is deep to shallow (20 to 30 m) over limestone bedrock (Smith et al., 1998). Soils within the RSA are heavily influenced by the geology of the area. Chernozemic dark grey surface horizons result as well as soils composed of luvisol, brunisol and organic matter (Mills, 1984). Map 3 presents the soil landscapes of the RSA.

6.1.5 Forest Cover and Vegetation

The RSA is located in the Boreal Forest Region. The Boreal Forest forms a continuous belt from Newfoundland to the Rocky Mountains and comprises the greater part of the forested area of Canada. The Boreal Forest is primarily coniferous with white and black spruce, jack pine, and tamarack as characteristic species (Zoladeski et al., 1995). There is an admixture of broadleaf trees such as white birch (*Betula papyrifera*), trembling aspen, and balsam poplar that play an important part in central portions of the region, particularly in the zone of transition to the prairie (Smith et al., 1998). Within the RSA, the Boreal Forest Region is further classified into the Manitoba Lowlands (B15) (Rowe, 1972).

The Manitoba Lowlands (B15) Forest Section surrounds Lake Winnipeg and therefore occurs along the entire Interlake Plain within the RSA; it is a low, level basin bounded by Lake Winnipeg on the west and the Precambrian Shield on the east (Rowe, 1972). The area consists of flat, poorly drained land with forested patches of black spruce and tamarack occurring with intervening swamps and meadows. Stands of white spruce, trembling aspen, and balsam poplar, sometimes intermixed with white birch and balsam fir (*Abies balsamea*), occur on the better-drained **alluvial** areas bordering creeks and rivers. Other tree species, such as white elm (*Ulmus laevis*), green ash (*Fraxinus pennsylvanica*), Manitoba maple (*Acer negundo var. interius*) and eastern white

cedar (*Thuja occidentalis*) also occur locally. The effects of repeated fires and poor shallow limestone sites, in the central Interlake specifically, is reflected in stands of scrubby aspen (Rowe, 1972).

Some of the high till areas have been cleared in the Interlake Plain for arable agriculture, but many areas remain as forest and wetlands, and significant areas have reverted back to shrubland after clearing (Smith et al., 1998). In the ecoregion, closed cover of dominant trembling aspen stands (often of poor growth due to highly calcareous soils), mixed with balsam poplar, tend to have an understory of mixed herbs and tall shrub; open stands of jack pine occur on dry, sandy sites; white spruce and balsam fir are less prominent due to fire, but do occur throughout the area except on very dry sites or those with shallow soils; and poorly-drained, depression areas are covered with sedges, willow and black spruce and tamarack (Smith et al., 1998).

The Federal Government has developed a Land Cover Classification (LCC) spatial database. The LCC is a national database map layer that has been harmonized across the major federal departments involved in land management and land change detection. These departments include the Agriculture and Agri-Foods Canada (AAFC), the Canadian Forest Service (CFS), and the Canadian Centre for Remote Sensing (CCRS).

Existing forest classifications and inventories are based primarily on aerial photography, whereas the development of the LCC was done using remotely sensed imagery (Landsat data) as part of the Earth Observation for Sustainable Development of Forests (EOSD) program. The EOSD program utilized a hybrid supervised-unsupervised classification methodology. This approach identified unique signatures using an automated algorithm (unsupervised spectral classification) that were subsequently linked to National Forest Inventory (NFI) equivalent classes (supervised classification). The LCC provides a series of vegetated and non-vegetated land cover classes that identify the vegetation/habitat conditions of an area. The LCC of the RSA is provided in Map 4.

6.1.6 Fire History

Natural disturbances, such as forest fires, are important for the health and succession of the boreal forest. Boreal forest fires play an important role in characterizing forest composition, energy cycles, and biochemical processes. Map 5 illustrates the fire activity within the RSA over the last 84 years. Much of the RSA was burnt in the 1970s and 1980s, with burns between 1960 and 2013 in smaller areas in the extreme north and south edge. The Route D LSA is located in areas close to communities and pasture and did not burn like the majority of the RSA did in the 1980s. Additionally, there is a portion of the RSA to the north around Dauphin that has not been burnt at all within the last 84 years. Route C had portions of the area burnt in the 1970s as well as pockets of the Route C LSA burnt from 2010 to 2013. Map 5 provides the fire history for the RSA.

6.1.7 Wildlife and Habitat

6.1.7.1 Mammals

The RSA, which occurs within the Manitoba Lowlands of the Boreal Forest, consists of flat, poorly drained land with forested patches of various deciduous and coniferous tree species, intermixed with swamps, meadows, and arable areas cleared for agriculture, as described in Section 2.1.5 (Rowe, 1972). Based on this diversity of habitat types, typical mammal species in the area include American marten (*Martes americana*), American beaver (*Castor canadensis*), black bear (*Ursus americanus*), coyote (*Canis latrans*), elk (Manitoba subspecies *Cervus elaphus manitobensis*), ermine (*Mustela erminea*), fisher (*Martes pennanti*), grey wolf (*Canis lupus*), least chipmunk (*Tamias minimus*), lynx (*Lynx canadensis*), mink (*Neovison vison*), moose (*Alces alces*), muskrat (*Ondatra zibethicus*), otter (*Lontra canadensis*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), and white-tailed deer (*Odocoileus virginianus*).

Moose are distributed across much of forested Canada (Banfield, 1974) and are common within the boreal forest, which covers many areas of Manitoba including the Project study area. Moose often select habitats of early successional vegetation such as shrubland areas and deciduous forests (Gillingham and Parker, 2008). Such successional vegetation frequently exists after disturbance, both natural (i.e. wildfire) and anthropogenic (i.e. forest removal). Moose are most commonly found in swampy areas with aquatic plants and willows, which make up the majority of their diet (Renecker and Schwartz, 1998). Moose are an integral component of the ecosystem in their predator/prey relationships.

Elk inhabit young coniferous tree stands and dense woodlands as well as meadows and valleys, including plains areas such as those found in the larger RSA. Elk are commonly found in early successional areas after disturbances such as fires where they find good foraging vegetation (Reid, 2006). This foraging preference correlates with the fire history described previously, where a number of fires have occurred in the area since the 1980s.

White-tailed deer are also present in the RSA. White-tailed deer tend to inhabit both woodland and open areas, which are used for cover and forage (Reid, 2006). The occurrence of higher ungulate populations in an area (increased prey) may result in increased predator populations. As a result, deer occurrence in areas near moose may result in higher wolf populations in the area and subsequent increases in predation.

Black bears are found across most wooded habitats in North America and are relatively common through northern mixed and eastern deciduous forests (Kolenosky and Strathearn, 1987; Reid, 2006). Black bear densities are highest in diverse forests at relatively early successional stages and lowest where soils are thinner and plant growth generally poorer (Kolenosky and Strathearn, 1987). Black bears can take advantage of anthropogenic landscape change such as agricultural lands and woodlots. Agricultural crops provide a variety of vegetation and insects to feed on, as do woodlots, given many small prey reside in woodlots, and they are typically comprised of a

variety of tree seeds, new successional vegetation, and insects. Black bears are found in the RSA in some areas, but due to habitat needs, they tend to stay away from the wetter lowland areas and select denser areas of forest stands.

Coyote are a highly adaptable species found most commonly in mixed habitats versus dense unbroken forests (Reid, 2006). Coyotes are found throughout the RSA and feed upon small mammals and rodents, as well as predate on calves of deer and larger ungulates. Coyotes, when banding together, can also take down these large animals (Caras, 1967).

Grey wolves are also plentiful in most of Manitoba and in the RSA. They tend to inhabit forested areas with sufficient prey species such as moose, American beaver, and snowshoe hare.

The RSA offers suitable habitat to many furbearers. American beaver and muskrat provide valuable furs and good meat for eating, as do hare and “bush chickens” (spruce grouse [*Falcipennis canadensis*] in particular). Ermine, fisher, American marten, mink, otters, red fox (*Vulpes vulpes*), and red squirrel are furbearers that are known to be present in the RSA.

Ermine habitat includes coniferous or mixedwood forests, fields, areas of dense vegetation and areas near wetlands, and can be found in most of these habitats in Manitoba, including the RSA (Reid, 2006). Both fisher and American marten can be found in most of Manitoba with American marten being limited to primarily boreal areas of the province. They generally inhabit mature coniferous or mixedwood forests and will feed on small mammals such as hares, some birds, fruit, nuts, and carrion (Reid, 2006). They also feed on rodents, hares, shrews, and insects. Mink inhabit areas along streams, lakes, and wooded cover. They can be found in all of Manitoba and will primarily feed on small to medium mammals, crayfish, frogs, snakes, and birds (Reid, 2006). Otters can be found in most of central/northern Manitoba and within the RSA near or in lakes, streams, rivers, or swamps. They feed on fish, frogs, crayfish, and shellfish (Reid, 2006).

There are several species of small mammals that can be considered to be within or at the edge of their natural range. These include the least weasel (*Mustela nivalis*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), northern bog lemming (*Synaptomys borealis*), pygmy shrew (*Sorex hoyi*), raccoon (*Procyon lotor*), short-tailed shrew (*Blarina brevicauda*), striped skunk (*Mephitis mephitis*), and woodchuck (*Marmota monax).*

There are also several species of bats that reside within and migrate through the RSA. These include the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), northern long-eared (*Myotis septentionalis)* also called the northern myotis, eastern-red bat *(Lasiurus borealis)* and silver-haired bat (*Lasionycteris noctivagans*). The Silver-haired, the eastern-red and the hoary species are migratory species while the northern long-eared, big and little brown bat species are hibernacula dwelling species. The little brown bat is listed as Endangered- Schedule 1 and as S2N by the Manitoba Conservation Data Centre (MBCDC, 2015).

SARA currently has a proposed Recovery Strategy for little brown bat: http://www.registrelep-sararegistry.gc.ca/default.asp?lang=En&n=2A04680B-1, with three critical habitat areas for little brown bat identified in the Interlake area of Manitoba (Norquay et al., 2013). The proposed SARA Recovery Strategy for little brown bat identifies several potential threats to little brown bat with accidental mortality resulting from vehicle collisions listed as an unknown level of concern (SARA, 2015). Sensory/vibration disturbance is another potential effect to these bats and their critical habitat. Both migratory and hibernacula dwelling bats are known to use road ROWs as flight corridors, resulting in an increase in bat mortality due to bat-vehicle collisions (SARA, 2015).

A listing of known mammals that can be found in the Interlake Plain and the Mid-Boreal Lowland Ecoregion and their conservation classification is presented in Appendix A.

6.1.7.2 Reptiles and Amphibians

The RSA provides habitat for a number of reptile and amphibian species. The red-sided garter snake (*Thamnophis sirtalis*) has the northernmost distribution of any species of snake in North America and, along with the smooth green snake (*Liochlorophis vernalis)* and the western plains garter snake (*Thamnophis radix*), are the only snake species to inhabit this area (Cook, 1984; Conant and Collins, 1991; Nature North, 2014; Preston, 1982). The red-sided garter snake prefers mesic woodlands where they can be often found at the margins of ponds (Preston, 1982). They will often hibernate within crevices in upland areas. The range of the red-sided garter snake extends throughout much of the RSA (Conant and Collins, 1991). The limestone substrate found within the LSA is characterized by crevices and rock formations that make for suitable habitat for snake hibernacula. The smooth green snake is the only snake species listed as a species of conservation concern by MBCDC and is ranked S3S4 by MBCDC (MBCDC, 2015).

The species of frogs and toads that may occur within the area include: boreal chorus frog (*Pseudacris maculata*), Canadian toad (*Anaxyrus hemiophrys*), grey tree frog (*Hyla versicolor*), northern leopard frog (*Lithobates pipiens*), and wood frog (*Lithobates sylvaticus*) (Conant and Collins, 1991). These species generally require shallow ponds and puddles for breeding. Of these frog and toad species, only the northern leopard frog is a species of conservation concern. There is currently a proposed Recovery Strategy under SARA in place for the northern leopard frog; however, only for the Rocky Mountain Population. The northern leopard frog requires several habitat types to meet its needs throughout the year, using different sites for overwintering, breeding, and foraging. The overwintering sites for northern leopard frogs need to be well-oxygenated bodies of water that do not freeze to the bottom (SARA, 2015).

The eastern tiger salamander (*Ambystoma tigrinum*) and the blue-spotted salamander (*Ambystoma laterale)* are two salamander species of concern found within the RSA. Both the eastern tiger salamander and the blue-spotted salamander prefer moist woodlots and wetland edge habitats (Nature North, 2014).

A listing of known amphibians and reptiles that can be found in the Interlake Plain and Mid-Boreal Lowland Ecoregion is presented in Appendix B.

6.1.7.3 Birds

There are a wide variety of bird species present in the Mid-Boreal Lowland and Interlake Plain Ecoregions including numerous raptor species such as bald eagles (*Haliaeetus leucocephalus*) and osprey (*Pandion haliaetus*). Bald eagles nest in tall shoreline trees along lakes, rivers, and open areas and primarily feed on water birds, small mammals, fish, and carrion (Bezener and De Smet, 2000). Osprey can be found in most of Manitoba, in habitat located along slow flowing rivers, streams as well as lakes, where they nest in tall trees or on artificial platforms. Their diet consists mostly of fish, though they will also take rodents, birds, and small vertebrates (Bezener and De Smet, 2000).

A variety of owl species can also be found within the RSA including but not limited to: the great grey owl (*Strix nebulosi*), great horned owl (*Bubo virginianus*), northern hawk owl (*Surnia ulula*), and short-eared owl (*Asio flammeus*).

Some of the forest birds that can be found within the RSA include: the bobolink (*Dolichonyx oryzivorus*), Canada warbler (*Cardellina canadensis*), common nighthawk (*Chordeiles minor*), eastern whip-poor-will (*Astrotomus vociferous*), eastern wood-pewee (*Contopus virens*), golden-winged warbler (*Vermivora chrysoptera*), gray jay (*Perisoreus canadensis*), olive-sided flycatcher (*Contopus cooperi*), ovenbird (*Seiurus aurocapilla*), red-headed woodpecker (*Melanerpes erythrocephalus*), and rusty blackbird (*Euphagus carolinus*), among others (Bezener and De Smet, 2000; Peterson and Peterson, 2002; Manitoba Avian Research Committee, 2003; MBBA, 2015).

Geese, ducks, and other waterfowl are also plentiful in the RSA. The RSA supports a variety of waterbirds and waterfowl such as the American white pelican (*Pelecanus erythrorhynchos*), black-crowned night heron (*Nycticorax nycticorax*), great blue heron (*Ardea herodias*), horned grebe (*Podiceps auritus*), least bittern (*Ixobrychus exilis*), trumpeter swan (*Cygnus buccinators*), and yellow rail (*Coturnicops noveboracensis*), among others (Bezener and De Smet, 2000; Peterson and Peterson, 2002; Manitoba Avian Research Committee, 2003; MBBA, 2015).

Shorebirds and gulls are common along the shores and on the islands of Lake Manitoba, Lake St. Martin, and Lake Winnipeg, including species such as the Caspian tern (*Hydroprogne capsica*), herring gull (*Larus argentatus*), and the piping plover (*Charadrius melodus*). The piping plover uses low-gradient, un-vegetated, and wide shorelines with patchy gravel substrates (AESRD, 2013). In Manitoba, the piping plover is most consistently found on sandy beaches along Lake Manitoba and Lake Winnipeg. Piping plover nests are extremely vulnerable to predation and human disturbance. Threats to piping plovers include loss of nesting habitat due to cottage development, use of nesting beaches by cattle, all terrain vehicles, sunbathers, or other

recreationalists, encroachment of vegetation, and flooding of nests or feeding areas by periodic high-water levels (MBSD, 2015).

Within the RSA, there is an Important Bird Area (IBA, 2016). Canada's IBA program aims to identify, conserve, and monitor important sites that provide essential habitat for Canada's bird populations. Canada's IBA program has nearly 600 sites, one of which is located around LSM (IBA, 2016).

A list of known birds that can be found in the Interlake Plain and Mid-Boreal Lowland ecoregions is presented in Appendix C.

6.1.8 Species at Risk and Species of Special Interest

Species of special interest are defined to include Species At Risk and species referred to as "species of conservation concern". For the purpose of this Wildlife Technical Report, Species at Risk were defined as all species federally listed by SARA (SARA, 2015), species listed provincially under MESEA, as well as species listed as very rare (provincial status of S1), rare (provincial status of S2), or uncommon (provincial status of S3) throughout their range as listed by the Manitoba Conservation Data Centre (MBCDC, 2015).

There are several mammal species listed under SARA, and/or by MESEA, and/or MBCDC of S3 or above that may have ranges that overlap with the Project Study Area (SARA, 2015; MESEA, 2015; MBCDC, 2015). Boreal woodland caribou (*Rangifer tarandus*) may have ranges that overlap with the Interlake Plain and Mid-boreal lowland ecroregions; however, their presence within the RSA is highly unlikely. During all field work, investigations included searches for any signs of caribou activity within the RSA. Similarly, wood bison (*Bison bison athabascae*) may have ranges that overlap with the Interlake Plain and Mid-boreal lowland ecroregions; however, their presence within the RSA is highly unlikely.

A number of bird species listed under SARA, and/or by MESEA, and/or MBCDC of S3 or above may have ranges that overlap with the Project Study Area (SARA, 2015; MESEA, 2015; MBCDC, 2015). These species include American white pelican, bank swallow, barn swallow, black-crowned night heron, bobolink, Canada warbler, Caspian tern, chimney swift, common nighthawk, eastern whip-poor-will, eastern wood-pewee, golden-winged warbler, grasshopper sparrow, horned grebe, least bittern, loggerhead shrike, northern parula, olive-sided flycatcher, peregrine falcon, piping plover, red-headed woodpecker, rusty blackbird, short-eared owl, trumpeter swan and yellow rail (MBBA, 2015; MBCDC, 2015; SARA, 2015).

A list of known bird possibly found within the RSA is provided in Appendix C. Appendix D presents bird Species At Risk that are potentially found within the RSA and the federal recovery documents associated with the species.

Two species of bats are of conservation concern. The little brown myotis and the northern long-eared (northern myotis) are listed as Endangered under SARA under Manitoba's Endangered Species and Ecosystems Act (MESEA). The northern leopard frog is listed as Special Concern under SARA. The Eastern tiger salamander and the Blue-spotted salamander are two other amphibian species of concern found within the RSA.

The MBCDC provided a list of known locations of species of concern and special interest that had been identified within the RSA (MBCDC 2015; C. Friesen pers. comm.).

7 KEY SPECIES FOR ANALYSIS

The federal environmental assessment process typically includes the need for the identification of Valued Ecosystem Components (VECs) in the area of interest to focus the environmental assessment on key species or key components of the environment. The Canadian Environmental Assessment Agency (CEAA) defines a Valued Ecosystem Component as "the environmental element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance" (CEAA, 2012).

The selection of VECs is used to identify key species in the area of interest that can represent a trophic level or guild of species (e.g., selection of a key ungulate species that is also important for human consumption), rather than conducting an assessment of all individual species in an area. Key species are selected based on their biological and socio-economic role in the ecosystem, their ability to represent the habitat and/or life history requirements of similar species, and often include Species At Risk or species of conservation concern to ensure that protected and rare species are accounted for in an environmental assessment.

As such, the desktop and field studies for wildlife and wildlife habitat included the collection of baseline data for the wildlife species found in the RSA, followed by the identification of a number of key wildlife species of interest and/or importance in the RSA, to focus the analysis of potential habitat changes or other effects of the Project activities, and provide context for the future environmental assessment. Not all Species at Risk were selected as focal species. Using the available historical data, species that had not been documented within the RSA to date, were not included as focal species and/or trophic level and guild species were used to account for species not included as a focal species.

Table 1 provides a detailed breakdown of the key wildlife species in the Project Study Area that were selected for analysis. The key wildlife species included:

- Moose;
- Elk;
- American marten;
- American beaver;

- Bats;
- Migratory Birds (forest birds and water birds);
- Ecologically Sensitive Wildlife Sites (bat hibernacula, snake hibernacula); and
- Reptiles and Amphibians.

Table 1: Summary of Key Species Selection and Rationale

Group	Key Species	Rationale
Ungulates	Moose	Demonstrate large home ranges (~40 km²) Important prey species for large carnivores, e.g., wolves Hunted by rights based and licensed hunters
	Elk	Demonstrate large home ranges (50-400 km²) Important prey species for large carnivores, e.g, wolves Hunted by rights based and licensed hunters
Furbearers	American marten	Commonly trapped furbearer Important species for predatory/prey dynamics Representative of mature forest thabitat
	American beaver	Ecosystem engineer Representative aquatic furbearer
Bats	Little brown myotis Northern long-eared (northern myotis)	Listed as Endangered under SARA and under MESEA Critical habitat for these species already identified in the Interlake region Geology within the RSA is conducive to support these species – representative of karst habitat
Ecologically Sensitive Wildlife Sites	Bat and snake hibernacula, terrestrial mammal dens (e.g. bears, wolves), rookeries large stick nests, tern colony, mineral licks	Critical wintering habitat Critical breeding habitat Species fidelity to dens and nests Culturally significant sites
Migratory Birds	Forest Bird Species* (including barn swallow, bank swallow, bobolink, Canada warbler, common nighthawk, eastern whip-poor-will, eastern wood-pewee, golden-winged warbler, olive-sided flycatcher, peregrine	Some species listed as "threatened" or "endangered" under SARA and/or MESEA Key species selected as being representative of forest habitat types

Table 1: Summary of Key Species Selection and Rationale

Group	Key Species	Rationale
	falcon, red-headed woodpecker, short-eared owl)	
	Water Bird Species* (including American white pelican, black-crowned night heron, Caspian tern, horned grebe, least bittern, piping plover, trumpeter swan, yellow rail, ducks and geese)	Some species listed as "threatened" or "endangered" under SARA and/or MBMESEA Some species hunted by license and rights based hunters
Amphibian and Reptile	Northern leopard frog, red-sided garter snake	Northern leopard frog listed under SARA, and MESEA Red-sided garter snake species most commonly found snake within RSA

8 LAND AND RESOURCE USE

To provide context to the findings presented, land and resource use have been described at a landscape scale, focusing on the RSA (Map 1).

8.1 Forestry

Administrative boundaries that best delineate the harvestable timber in the RSA are the MBSD, Forestry Branch, Forest Management Units (FMU) 41, 43, and 45 (MBSD, 2013). Included in this area is Integrated Wood Supply Area (IWSA) #2 that covers much of the RSA except for the southwest corner within which lies the LSA (Map 7).

There are four protected areas within the RSA where industrial activities are largely restricted: the Sturgeon Bay Park Reserve; and the Grahamdale, Mantagao Lake, and Little Birch Wildlife Management Areas (WMA) (Map 7).

A majority of the RSA is located within the IWSA #2. Within IWSA #2, the Pine Falls Paper Company has previously been given the first right of refusal for timber that is not allocated to quota holders of the IWSA and is still under the annual allowable cut levels for the area (Forest Resource Management, 2000). All harvest blocks identified within the publicly available land use data set (Manitoba Land Initiative) were not allocated a harvest year and therefore, differentiation is not possible from the cover classes within the LCC. Therefore, harvest cut blocks within the Land Use layer, were not used for analysis.

8.2 Hydroelectric Transmission Development

Within the RSA, there is one existing transmission line that enters the RSA in the south and parallels PTH 6 northwards towards Gypsumville and other communities (Map 8). This transmission line intersects both Route C and Route D. There is also a proposed transmission

line that would be located near the terminus of the existing winter road and Reach 1 of the Lake St. Martin Outlet Channels (Map 8). Additional hydro transmission development may be required to power the Water Control Structures associated with the Project.

8.3 Lodges and Outfitters

Map 9 shows the location of lodges and outfitters in the RSA and LSA. The four lodges or outfitters identified include: Einarsson's Guide Service, near Dauphin River; Bear Track Outfitters, northeast of Gypsumville; Steep Rock Canoe and Kayak, at Steep Rock; and Wildwood Outfitters near Moosehorn (Map 9). None of these lodges or outfitters are located within the LSA. Map 9 also presents hunting stands and hunting shacks that were identified in the LSA during field studies in 2016.

8.4 Quarries and Mining

There are many existing quarry sites in the RSA. The majority of the sites consist of quarry withdrawal activity and the remainder are quarry lease, private quarry permits, mining claims, and casual quarry permits. Within the LSA there are two quarry withdrawals, one quarry lease and one casual quarry permit. Map 10 shows the locations of all publicly available information on current quarry and mining activity in the RSA.

8.5 Recreational Use Areas

There are a number of recreational and snowmobile trails located within the RSA. A spatial layer for the known and available recreational trails was acquired from the Natural Resources Canada, Earth and Sciences Sector and the available snowmobile trail data was digitized from the Manitoba Provincial Snowmobile Trail Guide, 2015-2016 (Snowman, 2016). In addition to the publicly available data, the trail network was further enhanced with the digitization of access trails recordered with GPS units (Garmin Map 76csx) during 2016 winter aerial survey work. Map 11 presents the enhanced trail network of the RSA.

8.6 Hunting

The LSA is located within GHA 25 and GHA 21 and the top tip of the LSA touches GHA 20, and is south of GHA 16. Boreal woodland caribou hunting is not permitted in GHA 16, 20, 21 or 25 (MBSDa, 2016). Map 12 provides the delineation of GHAs within the RSA.

Moose are important big game animals for hunting within the RSA. Moose are valued for licensed hunting and rights-based subsistence hunting within the RSA (e.g., Game Hunting Area [GHA] 20, 21), but moose hunting is closed to licensed hunters in certain areas of the RSA such as GHA 16 and 25 (MBSD, 2016).

Elk are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from Manitoba Sustainable Development (MBSD) during certain times of year for GHAs 20, 21, and 25 (MBSD, 2016). With respect to elk, the GHA 20, 21, and 25 season dates

are late-September to mid-October for one bull elk in the general rifle draw and early- October to mid-October for one bull elk by general (rifle) draw. The archery draw is active in GHA 20 and 21 from early-September to mid-September, and GHA 25 is open for archery draw early-September to late-September for one elk.

White-tailed deer are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from MBSD during certain times of year for GHA 16, 20, 21, and 25 (MBSD, 2016). White-tailed deer in Zone B (including GHA 20, 21, and 25) is open to deer harvest. An archery season for resident, non-resident, and foreign resident hunters is open for parts of September and again in late October to early November (MBSD, 2016). A general rifle season for white-tailed deer in Zone B for resident, non-resident, and foreign resident hunters is open from early-November to mid-November (MBSD, 2016). Zone C (GHA 16) is also open to deer harvest; archery season is open to resident, non-resident, and foreign resident hunters from early-September to early November. General rifle is open for Zone C from early November to mid-November.

MBSD licenses hunters for resident, and non-resident bear hunting, along with registered outfitters for foreign resident bear hunting in GHA 16, 21, and 25 (MBSD, 2016). GHA 16, 20, and 21 are part of black bear hunting Zone B where licensed hunting is allowed between late April to end of June and late August to early October for one adult black bear (not female with cubs). GHA 25 is a part of Zone C where licensed hunting is allowed between late April to mid-June and then again in the beginning of September until mid-October.

Coyotes have been designated for recreational hunting by MBSD, and can be taken through the use of any big game tag which hunters can purchased for certain dates in GHA 16, 20, 21, and 25 (MBSD, 2016). GHA 16, 20, and 21 are part of grey wolf and coyote Zone B for licensed-based hunting between late August and late March for one wolf. GHA 25 is a part of Zone C for grey wolf and coyote season between the same dates.

GHA 16, 20, 21, and 25 are a part of Game Bird hunting zone 3 (GBHZ3) has a grouse (ruffed grouse (*Bonasa umbellus*), spruce grouse, and sharp-tailed grouse (*Tympanuchus phasianellus*) hunting season between the beginning of September and mid-December with a possession limit of 12.

Other birds that can be hunted within GBHZ3 include ducks such as mallard (*Anas platyrhynchos),* coots such as, American coot (*Fulica Americana*), snipe, such as the common snipe (*Gallinago gallinago*), geese such as the Canada goose (*Branta canadensis*), and sandhill crane (*Grus canadensis*).

Vehicle regulations within GHA 16 allow the use of off-road vehicles (ORVs) as transportation from one hunting site to another. Within GHA 20 and 21, ORVs may only be used on roads,

established trails, and waterways to access a hunting area. Map 12 represents with GHAs within the RSA.

8.7 Trapping

Commercial trapping of furbearers is administered by MBSD through the Registered Trapline (RTL) system (MBSDb, 2016). There are two RTL blocks that intersects the RSA, as well as one open trap area (Open Area #3). Map 13 provides an illustration of the RTLs within the RSA.

The Crane River RTL is intersected by the RSA, although it is located over water from the Project features. Given this RTL is located on a peninsula, the RTL is separated from the anticipated landscape change associated with the Project. Furbearers inhabiting the lands within the Crane River RTL are not expected to be affected by the Project. Therefore, the Crane River RTL data is not included within the trapping data quantification as a result of it being separated from the lands altered by the project. As such, the only data with respect to an RTL within the RSA presented here, is the Gypsumville, RTL Section 270-00. The Gypsumville RTL is part of the Interlake RTL District (MBSD, 2016) (Map 13).

Each year, MBSD issues permits to trappers within the RTL block. Table 2 provides the number of permits issued by fiscal year for the Gypsumville RTL Block, located in the northeastern portion of the RSA (unpublished data, MBSD, 2016).

Table 2: Trapper Permits issued by year for the Gypsumville RTL Block

Fiscal Year	Gypsumville
1996/1997	6
1997/1998	20
1998/1999	19
1999/2000	9
2000/2001	11
2001/2002	11
2002/2003	8
2003/2004	8
2004/2005	9
2005/2006	10
2006/2007	13
2007/2008	10
2008/2009	14
2009/2010	8
2010/2011	5
2011/2012	7
2012/2013	6

Fiscal Year	Gypsumville
2013/2014	12

The annual trapper data from 1996 to 2012 for Gypsumville is provided in Table 3 (unpublished data, MBSD, 2016). The highest number of species harvested between 1996 through to 2012 was muskrat, followed by American beaver and fisher. Coyotes were readily trapped as well as a small number of wolves. Within the LSA and the RSA is an Open Block (Open Block #3); however, MBSD does not track production within an open block. Therefore, production data for the Open Block #3 area are unavailable.

Table 3: Annual Trapper Data for Gypsumville RTL (1996 – 2012)

Year	Badger	American beaver	Coyote	Fox, Red	Fox, Cross	Lynx	American marten	Mink	Muskrat	Otter	Raccoon	Squirrel	Weasel	Wolf	Fisher
1996/ 1997		72	18	7				3	279	13		33	6		53
1997/ 1998		362	22	16	1	1	4	16	305	15	4	270	62	2	176
1998/ 1999		83					1	7	55	6		12	12		43
1999/ 2000		79		1			7		65	1					13
2000/ 2001		35	9	9			13		197						6
2001/ 2002		26	6	1		2	3	3	94	4	1		22		36
2002/ 2003		32	1	1			2	4			1	2	16		5
2003/ 2004	1	1	15	20	1	15	31	11		26	2	1	28		50
2004/ 2005		5	11	4		7	47	3		9		6	9		20
2005/ 2006		63	11	3		2	45	24	153	9	9	8	3		82
2006 /2007		79	23	7		1	58	6	496	9	3	61	8		17
2007/ 2008		30	1	12			44	14	11	4		7	70		39
2008/ 2009		17	3	3		2	48	3	281			6	9		30
2009/ 2010		4	6	4		2	48	1	1562	1		3	11	1	12
2010/ 2011														1	
2011/ 2012			8	2			18	1	57		1		1		5
Total	1	888	134	90	2	32	369	96	3555	97	21	409	257	4	587

[+] Unpublished trapping data provided by Dean Berezanski, Provincial Furbearer Biologist, Manitoba Sustainable Development

9 BASELINE WILDLIFE DATA COLLECTION AND ANALYSIS

Existing data derived from past studies conducted in the LSA and RSA, along with baseline data gathered during the current desk top analysis and field studies, provide present and historical mammal, avian, reptile, and amphibian distribution data. These data have been used to assess native and invasive species (example: white-tailed deer) presence and the availability and location of high quality habitat for key wildlife species within the LSA and RSA. Distribution data for the wildlife populations in the LSA and RSA were acquired from a number of provincial and federal databases, such as Important Bird Areas of Canada, MBCDC, MBSD wildlife distribution survey databases, the Manitoba Herps Atlas, and the Manitoba Breeding Bird Atlas (MBBA), among others. From these data sources, a GIS database was developed of the existing and available information.

9.1 LCC – Habitat Evaluation

The dynamic ecosystem where the RoW is located will be undergoing continuous change from both natural (e.g. flood, fire) and human disturbance (e.g. logging, landscape change). To establish the baseline habitat conditions prior to construction, an evaluation of existing habitat conditions was conducted using the LCC to determine the type of habitat currently available within and adjacent to the proposed LMOC works. The LCC covertype analysis provides a quantitative assessment into the amount of habitat available within the LSA and RSA.

9.1.1 Methods

The overall LCC covertypes present within the LSA and RSA were calculated based on the spatial boundaries described in Section 5. The RSA LCC covertypes were calculated based on a buffer zone of 20 km on either side of the LSM (proposed ASR and LSMOCs) and LMOC project features (the size of the RSA). The 20 km buffer zone represents the tract of land between two differently zoned areas, in this case, the LSMOC and LMOC project features and the area beyond the predicted zone of impact. The LSA LCC covertypes were calculated based on a buffer zone of 5 km on either side of the LSM (proposed ASR and LSMOCs) and LMOC project features. The LCC was clipped (only data within the buffer zone was used for analysis) to the area and the results were summarized as percentages of LCC covertypes (habitat) within the RSA and the LSA.

9.1.2 Results

The LCC habitat analysis results showed water and grasslands as the most commonly occurring habitat covertypes within the LSA and RSA. There is very little (<1% in RSA) low shrub, tall shrub, developed or exposed land covertypes located within the LSA and RSA (Table 4).

Table 4: LCC Covertypes within the RSA and LSA

LCC-Cover Type	RSA		LSA (Lake MB Outlet Channel)	
	Area km^2	Percent (%)	Area km^2	Percent (%)

100-Herb	118.26	1.74%	27.56	5.49%
110-Grassland	691.64	10.16%	183.91	36.65%
121-Annual crops	28.21	0.41%	13.07	2.60%
122-Perennial crops and Pasture	70.02	1.03%	28.34	5.65%
20-Water	1500.20	22.04%	92.19	18.37%
211-Coniferous - Dense	415.19	6.10%	1.46	0.29%
212-Coniferous - Open	82.87	1.22%	3.39	0.68%
221-BroadLeaf - Dense	376.68	5.53%	48.07	9.58%
222-BroadLeaf - Open	205.63	3.02%	9.78	1.95%
231-MixedWood - Dense	264.79	3.89%	7.41	1.48%
33-Exposed Land	17.74	0.26%	2.57	0.51%
34-Developed	43.20	0.63%	12.63	2.52%
51-Shrub -Tall	7.37	0.11%	0.03	0.01%
52-Shrub - Low	1.87	0.03%	0.00	0.00%
81-Wetland Treed	117.04	1.72%	0.00	0.00%
82-Wetland Shrub	1997.31	29.35%	39.27	7.83%
83-Wetland Herb	867.84	12.75%	32.05	6.39%
Total Area	6805.85	100.00%	501.74	100.00%

The LCC covertypes associated with the Route C and D (400 m RoW) are provided in Table 5.

Table 5: LCC Habitat Analysis of Route C and Route D Outlet Channels

LCC-Cover Type	Route C (400 m RoW)		Route D (400 m RoW)	
	Area km^2	Percent (%)	Area km^2	Percent (%)
100-Herb	0.31	6.58%	0.71	7.29%
110-Grassland	2.04	43.31%	5.28	54.21%
121-Annual crops	0	0.00%	0.4	4.11%
122-Perennial crops and Pasture	0.21	4.46%	0.88	9.03%
20-Water	0.18	3.82%	0.2	2.05%
211-Coniferous - Dense	0	0.00%	0	0.00%
212-Coniferous - Open	0	0.00%	0	0.00%
221-BroadLeaf - Dense	0.75	15.92%	0.71	7.29%
222-BroadLeaf - Open	0.25	5.31%	0.05	0.51%
231-MixedWood - Dense	0	0.00%	0	0.00%
33-Exposed Land	0.03	0.64%	0.02	0.21%
34-Developed	0.09	1.91%	0.22	2.26%
51-Shrub -Tall	0	0.00%	0	0.00%
52-Shrub - Low	0	0.00%	0	0.00%
81-Wetland Treed	0	0.00%	0	0.00%
82-Wetland Shrub	0.25	5.31%	0.31	3.18%

83-Wetland Herb	0.61	12.95%	0.95	9.75%
Total Area	4.71	100.00%	9.74	100.00%

9.2 Moose

Moose are the largest member of the ungulate family in North America. Key forage species for moose include willows and aquatic plants found in riparian habitats, along with early successional vegetation such as deciduous shrubs, sedges, and willows. Moose have been observed to avoid linear features and roads (e.g., Laurian et al. 2008; LeClerc et al. 2012, Beyer et al. 2013).

The range of moose is extensive in Manitoba and they are being observed more readily in the prairie region of Manitoba (Manitoba Conservation, n.d.a.). Moose are typically associated with riparian habitat, especially areas containing willows, but in the absence of such habitat they select stands of deciduous vegetation that originate after fire or logging, which feature early successional vegetation (Doerr, 1983). Other important habitat requirements include areas for aquatic feeding, areas of coniferous cover, and mineral licks (Palidwor et al., 1995). During both winter and summer coniferous cover is beneficial given it helps reduce snow depths for moose in winter and provides relief from thermal stress associated with open areas during summer months (Bangs et al., 1985). Moose have been found to generally remain within 100 m of forest edge or cover when browsing in open areas (Bangs et al., 1985). Moose populations in Manitoba are highly variable within the province; however, moose populations have been noted in the province at levels of 0.4 moose/km² in high-quality moose habitats (Palidwor et al., 1995). The provincial population has increased from 28,000 in 1992 to about 32,000 at the time of this writing (MBSD, n.d.b.).

9.2.1 Aerial Moose Distribution Survey Conducted by MBSD Methods

Manitoba Sustainable Development completed aerial moose surveys within portions of the RSA in 1992, 1995, and 2008 (MBSD, unpublished data, 2008). The area surveyed was GHA 21, excluding the islands on Lake Winnipeg. The survey area covered a total of 6,530 square kilometres (km^2) and was overlain with a 3-minute grid (Gassaway et al., 1986), which consists of 3 by 5-km grid cells or sample units. Map 14 shows the 3-minute grid cells used within the survey area.

The area was first stratified meaning it was categorized into blocks of high, medium, and low densities of moose presence and signs of moose activity. The stratification survey was flown using a 337 Cessna fixed wing air craft, following a transect lines of 1.5 km apart travelling along the edge of one cell, up the middle of the cell, and then down the other side of the cell, with the maximum visibility of 500 m on either side of the air craft. All observations for the aerial survey included the age (adult vs. calf) and sex of each animal where possible, as well as tracks. Observations were recorded using a hand-held GPS unit (Garmin map 76 csx) and all survey data were entered into an Excel database.

Based on the observations, moose tracks and signs within each cell were assigned a high, medium, or low stratification rank (density prediction of animals) based on the amount of activity within each grid cell. This cell stratification of the survey area was completed before the second sampling flight could occur. The sampling of random high, medium, and low-density cell blocks was then completed with a Bell 206 helicopter, flying 500 m transects within each of the randomly selected cells, allowing for 250 m of visibility on either side of the aircraft to obtain 100% coverage of the cell being flown. All observations, moose tracks and signs, were again recorded during the survey process.

Based on the results of the sampled cells, a population estimate was generated with confidence intervals to include a p-value to determine the significance of the end result. The sampling of the random blocks was completed until a confidence interval of 95% or greater was achieved. The final result of the survey is a population estimate with a +/- value, the p-value, and the composition of the observations to include a cow/calf ratio, calf/adult ratio, and a bull/cow ratio to assist in predicting the viability of the moose population.

The age and sex data provide insights into the structure and health of the herd. Calculating Caughley's (1977) survival-fecundity rate of increase indicates the necessary recruitment rate for a stable moose population requires an annual adult female survival rate of 0.88 with 28 calves per 100 cows (i.e., a calf:cow ratio of 0.28).

9.2.2 Aerial Moose Distribution Survey Conducted by MBSD Results

Table 6 provides a summary of the MBSD aerial moose survey results for GHA 21 in 1992, 1995, and 2008. Moose population estimates from the 1992, 1995, and 2008 MBSD aerial moose surveys in GHA 21 showed a total of 789 moose in 1992, a total of 1230 moose in 1995, and a total of 346 moose in 2008. During the 2008 aerial moose survey completed by MBSD within GHA 21, a total of 346 moose +/- 21.52% (with 95% confidence intervals) were found to be within GHA 21, with 98 bulls, 188 cows, and 59 calves identified during the survey (Table 6). These observations resulted in an estimate of 52 bulls per 100 cows and 31 calves per 100 cows (a calf:cow ratio of 0.31). Of the 353 sample units 321 were classified as low, 16 as medium, and 16 as high-density sample units.

Table 6: MBSD Aerial Moose Survey Results within GHA 21, 1992, 1995 and 2008

Survey Year	Population Estimate	Confidence Interval	Population +/-	Bulls	Cows	Calves	Bulls/100 Cows	Calves/100 Cows
1992	789	95%	21.5	NA	NA	NA	NA	NA
1995	1230	95%	29.2	77	94	58	82	62
2008	346	95%	29.0	98	188	59	52	32

9.2.3 Aerial Moose Distribution Survey Conducted by MI Methods

A winter aerial moose survey was conducted from January 31, 2016 to February 6, 2016 using a Bell 206 Jet Ranger flown by Custom Helicopters Inc. The aerial moose survey design adopted the UTM grid survey methodologies used by MBSD. The aerial moose survey area conducted in 2016 was divided into two survey areas, one being an intensive survey area (the LSA) and a second area being a stratified random block survey area within the RSA. The study deign was adopted to determine the baseline distribution of moose in the LSA and RSA prior to construction.

The intensive survey area offers complete (100%) coverage of the LSA, achieved by using parallel aerial survey north-south transects, flown approximately 400 m Above Ground Level (AGL), spaced at 500 m intervals with 250 m of visibility on either side of the helicopter within the LSA. The stratified random block survey area was conducted on 5% of the remaining three-minute grid survey blocks within the RSA. Map 16 illustrates the aerial moose distribution survey area. A moose distribution map was prepared and estimates of the moose population and the calf/cow ratios were determined. Based on these results, areas of moose concentrations were developed using volume-density kernel estimates using the kernels analysis tool in the Home Range Tools for ArcGIS 10.3 (Rogers & Kie, 2011).

Kernel estimates are a form of analysis conducted on animal borne location points to determine the animals core use areas. Adaptive kernels are generating in ArcGIS using any one of, or a combination of incidental wildlife observations, wildlife GPS collar locations, locations identified during track and sign surveys, or wildlife locations identified during aerial distribution surveys (ESRI, 2012). GPS locations or recorded observations are then used to generate the animals core use areas. Kernel analysis has been a widely used method for determining home range of wildlife populations (Rogers & Kie, 2011). Typically, the 95% isopleth is used to identify a home range of the species, for the purposes of the study, the 70% isopleth was used to identify moose core use areas. The 70% isopleth provides a further refined area where moose were observed. Core use areas were generated using the Home Range Tools (Rogers & Kie, 2011) within ArcGIS 10.3. A minimum sample size (GPS locations and/or observations) of 50 observations or more were used to generate the core use areas (Seaman et al., 1999). Any species where less than 50 observations were identified were not used for kernel analysis and core use areas were not generated.

9.2.4 Aerial Moose Distribution Survey Conducted by MI Results

The total length of survey area flown was 2,650 km with 14 moose observed (Table 7). Using observations and tracks, kernels of core use areas were identified and mapped.

Table 7: Aerial Moose Distribution Survey Results within the RSA

Species	Observations	Tracks	Total Points used to make Kernels
Moose	14	158	172

Of the moose identified, there were 6 bulls, 3 cows, 2 calves, 2 unknown sex within the intensive survey area, and 1 cow identified in the random block survey area. If the moose of unknown sex were cows, the cow:calf ratio would be .40.

While habitat exists within the RSA and the moose fecundity rate is 0.4 (above the .28 indicative of a growing moose population), overall moose numbers within the RSA are low.

9.2.1 Moose Track and Sign Survey Methods

Multispecies ground surveys were conducted by two biologists to identify terrestrial mammals present near the RoW. Tracks of all species, signs of activity, and direct observations of wildlife were recorded on handheld GPS units (Garmin map 76csx) and on field data sheets. Transects on either side of the centerline of the RoWs of Route C and Route D were walked by 2 biologists in June 2016 (June 2-11) in search of moose signs. Transects were spaced 20 m apart with 1 transect on either side of the RoW centerline covering a 40 m wide area. Based on habitat modelling conducted prior to field investigations, specific areas of the RoW were searched more intensively by biologists going off their transects and searching the area for additional landbase coverage in high quality moose habitat areas. All observations of wildlife and signs of activity were recorded on a handheld GPS unit and on field data sheets.

9.2.2 Moose Track and Sign Survey Results

During the ground-based track and sign surveys conducted along the Route C and Route D ROWs there were no signs of moose activity or moose identified.

9.2.3 Fire History

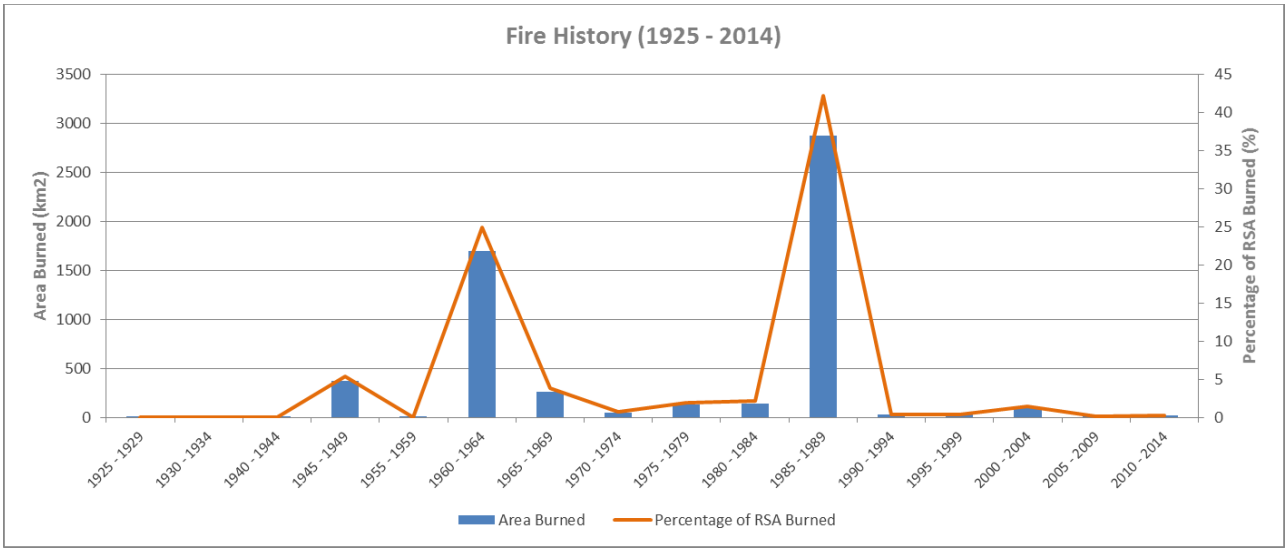
The spatial fire history data for the RSA was mapped and assessed for the timeframe between 1928 and 2013. This time frame was used given it was the timeframe of consistent data collected by the province and available for analysis. These spatial fire data that were obtained from the Manitoba Land Initiative (MLI) website were clipped (constrained) to the RSA. Burn years were classified into 5 year periods (1930-34, 1935-39 etc.) with the total area burned calculated and expressed in km^2 (Figure 1), thus providing a 5-year fire trend for the RSA over the majority of the last century.

Within the RSA, based on the fire history collected between 1928-2013, it would appear that a major burn cycle occurs every 20-25 years with approximately 1500-3000 km^2 (32-55% of total area) of mature habitat being burnt. Smaller burns are occurring during that time; however, large landscape burns appear to be on a 20-25 year cycle. As a result, within 5 to 10 years following a major fire event, successional vegetation offers quality moose habitat on the landscape. Given the last major burn event occurred in 1985-89, if the 20-25-year cycle occurs again, another major burn event should occur in 2015-2019 within the RSA. However, given that the only available

spatial fire history data were from 1928 onward, there is limited information available to determine burn cycle events beyond the last 90-year period.

The data collection from the 1950s onward is more accurate in comparison to the fire data collected prior to the 1950s as data collection, technological advances and reporting techniques had improved in the 1950s and onward. Moose populations thrive in areas of frequent fire (Gillingham and Parker, 2008). Given small burns occur on the landscape frequently, habitat is regenerated. However, based on the 90-year data, major large-scale burns are relatively infrequent within the RSA. In addition to fire suppression efforts in recent years, the combination of these two factors may influence the future availability of moose habitat within these areas (Table 4, Map 4, Map 5).

Figure 1: Fire History within the RSA



9.2.4 Moose Habitat Modelling Methods

Moose habitat was modelled using the LCC with the inclusion of any forest harvest block and fires data acquired from the Manitoba Land Initiative data warehouse. Fires less than 10 years of age were re-classified from the LCC classification into shrubs and used as a variable in the moose habitat model. The potential habitat for moose was modelled for both potential winter and summer habitat using mixed wood, broadleaf, and shrub stands with shrub stands less than 10 years of age (the age of the shrub and tree vegetation was determined by using burn data and harvest stand [logging] data). The availability of potential food sources for moose (successional vegetation) and dense vegetation cover for moose were incorporated into the model using queries that were developed within the Manitoba Model Forest Region for Habitat Suitability Index Moose Models (TAEM, 1995). Potential moose habitat models were created for the RSA (20 km buffer). These analyses were conducted to establish baseline potential summer and winter moose habitat prior to construction.

9.2.5 Moose Habitat Modelling Results

Potential moose summer habitat was modeled for the RSA (Table 8). Potential moose winter habitat was modeled for the RSA (Table 9). Based on the winter habitat model for moose, there are 648.84 km² of winter moose habitat within the RSA. The results of the moose habitat modelling show very little (0.12% and 0.11%) moose habitat may be lost or altered as a result of the Route C and D.

Table 8: Potential Moose Summer Habitat within the RSA and the Amount Of Potential Moose Summer Habitat Loss Associated with Route C and Route D

Habitat Type	Total Modeled Habitat (RSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Shrub	7.37	0.00	0.00%	0.00	0.00%
Broadleaf Dense	376.68	0.75	0.20%	0.70	0.19%
Mixedwood Dense	264.79	0.00	0.00%	0.00	0.00%
Total	648.84	0.75	0.12%	0.70	0.11%

Table 9: Potential Moose Winter Habitat within the RSA and the amount of Potential Moose Winter Habitat Loss Associated with Route C and Route D

Habitat Type	Total Modeled Habitat (RSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Shrub	7.37	0.00	0.00%	0.00	0.00%
Coniferous Sparse	82.87	0.00	0.00%	0.00	0.00%
Coniferous Dense	415.19	0.00	0.00%	0.00	0.00%
Mixedwood Dense	264.79	0.00	0.00%	0.00	0.00%
Total	770.22	0.00	0.00%	0.00	0.00%

9.2.6 Linear Density

Although moose have been extensively studied, little research has focused on the effects of habitat fragmentation and the habitat or landscape thresholds (boundary beyond which change occurs) in the management of the species. Salmo et al. (2004) compiled a table of management indicators and guidelines for moose based on studies across Canada and recommended that access density and stream crossing indices be used as land-use indicators, and that core areas and patch/corridor size be used as habitat indicators when conducting cumulative effects assessments.

The authors identified a target threshold for linear disturbance for moose on a landscape scale at a density of 0.4 km/km^2 (i.e., linear disturbance features divided by the total area of interest) and a critical threshold density of 0.9 km/km^2. Analyses were conducted to determine the linear density within the LSA and RSA to identify the linear densities in these areas in comparison to the published Salmo et al. (2004) thresholds for moose.

9.2.6.1 Linear Density Methods

To assess the linear density within the LSA and RSA, the 50k National Road Network (NRN) was used, which is publicly available spatial dataset. The 50K NRN provides a homogeneous and normalized spatial dataset of the entire Canadian road network. All linear features within the NRN data set were classified into transmission lines, major and minor roads, local roads (including community driveways and local streets as well as additional access in residential areas), and the municipal road section. All features were clipped to the LSA and RSA within ArcGIS 10.3 and the linear lengths were calculated as linear kilometers. The linear distance was then divided by the area of the LSA and area of the RSA to determine the linear density of the area (km/km²).

9.2.6.2 Linear Density Results

The linear density analyses conducted identified the current linear density for moose within the LSA and RSA to be 0.86 km/km^2 and 0.22 km/km^2 respectively (Table 10), both below the published Salmo et al. (2004) thresholds. However, the length of the Route D RoW is far greater (24.03 km) than the length of the Route C RoW (11.48 km). If Route D is selected as the final LMB Route, it will add 0.05 km/km² of linear density within the LSA bringing the total linear density within the LSA to 0.91 km/km², just at the literature recommended critical threshold density for moose of 0.90 km/km^2.

Table 10: Baseline Linear Density within the RSA and LSA

Linear Feature	RSA		LSA (Lake MB Outlet Channel)	
	Linear Features (km)	Linear Density (km/km^2)	Linear Features (km)	Linear Density (km/km^2)
Minor Roads	818.44	0.12	232.26	0.46
Major Roads	245.57	0.04	48.76	0.10
Local Streets	31.24	0.00	3.05	0.01
Transmission Lines	335.19	0.05	145.87	0.29
Municipal Road	9.98	0.00	0.00	0.00
Idylwild Road	48.12	0.01	0.00	0.00
Winter Road (proposed access)	34.72	0.01	0.00	0.00
Total	1523.26	0.22	429.94	0.86

Given the RSA is based on a typical moose home range size of 40 km² (Hundertmark, 1997), linear density thresholds are best applied at the RSA scale.

The linear distance of other proposed Project-related linear developments within the LSA and RSA was also calculated to allow for comparisons in linear density of the area (km/km^2) with the various proposed Project channel and reach Routes. The linear density analyses identified that, The construction of the Route C Route would result in an increase in linear density of 0.002 km/km^2 in the RSA and an increase in linear density of 0.02 km/km^2 in the LSA, and the construction of the Route D Route would result in an increase in linear density of 0.0035 km/km^2 in the RSA and an increase in linear density of 0.05 km/km^2 in the LSA (Table 11).

Table 11: Comparison of Linear Density within the RSA and LSA including Future Project Development Routes

	RSA		LSA (Lake MB Outlet Channel)	
Linear Development	Linear Features (km)	Linear Density (km/km2)	Linear Features (km)	Linear Density (km/km2)
Route C Channel	11.48	0.0017	11.48	0.0229
Route D Channel	24.03	0.0035	24.03	0.0479
Reach 3 Route – Johnson Beach	9.54	0.0014	0.00	0.0000
Reach 3 Route – Willow Point	11.42	0.0017	0.00	0.0000

9.3 Elk

Elk are the second largest ungulate species in North America behind moose. Elk feed on a variety of herbaceous species such as grasses, sedges, broad-leaved herbaceous plants, shrubs, tree twigs, leaves, and shoots in the warmer months of the year, and in winter, eat dry grasses and dry leaves they dig up in the snow.

Elk are a gregarious species and are commonly found in herds of seven individuals or more. They prefer areas of open country, but have been driven to parkland regions due to encroachment by humans (Collins & Urness,1983). Elk are known to have substantially variable home range sizes and these ranges can vary in size from a few square kilometers to hundreds of square kilometers. They use different parts of their home ranges at different times of the year, i.e. differences in summer vs. winter habitat, and will also switch from having small home ranges to very large home ranges from year to year (Childress & Lug, 2003). Cows will go off on their own to calve; some return to the same area every year and some cows will calve in nearby areas to where the herd is at the time. Following breeding season, the bulls will leave the females and move to areas of good foraging to regain body condition lost during the rut (Cranowski, 2009).

9.3.1 Aerial Elk Distribution Survey Conducted by MBSD Methods

In February 2013, an aerial elk survey was completed by MBSD (MBSD unpublished data, 2013) on the South Interlake Herd, which included areas of GHAs 21, 25, and 25A (Map 21). The elk survey area consisted of 6,714 km^2 and included agricultural land and forested lands, along with fen and muskeg habitat types. A total of 315 sample units covered the survey study area, which was also previously surveyed in 2000 and 2006 using the same study area and methodological design. The survey methods adopted for the aerial elk survey are similar to those used by MBSD for the aerial moose survey, involving the use of the 3-minute grid and the stratification using a fixed wing air-craft, followed by the intense random sampling of the classified high, medium, and low sample units. A population estimate is then generated upon the completion of the survey with a confidence interval based on the amount of observations identified within the random sampling.

9.3.2 Aerial Elk Distribution Survey Conducted by MBSD Results

Based on the initial 2013 stratification survey that had a total 315 sample units, 98 of the sample units were classified as low density, 152 were classified as medium density, and 65 of the sample units were classified as high density. A total of 809 elk were observed during the survey, producing a population estimate of 955 +/- 15.41% with a 95% confidence interval (Table 12). Within GHA 21, the population appeared to have decreased slightly from the 2006 survey results as the number of antlerless animals observed dropped by 56% (117/207). Of importance to note, however, was that the survey was conducted in February during winter conditions when it is difficult to determine cows from bulls due to antler drop.

Table 12: MBSD Aerial Elk Survey Results, 2000, 2006 and 2013

Survey Year	Population Estimate	Confidence Interval	Population +/-	GHA 21		GHA 25		GHA 25A	
				Antlered	Antlerless	Antlered	Antlerless	Antlered	Antlerless
2000	1119	NA	NA	NA	NA	NA	NA	NA	NA
2006	1180	95%	19.3	36	207	116	422	46	187
2013	955	95%	15.41	20	117	58	430	161	809

9.3.3 Aerial Elk Distribution Survey Conducted by MI Methods

An aerial survey in winter was conducted from January 31, 2016 to February 6, 2016. Winter aerial surveys have the advantage of improved detectability and permitting an assessment of annual calf recruitment through the identification of sex and age of animals (cows, bulls, calves). The aerial survey area was a sub-set of the MBSD survey area, with an intensive survey area comprised of 5 km on either side of the Route C, Route D, the proposed ASR, and the LSMOC Options. The intensive survey area offered complete (100%) coverage of the LSAs for these project linear features. The survey flight transects were spaced 500 m apart up to the 5km LSA boundary. Map 23 illustrates the intensive aerial distribution survey area for elk.

9.3.4 Aerial Elk Distribution Survey Conducted by MI Results

The total length flown during the winter 2016 aerial elk distribution survey conducted for MI was 2,650 km. There were 16 elk observed (Table 13). The elk were found in the southwestern portion of the RSA within the LMOC Route D LSA and a small group of elk were identified within the Lake St. Martin ASR LSA just to the north of Spearhill.

Table 13: Aerial Elk Distribution Survey Results within the RSA

Species	Observations	Tracks	Total Points used to make Kernels
Elk	16	58	74

9.3.5 Elk Track and Sign Survey Methods

Multispecies ground surveys were conducted to identify terrestrial mammals present along the RoW. Transects on either side of the centerline of the RoWs of Route C and Route D were walked by 4 biologists from June 2-11 in search of elk observation and signs of activity. Transects were spaced 20 m apart with 1 transects on either side of the RoW centerline covering a 40 m wide area surveyed. Based on habitat modelling conducted prior to field investigations, specific areas of the RoW were searched more intensively by biologists going off their transects and high-grading the area to provide additional landbase coverage in high quality elk habitat areas. Tracks of all species, signs of activity, and direct observations of wildlife were recorded on handheld GPS units (Garmin map76csx) and were recorded on field data sheets.

9.3.6 Elk Track and Sign Survey Results

Results of the elk track and sign surveys identified only one sign of elk activity along the Route C RoW (Table 14).

Table 14: Results of Elk Track and Sign Survey

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Elk Scat	1	5710011.38	526107.17	Route C

9.3.7 Elk Habitat Modelling Methods

Elk habitat modelling was conducted using the LCC. The potential habitat for elk was modelled using grasslands, annual crops, perennial crops, and pastures that were located within 300m of broadleaf open and broadleaf dense forest types. Potential elk habitat models were conducted for the RSA. These analyses were conducted based on the assumption that the existing Idylwild forestry road and the municipal road were not expected to remove any additional habitat beyond the existing 20 m RoW within the RSA.

9.3.8 Elk Habitat Modelling Results

Potential elk habitat was modeled for the RSA (Table 15). The amount of elk habitat that may be lost or altered as a result of the Project is a very small percentage of the overall elk habitat available within the RSA.

The elk habitat modeling conducted on the Route C and Route D Channel outlets exposed only minor differences in the amount of habitat loss/alteration associated with each Route. The most substantial differences associated with these two Routes is with respect to the removal of grasslands, which is higher with Route D (2.46 km^2) in comparison to Route C (1.83 km^2) (Table 15). However, given the degree of difference between the two Routes, the difference in the effect to elk would be expected to be negligible.

Table 15: Potential Elk Habitat within the RSA and the amount of Elk Habitat Loss associated with Route C and Route D

Habitat Type	Total Modeled Habitat (RSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Annual Crop (within 300 m of forest edge)	10.14	0.00	0.00%	0.16	1.54%
Broadleaf Dense	175.58	0.75	0.20%	0.71	0.19%
Broadleaf Open	205.08	0.25	0.12%	0.05	0.02%
Grassland (within 300 m of forest edge)	450.16	1.83	0.41%	2.46	0.55%
Perennial Crops and Pastures (within 300 m of forest edge)	29.14	0.21	0.73%	0.18	0.62%
Total	870.10	3.04	0.28%	3.56	0.33%

9.4 White-Tailed Deer

Although white-tailed deer (WTD) were not identified as a key species for the wildlife baseline work for the Project, understanding their current location and distribution within the RSA prior to construction is important for the future understanding of any potential effects of the Project on WTD movement and potential species interaction. Therefore, all observations and tracks of WTD that were observed during field work have been recorded and assessed. White-tailed deer movement northward raises concern over disease transmission from WTD to other ungulate species such as moose and elk (Wasel et al., 2003).

These diseases may include the transfer of the parasite *Parelaphostrongylus tenuis* (*P.tenuis*) meningeal worm, also known as “brain worm”, which is a common parasitic nematode of the central nervous system whose natural host is WTD (Kopcha et al., 2012; Wasel et al., 2003).

P.tenuis within WTD characteristically completes its life cycle without causing any significant adverse health effects (Kopcha et al., 2012). However, *P.tenuis* occurrence in other ungulates such as moose, elk and caribou (*Rangifer tarandus*), causes serious physical deterioration and eventual death.

Warning et al. (1991) demonstrated that WTD use RoWs to feed, especially when the available forage is more abundant or of better quality for deer than in adjacent landscapes. RoWs have the potential to provide WTD with good forage opportunities, given much of their diet consists of browse such as grasses, forbs (i.e., flowering plants), mast (e.g., acorns), and young successional vegetation such as shrubs, many of which grow in RoW edge habitats.

WTD, especially males, tend to disperse after their first year of age and may go as far as 25 km from their original home range (Fulbright and Ortega-S, 2006). As a result of the optimal foraging found in RoWs and WTD natural dispersal behaviour, WTD may increase their range northward with the creation of linear RoW corridors. The potential northern range expansion of WTD may be positively correlated to the northern spread of disease and parasites, including *P.tenuis*. Therefore, WTD baseline presence within the LSA is important to understand prior to construction so future potential effects of the Project on WTD north movement and distribution can be determined.

9.4.1 Aerial White-Tailed Deer Distribution Survey Methods

WTD distribution relative to the Project was determined during a winter aerial survey conducted from January 31, 2016 to February 6, 2016 using a Bell 206 Jet Ranger operated by Custom Helicopters Inc. The aerial survey area was delineated as 5 km on either side of the proposed project features, including the Lake St. Martin ASR and LMOC Route C, and Route D. The aerial survey area offered complete (100%) coverage of the LSA for these three proposed linear project features. The survey flight lines were north- south transects, flown at approximately 400 feet AGL and spaced at 500 m intervals allowing for 250 m visibility on either side of the helicopter. All results were assessed and mapped and a distribution map for WTD within the LSA was prepared.

9.4.2 Aerial White-Tailed Deer Distribution Survey Results

The total length flown during the aerial WTD distribution survey was 2,650 km. There were 628 WTD observed (Table 16). Using observations and tracks, kernels of high use areas were identified.

Table 16: Aerial WTD Distribution Survey Results within the RSA

Species	Observations	Tracks	Total Points used to make Kernels
White Tailed Deer	628	3495	4123

9.4.3 White-Tailed Deer Track and Sign Survey Methods

Multispecies ground surveys were conducted to identify terrestrial mammals present within the Route C and Route D RoWs. Transects on either side of the centerline of the RoWs of Route C and Route D were walked by 4 biologists from June 2-11 in search of white-tailed deer observations and signs of activity. Transects were spaced 20 m apart with 2 transects on either side of the RoW centerline (Map 28). Tracks of all species, signs of activity, and direct observations of wildlife were recorded on handheld GPS units and associated data were recorded on detailed data sheets.

9.4.4 White-Tailed Deer Track and Sign Survey Results

During the ground surveys conducted, there were several signs of white-tailed deer activity and their presence identified (Table 17).

Table 17: White-tailed Deer Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Deer Track	1	5699345.94	531860.21	Route D
Deer Antler Scrape	1	5699102.91	531748.99	Route D
Deer Trail	1	5698739.17	531534.66	Route D
Deer Track	1	5698739.17	531534.66	Route D
Deer Scat	1	5698627.14	531509.09	Route D
Deer Track	1	5697411.04	531021.88	Route D
Deer Track	1	5697332.39	531627.55	Route D
Deer Track	1	5696041.54	531150.47	Route D
Deer	1	5701502.11	532614.94	Route D
Deer Track	1	5702453.91	533202.01	Route D
Deer Track	1	5703418.54	533658.19	Route D
Deer Track	1	5692202.54	530492.25	Route D
Deer Track	1	5688945.23	530661.63	Route D
Deer Track	1	5688822.73	530534.16	Route D
Deer	1	5685444.33	531642.70	Route D
Deer	1	5710067.28	527104.57	Route C
Deer	1	5710372.05	526607.88	Route C
Deer	1	5678561.75	529735.89	Lake MB Shoreline (incidental)

9.5 Furbearers

As noted, the RSA offers suitable habitat to many furbearers. The American marten, representing a terrestrial furbearer, and the American beaver, representing an aquatic furbearer, have been selected as key species for the baseline data studies.

American marten is an economically important furbearer species for commercial trapping due to a relatively desirable coat and ease in capture. American marten is a solitary animal that spends most of its time in Manitoba's boreal forest. American marten is also an ecological indicator of mature coniferous forests featuring structural complexity, i.e. with high canopy closure and vertical and horizontal woody structure, and are abundant in undisturbed forests. American marten is carnivorous and will feed avidly on mice and other small rodents, utilizing coarse woody debris for foraging and to access prey. American marten has a very large home range sizes for its body mass, particularly for males versus females, and den in forest habitat with rock crevices, and large logs and snags (Caras, 1967). American marten play an important role in the predator/prey regime of an ecosystem and they are a valued economic species.

American beavers are a semi-aquatic furbearer species commonly found throughout Manitoba in riparian areas including lakes, creeks, rivers, and other water bodies. American beavers are known to be ecosystem engineers, creating and modifying habitat in significant ways, impacting species richness and landscape-level heterogeneity. As a keystone species, American beavers modify drainage regimes by cutting vegetation and building dams that have long-term effects on landscapes.

American beavers feed on almost any herbaceous or wood plant but prefers willows, aspen, and other deciduous trees, and construct lodges/dams from mud and sticks. American beavers mate for life and can produce a breeding colony of 2-12 members including breeding pair, yearlings, and kits. American beaver is a primarily nocturnal and travels far from home to food, overwintering under the ice for up to 6 months within the protection of their lodge (Caras, 1967).

9.5.1 Furbearers Winter Aerial Survey Methods

An aerial multispecies distribution survey was flown between January 31, 2016 to February 6, 2016 within parts of the RSA to locate individuals and tracks to determine the distribution of wildlife species. Using a Bell 206 Jet Ranger Helicopter operated by Custom Helicopters Inc., transects were spaced 500 m apart and were flown in a north-south direction flying at an average speed of 100 km/hr. A crew of three biologists were on board plus the pilot allowing for three observers. Hand-held GPS units (Garmin map 76csx) were utilized to record locations of all tracks, animal observations, habitat type, and any other important points of interest.

Core areas were developed using volume-density kernel estimates using the kernels analysis tool in the Home Range Tools for ArcGIS (ESRI, 2012), the same methodology described for moose

in Section 8.2.3. Winter volume-density kernels were determined to be the boundary of the 70% contour.

9.5.2 Furbearers Winter Aerial Survey Results

Maps 29 to Map 31 show the core use areas (distribution) for American beaver, American marten, otter, hare, lynx, and coyote created from the aerial survey data. Table 18 shows the observation and tracks for all furbearer species. American beaver activity was identified in abundance (107 observations) throughout the LMOC LSA (Map 29). Similarly, American marten tracks were also identified in abundance (1581 track observations) throughout the RSA, but there was no American marten activity identified within the LMOC LSA (Map 30). Otter activity was identified within the northern portion of the LMOC LSA (Map 31). Very little hare activity was identified within the LMOC LSA (Map 32) and no lynx activity was identified within the LMOC LSA (Map 33). Coyote observations and tracks were also identified within the LMOC LSA mostly in the Route D areas (Map 34).

Table 18: Aerial Furbearer Distribution Survey Results within the RSA

Species	Observations	Tracks	Total Points used to make Kernels
American beaver lodge/dam	107	0	107
American marten	0	1581	1581
Otter	0	188	188
Coyote	25	368	393
Lynx	3	177	180
Hare	3	3254	3257

9.5.3 Furbearer Track and Sign Survey Methods

Multispecies ground surveys were conducted to identify furbearers present along the RoW. Tracks of all species, dens, and direct observations of wildlife were recorded on handheld GPS units and associated data were recorded on detailed data sheets. Habitat modelling was conducted prior to field investigations. From June 6-11, 2016, two biologists walked transects located 20 m on either side of the Route C and Route D RoW centerlines (Map 35).

9.5.4 Furbearer Track and Sign Survey Results

During the ground surveys conducted in June 2016, there were several signs of furbearer activity and presence identified (Table 19).

Table 19: Furbearer Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Coyote Track	1	5694381.16	531020.81	Route D
Muskrat Lodge	1	5694088.04	530952.83	Route D
Coyote Vocalization	1	5697491.51	531604.66	Route D
Coyote observation	1	5697491.51	531604.66	Route D
Muskrat observation	1	5697491.51	531604.66	Route D
Coyote Track	1	5700916.53	532552.73	Route D
Coyote Track	1	5700448.41	532398.89	Route D
Coyote Track	1	5688945.23	530661.63	Route D
Coyote Track	1	5710293.10	527442.91	Route C
American beaver Lodge	1	5715706.70	515684.77	Lake MB Shoreline
American beaver Lodge	1	5682683.14	525486.80	Lake MB Shoreline
American beaver Lodge	1	5715706.70	515684.77	Lake MB Shoreline
American beaver Lodge	1	5682683.14	525486.80	Lake MB Shoreline

There were very few signs of bear and wolf presence identified during the ground searches (Table 20). Only three wolves were identified within the RSA during aerial survey, Lat 51.68165 and Long -98.231301). The aquatics team noted one wolf on April 29, 2016 on the forestry road, approximately 9 km south of where the three wolves were sighted during the winter 2016 aerial survey (M. Lowdon, pers.comm., 2016). During the aerial survey conducted in October 2015, a large adult black bear was observed in the LSMOC and ASR LSA.

Table 20: Results of Predator Species from the Multi-species Ground Survey

Species Name	Observation Type	Quantity	Location		
			UTM Y	UTM X	Area
Bear Scat	Observation	1	5698447.31	531333.05	Route D
Bear	Observation	1	5697491.51	531604.66	Route D
Wolf Scat	Observation	1	5688822.73	530534.16	Route D

9.5.5 Furbearer Habitat Modeling Methods

American beaver habitat, as our representative aquatic furbearer, and American marten habitat, as our representative terrestrial furbearer were modelled. Furbearer habitat modelling was conducted using the LCC. The potential habitat for American beaver was modelled using broadleaf and mixed wood stands, as well as stands dominated by willow shrub understory. Only habitat of these types within 200 m of creeks, rivers and water bodies was selected with stands that were less than 8 hectares (ha) in size. The potential habitat for American marten was

modelled using mature coniferous and mixed wood stands that were older than 60 years. Fire layers were used to determine the age of the mature stands. The potential habitat for both of these species were modelled for the LSA as well as the RSA.

9.5.6 Furbearer Habitat Modeling Results

9.5.6.1 American beaver

Based on modelling conducted, American beavers have 205.98 km² of potential habitat within the RSA. American beaver habitat was modeled using broadleaf open, broadleaf dense, and mixedwoods dense, and wetland shrub forest types that were less than 8 ha in size and that were located within 200 m of creeks, rivers, and water bodies. The amount of American beaver habitat that may be lost or altered as a result of the Project is a very small percentage of the overall American beaver habitat available within the LSA and RSA (Map 36).

The American beaver habitat modeling conducted on the Route C and Route D Channel outlets in the LSA and RSA exposed only minor differences in the amount of habitat loss/alteration associated with each Route (Table 21 and Table 22).

Table 21: Potential American beaver Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type (within 200 m of water)	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Broadleaf Dense	24.99	0.06	0.24%	0.002	0.01%
Broadleaf Open	9.26	0.05	0.58%	0.00	0.00%
Mixedwood Dense	17.30	0.00	0.00%	0.00	0.00%
Wetland Shrub	154.43	0.01	0.01%	0.03	0.02%
Total	205.98	0.12	0.06%	0.03	0.02%

Table 22: Potential American beaver Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type (within 200 m of water)	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Broadleaf Dense	3.17	0.06	1.74%	0.002	0.07%
Broadleaf Open	0.42	0.05	11.17%	0.00	0.00%
Mixedwood Dense	0.62	0.00	0.00%	0.00	0.00%
Wetland Shrub	4.99	0.01	0.29%	0.03	0.65%

Total	9.20	0.12	1.26%	0.03	0.38%

9.5.6.2 American marten

Based on habitat model there is 248.83 km² of American marten habitat available within the RSA. American marten habitat was modelled using mature coniferous and mixedwood stands that were older than 60 years. Fire layers were used to determine the age of the mature stands. The amount of American marten habitat that may be lost or altered as a result of the Project is a very small percentage of the overall American marten habitat available within the LSA and RSA (Map 37).

The American marten habitat modeling conducted on the Route C and Route D Channel outlets in the LSA and RSA exposed no differences in the amount of habitat loss/alteration associated with each Route (Table 23 and Table 24). Habitat for American marten is not limiting within the RSA. There will be no potential American marten habitat lost as a result of either the Route C or Route Outlet channels.

Table 23: Potential American Marten Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type (older than 60 years of age)	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Coniferous Dense	110.59	0	0.00%	0	0.00%
Coniferous Open	43.65	0	0.00%	0	0.00%
Mixedwood Dense	94.59	0	0.00%	0	0.00%
Total	248.83	0	0.00%	0	0.00%

Table 24: Potential American Marten Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type (older than 60 years of age)	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Coniferous Dense	0.83	0	0.00%	0	0.00%
Coniferous Open	2.64	0	0.00%	0	0.00%
Mixedwood Dense	3.45	0	0.00%	0	0.00%
Total	6.92	0	0.00%	0	0.00%

9.6 Bats

As noted earlier in this report, many of the known bat hibernacula present in Manitoba are found within the Interlake, Grand Rapids, and Gypsumville areas McRitchie and Monson (2000). Many

bat species in Manitoba utilize hollow trees and forested areas for roosting habitats during summer months and then tend to swarm in middle to late August. Migratory bat species swam in fall during their migration south, while non-migratory bat species swarm near their hibernacula in preparation for the colder temperatures of fall and their eventual hibernation in winter (McRitchie and Monson, 2000).

During winter aerial survey work, potential bat and snake hibernacula and large mammal dens were identified visually by biologists onboard the helicopter. Biologists noted large rock outcrops with the appearance of hibernacula entries where snow was unable to accumulate and what appeared to be hot air was rising from the openingsThere were no potential bat hibernacula identified within the Reach C and D LSA; however, several identified within the LMOC RSA.

Table 25: Potential Hibernacula as well as Potential Large Mammals Dens Identified during Winter Aerial Survey Work

Site	Location	Distance to Nearest Project Feature (km)	Nearest Project Feature
Potential Hibernacula 1	Northeast of Lake St. Martin FN	1.68	Reach 1
Potential Hibernacula 2	Southeast of Lake St. Martin FN	3.41	LSM ASR
Potential Hibernacula 3	Southeast of Lake St. Martin FN	3.32	LSM ASR
Potential Hibernacula 4	Southeast of Lake St. Martin FN	3.47	LSM ASR
Potential Hibernacula 5	Southeast of Lake St. Martin FN	4.09	LSM ASR
Potential Hibernacula 6	Southeast of Lake St. Martin FN	1.44	LSM ASR
Potential Hibernacula 7	Southeast of Lake St. Martin FN	2.62	LSM ASR

In June 2016, two biologists were flown to each of the potential hibernaculum sites (Table 25) identified during the winter aerial surveys. Biologists searched each site in June 2016 recording their observations and findings at each site on hand-held GPS units (Garmin map 76 csx). Of the sites surveyed, two sites were determined to be potentially active snake hibernacula with one red-sided garter snake was identified in close proximity (Table 73 in Section 8.8.4). The remaining 5 sites were consistent with potential bat hibernaculum, with one large potential bat hibernaculum identified that was thought to have been previously active with possible bat guano noted and deep cavernous openings within the hibernacula that would support over-wintering (Table 26). Photographs 2 and 3 are of potential bat hibernacula identified in June 2016.

Table 26: Potentially Active Bat Hibernacula Identified during Field Investigations

Species Name	Observation Type	Quantity	Area
Potential bat hibernacula	Observation	1	Proposed ASR
Potential Bat quano matter	Observation	1	Proposed ASR
Potential bat hibernacula	Observation	1	Proposed ASR
Potential bat hibernacula	Observation	1	Proposed ASR
Potential bat hibernacula -Possible guano	Observation	1	Proposed ASR

Photograph 2: Possible bat hibernacula identified within the proposed ASR LSA. Photograph taken by EcoLogic Environmental Inc. on June 8, 2016

Photograph 3: Possible bat hibernacula identified within the proposed ASR LSA. Picture of the opening of one potential hibernacula. Photography taken by EcoLogic Environmental Inc. on June 8, 2016

Given the identification of potential bat hibernaculum within the RSA and based on discussions and consultation with Dr. Craig Willis, Bat Specialist, University of Winnipeg (pers. Comm., 2016), further investigation was undertaken. Bat recorders (specialized recording devices that identify bat presence by converting their emitted echolocation ultrasound signals to audible frequencies, each unique to different bat species) were deployed in areas where potential bat hibernaculum was identified. Bat recorders are an effective method used to investigate bat species presence in an area, to identify potential hibernacula locations, and to assess for the presence of bat species at risk (Agrant, 2012).

SM4BAT bat recorders were deployed on August 2, 2016 in the areas where potential hibernaculum were identified (approximately 2.9 km to the west of the LSM ASR). The bat recording devices were deployed in jackpine rock outcrop and were retrieved on September 14, 2016. The bat recorders were attached to large jack pine trees, approximately 5 m above the ground. The UHF microphones were attached to a branch with the actual microphone pointed in a 45-degree downward direction, as specified by the manufacture. This deployment method is undertaken in order prevent rain from entering the microphone.

Upon retrieval of the bat recorders, three biologists conducted pedestrian ground searches of the area to further investigate for the possibility of other potential hibernacula areas and possible active hibernacula.

Once retrieved, the data captured on the bat recorders were analyzed using the Kaleidoscope Pro 4 Analysis Software. The software reads and converts the collected .wav files to identify high frequency bat calls and an Auto ID function, providing a predicted species of bat for each of the

identified calls. The software uses a probability analysis to determine the species, producing a p-value. Those identified species with a p-value <0.05 are statistically significant in predicting the species of bat correctly. Those calls with a p-value are >0.05 are not necessarily the identified species. Having a p-value >0.05 can be due to small sample size (only having a few calls) or can be that the files recorded only have a few sound bursts recorded. When the p-value is >0.05, a manual identification of the call is required. The spectrogram is visually inspected by the biologist and is compared with the "training dataset", which is a database of recorded calls of bat species within optimal conditions. The training data set for North America consists of approximately 9,000 files (or calls) with over 200,000 bursts (or clusters of collected frequencies) (Agrant, 2012). The training data set generates a minimum and maximum value for each frequency and a likelihood, which when compared to the recorded call, can determine the identity of the species of bat (Agrant, 2012).

Based on the recorded files collected, four bat species were identified. All of the calls identified were assigned a highly statistically significant p-value reading (p-value <0.05), suggestive of a high degree of certainty of accurate species identification. The four species of bats that were identified on the recording devices were: the Silver-haired and Hoary species (both migratory species) and the big and little brown bat species (both hibernacula dwelling species).

Given little brown bats, listed as endangered under SARA, were identified on the bat recorders, a second deployment of the bat recorders (SM4BAT) was undertaken on September 26th, 2016. For this deployment, locations along the Idylwild Road (Map 39) were selected in habitat types (jack pine dominated and black spruce forested areas) consistent with the first bat recorder deployment sites. The locations for second deployment sites were along the ASR in order to determine whether little brown bats may be swarming closer to the ASR, which may be indicative of potential hibernaculum closer to the ASR than the original recorder deployment sites located 2.9 km from the ASR. The bat recorders were re-deployed using the same methodologies described for the first deployment. The bat recorders collected data from dusk to dawn for approximately 22 days and were retrieved on October 17th, 2016. Once recovered, the recorders were analyzed using the Kaleidoscope Pro 4 Analysis Software.

The species of bats identified were little brown bats, big brown bats, and northern long-eared bats. Northern long-eared bats, similar to little brown bats, are listed as Endangered – Schedule 1 under SARA and under MESEA. All of the little brown bat calls recorded were identified with certainty by the software; however, only a portion the northern long-eared bats vocals could be identified with certainty. The number of suspected northern long-eared bat calls did not produce the clarity and/or a large enough sample size for the software to confirm the identity of the calls with statistical confidence (p-value>0.05). Additional study is required to confirm the presence of northern long-eared bats in the RSA. Given the timeline of these species identifications and given the hibernacula and hibernacula openings typical of the area, it is likely that little brown bats are hibernating in the vicinity. If active little brown bat hibernaculum is identified, the area would fit the criteria for critical habitat under SARA.

The location of the first bat recorder deployment is 37 km to the west of the largest identified critical habitat area in the Interlake for little brown bats and is located 23 km to the southeast of the other two smaller critical habitat areas identified in the Interlake for little brown bats. The second bat recorder deployments along the LSM ASR were located 33 km to the southwest of the smaller known critical habitat area for little brown bats and 29 km to the west of the larger known critical habitat area for little brown bats.

Calculating the detection range for ultrasonic microphones (the type used in bat recorders), is highly variable and complex (Wildlife Acoustics, 2016). The bat recorder identifies that little browns are present but the recorder is unable to determine the distance and/or direction of the bats from the recorder. Given that little brown bats are present at a time of year consistent with hibernation, further investigation is required to determine whether little brown bats have indeed established hibernacula (critical habitat) within the RSA.

9.6.1 Elevation Assessment

To enhance our understanding of the relationship between landscape elevation and the potential effect that project related activities may have on any would-be bat hibernacula within the LSA, the elevation of project related features gathered and mapped (Table 27). Understanding the relationship of landscape elevation to potential hibernaculum assists in understanding potential hibernacula abiotic environmental changes (humidity, temperature, moisture) that may occur as a result of landscape change in the area, such as potential ground water/surface water fluctuations. The elevation data were gathered from the CanVec dataset created by Natural Resources Canada, Earth Sciences Sector (Natural Resources Canada, 2016). Table 27 provides the elevation of the area where potential hibernacula were identified in relation to the LSM ASR, the LSMOCs, as well as other landscape features.

Table 27: Elevation of Project Features within the LSA

Location	Elevation Min (masl)	Elevation Max (masl)
Drill Hole 1	227	227
Quarry Withdrawal 1	240	240
Quarry Withdrawal 2	255	260
Quarry Withdrawal 3	260	280
Quarry Withdrawal 4	255	265
Quarry Withdrawal 5	290	290
Quarry Withdrawal 6	285	285
Quarry Withdrawal 7	285	285
Quarry Lease 1	270	270
Quarry Lease 2	282	282
Quarry Lease 3	285	285
Quarry Lease 4	285	285

Table 27: Elevation of Project Features within the LSA

Location	Elevation Min (masl)	Elevation Max (masl)
Quarry Lease 5	285	285
Quarry Lease 6	285	285
Private Quarry Permit 1	285	285
Casual Quarry Permit 1	260	260
Casual Quarry Permit 2	260	260
Casual Quarry Permit 3	285	285
Casual Quarry Permit 4	282	282
Casual Quarry Permit 5	282	282
Casual Quarry Permit 6	282	282
Potential Bat hibernacula /Bat Recorder	295	295
Reach 1 (Option L)	245	250
Reach 2	235	250
Reach 3 (Johnson Beach and Willow Pt)	220	235

The area where several hibernacula were identified is located at a higher elevation than the LSM ASR, however, given bats were also recorded along the LSM ASR. Given these species were heard during late September, early October, it is highly likely that these species are hibernating within the nearby area as bats do not tend to travel far from hibernacula at that time of year (Norquay, personal communication, September 2016). Therefore, further investigation is required to assess for the presence of bat hibernacula within the LSA and then, if hibernacula are present, to determine their elevation in relation to project related landscape features to assist with future potential effects assessment.

9.7 Avian Species

A suite of key avian species that were identified as key focal bird species for the baseline studies were modelled for potential habitat. Not all avian species at risk were modelled. Only avian species at risk that were identified during historical bird survey work within the RSA and/or habitat types that were consistent with the RSA were modelled. Table 1 provides the suite of migratory and forest birds that were selected as key species for the baseline studies. These species were selected given their status as either “threatened” or “endangered” under SARA (2015), MESEA (2015), and/or as being ranked as S3 or higher by MBCDC (2015) with historical data that has identified them within the RSA.

9.7.1 Avian Species Habitat Modeling Methods

A suite of bird species was modelled for potential habitat using the LCC for some species and the Manitoba Forest Resource Inventory (FRI) for other species. The FRI was used in cases where the avian species had a strong preference for water and wetland habitats. The FRI, although

dated to 1980, was determined to be a better base layer for modelling for such species given the finer scale of the FRI and therefore enhanced detailed information on riparian vegetation species (such as cattails [*Typha* spp.]). For certain models, Ecologic's Geomatics team unioned various habitat layers to meet the specific habitat requirements for each species. A combination was used of the LCC, to include fire and any harvest data acquired, FRI, and the soil classification from CANSIS (Canadian Soil Information Service). LCC cover types, were joined with those FRI covertype to identify stand age, crown closure etc., at time of FRI data production. This allows Ecologic Biologists to create more comprehensive habitat models for the given species. Each key avian species was modelled for potential habitat within the Project Footprint area (400 m) and the LSA. The model parameters were developed by a team of wildlife biologists, based on their expertise and literature review of species habitat requirements. These habitat models were used to guide field studies and were validated during field surveys.

9.7.2 Avian Species Habitat Modeling Results

9.7.2.1 American White Pelican

The American white pelican (*Pelecanus erythrorhynchos*) is a large white bird with a distinctive oversized bill and is listed as uncommon in Manitoba (MBCDC, 2015). The pelican frequents large lakes and marshes in western North American. The American white pelican forms foraging flocks with coordinated wing movements to drive fish into shallow water where they can be caught more easily (Vuilleumier, 2009).

The American white pelican potential habitat was modelled using the FRI with a focus on water, grassy marshes, and habitat dominated by grassy vegetation around American beaver floods.

Based on modelling conducted, there is 729.98 km² of American white pelican habitat available within the RSA. The amount of potential American white pelican habitat that may be lost or altered as a result of the Project is a very small percentage of the overall habitat available within the LSA and RSA. The American white pelican habitat modeling conducted on the Route C and Route D Channel outlets in the LSA and RSA exposed only minor differences in the amount of habitat loss/alteration associated with each Route (Table 28 and Table 29). Habitat for the American white pelican is not limiting within the LSA and RSA. There will be more grassy marsh lands lost/altered with Route D. The loss/alteration with Route D and Route C is a very small portion of the grassy marsh lands available within the RSA.

Table 28: Potential American White Pelican Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Grassy Marshes	68.60	0.24	0.35%	0.70	1.02%
American beaver Floods	34.07	0.00	0.00%	0.00	0.00%
Water	627.32	0.43	0.07%	0.52	0.08%
Total	729.98	0.67	0.09%	1.22	0.17%

Table 29: Potential American White Pelican Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Grassy Marshes	9.04	0.24	2.65%	0.70	7.74%
American beaver Floods	0.93	0.00	0.00%	0.00	0.00%
Water	73.52	0.43	0.59%	0.52	0.71%
Total	83.49	0.67	0.80%	1.22	1.46%

9.7.2.2 Bank Swallow

The bank swallow listed as threatened by SARA and occupies a range in Manitoba that may include the LSA. The bank swallow has a recovery strategy under SARA for Ontario as well as several action plans in several National Parks in Canada (SARA, 2015).

Bank swallows use both natural and man-made settings. Townsites and residential sites offer numerous potential habitat locations for bank swallows. Bank swallows are commonly found near water, fields, marshes, streams, and lakes. They are typically seen feeding in flight over (or near) water at all seasons, even during migration. The bank swallow nests in colonies in vertical banks of dirt or sand, usually along rivers or ponds, seldom away from water. Bank swallows nest in dense colonies, in holes in dirt, gravel pits, along fire guards or sand banks. In some cases, they will take advantage of vertical slits in fence posts or abandoned buildings. Some of these colonies are quite large, and a tall riverine cut bank may be pockmarked with several hundred holes (MBBA, 2015). The bank swallow potential habitat was modelled using the FRI focusing on all wetlands, river banks, rivers, lakes, and marsh areas and including townsites, residential sites, gravel pits, mine sites, fence lines and fire guards.

Habitat for bank swallow is not limiting within the LSA and RSA. Bank swallow habitat modeling conducted on the Route C and Route D Channel outlets exposed only minor differences in the amount of habitat that may be loss or altered associated with each Route (Table 30 and Table 31). There will be more habitat lost/altered with Route D in comparison to Route C for this species.

Table 30: Potential Bank Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Wet Meadow	109.03	0.03	0.02%	1.31	1.20%
Marsh	68.60	0.24	0.35%	0.70	1.02%
Townsites/Residential Sites	31.89	0.10	0.30%	0.05	0.16%
Gravel Pits/Mine sites	8.73	0.04	0.51%	0.00	0.00%
Fence lines (Community Pastures), fire guards	1.92	0.00	0.00%	0.00	0.00%
Total	220.17	0.41	0.19%	2.05	0.93%

Table 31: Potential Bank Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Wet Meadow	15.23	0.03	0.17%	1.31	8.58%
Marsh	9.04	0.24	2.69%	0.70	7.71%
Townsites/Residential Sites	9.67	0.10	1.00%	0.05	0.52%
Gravel Pits/Mine sites	0.92	0.04	4.83%	0.00	0.00%
Fence lines (Community Pastures), fire guards	0.08	0.00	0.00%	0.00	0.00%
Total	34.94	0.41	1.17%	2.05	5.88%

9.7.2.3 Barn Swallow

The barn swallow (*Hirundo rustica*), listed as threatened by SARA, is readily adapted to nesting under eaves of houses, under bridges, and inside buildings such as barns. The barn swallow prefers agricultural regions where nesting is primarily in man-made structures such as abandoned structures, buildings and barns. As a result, barn swallows are often found in townsites, near

bridges, barns, farm homes, and mine sites (Cornell Lab of Ornithology, 2016). Barn swallows migrate over winter to sugar cane fields, grain fields and marshes. The barn swallow potential habitat was modelled using the FRI focusing on all wet meadow, marsh, townsites/residential, fence lines, gravel pits, and mine sites where typical nesting structures are found.

Based on modelling, barn swallows have 69.96 km² of available habitat within the RSA. Barn swallow habitat modeling conducted on the Route C and Route D Channel outlets in the LSA and RSA exposed a small amount of potential habitat loss/alteration associated with Route C with little to no potential habitat loss/alteration with Route D (Table 32 and Table 33).

Table 32: Potential Barn Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Precipitous Slopes/Fragile Sites	0.27	0.00	0.00%	0.00	0.00%
Abandoned Cultivated Land	16.79	0.00	0.00%	0.00	0.00%
Dry Upland Ridge Prairie	3.32	0.20	6.02%	0.00	0.00%
Townsites/Residential Sites	31.89	0.10	0.31%	0.05	0.16%
Gravel Pits/Mine Sites	8.73	0.04	0.46%	0.00	0.00%
River Banks	8.95	0.00	0.00%	0.00	0.00%
Total	69.96	0.34	0.49%	0.05	0.07%

Table 33: Potential Barn Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Precipitous Slopes/Fragile Sites	0.00	0.00	0.00%	0.00	0.00%
Abandoned Cultivated Land	1.65	0.00	0.00%	0.00	0.00%
Dry Upland Ridge Prairie	1.61	0.20	12.41%	0.00	0.00%
Townsites/Residential Sites	9.67	0.10	1.03%	0.05	0.52%
Gravel Pits/Mine Sites	0.92	0.04	4.33%	0.00	0.00%
River Banks	0.70	0.00	0.00%	0.00	0.00%
Total	14.56	0.34	2.34%	0.05	0.34%

9.7.2.4 Black-Crowned Night-Heron

The black-crowned night-heron is listed as widespread and abundant in Manitoba (MBCDC, 2015). The black-crowned night-heron can be found near waterbodies, such as lakes, ponds, streams; however, they are generally absent from waterbodies located in higher elevations. These herons often form colonies on islands or in marshes and have been known to have strong fidelity to colony sites (Vuilleumier, 2009). Potential habitat for the black-crowned night-heron was modelled using the FRI with a focus on grassy marshes, drainage areas, American beaver floods, lake shores, islands and rivers.

Based on modelling, the potential habitat for the black-crowned night-heron within the RSA is 219.66 km². Black-crowned night-heron habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 34 and Table 35). There will be more grass/marshland areas that may be lost/altered with Route D. The overall potential amount of grassy marshes lost/altered with either Route C or Route D is a small percentage of the overall grassy marsh lands available in the RSA and LSA.

Table 34: Potential Black-Crowned Night-Heron Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Grassy Marshes	68.6	0.24	0.35%	0.7	1.02%
Mud/Salt Flats	31.4	0.04	0.13%	0.01	0.03%
Drainage Ditches	5.78	0	0.00%	0.03	0.52%
American beaver Flood	34.07	0	0.00%	0	0.00%
Dugouts/Water holes	1	0	0.00%	0	0.00%
Rivers	8.95	0	0.00%	0	0.00%
Shorelines/Islands	69.86	0.04	0.06%	0.16	0.23%
Total	219.66	0.32	0.19%	0.74	0.49%

Table 35: Potential Black-Crowned Night-Heron Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Grassy Marshes	9.04	0.24	2.65%	0.7	7.74%
Mud/Salt Flats	1.41	0.04	2.83%	0.01	0.71%
Drainage Ditches	2.26	0	0.00%	0.03	1.33%
American beaver Flood	0.93	0	0.00%	0	0.00%
Dugouts/Water holes	0.21	0	0.00%	0	0.00%
Rivers	0.7	0	0.00%	0	0.00%
Shorelines/Islands	6.92	0.04	0.58%	0.16	2.31%
Total	21.47	0.32	2.68%	0.9	4.19%

9.7.2.5 Bobolink

The bobolink occurs in Manitoba and may be found in the LSA. They primarily reside in hayfields and agricultural areas and are located in large flocks near marshes during the fall (MBBA, 2015). They are listed as threatened by SARA (SARA, 2015).

The bobolink potential habitat was modelled using the FRI focusing on cultivated lands, pasture lands, and marshes. Habitat for bobolink is not limiting within the RSA and LSA. Bobolink habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed higher amounts of potential habitat loss/alteration associated with Route D in comparison to Route C (Table 36 and Table 37).

Table 36: Potential Bobolink Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Hayland - Cultivated	292.97	1.46	0.50%	3.07	1.05%
Cropland - Cultivated	59.69	0.00	0.00%	0.64	1.07%
Pastureland - Domestic Animals	233.20	0.39	0.17%	1.90	0.81%
Abandoned Cultivated Land	16.79	0.00	0.00%	0.00	0.00%
Marsh	68.60	0.35	0.51%	0.69	1.01%
Total	671.25	2.20	0.33%	6.30	0.94%

Table 37: Potential Bobolink Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Hayland - Cultivated	98.83	1.46	1.48%	3.07	3.11%
Cropland - Cultivated	25.81	0.00	0.00%	0.64	2.48%
Pastureland - Domestic Animals	60.49	0.39	0.64%	1.90	3.14%
Abandoned Cultivated Land	1.65	0.00	0.00%	0.00	0.00%
Marsh	9.04	0.35	3.87%	0.69	7.63%
Total	195.82	2.20	1.12%	6.30	3.22%

9.7.2.6 Canada Warbler

Canada warbler is a migratory songbird listed as threatened under SARA (2015) and threatened (S3B) under MBCDC (2015). It is found in various forest types, but is most abundant in wet, deciduous-coniferous forest with thick underbrush (MBBA, 2015). Generally, this species is uncommon in Manitoba, but has been found breeding throughout the southern boreal forest (along the Manitoba Escarpment in western Manitoba to the Whiteshell and Nopoming Provincial Park boundaries in the southeast) and north toward The Pas in scattered locations. This species may spend no more than a few months on its summer breeding grounds (i.e. it is one of the last species to arrive and the first to leave). After migration, it rapidly migrates in pairs (males typically arrive slightly ahead of females) at night to wintering grounds in southern Mexico and northwestern South America.

The Canada warbler potential habitat was modelled using the LCC focusing on all dense broadleaf and mixedwood stands found on mineral soils based on the CANDIS (Canadian Soil Info Service). Only the tree stands located on mineral soils were used for the model.

Based on the model, potential habitat for Canada warbler within the RSA is 498.18 km^2. Canada warbler habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 38 and Table 39). The difference in the amount of potential habitat loss/alteration associated with either Route C or Route D is negligible and represents a small percentage of the overall Canada warbler habitat available in the RSA and LSA.

Table 38: Potential Canada Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Broadleaf Dense	346.94	0.75	0.21%	0.59	0.17%
Mixedwood Dense	151.24	0.00	0.00%	0.00	0.00%
Total	498.18	0.75	0.15%	0.59	0.12%

Table 39: Potential Canada Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km2)	Proportion (%)	Area (km2)	Proportion (%)
Broadleaf Dense	47.07	0.75	1.58%	0.59	1.25%
Mixedwood Dense	7.25	0.00	0.00%	0.00	0.00%
Total	54.33	0.75	1.37%	0.59	1.09%

9.7.2.7 Caspian Tern

The Caspian tern is the world's largest tern and is listed as uncommon in Manitoba (MBCDC, 2015). This species is an aggressive bird occurring in a variety of aquatic habitats including both freshwater and marine ecosystems. The Caspian tern is rare offshore, it breeds in interior lakes and frequents marshes and wetlands (Vuilleumier, 2009).

The Caspian tern potential habitat was modelled using the FRI with a focus on wet marshy areas, dominated by grassy vegetation around American beaver floods and wet treed areas, small lakes and shorelines of larger lakes.

Based on modelling, the potential habitat available for Caspian tern within the RSA is 327.25 km^2. Caspian tern habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 40 and Table 41). The amount of difference in potential Caspian tern habitat lost/altered with Route C in comparison to Route D is negligible and the potential habitat loss/alteration associated with the development of either Route represents a small percentage of the overall Caspian tern habitat available in the RSA and LSA.

Table 40: Potential Caspian Tern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Marsh	68.60	0.24	0.35%	0.70	1.02%
Drainage Ditches	5.78	0.00	0.00%	0.03	0.56%
American beaver Flood	34.07	0.00	0.00%	0.00	0.00%
Dugouts/Water Holes	1.00	0.00	0.00%	0.00	0.00%
Water	218.01	0.36	0.17%	0.47	0.21%
Total	327.45	0.61	0.19%	1.20	0.37%

Table 41: Potential Caspian Tern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Marsh	9.04	0.24	2.69%	0.70	7.71%
Drainage Ditches	2.26	0.00	0.00%	0.03	1.44%
American beaver Flood	0.93	0.00	0.00%	0.00	0.00%
Dugouts/Water Holes	0.21	0.00	0.00%	0.00	0.00%
Water	30.09	0.36	1.21%	0.47	1.56%
Total	42.53	0.61	1.43%	1.20	2.82%

9.7.2.8 Common Nighthawk

Common nighthawk is a migratory songbird listed as threatened by MESEA, SARA, and uncommon (S3B) by the MCDC (2015). The common nighthawk can be found in most of Manitoba except the northern extremity of the province and is highly likely to be found within the LSA (Bezener and De Smet, 2000). This species breeds in a wide range of open habitats (e.g. dunes, beaches, burnt, logged or recently harvested areas, rocky outcrops, rocky barrens, grasslands, pastures, or riparian areas), along with mixed and coniferous forests. Less common in southern Manitoba, it is still quite common in parts of northern Manitoba, and typically arrives late to spring breeding grounds (MBBA, 2015). It winters in the tropics, but migratory patterns are difficult to distinguish from other nighthawks, as they mix together with other nighthawks in parts of the winter range; uniquely, females usually arrive several days ahead of males.

For the common nighthawk, using the LCC, dense and open coniferous stands with areas of open rock outcrop and exposed land and grasslands within 500m of fence lines and fire guards were used to model potential habitat. Based on the model, there is 119.19 km² of habitat available for the common nighthawk within the RSA. The degree of habitat loss/alteration is a very small percentage of the overall common nighthawk habitat available.

Common nighthawk habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 42 and Table 43). There is little variation in the amount of potential common nighthawk habitat lost/altered with Route C in comparison to Route D and in either case, the potential habitat loss/alteration is a small percentage of the overall common nighthawk habitat available in the RSA and LSA.

Table 42: Potential Common Nighthawk Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in Km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Coniferous Open	82.87	0.00	0.00%	0.00	0.00%
Exposed Land	17.74	0.03	0.17%	0.02	0.11%
Grassland	18.58	0.00	0.00%	0.00	0.00%
Total	119.19	0.03	0.03%	0.02	0.02%

Table 43: Potential Common Nighthawk Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in Km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Coniferous Open	3.39	0.00	0.00%	0.00	0.00%
Exposed Land	2.57	0.03	1.17%	0.02	0.78%
Grassland	0.9	0.00	0.00%	0.00	0.00%
Total	6.86	0.03	0..44%	0.02	0.29%

9.7.2.9 Eastern Whip-Poor-Will

Eastern whip-poor-will is a migratory songbird listed as threatened by MESEA, SARA, and is uncommon (S3B) in Manitoba (MCDC, 2015). It prefers to breed in semi-open or patchy forests

with clearings, such as regenerating disturbed areas, upland deciduous or mixed-wood forests; this species occurs in a variety of similar forest-structure areas in Manitoba, but not wide-open spaces or dense forests (MBBA, 2015). The northern border of the breeding range is a diagonal stripe along the aspen parkland transition zone from southeastern Manitoba to eastern central Saskatchewan. Wintering grounds are in Mexico and Central America.

For the eastern whip-poor-will, the potential habitat was modelled using the LCC with a focus on broadleaf open and mixed-wood dense habitat with stands having less than 50% crown closure, obtained from the LCC and FRI, unioned habitat layer.

Based on the results of the habitat model, eastern whip-poor-will has 310.55 km² of available habitat within the RSA. The degree of potential loss/alteration with the Project is a very small percentage of the overall Eastern whip-poor-will habitat available (Table 44 and Table 45). Eastern whip-poor-will habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route. The difference in the amount of potential Eastern whip-poor-will habitat lost/altered with Route C versus Route D is negligible and is a small percentage of the overall Eastern whip-poor-will habitat available in the RSA and LSA.

Table 44: Potential Eastern Whip-Poor-Will Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Broadleaf Open	185.82	0.25	0.14%	0.05	0.03%
Mixedwood Dense	124.73	0.00	0.00%	0.00	0.00%
Total	310.55	0.25	0.08%	0.05	0.02%

Table 45: Potential Eastern Whip-Poor-Will Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Broadleaf Open	9.64	0.25	2.63%	0.05	0.52%
Mixedwood Dense	7.25	0.00	0.00%	0.00	0.00%
Total	16.90	0.25	1.50%	0.05	0.30%

9.7.2.10 Eastern Wood-Pewee

Eastern wood-pewee is a common (S4B) migratory songbird in Manitoba (MCDC, 2015) and is not listed under SARA or MESEA, but is assessed as Special Concern by COSEWIC. The Eastern wood-pewee is common in mature mixedwoods and deciduous forests, often including aspen stands in Manitoba, and may be present in mature deciduous woods such as large aspen stands and along edges of fairly open woods; it also occurs in riparian forests, beach ridge forests, and sometimes well-wooded urban and rural parks, and southern boreal transitional forest, with a deciduous component, or sometimes jack pine and more open boreal forest types (MBBA, 2015). It is one of the last migrants in spring, and winters in the tropics of South America.

For the Eastern wood pewee, using the LCC, dense broadleaf and mixedwood stands were used to model potential habitat. Based on modelling, the potential habitat for Eastern wood-peewee is within the RSA is 641.47 km². The degree of Eastern wood-pewee habitat loss/alteration with respect to the Project is a very small percentage of the overall Eastern wood-pewee habitat available.

Eastern wood-pewee habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 46 and Table 47). The amount of difference in potential Eastern wood-pewee habitat lost/altered with Route C in comparison to Route D is negligible and the potential habitat loss/alteration associated with the development of either Route represents a small percentage of the overall eastern wood-pewee habitat available in the RSA and LSA.

Table 46: Potential Eastern Wood-Pewee Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Broadleaf Dense	376.68	0.75	0.20%	0.71	0.19%
Mixedwood Dense	264.79	0.00	0.00%	0.00	0.00%
Total	641.47	0.75	0.12%	0.71	0.11%

Table 47: Potential Eastern Wood-Pewee Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Broadleaf Dense	48.07	0.75	1.55%	0.71	1.47%
Mixedwood Dense	7.41	0.00	0.00%	0.00	0.00%
Total	55.48	0.75	1.35%	0.71	1.28%

9.7.2.11 Golden-Winged Warbler

Golden-winged warblers are listed as threatened under MESEA and SARA and is uncommon (S3B) in Manitoba (MCDC, 2015). They are found in dry uplands, swamp forests, marshes, scrubby bur-oak woodland, young willow-tamarack stands, and other early successional habitats including the fringes of the boreal forest in Manitoba (MBBA, 2015). They are likely to be found in the LSA. Golden-winged warblers can be found on and near lakes, rivers, marshes, and prairie wetlands in Manitoba (MBBA, 2015).

For the golden-winged warbler, potential habitat was modelled using the FRI with a focus on tamarack, willow, birch, wet meadows and marshes. Based on modelling, the potential habitat for the golden-winged warbler is 556.93 km² within the RSA. Golden-winged warbler habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 48 and Table 49). There will be more wet meadow potentially lost/altered with Route D in comparison to Route C; however, the overall amount of potential golden-winged warbler habitat lost/altered with either Route C or Route D is a small percentage of the overall golden-winged warbler habitat available in the RSA and LSA.

Table 48: Potential Golden-Winged Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Tamarack Larch Treed Muskeg	58.03	0.00	0.00%	0.00	0.00%
Willow	198.78	0.39	0.20%	0.07	0.04%
Dwarf Birch	122.49	0.00	0.00%	0.00	0.00%
Wet Meadow	109.03	0.03	0.03%	1.30	1.19%
Marsh	68.60	0.24	0.35%	0.70	1.02%
Total	556.93	0.66	0.12%	2.07	0.37%

Table 49: Potential Golden-Winged Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Tamarack Larch Treed Muskeg	0.00	0.00	0.00%	0.00	0.00%
Willow	11.36	0.39	3.43%	0.07	0.62%
Dwarf Birch	0.70	0.00	0.00%	0.00	0.00%
Wet Meadow	15.23	0.03	0.20%	1.30	8.54%
Marsh	9.04	0.24	2.65%	0.70	7.74%
Total	36.33	0.66	1.82%	2.07	5.70%

9.7.2.12 Horned Grebe

The horned grebe is listed under SARA and a species of special concern but is not listed by the MESEA. It is ranked as widespread and abundant in Manitoba (MBCDC, 2015). The horned grebe breeds in small freshwater lakes, ponds, and marshes, including man-made ponds. The horned grebe prefers areas with open water and patches of sedges, cattails, and other wetland vegetation (Vuilleumier, 2009). The horned grebe potential habitat was modelled using the FRI with a focus on marsh and water drainage areas, gravel pits, and mine sites, as well as American beaver flood, rivers and small lakes less than 10ha.

Based on habitat modelling conducted for horned grebe, there is 139.51 km² of available habitat within the RSA. Horned grebe habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed a larger amount of potential habitat loss/alteration associated with Route D (Table 50 and Table 51). There will be more marsh habitat potentially lost/altered with Route D in comparison to Route C.

Table 50: Potential Horned Grebe Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in Km2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km2)	Proportion (%)	Area (km2)	Proportion (%)
Marsh	68.6	0.24	0.35%	1.75	2.55%
Sand Beaches	5.07	0.04	0.79%	0	0.00%
Gravel Pits/Mine sites	8.73	0.07	0.80%	0	0.00%
Drainage Ditches	5.78	0	0.00%	0.06	1.04%
American beaver Flood	34.07	0	0.00%	0	0.00%
Dugouts/Water Holes	1	0	0.00%	0	0.00%
Rivers	8.95	0	0.00%	0	0.00%
Small Lakes	7.31	0.003	0.04%	0.01	0.14%
Total	139.51	0.35	0.26%	1.82	1.30%

Table 51: Potential Horned Grebe Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Marsh	9.04	0.24	2.65%	1.75	19.35%
Sand Beaches	1.21	0.04	3.30%	0	0.00%
Gravel Pits/Mine sites	0.92	0.07	7.58%	0	0.00%
Drainage Ditches	2.26	0	0.00%	0.06	2.66%
American beaver Flood	0.93	0	0.00%	0	0.00%
Dugouts/Water Holes	0.21	0	0.00%	0	0.00%
Small Lakes	0.47	0.003	0.64%	0.01	2.13%
Rivers	0.7	0	0.00%	0	0.00%
Total	15.74	0.35	3.41%	1.82	11.5%

9.7.2.13 Least Bittern

Least bittern is a migratory marsh bird listed as threatened under SARA (2015) and endangered under MESEA (2015). It prefers to breed only in marshes dominated by emergent vegetation such as cattails, surrounded by stable-level areas of open water, but will also breed in shrubby swamps. Dense vegetation is required for nesting to enable its nest to sit on a platform of stiff stems; open water is needed for foraging to allow it to ambush prey in shallow water near marsh edges; and access to clear water is essential to see its prey. Least bittern is secretive and most often detected only by its cuckoo-like call. It is found in southern Manitoba and winters mainly along the Gulf and Mexican coasts, south to Panama. Least bittern habitat was modelled using the FRI and focussing on marsh and American beaver floods.

Based on habitat modelling conducted, there is 102.66 km² of available least bittern habitat within the RSA. Least bittern habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 52 and Table 53). There will be more marsh lands potentially lost/altered with Route D in comparison to Route C; however, the overall amount of potential least bittern habitat lost/altered with either Route C or Route D is a small percentage of the overall least bittern habitat available in the RSA and LSA.

Table 52: Potential Least Bittern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Marsh	68.60	0.24	0.35%	0.70	1.02%
American beaver Floods	34.07	0.00	0.00%	0.00	0.00%
Total	102.66	0.24	0.24%	0.70	0.68%

Table 53: Potential Least Bittern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Marsh	9.04	0.24	2.69%	0.70	7.71%
American beaver Floods	0.93	0.00	0.00%	0.00	0.00%
Total	9.97	0.24	2.44%	0.70	6.99%

9.7.2.14 Olive-sided Flycatcher

Olive-sided flycatcher is a migratory songbird listed as threatened under SARA (2015) and MESEA (2015) and is uncommon in Manitoba (S3B) (MCDC, 2015). Commonly it is found in open forest habitat (boreal wetland, western coniferous, or mixedwood forests), containing tall mature trees or snags for perching to enable foraging; open areas include natural forest-edge wetland areas, burned forest clearings, old-growth stand openings, or harvested areas such as logged areas (Bezener and De Smet, 2000; MBBA, 2015). Successful breeding habitat is more likely to be in natural openings rather than harvested areas. In Manitoba, it is located in lowland coniferous forest; from Riding Mountain National Park in the west to Moose Lake in the southeast, and up into the Interlake to Hecla Island and Mantagao Lake. This species has the longest migration of any North American flycatcher, travelling solitary to its wintering grounds; the majority of this species migrates to Panama, and the northern Andes from northern Venezuela to western Bolivia, with high densities in Colombia.

Olive-sided flycatcher was modelled for potential habitat using the LCC with a focus on all coniferous and treed wet areas, and wooded to forested bogs that have greater than 10% tree cover. Based on the model, the olive-sided flycatcher has 2,197.22 km² of available habitat within the RSA. Olive-sided flycatcher habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 54 and Table 55). The amount of difference in potential olive-sided flycatcher habitat lost/altered with Route C in comparison to Route D is negligible and the habitat loss/alteration associated with the development of either Route represents a small percentage of the overall olive-sided flycatcher habitat available in the RSA and LSA.

Table 54: Potential Olive-Sided Flycatcher Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Coniferous Open	82.87	0.00	0.00%	0.00	0.00%
Wetland Shrub	1997.31	0.25	0.01%	0.31	0.02%
Wetland Treed	117.04	0.00	0.00%	0.00	0.00%
Total	2197.22	0.25	0.01%	0.31	0.01%

Table 55: Potential Olive-Sided Flycatcher Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in Km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Coniferous Open	3.39	0.00	0.00%	0.00	0.00%
Wetland Shrub	39.27	0.25	0.63%	0.31	0.79%
Wetland Treed	0.00	0.00	0.00%	0.00	0.00%
Total	42.67	0.25	0.58%	0.31	0.73%

9.7.2.15 Peregrine Falcon

The peregrine falcon is listed as a species of special concern under SARA and as endangered by MESEA and very rare in the province of Manitoba (MBCDC, 2015). The peregrine falcon is known to be a “wanderer” that can dive from great heights at speeds of up to 320 kmph (Vuilleumier, 2009). The peregrine falcon occupies a wide variety of habitats, such as open valleys, cities with tall buildings, and along inland cliffs or mountain ranges, in all cases, requiring a high nesting perch for raising their young and hunting (Vuilleumier, 2009).

Peregrines require open spaces consistent with much of the terrain in southern Manitoba and traditionally nest at cliff locations. In southern Manitoba, where there is an absence of high cliffs, urban centres provide an alternative nesting habitat. Hydro structures such as transmission line poles often serve as vantage points in these fairly open and relatively flat landscapes. The entire landscape of the RSA has an overall topography that ranges from 220 to 310 m asl with the winter road located along an upland glacial beach ridge. Historical accounts within the heritage resources technical report indicate a “big ridge” within the RSA; however, this is located along the winter road moraine. Therefore, there are no true cliffs or ridges that are tall enough within the RSA for peregrine falcon use. During migration, they may use wooded habitats to roost and rest as they fly through an area. The amount of potential roosting habitat for peregrine is not limiting within the RSA and LSA.

For the peregrine falcon, using the LCC, dense broadleaf and mixedwood stands were used to model potential roosting habitat, as no nesting habitat occurs in the area. The amount of potential habitat for peregrine, based on the habitat modelling conducted is 641.47 km² within the RSA.

Peregrine falcon habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 56 and Table 57). The overall amount of potential peregrine falcon roosting habitat lost/altered with either Route C or Route D is a small percentage of the overall peregrine falcon habitat available in the RSA and LSA.

Table 56: Potential Peregrine Falcon Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Broadleaf Dense	376.68	0.75	0.20%	0.71	0.19%
Mixedwood Dense	264.79	0.00	0.00%	0.00	0.00%
Total	641.47	0.75	0.12%	0.71	0.11%

Table 57: Potential Peregrine Falcon Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Broadleaf Dense	48.07	0.75	1.55%	0.71	1.47%
Mixedwood Dense	7.41	0.00	0.00%	0.00	0.00%
Total	55.48	0.75	1.35%	0.71	1.28%

9.7.2.16 Piping Plover

The piping plover is very rare (S1B) in Manitoba (MCDC 2016) and is listed as endangered under SARA and MESEA. Piping plover habitat primarily consists of open sandy beaches or rocky shorelines, often in areas of the beach that are dry and away from the water. For the piping plover, the FRI was used, specifically modelling for sandy shores and/or mudflats/salt flats along shorelines within 150 m of LMB, LSM, and Lake Winnipeg.

The amount of potential habitat for piping plover is limited to the shorelines of LMB, LSM, and Lake Winnipeg within the RSA. The degree of potential loss/alteration with the LMB Routes C and D is very small with 0.08 km2 and 0.06 km2 respectively in the RSA and 0.08 km2 and 0.01 km2 respectively in the LSA (Table 58 and Table 59).

Table 58: Potential Piping Plover Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D

Habitat Type (within 150m of large water body)	Total Modeled Habitat (RSA) in km²	Route C (400m RoW)		Route D (400m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Mud/Salt Flats	19.03	0.04	0.22%	0.01	0.07%
Sand Beaches	4.65	0.04	0.81%	0.00	0.00%
Total	23.68	0.08	0.33%	0.01	0.06%

Table 59: Potential Piping Plover Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D

Habitat Type (within 150m of large water body)	Total Modeled Habitat (LMB LSA) in km²	Route C (400m RoW)		Route D (400m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Mud/Salt Flats	1.41	0.04	2.93%	0.01	0.95%
Sand Beaches	1.19	0.04	3.19%	0.00	0.00%
Total	2.59	0.08	3.05%	0.01	0.52%

9.7.2.17 Red-Headed Woodpecker

The red-headed woodpecker prefers a variety of habitat types: open oak, beech, or riparian forests, forest edges, orchards, grasslands, pastures, roadsides, urban green spaces, and beside American beaver ponds and brooks. They are uncommon in Manitoba (S3B) (MCDC, 2015), listed as threatened under MESEA (2015) and SARA (2015) and likely to be present in the LSA. The red-headed woodpecker was modelled for potential habitat using the FRI with a focus on all recreational sites, water drainage areas, fence lines, American beaver floods, and grasslands within 500m of fence lines and fireguards.

Based on the modelled habitat for red-headed woodpecker, there is 43.94 km² of available habitat within the RSA. Red-headed woodpecker habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 60 and Table 61). The amount of difference in potential red-headed woodpecker habitat lost/altered with Route C in comparison to Route D is negligible and the habitat loss/alteration associated with the development of either Route represents a small percentage of the overall red-woodpecker habitat available in the RSA and LSA.

Table 60: Potential Red-Headed Woodpecker Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Recreational sites	1.33	0.00	0.00%	0.00	0.00%
Shelter Belts	0.83	0.00	0.00%	0.01	1.47%
Fence lines (Community Pastures), fire guards	1.92	0.00	0.00%	0.00	0.00%
Drainage Ditches	5.78	0.00	0.00%	0.03	0.56%
American beaver Flood	34.07	0.00	0.00%	0.00	0.00%
Grassland	18.58	0.00	0.00%	0.00	0.00%
Total	62.513	0.00	0.00%	0.04	0.10%

Table 61: Potential Red-Headed Woodpecker Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km²	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km²)	Proportion (%)	Area (km²)	Proportion (%)
Recreational sites	0.21	0.00	0.00%	0.00	0.00%
Shelter Belts	0.18	0.00	0.00%	0.01	6.74%
Fence lines (Community Pastures), fire guards	0.08	0.00	0.00%	0.00	0.00%
Drainage Ditches	2.26	0.00	0.00%	0.03	1.44%
American beaver Flood	0.93	0.00	0.00%	0.00	0.00%
Grassland	0.9	0.00	0.00%	0.00	0.00%
Total	4.56	0.00	0.00%	0.04	0.88%

9.7.2.18 Short-Eared Owl

Short-eared owl is a migratory marsh or open-grassland bird that is listed as special concern under by SARA (2015). It is rare to uncommon in Manitoba (S2S3B) and threatened under MESEA (2015). It makes use of a wide variety of open habitats, including arctic tundra, grasslands, peat bogs, marshes, sand-sage concentrations, and old pastures, with preferred

nesting sites found in dense grasslands, as well as tundra with areas of small willows (Bezener and De Smet, 2000; MBBA, 2015).

The main factor influencing the preference of short-eared owl for open habitat is believed to be the abundance of food, especially the presence of meadow voles in the south and collared lemmings in the north. Short-eared owls are often associated with spring concentrations of rough-legged hawks and northern harriers, which are also positive indicators of rodent abundance. Short-eared owls breed mainly in southern farmland and northern tundra in Manitoba; in the boreal plains, they are sparsely distributed and breed in extensive marshes and fens. Wintering grounds are located south throughout the United States to Central America.

The short-eared owl was modelled for potential habitat using the LCC with a focus on all grasslands, croplands, and wetland herb. Based on modelling, the habitat for the short-eared owl within the RSA wad 1747.76 km². Short-eared owl habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 62 and Table 63). There will be more grasslands and cultivated lands potentially lost/altered with Route D in comparison to Route C; however, the overall amount of short-eared owl habitat lost/altered with either Route C or Route D is a small percentage of the overall short-eared owl habitat available in the RSA and LSA.

Table 62: Potential Short-Eared Owl Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Herb	118.26	0.31	0.27%	0.71	0.60%
Grassland	691.64	2.04	0.29%	5.28	0.76%
Perennial Crops and Pasture	70.02	0.21	0.30%	0.88	1.26%
Wetland Herb	867.84	0.61	0.07%	0.95	0.11%
Total	1747.76	3.17	0.18%	7.83	0.45%

Table 63: Potential Short-Eared Owl Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Herb	27.56	0.31	1.14%	0.71	2.58%
Grassland	183.91	2.04	1.11%	5.28	2.87%
Perennial Crops and Pasture	28.34	0.21	0.75%	0.88	3.12%
Wetland Herb	32.05	0.61	1.90%	0.95	2.97%
Total	271.86	3.17	1.17%	7.83	2.88%

9.7.2.19 Trumpeter Swan

Trumpeter swan is a migratory water bird not listed under SARA (2015) but is listed as very rare in Manitoba (S1B) (MCDC, 2015) and endangered under MESEA (2015). Despite its rarity, a number of sightings have occurred in Manitoba in recent years (MBBA, 2015). It prefers nesting in shallow wetlands with stable water levels, abundant and elevated nest sites, abundant and diverse aquatic invertebrates and/or plants, and low levels of human disturbance.

Trumpeter swan typically mates for life, with females laying an egg every second day until they have a full clutch (average of five to six eggs). Migration to wintering grounds is complex and flown in short segments with long layovers and very few long flights; birds from western Canada fly east of the Rockies to the Yellowstone area following freeze up in late fall.

The trumpeter swan was modelled for potential habitat using the FRI. Boreal lakes, American beaver floods, and open wet marshes were used to highlight potential habitat. Topographic maps at the scale of 1:50,000 were used to identify lakes potentially inhabited by swans, including Lake Winnipeg, Lake St. Martin, Lake Manitoba, and a series of smaller lakes with a majority of these smaller lakes located in the southeastern corner of the RSA.

Based on the modelling, potential habitat for trumpeter swan within the RSA is 706.57 km^2. Trumpeter swan habitat modeling conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each Route (Table 64 and Table 65). The amount of difference in trumpeter swan habitat potentially lost/altered with Route C in comparison to Route D is negligible and the habitat loss/alteration associated with the development of either Route represents a small percentage of the overall trumpeter swan habitat available in the RSA and LSA.

Table 64: Potential Trumpeter Swan Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Marsh	68.60	0.24	0.35%	0.70	1.02%
American beaver Flood	34.07	0.00	0.00%	0.00	0.00%
Water	594.96	0.38	0.06%	0.54	0.09%
Rivers	8.95	0.00	0.00%	0.00	0.00%
Total	706.57	0.62	0.09%	1.23	0.17%

Table 65: Potential Trumpeter Swan Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Marsh	9.04	0.24	2.69%	0.70	7.71%
American beaver Flood	0.93	0.00	0.00%	0.00	0.00%
Water	74.62	0.38	0.51%	0.54	0.72%
Rivers	0.70	0.00	0.00%	0.00	0.00%
Total	85.29	0.62	0.73%	1.23	1.45%

9.7.2.20 Yellow Rail

Yellow rail is a migratory marsh bird listed as Special Concern under SARA (2015) but is not listed under MESEA (2015). It is uncommon in Manitoba, typically found in marshes with little standing water (0 to 12 centimetre depth) and emergent vegetation (sedges, true grasses, and rushes, for example), but also inhabits damp fields and meadows, river and stream floodplains, herbaceous vegetation of bogs, and drier margins of estuarine- and salt marshes (MBBA, 2015).

The yellow rail potential habitat was modelled using the FRI with a focus on wet marshy areas, dominated by grassy vegetation around American beaver floods and wet treed areas (i.e. muskeg).

Based on the habitat modelling conducted, there is 541.49 km² of available habitat for yellow rails within the RSA. Yellow rail habitat modeling was conducted on the Route C and Route D Channel outlets in the RSA and LSA exposed more potential habitat loss/alteration is associated with Route D than Route C (Table 66 and Table 67). The amount of difference in yellow rail habitat

potentially lost/altered with both Route C and Route D represents a small percentage of the overall yellow rail habitat available in the RSA and LSA.

Table 66: Potential Yellow Rail Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (RSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Muskeg	438.83	0.03	0.01%	0.00	0.00%
Marsh	68.60	0.24	0.35%	0.70	1.02%
American beaver Floods	34.07	0.00	0.00%	0.00	0.00%
Total	541.49	0.28	0.05%	0.70	0.13%

Table 67: Potential Yellow Rail Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with Route C and Route D Outlet Channels

Habitat Type	Total Modeled Habitat (LSA) in km^2	Route C (400 m RoW)		Route D (400 m RoW)	
		Area (km^2)	Proportion (%)	Area (km^2)	Proportion (%)
Muskeg	3.16	0.03	1.06%	0.00	0.00%
Marsh	9.04	0.24	2.69%	0.70	7.71%
American beaver Floods	0.93	0.00	0.00%	0.00	0.00%
Total	13.13	0.28	2.10%	0.70	5.31%

9.7.3 Manitoba Breeding Bird Atlas Surveys

The Manitoba Breeding Bird Atlas (MBBA) has conducted bird survey work within the RSA. Map 42 presents the grid map used by the MBBA showing where survey work has been conducted within the RSA. A full listing of all of the birds identified by the MBBA surveys can be found at the Manitoba Breeding Bird Atlas website (MBBA, 2015) by downloading the survey data for each tile of interest. Map 43 and Table 68 provide the general location (by tile) and the bird species at risk that were identified during the MBBA surveys conducted within the RSA. The tiles that are colored red on the map represent the areas with seven unique bird species at risk identified. The Project linear feature with the highest number of bird species at risk identified is the Route D route alignment for the Lake Manitoba Outlet Channel.

Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 43)

Region	Category	Square	Species1	Species2	Species3	Species4	Species5	Species6	Species7
7	Forest SAR	14MC90	Barn Swallow	Eastern Wood-Pewee					
7	Forest and Water SAR	14MC91	American White Pelican	Barn Swallow					
7	Forest and Water SAR	14MC92	American White Pelican	Barn Swallow	Eastern Whip-poor-will	Eastern Wood-Pewee	Red-headed Woodpecker		
7	Forest and Water SAR	14NB07	Barn Swallow	Caspian Tern	Eastern Wood-Pewee	Horned Grebe			
7	Forest and Water SAR	14NB09	Barn Swallow	Least Bittern					
6	Forest SAR	14NB16	Barn Swallow						
6	Forest and Water SAR	14NB18	American White Pelican	Barn Swallow	Bobolink	Eastern Wood-Pewee	Red-headed Woodpecker		
6	Forest and Water SAR	14NB19	American White Pelican	Bank Swallow	Barn Swallow	Bobolink	Horned Grebe	Red-headed Woodpecker	
6	Forest and Water SAR	14NB26	American White Pelican	Barn Swallow	Bobolink				
6	Forest and Water SAR	14NB28	American White Pelican	Barn Swallow	Bobolink				
6	Forest and Water SAR	14NB29	Barn Swallow	Bobolink	Horned Grebe	Red-headed Woodpecker			
6	Forest and Water SAR	14NB36	American White Pelican	Barn Swallow	Bobolink	Red-headed Woodpecker			
6	Forest SAR	14NB37	Barn Swallow	Bobolink	Eastern Whip-poor-will	Red-headed Woodpecker			
6	Forest and Water SAR	14NB38	American White Pelican	Barn Swallow	Bobolink	Eastern Whip-poor-will	Least Bittern		
6	Forest and Water SAR	14NB39	Barn Swallow	Eastern Whip-poor-will	Least Bittern				
6	Forest and Water SAR	14NB46	American White Pelican	Barn Swallow	Bobolink	Common Nighthawk	Eastern Whip-poor-will	Red-headed Woodpecker	
6	Forest SAR	14NB47	Barn Swallow	Bobolink	Eastern Whip-poor-will	Red-headed Woodpecker			
6	Forest SAR	14NB48	Barn Swallow	Red-headed Woodpecker					
6	Forest SAR	14NB49	Barn Swallow	Bobolink	Eastern Whip-poor-will				

Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 43)

Region	Category	Square	Species1	Species2	Species3	Species4	Species5	Species6	Species7
6	Forest and Water SAR	14NB56	Bobolink	Eastern Whip-poor-will	Yellow Rail				
6	Forest SAR	14NB57	Barn Swallow	Bobolink	Eastern Whip-poor-will				
6	Forest SAR	14NB58	Barn Swallow	Canada Warbler					
6	Forest SAR	14NB59	Canada Warbler						
6	Water SAR	14NB68	Yellow Rail						
6	Forest SAR	14NB77	Barn Swallow	Eastern Wood-Pewee	Golden-winged Warbler				
6	Forest SAR	14NB78	Golden-winged Warbler						
6	Forest SAR	14NB89	Barn Swallow	Golden-winged Warbler					
7	Forest SAR	14NC00	Barn Swallow						
7	Forest SAR	14NC01	Eastern Whip-poor-will						
6	Forest and Water SAR	14NC03	American White Pelican	Barn Swallow					
6	Forest and Water SAR	14NC10	American White Pelican	Bank Swallow	Barn Swallow	Bobolink	Caspian Tern	Common Nighthawk	Eastern Wood-Pewee
6	Forest and Water SAR	14NC11	American White Pelican	Barn Swallow	Eastern Whip-poor-will				
6	Forest and Water SAR	14NC12	American White Pelican	Barn Swallow	Bobolink	Common Nighthawk	Eastern Whip-poor-will		
6	Forest SAR	14NC13	Barn Swallow	Bobolink	Common Nighthawk	Eastern Wood-Pewee	Red-headed Woodpecker		
6	Forest SAR	14NC20	Bank Swallow	Barn Swallow	Bobolink	Common Nighthawk	Red-headed Woodpecker		
6	Forest and Water SAR	14NC21	American White Pelican	Barn Swallow	Horned Grebe				
6	Forest SAR	14NC22	Bobolink	Eastern Whip-poor-will					
6	Forest and Water SAR	14NC23	Barn Swallow	Eastern Whip-poor-will	Horned Grebe				

Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 43)

Region	Category	Square	Species1	Species2	Species3	Species4	Species5	Species6	Species7
6	Forest and Water SAR	14NC30	American White Pelican	Barn Swallow	Bobolink	Caspian Tern	Eastern Whip-poor-will	Red-headed Woodpecker	Yellow Rail
6	Forest SAR	14NC32	Barn Swallow	Eastern Whip-poor-will					
6	Forest and Water SAR	14NC33	Barn Swallow	Bobolink	Eastern Whip-poor-will	Yellow Rail			
6	Forest and Water SAR	14NC34	Common Nighthawk	Yellow Rail					
6	Forest and Water SAR	14NC42	American White Pelican	Caspian Tern	Olive-sided Flycatcher				
6	Forest SAR	14NC43	Canada Warbler	Eastern Whip-poor-will					
6	Forest and Water SAR	14NC44	American White Pelican	Barn Swallow	Canada Warbler				
6	Forest and Water SAR	14NC45	American White Pelican	Barn Swallow	Canada Warbler	Golden-winged Warbler	Yellow Rail		
9	Forest and Water SAR	14NC46	American White Pelican	Barn Swallow	Canada Warbler	Eastern Whip-poor-will			
6	Forest SAR	14NC53	Common Nighthawk	Eastern Whip-poor-will	Olive-sided Flycatcher				
6	Forest SAR	14NC55	Barn Swallow	Canada Warbler	Common Nighthawk	Eastern Whip-poor-will			
9	Forest SAR	14NC56	Common Nighthawk	Eastern Whip-poor-will					
6	Forest and Water SAR	14NC65	American White Pelican	Barn Swallow					
6	Forest SAR	14NC80	Eastern Wood-Pewee	Golden-winged Warbler					

9.7.4 Raptor Nest and Heron Rookery Search Methods

Aerial surveys for raptor stick nests were conducted in conjunction with the aerial multispecies and aerial moose surveys from Jan 31 – Feb 6, 2017 (winter) as well as during aerial survey flights conducted June 2-11, 2016 (spring/early summer). Raptor nest searches were conducted for bald eagle (*Haliaeetus leucocephalus*), osprey (*Pandion haliaetus*), and great blue-heron (*Ardea herodias*) rookeries, among other raptor species nests. Pedestrian surveys for smaller

raptor nest were conducted from June 2-11, 2016 along the centerline of the RoWs for Route C and Route D (See Section 8.6.6).

9.7.5 Raptor Nest and Heron Rookery Search Results

During the aerial surveys (both winter and spring/early summer) as well as the pedestrian ground-based surveys conducted in June 2016, several small and large bird nests as well as numerous nesting snags were identified (Table 69). Depending on the alignment Route selected, these large hawk and eagle nests will need to be surveyed prior to construction to determine if they are active and the proper provincial requirements for set-back distances will need to be adhered to.

Table 69: Aerial Raptor and Pedestrian-Based Nest Search Results within the LSA

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Nesting Snag	1	5699313.32	531850.11	Route D
Nesting Snag	1	5712972.69	519352.74	Route C
Nesting Snag	1	5713007.26	519630.38	Route C
Nesting Snag	2	5713001.65	519815.61	Route C
Nesting Snag	1	5713000.56	519997.48	Route C
Nesting Snag	1	5712512.14	523353.32	Route C
Nesting Snag	1	5712394.8	523329.23	Route C
Nesting Snag	1	5711689.07	523807.6	Route C
Nesting Snag	1	5695058.39	531172.69	Route D
Stick Nest medium (6-10 inch diameter)	3	5695058.39	531172.69	Route D
Nesting Snag	1	5695073.67	531162.4	Route D
Nesting Snag	1	5695103.85	531146.02	Route D
Small Nests (2-4 inch diameter)	2	5695103.85	531146.02	Route D
Nesting Snag	1	5703097.56	533219.81	Route D
Nesting Snag	2	5691034.72	530423.72	Route D
Nesting Snag	1	5690429.64	530591.67	Route D
Warbler Nest	1	5690285.07	530650.28	Route D
Nesting Snag Active (Red-headed woodpecker)	1	5689966.89	530724.19	Route D
Nesting Snag	2	5689835.62	530745.41	Route D
Nesting Snag	1	5689125.96	530654.56	Route D
Nesting Snag	1	5688102.49	530535.94	Route D
Stick Nest - medium (6-10 inch diameter)	1	5682583.37	529773.56	Route D

Table 69: Aerial Raptor and Pedestrian-Based Nest Search Results within the LSA

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Nesting Snag	1	5682377.81	530638.42	Route D
Nesting Snag	1	5709584.41	527949.3	Route C
Nesting Snag	1	5710293.1	527442.91	Route C
Nesting Snag	1	5710294.99	527458.67	Route C
Nesting Snag	1	5709578.16	527674.1	Route C
Blue Teal Nest and Eggs	1	5709485.26	527993.64	Route C
Nesting Snag	1	5696665.46	513071	Lake MB Shoreline
Stick Nest - medium (6-10 inch diameter)	1	5681912.96	526251.12	Lake MB Shoreline
Stick Nest – Large (12+ inch diameter)	1	5683196.92	531229.69	Route D
Swainson's hawk Nest	1	5682377.81	530638.42	Route D
Swainson's hawk Nest	1	5710134.54	527711.06	Route C
Eagle Nest	1	5713298.05	518547.12	Lake MB Shoreline
Eagle Nest	1	5711167.42	516277.59	Lake MB Shoreline
Eagle Nest	1	5709091.8	514909.31	Lake MB Shoreline
Eagle Nest	1	5688105.13	517092.95	Lake MB Shoreline
Eagle Nest	1	5683196.92	531229.69	Route D
Eagle Nest	1	5709091.8	514909.31	Lake MB Shoreline
Eagle Nest	1	5711090.01	516558.25	LK MB meets Route C

9.7.6 Pedestrian Bird Nest Search Methods

To investigate for bird nesting along the RoW for Route C and Route D, pedestrian ground nest searches were conducted between June 2, 2016 and June 11, 2016 in conjunction with bird point count surveys. The pedestrian nest search surveys were conducted by two biologists in forested areas walking 20 m apart on either side of the Route C and Route D RoW centerline. In grassland, pasture, wet meadow, marshes, and oak savannah habitat types, four biologists walked side by side, spaced 10 m apart with two transects on either side of the RoW centerline. In these open areas, biologists were sweeping the ground lying vegetation for potential ground nesting. In all habitat types, an area of 40 m was covered (20 m on either side of the centerline of the RoW). Biologists searched for both ground and tree nests, specifically for multi-generational stick nests, active nesting tree cavities, ground nesting activities, and active stick nests and eggs. Biologists recorded all incidental observations of birds made during the nest searches, as well as any incidental sightings of wildlife or wildlife signs.

During all avian surveys, birds that were seen were marked as observed on data recording sheets. If a species was heard (vocalization) but also confirmed with an actual sighting, the data is reflected as an observation (even if it is seen and heard). Data which indicates a vocalization of a species is an indication of a bird species being heard but with no corresponding direct visual observation of the species.

9.7.7 Pedestrian Bird and Bird Nest Search Results

Several nests were identified during the pedestrian ground based nest searches as well as the aerial nest surveys conducted in Jan-Feb 2016 and June 2016. Based on the collective results from these nest search survey types, Table 69 presents the nest type, the Route RoW the nest was found on, along with the UTM coordinates for each nest. One active nesting snag was identified and confirmed to be used by the red headed woodpecker within oak savannah habitat along Route D.

Many incidental bird observations and vocal calls were heard during the ground-based nest searches. These species identified are presented in Section 8.7.9 and Appendix E.

9.7.8 Songbird and Water Bird Point Count Survey Methods

Point count surveys are a common method used to identify the presence of a variety of song bird species (MBBA, 2015). Point Count surveys have also been used successfully for waterfowl and water bird species (Abraham, 2014; Linz et al., 1998; Poysa & Nummi, 1992). Point count surveys provide an idea of bird presence and their relative habitat use (Ralph et al., 1993; Welsh, 1995). Point count surveys for songbirds, water birds, and waterfowl were conducted in conjunction with the bird nest searches along Route C and Route D RoW centerline from June 2, 2016 and June 11, 2016. There were 35 point count survey locations along the centerline of Route D RoW and 24 point count locations along the centerline of Route C RoW. Map 45 presents the locations of the point count survey sites along Route C and Route D.

Using the Point Count Survey methods of Ralph et al., 1993 and Welsh, 1995, surveys were conducted during periods of little wind (less than 20 km/hr) on a warm, clear morning (between 6:00-10:00 am) and during the late evening after sunset. Point counts sites were selected in a variety of habitat types including along waterbodies and wetlands to assess for the presence of water birds and waterfowl. After a 2-minute calming period, biologists, using a combination of naked eye, binoculars, and scopes (depending on point count location and habitat types) to recorded all birds heard and observed. Birds within an approximate 75 m radius at each survey plot center were recorded over a 10-minute period at each site.

The late evening point count surveys were conducted to assess for the potential presence of yellow rails as well as to document avian species more vocally active during evening such as the Eastern whip-poor-will, American woodcock, American bittern, wilson’s snipe, among others. During these late evening point counts, biologists used ATVs to access the point count locations. Using the model prediction of quality yellow rail habitat locations, there were three survey sites

selected in high quality yellow rail habitat along Route C and five survey sites in high quality habitat selected along Route D.

9.7.9 Songbird and Water Bird Point Count Survey Results

Many species of birds were observed and heard during the point count surveys as well as incidental observations while conducting the bird nest searches along Route C and D RoWs. All of the bird species identified during the point counts as well as incidental observations made during the nest searches are provided in Appendix E.

Further, there were several bird species at risk that were identified during the surveys, with a significantly higher number of avian species at risk observations occurring along the centerline of the Route D RoW in comparison to Route C. Species at risk identified along Route D include species such as: American white pelicans, bank swallows, barn swallows, bobolink, Caspian tern, common nighthawk, short-eared owl, and red-headed woodpecker.

Habitat modelling conducted prior to field surveys was ground validated during field surveys. The habitat models were successful in identifying quality habitat for many of the avian species at risk.

The red-headed woodpecker is listed as threatened by SARA and as an S2B species by MBCDC. As noted, an active nesting snag was confirmed active with red-headed woodpecker nesting identified (Table 69). Based on the definition of critical habitat under SARA listed species (SARA, 2015), the identification of the active nesting snag is critical habitat for the red-headed woodpecker.

Only one avian species at risk (barn swallow) was identified along the centerline of the Route C RoW. Table 70 provides the species at risk and the location of the identification. Photographs 1 and 2 are of a Bobolink and a Red-Headed Woodpecker identified on Route D.

There were no yellow rails identified during survey work.

Table 70: Avian Listed Species Identified along Route C and Route D RoW

Species Name	Observation Type	Quantity	Conservation Listing	Area
American White Pelican	Observation	4	S3S4B	Route D
American White Pelican	Observation	14	S3S4B	Route D
American White Pelican	Observation	20	S3S4B	Lake MB Shoreline
American White Pelican	Observation	10	S3S4B	Lake MB Shoreline
American White Pelican	Observation	5	S3S4B	Lake MB Shoreline
Bank Swallow	Observation	1	Threatened – no schedule	Route D
Bank Swallow	Observation	1	Threatened – no schedule	Route D
Barn Swallow	Observation	1	Threatened – no schedule – S4B	Route D
Barn Swallow	Observation	1	Threatened – no schedule – S4B	Route D
Barn swallow	Observation	2	Threatened – no schedule – S4B	Route D
Barn Swallow	Observation	2	Threatened – no schedule – S4B	Route D
Barn Swallow	Observation	2	Threatened – no schedule – S4B	Route D
Barn Swallow	Observation	2	Threatened – no schedule – S4B	Route D

Table 70: Avian Listed Species Identified along Route C and Route D RoW

Species Name	Observation Type	Quantity	Conservation Listing	Area
Barn swallow	Observation	2	Threatened – no schedule – S4B	Route D
Barn swallow	Observation	1	Threatened – no schedule – S4B	Route D
Barn Swallow	Observation	2	Threatened – no schedule – S4B	Route D
Bobolink	Observation	2	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	1	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	1	Threatened – no Schedule– S4B	Route D
Bobolink	Vocalization	1	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	3	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	1	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	1	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	2	Threatened – no Schedule– S4B	Route D
Bobolink	Observation	1	Threatened – no Schedule– S4B	Route D
Bobolink	Vocalization	1	Threatened – no Schedule– S4B	Route D
Caspian Tern	Observation	1	S3S4B	Lake MB Shoreline
Caspian Tern	Observation	1	S3S4B	Lake MB Shoreline
Common Nighthawk	Vocalization	1	Threatened – Schedule 1 – S3B	Route D
Red-headed Woodpecker	Observation	2	Threatened – Schedule 1 – S2B	Route D
Red-headed Woodpecker	Observation	2	Threatened – Schedule 1 – S2B	Route D
Red-headed Woodpecker	Observation	1	Threatened – Schedule 1 – S2B	Route D
Red-headed Woodpecker	Observation	1	Threatened – Schedule 1 – S2B	Route D
Short-eared Owl	Observation	1	Special Concern –Schedule 1 – S2S3B	Route D
Barn swallow	Observation	5	Threatened – no schedule – S4B	Route C

Photograph 1: Bobolink identified along the Route D proposed RoW, June 3, 2016. Photograph taken by EcoLogic Environmental Inc.

Photograph 2: Red headed woodpecker identified along the Route D proposed RoW, June 3, 2016. Photograph taken by EcoLogic Environmental Inc.

9.7.10 Piping Plover Survey Methods

Piping plover surveys were conducted along sandy beach shorelines where potential piping plover habitat exists through a combination of ground and aerial approaches in June 2016. Locations for potential habitat were identified based on the habitat assessment and modeling conducted prior to the field surveys. Where Route C and D RoWs intersected lake shores, the sandy beaches were investigated on foot to the width of the RoW (400m) by two biologists. Biologists high-graded the 400 m area in search of potential signs of piping plover presence. The sparse vegetation above the high-water mark were investigated for nests. This approach followed accepted methodologies, within the acceptable window which occurs between May 1 and June 15, given this timeline coincides with their breeding period and follows the protocol suggested by the Sensitive Species Inventory Protocol Guidelines (AESRD, 2013). Given the substaintial size of the LSA and RSA, not all sandy beaches could be covered through ground-based surveys. Only the areas that would be directly within the 400 m RoW were investigated on foot. During the ground searches, biologists walked slowly to listen for the distinctive vocalization and watch for sightings of plovers feeding at the water's edge.

Given not all of the LSA and RSA sandy beaches could be investigated by biologists on the ground, due to the size of the study areas, aerial surveys were conducted on June 11, 2016, of sandy shorelines within the LSA and the RSA (along Lake MB, Lake Winnipeg, and Lake St. Martin). Aerial surveyed were flown using a helicopter at low height and low speed along all sandy beach shorelines. Observers searched the shorelines, documenting observations and/or sign of piping plover activity. All observations of findings, including other bird and wildlife sightings, were also recorded.

9.7.11 Piping Plover Survey Results

There were no piping plover observations or signs of their activity identified within the LSA or RSA.

9.8 Amphibians and Reptiles

9.8.1 Amphibian Point Count Survey Methods

Point count surveys for amphibians were conducted between June 2 and June 11, 2016. Pre-determined sites for amphibians were selected based on specific habitat features such as wetlands, marshlands, beaver floods, potholes, and small waterbodies along Route D and Route C RoWs. Point counts were conducted in the early morning (between 6:00-10:00 am) and well as later in the evening after sunset but prior to 1:00am, based on the methods of the Sensitive Species Inventory Protocol Guidelines (AESRD, 2013).

A series of factors affect when amphibians may call such as snow pack, rain events, elevation, and/or distance of travel between overwintering locations and breeding sites. Each species of amphibian will call during different timing windows (ASERD, 2013). The northern leopard frog typically calls between the middle of April and end of May. The timing window for amphibian point count surveys as suggested by AESRD, 2013 is between the second week in April until the second week in June (AESRD, 2013).

Based on the methods for Sensitive Species Inventory guidelines, biologists allowed for a 2-minute calming period at each amphibian point count location. Biologists recorded all amphibians heard and observed at each survey plot center during a 10-minute period (AESRD, 2013). There was a total of nine amphibian point count locations conducted along Route C and 12 amphibian point count locations conducted along Route D.

During amphibian point count surveys, amphibians that were seen were marked as “observed” on data recording sheets. If a species was heard (vocalization) but also confirmed with an actual sighting, the data is reflected as an observation (even if it is seen and heard). Data which indicates a vocalization of a species is an indication of an amphibian species being heard but with no corresponding direct visual observation of the species.

9.8.2 Amphibian Point Count Survey Results

During the amphibian point count survey, several species of frogs were observed and/or heard (Table 71). The northern leopard frog was identified in several point count locations along Route C and Route D. The northern leopard frog is listed as a Special Concern - Schedule 1 – and a rank of S4 by MBCDC (Photograph 3). All amphibians identified during point count surveys are indicated within Table 71 by a point count (PC) location. Amphibians identified during other survey work are indicated in Table 71 as an incidental observation.

Table 71: Results of Amphibian Point Count Survey

Point Count Number/ Waypoint	Species Name	Observation Type	Quantity	Area
Incidental	Boreal Chorus Frog	Observation	1	Route D
Incidental	Boreal Chorus Frog	Vocalization	1	Route D
PC C02	Northern leopard frog	Observation	1	Route C
Incidental	Northern leopard frog	Observation	1	Route C
Incidental	Northern leopard frog	Observation	4	Route C
Incidental	Northern leopard frog	Observation	1	Route C
Incidental	Northern leopard frog	Observation	1	Route D
Incidental	Northern leopard frog	Observation	1	Route D
PC D62	Wood Frog	Observation	1	Route D

Incidental	Wood Frog	Observation	2	Route C
Incidental	Wood Frog	Observation	1	Route C
Incidental	Wood Frog	Observation	2	Route C
Incidental	Wood Frog	Observation	1	Route C
PC D73	Wood Frog	Observation	1	Route D
PC D73	Wood Frog	Vocalization	1	Route D
Incidental	Wood Frog	Observation	1	Route D
Incidental	Wood Frog	Observation	1	Route D
Incidental	Wood Frog	Observation	1	Route D
PC D67	Wood Frog	Observation	1	Route D
Incidental	Wood Frog	Observation	1	Route D
PC D81	Wood Frog	Observation	1	Route D

Photograph 3: Illustrates a northern leopard frog observed along the proposed Route C RoW. Photograph taken by EcoLogic Environmental Inc.

9.8.3 Reptile Hibernacula Search Methods

Suitable reptile hibernacula must offer reptiles an entry into a hibernacula space that is deep enough to be below the frost line during winter months. Reptiles often select for hibernacula within bedrock given rock offers reptiles protection from digging predators (Nature North, 2014). In conjunction with the bird nest searches conducted from June 2-11, 2016, biologists searched for signs of reptile presence and potential reptile hibernaculum sites.

In addition to the ground based surveys conducted along the Proposed ASR RoW, a combination of aerial and ground surveys were conducted to investigate for potential bat hibernacula. Methods used for these studies are described in the bat Section 8.6.

9.8.4 Reptile Hibernacula Search Results

One red-sided garter snake was observed along Route D during the pedestrian surveys (Table 72); however, no other reptile activity was noted. There were no sites along the transects traversed that were observed to be rock outcrop or visible cavernous entries that would support overwintering required for reptile hibernacula within the LSA.

Within the RSA, however, the aerial and ground based survey work conducted for bats (as described in Section 8.6) did identify two locations of suspected active snake hibernacula (limestone depressions with multiple sinkholes) as well as one observation of a red-sided garter snake found in close proximity to one of the potential snake dens identified (Table 71, Map 39). The snake hibernacula where the red-sided garter snake was observed nearby was a linear distance of 14.4 km from LSMOC Reach 1 and 4.1 km from the Proposed ASR. Further monitoring is required to confirm these sites as active snake hibernacula.

Table 72: Reptile Hibernacula Survey Results

Species Name	Observation Type	Quantity	Location		
			UTM Y	UTM X	Area
Red Sided Garter Snake	Observation	1	5694230.51	530961.22	Route D
Red Sided Garter Snake	Observation	1	5725598.44	550141.36	LSM ASR
Potential Snake Den	Observation	1			LSM ASR
Potential Snake Den	Observation	2			LSM ASR

9.9 Ecologically Sensitive Sites

In consideration of a future EIA, baseline data was gathered on a number of ecologically sensitive sites pre-determined to be; mammal dens, large stick nests, mineral licks, rookeries, as well as potential bat and snake hibernacula. During all field surveys (winter aerial multi-species survey, ground based bird and amphibian surveys, and spring aerial shoreline surveys), concurrent with all other surveys conducted, searches were performed for the presence of these ecologically sensitive sites within the LSA and RSA.

As noted, several large raptor nests were located during winter aerial survey work within the LSA, the ground-based pedestrian spring (2015) and summer (June 2016) surveys, as well as the spring aerial shoreline survey.

In combination with the bird nesting and reptile den search surveys, mammal denning searches were conducted. Using the habitat analysis conducted prior to field work, suitable habitat for small

mammal dens, fox dens, wolf dens, and bear dens near the RoWs were identified. Using the same methodology as applied to the bird nest searches, transects spaced 20 m on either side of the Route C and Route D RoW centerline in forested habitats were walked by two biologists and transects spaced 10 m apart were walked by four biologists within grasslands, agriculture, and pasture habitats to investigate for the presence of mammal denning. The total area cover was 40 m wide. Field biologists walked each transect slowly, searching for small and large mammal dens (both aquatic and terrestrial species). Each member of the field team walked parallel to each other, along the pre-determined transects, ensuring to keep visual contact with each other and allowing for 100% viewing coverage of the survey area.

While there were a few signs of wolf and bear activity along Route D, there were no dens identified on either Route D or Route C RoW centerline.

There were no mineral licks identified during any field studies conducted within the LMOC LSA or RSA.

There were no heron rookeries identified within the LSA; however, a heron rookery was identified on an island of Lake St. Martin located at a linear distance of 15.78 km from LSMOC Reach 1 and 14.9 km from the Proposed ASR (Table 73). Photograph 4 presents the blue heron rookery identified within the RSA on an island on Lake St. Martin.

Table 73: Ecologically Sensitive Site - Heron Rookery Location

Species Name	Observation Type	Quantity	Area
Heron Rookery	Observation	1	Lake St. Martin Island

Photograph 4: Heron Rookery identified on an island on Lake St. Martin. Photo taken by EcoLogic Environmental Inc. on June 9, 2016

Given the location of the rookery, well outside of the LSA, no adverse effects resulting from the LMOC Project are anticipated.

There were also several tern colonies and shorebird nesting islands and reefs identified during the aerial survey work conducted within the RSA. Nesting islands for hundreds of cormorants and shorebirds were identified north east portion of Lake St. Martin with the nesting islands and colonies located a linear distance of between 14.0-18.6 km from LSM Reach 1 and between 11.6-13.1 km from the Proposed ASR. Photograph 5 presents one of the cormorant nesting islands identified.

Photograph 5: Cormorant nesting island identified on Lake St. Martin. Photo taken by EcoLogic Environmental Inc. on June 9, 2016

10 SUMMARY

This Wildlife Technical Report was developed for the LMOC component of the Project to provide a detailed summation of the wildlife data collection activities, methods, analyses, and results that were conducted to date within the RSA and LSA.

Data were gathered from various agencies providing historical context to mammals, avian, reptile and amphibian presence and distribution within the LSA and RSA. Habitat modelling was conducted for moose, elk, and white-tailed deer. Despite moose summer and winter habitat was not limiting within the RSA, the number of moose identified (n=14) during the 2016 winter aerial survey was low. A considerable amount of access trails were identified throughout the RSA.

The analyses conducted identified the current linear density for moose within the LSA and RSA to be 0.86 km^2 and 0.22 km^2 respectively, both below the published Salmo et al. (2004) thresholds. The linear density analysis of Project-related linear developments within the LSA and RSA identified that, regardless of which route is selected, the linear density of the LSA and RSA will remain below the published Salmo et al. (2004) linear density thresholds for moose.

Elk habitat modelling revealed quality elk habitat is located in the southern portion of the RSA. White-tailed deer were found to be abundant within the south/central portion of the RSA with 628 individuals identified within the 2016 winter aerial survey area.

Habitat modelling on American beaver and American marten identified their habitat types were not limiting within the RSA. American beaver and American marten activity were found to be minimal within the LSA.

Habitat modelling was conducted on key avian species exhibiting the available habitat for these bird species within the RSA and LSA. Historically, surveys conducted by the BBA have identified several avian Species At Risk within the LSA. The Project linear feature with the highest number of bird species at risk identified is the Route D route alignment for the Lake Manitoba Outlet Channel. Species at risk identified along Route D included American white pelicans, bank swallows, barn swallows, bobolink, Caspian tern, common nighthawk, short-eared owl, and red-headed woodpecker. Only one avian species at risk (barn swallow) was identified along the centerline of the Route C RoW.

There were no bat or snake hibernacula identified within the LSA.

There were no heron rookeries, large mammal dens, nor mineral lick identified within the LSA.

Information derived from these baseline studies will have utility in route verification, offer comparative data for pre- and post construction analysis and monitoring, as well as assist with the future EIA process.

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Appendix A: Known Mammals for the Interlake Plain and Mid-Boreal Lowland Ecoregions

Common Name	Scientific Name	Conservation Listing (SARA, MESEA, MBCDC)
American beaver	*Castor canadensis*	S5
American deer mouse	*Peromyscus maniculatus*	S5
American marten	*Martes americana*	S5
American water shrew	*Sorex palustris*	S5
Arctic shrew	*Sorex arcticus*	S5
Big brown bat	*Eptesicus fuscus*	S4S5B
Black bear	*Ursus americanus*	S5
Woodland caribou	*Rangifer tarandus*	Threatened - S2S3
Coyote	*Canis latrans*	S5
Eastern heather vole	*Phenacomys ungava*	S5
Eastern fox squirrel	*Sciurus niger*	S3
Elk	*Cervus elaphus*	S4
Ermine (short-tailed weasel)	*Mustela erminea*	S5
Fisher	*Martes pennanti*	S5
Grey wolf	*Canis lupus*	S5
Hoary bat	*Lasiurus cinereus*	S3B
House mouse	*Mus musculus*	SNA
Least chipmunk	*Eutamias minimus*	S5
Least weasel	*Mustela nivalis*	S3S4
Litte brown myotis	*Myotis lucifugus*	Endangered- Schedule 1- S2N
Long-tailed weasel	*Mustela frenata*	S3
Lynx	*Lynx canadensis*	S5
Masked shrew	*Sorex cinereus*	S5
Meadow jumping mouse	*Zapus hudsonius*	S5
Meadow vole	*Microtus pennsylvanicus*	S5
Mink	*Neovison vison*	S5
Moose	Alces alces	S5
Muskrat	*Ondatra zibethicus*	S5
North American porcupine	*Erethizon dorsatum*	S5
Northern bog lemming	*Synaptomys borealis*	S5
Northern flying squirrel	*Glaucomys sabrinus*	S5
Northern myotis	*Myotis septentrionalis*	Endangered- Schedule 1-
Pygmy shrew	*Sorex hoyi*	S5

Common Name	Scientific Name	Conservation Listing (SARA, MESEA, MBCDC)
Raccoon	*Procyon lotor*	S5
Red fox	*Vulpes vulpes*	S5
Red squirrel	*Tamisciurus hudsonicus*	S5
River otter	*Lontra canadensis*	S5
Short-tailed shrew	*Blarina brevicauda*	S5
Silver-haired bat	*Lasionycteris noctivagans*	S3S4B
Snowshoe hare	*Lepus americanus*	S5
Star-nosed mole	*Condylura cristata*	S3
Striped skunk	*Mephitis mephitis*	S5
White-tailed deer	*Odocoileus virginianus*	S5
Woodchuck	*Marmota monax*	S5
Wood bison	*Bos bison athabascae*	Special Concern-Schedule 1-SNA

Sources: Caras (1967); Reid (2006); MBCDC (2015); and SARA (2015)

MBCDC (2015) Definitions for Status Listing:

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.

U Possibly in peril, but status uncertain; more information needed.

H Historically known; may be rediscovered.

X Believed to be extinct; historical records only, continue search.

SNR A species not ranked. A rank has not yet assigned or the species has not been evaluated.

SNA A conservation status rank is not applicable to the element.

S#S# Numeric range rank: A range between two of the numeric ranks. Denotes range of uncertainty about the exact rarity of the species.

?* Inexact or uncertain; for numeric ranks, denotes inexactness.

SARA (2015) Definitions for Status Listing:

Schedule 1: is the official list of species that are classified as extirpated, endangered, threatened, and of special concern.

Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Special Concern: a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Endangered: A wildlife species facing imminent extirpation or extinction.

Appendix B: Known Amphibians and Reptiles for the Interlake Plain and Mid-Boreal Ecoregions

Common Name	Scientific Name	Conservation Status (SARA, MESEA, MBCDC)
Blue-spotted salamander	*Ambystoma laterale*	S3S4
Eastern Tiger Salamander	*Ambystoma tigrinum tigrinum*	S2
Canadian Toad	*Anaxyrus hemiophrys*	S4
Grey tree frog	*Hyla versicolor*	S4S5
Boreal chorus frog	*Pseudacris maculata*	S5
Wood frog	*Rana sylvatica*	S5
Smooth green snake	*Liochlorophis vernalis*	S3S4
Northern leopard frog	*Lithobates pipiens*	Special Concern - Schedule 1 - S4
Western plains garter snake	*Thamnophis radix haydenii*	S4
Red-sided garter snake	*Thamnopis sirtalis parietalis*	S4

Sources: Conant and Collins (1991); Science Team Report (2002); MBCDC (2015); Nature North (2014); and SARA (2015)

MBCDC (2015) Definitions for Status Listing:

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.

U Possibly in peril, but status uncertain; more information needed.

H Historically known; may be rediscovered.

X Believed to be extinct; historical records only, continue search.

SNR A species not ranked. A rank has not yet assigned or the species has not been evaluated.

SNA A conservation status rank is not applicable to the element.

S#S# Numeric range rank: A range between two of the numeric ranks. Denotes range of uncertainty about the exact rarity of the species.

?* Inexact or uncertain; for numeric ranks, denotes inexactness.

SARA (2015) Definitions for Status Listing:

Schedule 1: is the official list of species that are classified as extirpated, endangered, threatened, and of special concern.

Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Special Concern: a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Appendix C: Known Birds for the Interlake Plain and Mid-Boreal Lowland Ecoregion

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Alder flycatcher	*Empidonax alnorum*	S5B
American avocet	*Recurvirostra americana*	S4B
American bittern	*Botaurus lentiginosus*	S5B
American coot	*Fulica americana*	S5B
American crow	*Corvus brachyrhynchos*	S5B, SUN
American golden-plover	*Pluvialis dominica*	S4B, SUM
American goldfinch	*Spinus tristis*	S5B
American kestrel	*Falco sparverius*	S4B
American redstart	*Setophaga ruticilla*	S5B
American robin	*Turdus migratorius*	S5B
American three-toed woodpecker	*Picoides dorsalis*	S5
American tree sparrow	*Spizella arborea*	S5B, SUM
American white pelican	*Pelecanus erythrorhynchos*	S3S4B
American wigeon	*Anas americana*	S4B
American woodcock	*Scolopax minor*	S4B
Bald eagle	*Haliaeetus leucocephalus*	S5B, SUN
Baltimore oriole	*Icterus galbula*	S4B
Bank swallow	*Riparia riparia*	Threatened – no schedule
Barn swallow	*Hirundo rustica*	Threatened – no schedule – S4B
Barred owl	*Strix varia*	S4B
Bay-breasted warbler	*Setophaga castanea*	S5B
Belted kingfisher	*Megaceryle alcyon*	S5B
Black tern	*Chlidonias niger*	S4B
Black-and-white warbler	*Mniotilta varia*	S5B
Black-billed cuckoo	*Coccyzus erythropthaLMBus*	S5B
Black-billed magpie	*Pica hudsonia*	S4
Blackburnian warbler	*Setophaga fusca*	S5B
Black-capped chickadee	*Poecile atricapillus*	S5
Black-crowned night heron	*Nycticorax nycticorax*	S3S4B
Blackpoll warbler	*Setophaga striata*	S5B, SUM
Black-throated blue warbler	*Setophaga caerulescens*	SNA

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Black-throated green warbler	*Setophaga virens*	S4B
Blue jay	*Cyanocitta cristata*	S5
Blue-headed vireo	*Vireo solitarius*	S5B
Blue-winged teal	*Anas discors*	S4B
Bobolink	*Dolichonyx oryzivorus*	Threatened – no Schedule– S4B
Bonaparte's gull	*Chroicocephalus philadelphia*	S5B
Boreal owl	*Aegolius funereus*	S4
Brewer's blackbird	*Euphagus cyanocephalus*	S5B
Broad-winged hawk	*Buteo platypterus*	S5B
Brown creeper	*Certhia americana*	S5B
Brown thrasher	*Toxostoma rufum*	S4B
Brown-headed cowbird	*Molothrus ater*	S5B
Bufflehead	*Bucephala albeola*	S4B
Cackling goose	*Branta hutchinsii*	S2B
California gull	*Larus californicus*	S3B
Canada goose	*Branta canadensis*	S5B
Canada warbler	*Cardellina canadensis*	Threatened – Schedule 1 – S4B
Canvasback	*Aythya valisineria*	S4B
Cape may warbler	*Setophaga tigrina*	S5B
Caspian tern	*Sterna caspia*	S3S4B
Cedar waxwing	*Bombycilla cedrorum*	S5B, SUN
Chestnut-sided warbler	*Setophaga pensylvanica*	S5B
Chimney swift	*Chaetura pelagica*	Threatened – Schedule 1 – S2B
Chipping sparrow	*Spizella passerina*	S5B
Clay-colored sparrow	*Spizella pallida*	S5B
Cliff swallow	*Petrochelidon pyrrhonota*	S4B
Common goldeneye	*Bucephala clangula*	S5B, SUN
Common grackle	*Quiscalus quiscula*	S5B
Common loon	*Gavia immer*	S5B
Common merganser	*Mergus merganser*	S5B
Common nighthawk	*Chordeiles minor*	Threatened – Schedule 1 – S3B
Common raven	*Corvus corax*	S5
Common redpoll	*Acanthus flammea*	S4B, S5N
Common tern	*Sterna hirundo*	S5B
Common yellowthroat	*Geothlypis trichas*	S5B

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Connecticut warbler	*Oporornis agilis*	S4B
Cooper's hawk	*Accipiter cooperii*	S4S5B
Dark-eyed junco	*Junco hyemalis*	S5B, SUN
Double-crested cormorant	*Phalacrocorax auritus*	S5B
Downy woodpecker	*Picoides pubescens*	S5
Eared grebe	*Podiceps nigricollis*	S4S5B
Eastern bluebird	*Sialia sialis*	S4B
Eastern kingbird	*Tyrannus tyrannus*	S4B
Eastern phoebe	*Sayornis phoebe*	S5B
Eastern towhee	*Pipilo erythrophthalmus*	S4B
Eastern whip-poor-will	*Antrostomus vociferus*	Threatened – Schedule 1 – S3B
Eastern wood-pewee	*Contopus virens*	Special Concern – no schedule
Eastern-screech owl	*Megascops asio*	S4
European starling	*Sturnus vulgaris*	SNA
Evening grosbeak	*Coccothraustes vespertinus*	S3
Forster’s tern	*Sterna forsteri*	S4B
Fox sparrow	*Passerella iliaca*	S5B, S4M
Franklin’s gull	*Leucophaeus pipixcan*	S4B
Gadwell	*Anas strepera*	S5B
Golden-winged warbler	*Vermivora chrysoptera*	Threatened – Schedule 1 – S3B
Grasshopper sparrow	*Ammodramus savannarum*	S2B
Gray jay	*Perisoreus canadensis*	S5
Gray partridge	*Perdix perdix*	SNA
Great blue heron	*Ardea herodias*	S4S5B
Great crested flycatcher	*Myiarchus crinitus*	S4B
Great egret	*Ardea alba*	S2S3B
Great grey owl	*Strix nebulosa*	S4
Great horned owl	*Bubo virginianus*	S4
Greater scaup	*Aythya marila*	S5B, SUM
Greater white-fronted goose	*Anser albifrons*	SUM
Greater yellowlegs	*Tringa melanoleuca*	S5B, SUM
Green winged teal	*Anas carolinensis*	S4B
Grey catbird	*Dumetella carolinensis*	S5B
Hairy woodpecker	*Picoides villosus*	S5
Harris’s sparrow	*Zonotrichia querula*	S4B, S5M
Hermit thrush	*Catharus guttatus*	S5B

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Herring gull	*Larus argentatus*	S4B
Hooded merganser	*Lophodytes cucullatus*	S5B
Horned grebe	*Podiceps auritus*	Special concern – no Schedule - S3B
Horned lark	*Eremophila alpestris*	S3B, SUM
House finch	*Haemorhous mexicanus*	S5B
House sparrow	*Passer domesticus*	SNA
Indigo bunting	*Passerina cyanea*	S4B
Killdeer	*Charadrius vociferus*	S5B
Lapland longspur	*Calcarius lapponicus*	S4B, SUM, SUN
Lark sparrow	*Chondestes grammacus*	S4B
Le Conte's sparrow	*Ammodramus leconteii*	S5B
Least bittern	*Ixobrychus exilis*	Threatened – Schedule 1 – S2S3B
Least flycatcher	*Empidonax minimus*	S5B
Least sandpiper	*Calidris minutilla*	S4B, SUM
Lesser scaup	*Aythya affinis*	S5B
Lesser yellowlegs	*Tringa flavipes*	S4B, SUM
Lincoln's sparrow	*Melospiza lincolnii*	S5B
Loggerhead shrike	*Lanius ludovicianus excubitorides*	Threatened – Schedule 1 – S1B
Long-eared owl	*Asio otus*	S4B
Magnolia warbler	*Setophaga magnolia*	S5B
Mallard	*Anas platyrhynchos*	S5B
Marbled godwit	*Limosa fedoa*	S4B
Merlin	*Falco columbarius*	S5B, SUN
Mountain bluebird	*Sialia currucoides*	S2S3B
Mourning dove	*Zenaida macroura*	S4B
Mourning warbler	*Geothlypis philadelphia*	S5B
Nelson's sparrow	*Ammodramus nelsoni*	S5B
Northern flicker	*Colaptes auratus*	S5B
Northern goshawk	*Accipiter gentilis*	S4B, S5N
Northern harrier	*Circus cyaneus*	S5B
Northern hawk owl	*Surnia ulula*	S4
Northern parula	*Setophaga americana*	S3B
Northern pintail	*Anas acuta*	S5B
Northern rough-winged swallow	*Stelgidopteryx serripennis*	S4B
Northern saw-whet owl	*Aegolius acadicus*	S4B

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Northern shoveler	*Anas clypeata*	S5B
Northern waterthrush	*Parkesia noveboracensis*	S5B
Olive-sided flycatcher	*Contopus cooperi*	Threatened – Schedule 1 – S3S4B
Orange-crowned warbler	*Oreothlypis celata*	S5B
Orchard oriole	*Icterus spurius*	S5B
Osprey	*Pandion haliaetus*	S4B
Ovenbird	*Seiurus aurocapilla*	S5B
Palm warbler	*Setophaga palmarum*	S5B
Pectoral sandpiper	*Calidris melanotos*	S4M
Peregrine falcon	*Falco peregrinus anatum*	Special Concern- no Schedule – S1B
Philadelphia vireo	*Vireo philadelphicus*	S4B
Pied-billed grebe	*Podilymbus podiceps*	S5B
Pileated woodpecker	*Dryocopus pileatus*	S5
Pine grosbeak	*Pinicola enucleator*	S4
Pine siskin	*Spinus pinus*	S5
Pine warbler	*Setophaga pinus*	S3B
Piping plover	*Charadrius melodus*	Endangered – Schedule 1 – S1B
Purple finch	*Haemorhous purpureus*	S5B
Purple martin	*Progne subis*	S4B
Red crossbill	*Loxia curvirostra*	S4B, SUN
Red-breasted merganser	*Mergus serrator*	S4B
Red-breasted nuthatch	*Sitta canadensis*	S5
Red-eyed vireo	*Vireo olivaceus*	S5B
Redhead	*Aythya americana*	S4B
Red-headed woodpecker	*Melanerpes erythrocephalus*	Threatened – Schedule 1 – S2B
Red-necked grebe	*Podiceps grisegena*	S5B
Red-tailed hawk	*Buteo jamaicensis*	S5B
Red-winged blackbird	*Agelaius phoeniceus*	S5B
Ring-billed gull	*Larus delawarensis*	S5B
Ring-necked duck	*Aythya collaris*	S5B
Rock pigeon	*Columba livia*	SNA
Rose-breasted grosbeak	*Pheucticus ludovicianus*	S5B
Rough-legged hawk	*Buteo lagopus*	S3B, SUM
Ruby-crowned kinglet	*Regulus calendula*	S5B
Ruby-throated hummingbird	*Archilochus colubris*	S5B

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
Ruddy duck	*Oxyura jamaicensis*	S5B
Ruffed grouse	*Bonasa umbellus*	S4S5
Rusty blackbird	*Euphagus carolinus*	Special Concern –Schedule 1 -
Sanderling	*Calidris alba*	SUM
Sandhill crane	*Grus canadensis*	S5B
Savannah sparrow	*Passerculus sandwichensis*	S5B
Scarlet tanager	*Piranga olivacea*	S4B
Sedge wren	*Cistothorus platensis*	S5B
Semi-palmated Sandpiper	*Calidris pusilla*	S3B, SUM
Sharp-skinned hawk	*Accipiter striatus*	S4B
Sharp-tailed grouse	*Tympanuchus phasianellus*	S5
Short-billed dowitcher	*Limnodromus griseus*	S4B
Short-eared owl	*Asio flammeus*	Special Concern –Schedule 1 – S2S3B
Snow bunting	*Plectrophenax nivalis*	S4N, SUM
Snow goose	*Chen caerulescens*	S5B, S5M
Solitary sandpiper	*Tringa solitaria*	S4B, SUM
Song sparrow	*Melospiza melodia*	S5B
Sora	*Porzana carolina*	S5B
Spotted sandpiper	*Actitis macularius*	S5B
Sprague's pipit	*Anthus spragueii*	Threatened – Schedule 1 – S2B
Spruce grouse	*Falcipennis canadensis*	S4
Swainson's hawk	*Buteo swainsoni*	S4B
Swainson's thrush	*Catharus ustulatus*	S5B
Swamp sparrow	*Melospiza georgiana*	S5B
Tennessee warbler	*Oreothlypis peregrina*	S5B
Tree swallow	*Tachycineta bicolor*	S4B
Trumpeter Swan	*Cygnus buccinator*	S1S2B
Tundra swan	*Cygnus columbianus*	S4B, SUM
Turkey vulture	*Cathartes aura*	S4B
Upland sandpiper	*Bartramia longicauda*	S4B
Veery	*Catharus fuscescens*	S5B
Vesper sparrow	*Pooecetes gramineus*	S5B
Virginia rail	*Rallus limicola*	S5B
Warbling vireo	*Vireo gilvus*	S5B
Western grebe	*Aechmophorus occidentalis*	S4B
Western kingbird	*Tyrannus verticalis*	S5B
Western meadowlark	*Sturnella neglecta*	S3S4B

Common Name	*Scientific Name*	Conservation Listing (SARA, MESEA, MBCDC)
White-breasted nuthatch	*Sitta carolinensis*	S5
White-crowned sparrow	*Zonotrichia leucophrys*	S5B
White-throated sparrow	*Zonotrichia albicollis*	S5B
White-winged crossbill	*Loxia leucoptera*	S5
Willet	*Tringa semipaLMBata*	S4B
Wilson's phalarope	*Phalaropus tricolor*	S4B
Wilson's snipe	*Gallinago delicata*	S5B
Wilson's warbler	*Cardellina pusilla*	S5B, SUM
Winter wren	*Troglodytes hiemalis*	S5B
Wood duck	*Aix sponsa*	S5B
Yellow rail	*Coturnicops noveboracensis*	Special Concern –Schedule 1 – S3S4B
Yellow warbler	*Setophaga petechia*	S5B
Yellow-bellied flycatcher	*Empidonax flaviventris*	S5B
Yellow-bellied sapsucker	*Sphyrapicus varius*	S5B
Yellow-headed blackbird	*Xanthocephalus xanthocephalus*	S4B
Yellow-rumped warbler	*Setophaga coronata*	S5B
Yellow-throated vireo	*Vireo flavifrons*	S4B

Sources: Bezener and De Smet (2000); Peterson and Peterson (2002); Manitoba Avian Research Committee (2003); MBCDC (2015); SARA (2015); and MBBA (2015)

MBCDC (2015) Definitions for Status Listing:

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.

U Possibly in peril, but status uncertain; more information needed.

H Historically known; may be rediscovered.

X Believed to be extinct; historical records only, continue search.

SNR A species not ranked. A rank has not yet assigned or the species has not been evaluated.

SNA A conservation status rank is not applicable to the element.

S#S# Numeric range rank: A range between two of the numeric ranks. Denotes range of uncertainty about the exact rarity of the species.

?* Inexact or uncertain; for numeric ranks, denotes inexactness.

B Breeding status of a migratory species. Example: S1B,SZN - breeding occurrences for the species are ranked S1 (critically imperilled) in the province, nonbreeding occurrences are not ranked in the province.

SARA (2015) Definitions for Status Listing:

Schedule 1: is the official list of species that are classified as extirpated, endangered, threatened, and of special concern.

Schedule 2: species listed in Schedule 2 are species that had been designated as endangered or threatened, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

Schedule 3: species listed in Schedule 3 are species that had been designated as special concern, and have yet to be re-assessed by COSEWIC using revised criteria. Once these species have been re-assessed, they may be considered for inclusion in Schedule 1.

Special Concern: a wildlife species that may become a threatened or an endangered species because of a combination of biological characteristics and identified threats.

Threatened: a wildlife species that is likely to become endangered if nothing is done to reverse the factors leading to its extirpation or extinction.

Appendix D: Avian Species at Risk Federal Recovery Documents

Species	Federal Recovery Documents Available
American white pelican	No Documents
Bank swallow	11 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (5 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1233#ot10
Barn swallow	18 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (12 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1147#ot10
Black-crowned night heron	Not Listed under SARA
Bobolink	12 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (5 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1087#ot10
Caspian tern	No Documents

Species	Federal Recovery Documents Available
Canada warbler	28 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (7 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (12 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1008#ot10
Chimney swift	21 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (4 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (8 record(s) found.) • Consultation Documents (1 record(s) found.) • Factsheet (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=951#ot10
Common nighthawk	32 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (12 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (11 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=986#ot10

Species	Federal Recovery Documents Available
Eastern whip-poor-will	21 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (5 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (7 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1047#ot10
Eastern wood-pewee	13 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (7 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1198#ot10
Golden-winged warbler	26 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (3 record(s) found.) • Orders (2 record(s) found.) • Permits and Related Agreements (14 record(s) found.) • Consultation Documents (1 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=942#ot10
Grasshopper sparrow	7 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (1 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1241#ot10

Species	Federal Recovery Documents Available
Horned grebe	9 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1045#ot10
Least bittern	19 record(s) found. • COSEWIC Status Reports (2 record(s) found.) • COSEWIC Assessments (2 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (3 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (7 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (2 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=51#ot10
Loggerhead shrike	18 record(s) found. • COSEWIC Status Reports (2 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (2 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (3 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (1 record(s) found.) • Consultation Documents (2 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (2 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=38#ot10
Northern parula	No Documents

Species	Federal Recovery Documents Available
Olive-sided flycatcher	35 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (17 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (8 record(s) found.) • Consultation Documents (1 record(s) found.) • Exceptions (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=999#ot10
Peregrine falcon	7 record(s) found. • Orders (1 record(s) found.) • Permits and Related Agreements (6 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=29#ot10
Piping plover	18 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (5 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (6 record(s) found.) • Consultation Documents (1 record(s) found.) • Residence Description (1 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=686#ot10
Red-headed woodpecker	14 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (4 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=57#ot10

Species	Federal Recovery Documents Available
Rusty blackbird	18 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (9 record(s) found.) • Management Plans (1 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=907#ot10
Short-eared owl	15 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (6 record(s) found.) • Management Plans (1 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=60#ot10
Trumpeter swan	No Documents
Yellow rail	8 record(s) found. • COSEWIC Status Reports (2 record(s) found.) • COSEWIC Assessments (2 record(s) found.) • Response Statements (1 record(s) found.) • Management Plans (1 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=574#ot10

Appendix E: Song Bird and Waterbird Point Count Survey Results and Incidental Bird Sightings in LSA

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
Incidental	American robin	*Turdus migratorius*	Observation	1	5711233	516434	Lake MB Shoreline
Incidental	American white pelican	*Pelecanus erythrorhynchos*	Observation	20	5714209	517885	Lake MB Shoreline
Incidental	American white pelican	*Pelecanus erythrorhynchos*	Observation	10	5693904	514384	Lake MB Shoreline
Incidental	American white pelican	*Pelecanus erythrorhynchos*	Observation	5	5681022	526031	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5695667	512927	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5682463	519403	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5681999	522920	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5681775	526764	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5712398	518103	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	2	5711614	517270	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	2	5711167	516278	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5709244	515511	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5692249	513122	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	2	5688105	517093	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5680161	530438	Lake MB Shoreline
Incidental	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5679764	530350	Lake MB Shoreline
Incidental	Blackbilled magpie	*Pica hudsonia*	Observation	4	5693581	513968	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	1	5693515	512818	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	2	5715707	515685	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	8	5712398	518103	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	4	5710955	516820	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	6	5710104	515950	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	4	5709927	516003	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	2	5708854	515205	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	2	5696216	513165	Lake MB Shoreline

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
Incidental	Canada goose	*Branta canadensis*	Observation	1	5692688	512775	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	1	5692846	513826	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	2	5681977	525604	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	2	5681492	525900	Lake MB Shoreline
Incidental	Canada goose	*Branta canadensis*	Observation	5	5681723	526413	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	30	5710955	516820	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	8	5710104	515950	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	6	5709927	516003	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	8	5708854	515205	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	1	5681977	525604	Lake MB Shoreline
Incidental	Canada goose gosling	*Branta canadensis*	Observation	6	5681492	525900	Lake MB Shoreline
Incidental	Caspian tern	*Sterna caspia*	Observation	1	5693494	514814	Lake MB Shoreline
Incidental	Caspian tern	*Sterna caspia*	Observation	1	5681649	527616	Lake MB Shoreline
Incidental	Common raven	*Corvus corax*	Observation	3	5706159	515300	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	1	5710349	515823	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	1	5705305	515266	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	3	5682599	518893	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	1	5682609	519908	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	2	5682978	525380	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	1	5708808	514791	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	2	5707106	514859	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	8	5683463	518770	Lake MB Shoreline
Incidental	Common tern	*Sterna hirundo*	Observation	50	5681755	528058	Lake MB Shoreline
Incidental	Double-crested cormorant	*Phalacrocorax auritus*	Observation	11	5707106	514859	Lake MB Shoreline
Incidental	Double-crested cormorant	*Phalacrocorax auritus*	Observation	1	5681022	526031	Lake MB Shoreline
Incidental	Downy woodpecker	*Picoides pubescens*	Observation	1	5693158	512718	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5692758	515289	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5711614	517270	Lake MB Shoreline

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5696665	513071	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	3	5690304	515744	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5687788	517211	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5693515	512818	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5681022	526031	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5681723	526413	Lake MB Shoreline
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5681755	528058	Lake MB Shoreline
Incidental	Great blue heron	*Ardea herodias*	Observation	1	5692688	512775	Lake MB Shoreline
Incidental	Great blue heron	*Ardea herodias*	Observation	1	5693581	513968	Lake MB Shoreline
Incidental	Great blue heron	*Ardea herodias*	Observation	1	5715541	515327	Lake MB Shoreline
Incidental	Great blue heron	*Ardea herodias*	Observation	1	5682559	525885	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	5	5712321	518425	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	2	5712398	518103	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	2	5710929	515990	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5709474	515867	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5709377	515779	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5705588	515314	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5704857	515294	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	2	5697115	513147	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5685284	517137	Lake MB Shoreline
Incidental	Killdeer	*Charadrius vociferus*	Observation	2	5684524	517644	Lake MB Shoreline
Incidental	Lesser scaup	*Aythya affinis*	Observation	20	5712080	517351	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	1	5715707	515685	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	2	5711614	517270	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	2	5708854	515205	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	6	5704857	515294	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	10	5695679	513150	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	3	5692249	513122	Lake MB Shoreline

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
Incidental	Mallard	*Anas platyrhynchos*	Observation	4	5686528	517377	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	5	5682203	525951	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	1	5678296	529614	Lake MB Shoreline
Incidental	Mallard	*Anas platyrhynchos*	Observation	1	5681755	528058	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5711614	517270	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	5	5681524	521711	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5682559	525885	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	6	5681630	526970	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	60	5677153	528698	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5712080	517351	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5704603	515496	Lake MB Shoreline
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5689961	516039	Lake MB Shoreline
Incidental	Sandhill crane	*Grus canadensis*	Observation	1	5708771	515280	Lake MB Shoreline
Incidental	Shore bird	*Unkown Species*	Observation	1	5691089	515483	Lake MB Shoreline
Incidental	Short-eared owl	*Asio flammeus*	Observation	1	5699804	529683	Route D
D63	Chipping sparrow	*Spizella passerina*	Observation	1	5699441	531895	Route D
D63	Chipping sparrow	*Spizella passerina*	Observation	1	5699346	531860	Route D
D63	Ovenbird	*Seiurus aurocapilla*	Observation	2	5699441	531895	Route D
D63	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5699441	531895	Route D
D63	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5699441	531895	Route D
D60	Alder Flycatcher	*Empidonax alnorum*	Observation	1	5697918	531177	Route D
D60	Barn swallow	*Hirundo rustica*	Observation	1	5697918	531177	Route D
D60	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5697918	531177	Route D
D60	Ovenbird	*Seiurus aurocapilla*	Observation	1	5697918	531177	Route D
D60	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5697918	531177	Route D
D60	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5697918	531177	Route D
D60	Swamp sparrow	*Melospiza georgiana*	Observation	1	5697918	531177	Route D
D60	Wilson'ssSnipe	*Gallinago delicata*	Observation	1	5697918	531177	Route D
C13	Common raven	*Corvus corax*	Vocalization	1	5712098	523561	Route C
C13	Female goldeneye chicks	*Bucephala clangula*	Observation	12	5712189	523430	Route C

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
C13	Female goldeneye duck	*Bucephala clangula*	Observation	1	5712189	523430	Route C
C13	Yellow warbler	*Setophaga petechia*	Observation	1	5712189	523430	Route C
D56	Alder Flycatcher	*Empidonax alnorum*	Vocalization	1	5695548	531010	Route D
D56	American robin	*Turdus migratorius*	Observation	2	5694522	531088	Route D
D56	Bank swallow	*Riparia riparia*	Observation	1	5695548	531010	Route D
D56	Bank swallo	*Riparia riparia*	Observation	1	5695119	531101	Route D
D56	Bobolink	*Dolichonyx oryzivorus*	Observation	1	5694522	531088	Route D
D56	Brown headed cowbird	*Molothrus ater*	Observation	1	5695104	531146	Route D
D56	Brown headed cowbird	*Molothrus ater*	Vocalization	1	5695104	531146	Route D
D56	Brown headed cowbird	*Molothrus ater*	Observation	1	5694964	531080	Route D
D56	Canada goose	*Branta canadensis*	Tracks	1	5694964	531080	Route D
D56	Canada goose	*Branta canadensis*	Tracks	1	5694381	531021	Route D
D56	Canada goose scat	*Branta canadensis*	Observation	1	5694964	531080	Route D
D56	Eastern kingbird	*Tyrannus tyrannus*	Observation	2	5695114	531106	Route D
D56	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5694522	531088	Route D
D56	Eastern meadowlark	*Sturnella magna*	Observation	1	5695742	531002	Route D
D56	Grackle	*Quiscalus quiscula*	Observation	4	5694964	531080	Route D
D56	House sparrow	*Passer domesticus*	Observation	1	5695548	531010	Route D
D56	Killdeer	*Charadrius vociferus*	Vocalization	1	5695074	531162	Route D
D56	Killdeer	*Charadrius vociferus*	Observation	1	5694964	531080	Route D
D56	Killdeer	*Charadrius vociferus*	Observation	1	5694522	531088	Route D
D56	Marsh wren	*Cistothorus palustris*	Observation	1	5695208	531073	Route D
D56	Marsh wren	*Cistothorus palustris*	Observation	1	5694381	531021	Route D
D56	Mourning dove	*Zenaida macroura*	Vocalization	1	5694522	531088	Route D
D56	Northern flicker	*Colaptes auratus*	Observation	1	5695074	531162	Route D
D56	Northern flicker	*Colaptes auratus*	Observation	2	5694522	531088	Route D
D56	Red-headed woodpecker	*Melanerpes erythrocephalus*	Observation	2	5695119	531101	Route D
D56	Red-headed woodpecker	*Melanerpes erythrocephalus*	Observation	2	5694522	531088	Route D
D56	Savannah sparrow	*Passerculus sandwichensis*	Observation	2	5695548	531010	Route D
D56	Swainson's hawk	*Buteo swainsoni*	Observation	2	5694964	531080	Route D
D56	Swainson's hawk	*Buteo swainsoni*	Observation	1	5695114	531106	Route D
D56	Turkey vulture	*Cathartes aura*	Observation	3	5694231	530961	Route D
D56	Warbler	*Unkown Species*	Observation	3	5695548	531010	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D67	Alder Flycatcher	*Empidonax alnorum*	Observation	1	5699892	532069	Route D
D67	American robin	*Turdus migratorius*	Vocalization	1	5699892	532069	Route D
D67	American robin	*Turdus migratorius*	Observation	1	5699892	532069	Route D
D67	American robin	*Turdus migratorius*	Vocalization	1	5699892	532069	Route D
D67	Brown creeper	*Certhia americana*	Observation	1	5699892	532069	Route D
D67	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5699892	532069	Route D
D67	Franklin's gull	*Leucophaeus pipixcan*	Vocalization	1	5699892	532069	Route D
D67	Hairy woodpecker	*Leuconotopicus villosus*	Observation	1	5699892	532069	Route D
D67	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5699892	532069	Route D
D51	Alder Flycatcher	*Empidonax alnorum*	Vocalization	2	5692757	530345	Route D
D51	Alder Flycatcher	*Empidonax alnorum*	Observation	5	5692757	530345	Route D
D51	American Bittern	*Botaurus lentiginosus*	Vocalization	1	5693398	530627	Route D
D51	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5693398	530627	Route D
D51	Barn swallow	*Hirundo rustica*	Observation	2	5693412	531223	Route D
D51	Barn swallow	*Hirundo rustica*	Observation	2	5693396	530503	Route D
D51	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5692757	530345	Route D
D51	Common raven	*Corvus corax*	Observation	1	5692757	530345	Route D
D51	Common yellowthroat	*Geothlypis trichas*	Observation	1	5693762	531113	Route D
D51	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5692757	530345	Route D
D51	Lesser scaup	*Aythya affinis*	Observation	2	5693412	531223	Route D
D51	Lesser scaup	*Aythya affinis*	Observation	1	5693396	530503	Route D
D51	Lincoln's sparrow	*Melospiza lincolnii*	Vocalization	1	5692757	530345	Route D
D51	Mallard	*Anas platyrhynchos*	Observation	2	5693396	530503	Route D
D51	Mallard	*Anas platyrhynchos*	Observation	2	5693396	530503	Route D
D51	Mallard	*Anas platyrhynchos*	Observation	2	5692757	530345	Route D
D51	Northern shoveler	*Anas clypeata*	Observation	2	5693412	531223	Route D
D51	Northern shoveler	*Anas clypeata*	Observation	5	5693396	530503	Route D
D51	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5693963	530968	Route D
D51	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5693396	530503	Route D
D51	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5693398	530627	Route D
D49	Alder Flycatcher	*Empidonax alnorum*	Vocalization	1	5691724	530378	Route D
D49	Blue winged teal	*Anas discors*	Observation	2	5691299	530428	Route D
D49	Common raven	*Corvus corax*	Observation	1	5691588	530513	Route D
D49	Common tern	*Sterna hirundo*	Observation	1	5692049	530415	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D49	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5691299	530428	Route D
D49	Killdeer	*Charadrius vociferus*	Vocalization	1	5692049	530415	Route D
D49	Marsh wren	*Cistothorus palustris*	Observation	2	5691803	530300	Route D
D49	Marsh wren	*Cistothorus palustris*	Observation	1	5691724	530378	Route D
D49	Mourning dove	*Zenaida macroura*	Vocalization	1	5691803	530300	Route D
D49	Northern flicker	*Colaptes auratus*	Observation	1	5691299	530428	Route D
D49	Northern harrier	*Circus cyaneus*	Observation	1	5691299	530428	Route D
D49	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5691588	530513	Route D
D49	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5691588	530513	Route D
D49	Red-winged blackbird	*Agelaius phoeniceus*	Observation	5	5692049	530415	Route D
D49	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5691803	530300	Route D
D49	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5691724	530378	Route D
D49	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5691299	530428	Route D
D49	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5691486	530566	Route D
D46D70	Alder Flycatcher	*Empidonax alnorum*	Vocalization	1	5689918	530772	Route D
D46D70	American robin	*Turdus migratorius*	Observation	2	5689689	530723	Route D
D46D70	Clay-colored sparrow	*Spizella pallida*	Observation	1	5689334	530682	Route D
D46D70	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5689126	530655	Route D
D46D70	Clay-colored sparrow	*Spizella pallida*	Observation	1	5689126	530655	Route D
D46D70	Common raven	*Corvus corax*	Observation	2	5689431	530656	Route D
D46D70	Gray jay	*Perisoreus canadensis*	Observation	1	5689918	530772	Route D
D46D70	Mallard	*Anas platyrhynchos*	Observation	1	5689587	530640	Route D
D46D70	Marsh wren	*Cistothorus palustris*	Observation	2	5689587	530640	Route D
D46D70	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5689334	530682	Route D
D46D70	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5689334	530682	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5689918	530772	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5689836	530745	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5689689	530723	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5689587	530640	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5689431	530656	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5689334	530682	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	2	5689334	530682	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5689126	530655	Route D
D46D70	Yellow warbler	*Setophaga petechia*	Observation	1	5689431	530656	Route D
C - 10	Blackbilled magpie	*Pica hudsonia*	Observation	1	5712717	522831	Route C
C - 10	Northern harrier	*Circus cyaneus*	Observation	1	5712717	522833	Route C
C - 8	Swainson's hawk	*Buteo swainsoni*	Observation	1	5712775	522060	Route C
D61	American robin	*Turdus migratorius*	Observation	1	5698522	531359	Route D
D61	Gray jay	*Perisoreus canadensis*	Observation	1	5698522	531359	Route D
D61	Ovenbird	*Seiurus aurocapilla*	Observation	1	5698522	531359	Route D
D61	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5698627	531509	Route D
D61	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5698447	531333	Route D
D61	Sandhill crane	*Grus canadensis*	Observation	2	5698522	531359	Route D
D61	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5698522	531359	Route D
D61	Swainson's hawk	*Buteo swainsoni*	Observation	1	5698447	531333	Route D
C12	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5712512	523353	Route C
C12	White throated sparrow	*Zonotrichia albicollis*	Observation	1	5712527	523329	Route C
D72	American robin	*Turdus migratorius*	Observation	1	5697332	531628	Route D
D72	American robin	*Turdus migratorius*	Observation	1	5697492	531605	Route D
D72	American white pelican	*Pelecanus erythrorhynchos*	Observation	4	5697332	531628	Route D
D72	American woodcock	*Scolopax minor*	Observation	1	5697492	531605	Route D
D72	Barn swallow	*Hirundo rustica*	Observation	1	5697332	531628	Route D
D72	Canada goose	*Branta canadensis*	Observation	1	5697332	531628	Route D
D72	Canada goose	*Branta canadensis*	Observation	46	5697332	531628	Route D
D72	Canada goose	*Branta canadensis*	Vocalization	1	5697492	531605	Route D
D72	Common nighthawk	*Chordeiles minor*	Vocalization	1	5697492	531605	Route D
D72	Common raven	*Corvus corax*	Observation	1	5697332	531628	Route D
D72	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5697332	531628	Route D
D72	Le Conte's sparrow	*Ammodramus leconteii*	Vocalization	1	5697332	531628	Route D
D72	Lesser scaup	*Aythya affinis*	Observation	2	5697332	531628	Route D
D72	Mallard	*Anas platyrhynchos*	Observation	2	5697332	531628	Route D
D72	Mallard	*Anas platyrhynchos*	Observation	5	5697492	531605	Route D
D72	Marsh wren	*Cistothorus palustris*	Observation	1	5697332	531628	Route D
D72	Northern saw-whet owl	*Aegolius acadicus*	Vocalization	1	5697492	531605	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D72	Northern waterthrush	*Parkesia noveboracensis*	Vocalization	1	5697332	531628	Route D
D72	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5697332	531628	Route D
D72	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5697332	531628	Route D
D72	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5697332	531628	Route D
D72	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5697492	531605	Route D
D81	American robin	*Turdus migratorius*	Observation	1	5686075	531474	Route D
D81	Baltimore oriole	*Icterus galbula*	Observation	1	5686075	531474	Route D
D81	Bobolink	*Dolichonyx oryzivorus*	Vocalization	1	5686075	531474	Route D
D81	Canada goose	*Branta canadensis*	Vocalization	1	5686075	531474	Route D
D81	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5686075	531474	Route D
D81	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5686075	531474	Route D
D81	Hawk	*Unkown Species*	Observation	1	5686075	531474	Route D
D81	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5686075	531474	Route D
D81	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5686075	531474	Route D
D81	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5686075	531474	Route D
D81	Swamp sparrow	*Melospiza georgiana*	Vocalization	1	5686075	531474	Route D
D81	Tennessee warbler	*Leiothlypis peregrina*	Observation	1	5686075	531474	Route D
D81	Tree swallow	*Tachycineta bicolor*	Observation	1	5686075	531474	Route D
D82	American robin	*Turdus migratorius*	Observation	1	5685444	531643	Route D
D82	Brown-headed cowbird	*Molothrus ater*	Observation	1	5685444	531643	Route D
D82	Clay-colored sparrow	*Spizella pallida*	Observation	1	5685444	531643	Route D
D82	Downy woodpecker	*Picoides pubescens*	Observation	1	5685444	531643	Route D
D82	Red-headed woodpecker	*Melanerpes erythrocephalus*	Observation	1	5685444	531643	Route D
D82	Red-winged blackbird	*Agelaius phoeniceus*	Observation	6	5685444	531643	Route D
D82	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5685444	531643	Route D
D82	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5685444	531643	Route D
D82	Swainson’s hawk	*Buteo swainsoni*	Observation	1	5685444	531643	Route D
D82	Veery	*Catharus fuscescens*	Observation	1	5685444	531643	Route D
D85	American robin	*Turdus migratorius*	Observation	1	5685427	531368	Route D
D85	American robin	*Turdus migratorius*	Vocalization	1	5685427	531368	Route D
D85	Chipping sparrow	*Spizella passerina*	Observation	1	5685427	531368	Route D
D85	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5685427	531368	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D85	Common raven	*Corvus corax*	Observation	1	5685427	531368	Route D
D85	Ovenbird	*Seiurus aurocapilla*	Observation	1	5685427	531368	Route D
D85	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5685427	531368	Route D
D85	Red-headed woodpecker	*Melanerpes erythrocephalus*	Observation	1	5685427	531368	Route D
D85	Swainson's hawk	*Buteo swainsoni*	Observation	1	5685427	531368	Route D
D85	Swainson's hawk	*Buteo swainsoni*	Vocalization	1	5685427	531368	Route D
D85	Warbler	*Unkown Species*	Observation	1	5685427	531368	Route D
D86	American robin	*Turdus migratorius*	Vocalization	1	5685746	531091	Route D
D86	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5685746	531091	Route D
D86	Marsh wren	*Cistothorus palustris*	Vocalization	1	5685746	531091	Route D
D86	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5685746	531091	Route D
D86	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5685746	531091	Route D
D86	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5685746	531091	Route D
D86	Swainson's hawk	*Buteo swainsoni*	Vocalization	2	5685746	531091	Route D
D34	American robin	*Turdus migratorius*	Observation	1	5684503	531311	Route D
D34	Chipping sparrow	*Spizella passerina*	Observation	1	5684503	531311	Route D
D34	Common raven	*Corvus corax*	Observation	1	5684503	531311	Route D
D34	Marsh wren	*Cistothorus palustris*	Observation	1	5684503	531311	Route D
D34	Northern harrier	*Circus cyaneus*	Observation	1	5684503	531311	Route D
D34	Veery	*Catharus fuscescens*	Observation	1	5684503	531311	Route D
D31	American robin	*Turdus migratorius*	Observation	1	5682778	530724	Route D
D31	Canada goose	*Branta canadensis*	Observation	1	5682778	530724	Route D
D31	Clay-colored sparrow	*Spizella pallida*	Observation	1	5682778	530724	Route D
D31	Common raven	*Corvus corax*	Observation	1	5682778	530724	Route D
D31	Eastern meadowlark	*Sturnella magna*	Observation	1	5682778	530724	Route D
D31	Mallard	*Anas platyrhynchos*	Observation	1	5682778	530724	Route D
D31	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5683406	529768	Route D
D31	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5682778	530724	Route D
D31	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5683406	529768	Route D
D31	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5682778	530724	Route D
D31	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5682778	530724	Route D
D31	Swainson's hawk	*Buteo swainsoni*	Observation	1	5682778	530724	Route D
D31	Veery	*Catharus fuscescens*	Observation	1	5682778	530724	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D36	American robin	*Turdus migratorius*	Observation	1	5682378	530638	Route D
D36	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5682378	530638	Route D
D36	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5682378	530638	Route D
D36	Swainson's hawk	*Buteo swainsoni*	Observation	2	5682378	530638	Route D
D29	American robin	*Turdus migratorius*	Observation	1	5682072	530228	Route D
D29	Bald eagle	*Haliaeetus leucocephalus*	Vocalization	1	5682072	530228	Route D
D29	Barn swallow	*Hirundo rustica*	Observation	2	5682010	529800	Route D
D29	Brown-headed cowbird	*Molothrus ater*	Observation	1	5682072	530228	Route D
D29	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5682010	529800	Route D
D29	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5682072	530228	Route D
D29	Eastern meadowlark	*Sturnella magna*	Observation	2	5682072	530228	Route D
D29	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5682780	529774	Route D
D29	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5682072	530228	Route D
D29	Killdeer	*Charadrius vociferus*	Observation	1	5682072	530228	Route D
D29	Marsh wren	*Cistothorus palustris*	Observation	1	5682072	530228	Route D
D29	Northern harrier	*Circus cyaneus*	Observation	1	5682010	529800	Route D
D29	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5682583	529774	Route D
D29	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5682010	529800	Route D
D29	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5682072	530228	Route D
D29	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5682072	530228	Route D
D29	Swamp sparrow	*Melospiza georgiana*	Observation	1	5682072	530228	Route D
D29	Warbling vireo	*Vireo gilvus*	Observation	1	5682780	529774	Route D
D29	Yellow headed blackbird	*Xanthocephalus xanthocephalus*	Observation	2	5682072	530228	Route D
D29	Yellow warbler	*Setophaga petechia*	Observation	1	5682072	530228	Route D
C20	American robin	*Turdus migratorius*	Observation	1	5710079	525863	Route C
C20	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5710079	525863	Route C
C20	House sparrow	*Passer domesticus*	Vocalization	1	5710079	525863	Route C
C20	Le Conte's sparrow	*Ammodramus leconteii*	Vocalization	1	5710079	525863	Route C
C20	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5710079	525863	Route C
C20	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5710079	525863	Route C
C20	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5710079	525863	Route C
C20	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5710079	525863	Route C
C20	Swamp sparrow	*Melospiza georgiana*	Vocalization	1	5710079	525863	Route C

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
C20	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5710079	525863	Route C
C20	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5710079	525863	Route C
D39	Bald eagle	*Haliaeetus leucocephalus*	Vocalization	1	5687140	530542	Route D
D39	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5687140	530542	Route D
C26	Bald eagle	*Haliaeetus leucocephalus*	Observation	2	5709478	527993	Route C
C26	Bald eagle	*Haliaeetus leucocephalus*	Vocalization	1	5710108	527977	Route C
C26	Barn swallow	*Hirundo rustica*	Observation	5	5709478	527993	Route C
C26	Canada goose	*Branta canadensis*	Observation	0	5710108	527977	Route C
C26	Common raven	*Corvus corax*	Observation	2	5709478	527993	Route C
C26	Common raven	*Corvus corax*	Observation	1	5710108	527977	Route C
C26	Herring gull	*Larus argentatus*	Observation	1	5710108	527977	Route C
C26	Mallard	*Anas platyrhynchos*	Observation	1	5710108	527977	Route C
C26	Mallard	*Anas platyrhynchos*	Observation	2	5710108	527977	Route C
C26	Marsh wren	*Cistothorus palustris*	Observation	1	5710108	527977	Route C
C26	Merlin	*Falco columbarius*	Observation	1	5709478	527993	Route C
C26	Purple finch	*Haemorhous purpureus*	Observation	1	5709478	527993	Route C
C26	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5709478	527993	Route C
C26	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5709584	527949	Route C
C26	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5710108	527977	Route C
C26	Sora	*Porzana carolina*	Vocalization	1	5710108	527977	Route C
C26	Swainson's hawk	*Buteo swainsoni*	Observation	2	5710108	527977	Route C
C26	Yellow headed blackbird	*Xanthocephalus xanthocephalus*	Observation	1	5709478	527993	Route C
C26	Yellow headed blackbird	*Xanthocephalus xanthocephalus*	Observation	1	5709584	527949	Route C
C26	Yellow headed blackbird	*Xanthocephalus xanthocephalus*	Observation	1	5710108	527977	Route C
C15	Mallard	*Anas platyrhynchos*	Observation	3	5711467	523996	Route C
C15	Marsh wren	*Cistothorus palustris*	Observation	1	5711467	523996	Route C
D67	Barn swallow	*Hirundo rustica*	Observation	2	5701502	532615	Route D
D67	Blackbilled magpie	*Pica hudsonia*	Observation	1	5701502	532615	Route D
D67	Blue jay	*Cyanocitta cristata*	Observation	1	5701502	532615	Route D
D67	Bobolink	*Dolichonyx oryzivorus*	Observation	1	5701502	532615	Route D
D67	Bobolink	*Dolichonyx oryzivorus*	Vocalization	1	5701502	532615	Route D
D67	Brown-headed cowbird	*Molothrus ater*	Observation	1	5701502	532615	Route D
D67	Brown-headed cowbird	*Molothrus ater*	Observation	2	5702151	532891	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D67	Common merganser	*Mergus merganser*	Observation	1	5701502	532615	Route D
D67	Common raven	*Corvus corax*	Observation	2	5702151	532891	Route D
D67	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5701502	532615	Route D
D67	Eastern meadowlark	*Sturnella magna*	Observation	1	5701502	532615	Route D
D67	Eastern meadowlark	*Sturnella magna*	Observation	1	5701314	532747	Route D
D67	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5701502	532615	Route D
D67	House sparrow	*Passer domesticus*	Observation	8	5701502	532615	Route D
D67	Killdeer	*Charadrius vociferus*	Vocalization	1	5702151	532891	Route D
D67	Merlin	*Falco columbarius*	Observation	1	5702151	532891	Route D
D67	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5702151	532891	Route D
D67	Swainson’s hawk	*Buteo swainsoni*	Observation	1	5701502	532615	Route D
D67	Wilson's snipe	*Gallinago delicata*	Observation	2	5702151	532891	Route D
D67	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5702151	532891	Route D
D37	Barn swallow	*Hirundo rustica*	Observation	2	5686185	530546	Route D
D37	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5686043	530547	Route D
D37	Mallard	*Anas platyrhynchos*	Observation	2	5686043	530547	Route D
D37	Northern flicker	*Colaptes auratus*	Vocalization	1	5686043	530547	Route D
D37	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5686043	530547	Route D
D37	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5686228	530545	Route D
D37	Red-winged blackbird	*Agelaius phoeniceus*	Observation	6	5686043	530547	Route D
D71	Bobolink	*Dolichonyx oryzivorus*	Observation	3	5703767	533997	Route D
D71	Double-crested cormorant	*Phalacrocorax auritus*	Observation	1	5703767	533997	Route D
D71	Mallard	*Anas platyrhynchos*	Observation	1	5703767	533997	Route D
D71	Marsh wren	*Cistothorus palustris*	Observation	1	5703767	533997	Route D
D71	Northern flicker	*Colaptes auratus*	Observation	1	5703767	533997	Route D
D71	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5703767	533997	Route D
D71	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5703767	533997	Route D
D32	Blackbilled magpie	*Pica hudsonia*	Observation	1	5682888	531395	Route D
D32	Blue winged teal	*Anas discors*	Observation	1	5683334	531156	Route D
D32	Bobolink	*Dolichonyx oryzivorus*	Observation	1	5683334	531156	Route D
D32	Bobolink	*Dolichonyx oryzivorus*	Observation	2	5682888	531395	Route D
D32	Brown-headed cowbird	*Molothrus ater*	Observation	10	5683609	530413	Route D
D32	Mallard	*Anas platyrhynchos*	Observation	2	5683652	530564	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D32	Red-winged blackbird	*Agelaius phoeniceus*	Observation	7	5683652	530564	Route D
D32	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5682888	531395	Route D
D32	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5683197	531230	Route D
D32	Wood thrush	*Hylocichla mustelina*	Observation	1	5683334	531156	Route D
D59	Brown creeper	*Certhia americana*	Observation	2	5697411	531022	Route D
D59	Brown creeper	*Certhia americana*	Vocalization	1	5697411	531022	Route D
D59	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5697411	531022	Route D
D59	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5697411	531022	Route D
D59	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5697411	531022	Route D
D41	Blue winged teal	*Anas discors*	Observation	10	5687783	530531	Route D
D41	Brown-headed cowbird	*Molothrus ater*	Observation	6	5687955	530534	Route D
D41	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5687783	530531	Route D
D41	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5687783	530531	Route D
D41	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5687955	530534	Route D
D41	Red-winged blackbird	*Agelaius phoeniceus*	Observation	6	5687783	530531	Route D
D34	Barn swallow	*Hirundo rustica*	Observation	1	5684752	530557	Route D
D34	Bobolink	*Dolichonyx oryzivorus*	Observation	1	5684752	530557	Route D
D34	Brown-headed cowbird	*Molothrus ater*	Observation	3	5684410	530560	Route D
D34	Common raven	*Corvus corax*	Observation	1	5684410	530560	Route D
D34	Green winged weal	*Anas carolinensis*	Observation	1	5684432	530560	Route D
D34	Red-winged blackbird	*Agelaius phoeniceus*	Observation	11	5684410	530560	Route D
C25	Canada goose	*Branta canadensis*	Observation	50	5710293	527443	Route C
C25	Chestnut-sided warbler	*Setophaga pensylvanica*	Vocalization	1	5710097	527673	Route C
C25	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5710164	527600	Route C
C25	Eastern phoebe	*Sayornis phoebe*	Observation	1	5709854	527687	Route C
C25	Great blue heron	*Ardea herodias*	Observation	1	5710097	527673	Route C
C25	Killdeer	*Charadrius vociferus*	Observation	1	5709608	527794	Route C
C25	Mallard	*Anas platyrhynchos*	Observation	1	5710069	527648	Route C
C25	Mallard chicks	*Anas platyrhynchos*	Observation	8	5710069	527648	Route C
C25	Marsh wren	*Cistothorus palustris*	Observation	1	5710293	527443	Route C
C25	Marsh wren	*Cistothorus palustris*	Observation	2	5710295	527459	Route C
C25	Merlin	*Falco columbarius*	Observation	1	5710293	527443	Route C
C25	Northern flicker	*Colaptes auratus*	Observation	1	5709854	527687	Route C

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
C25	Red-winged blackbird	*Agelaius phoeniceus*	Observation	10	5710097	527673	Route C
C25	Sandhill crane	*Grus canadensis*	Observation	1	5710097	527673	Route C
C25	Swainson's hawk	*Buteo swainsoni*	Observation	2	5710097	527673	Route C
C23	Chestnut-sided warbler	*Setophaga pensylvanica*	Vocalization	1	5710003	526893	Route C
C23	Chipping sparrow	*Spizella passerina*	Vocalization	1	5710003	526893	Route C
C23	House sparrow	*Passer domesticus*	Vocalization	1	5710003	526893	Route C
C23	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5710003	526893	Route C
D73	Canada goose	*Branta canadensis*	Observation	2	5695927	531343	Route D
D73	Canada goose	*Branta canadensis*	Observation	1	5695822	531276	Route D
D73	Chipping sparrow	*Spizella passerina*	Vocalization	1	5695927	531343	Route D
D73	Curlew sandpiper	*Calidris ferruginea*	Observation	1	5695861	531326	Route D
D73	Dark eyed junco	*Junco hyemalis*	Vocalization	1	5695927	531343	Route D
D73	House sparrow	*Passer domesticus*	Vocalization	1	5695927	531343	Route D
D73	Mallard	*Anas platyrhynchos*	Observation	1	5695927	531343	Route D
D73	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5695861	531326	Route D
C01	American crow	*Corvus brachyrhynchos*	Observation	5	5712804	519053	Route C
C01	American crow	*Corvus brachyrhynchos*	Observation	4	5712973	519353	Route C
C01	Brown-headed cowbird	*Molothrus ater*	Observation	5	5712804	519053	Route C
C01	Canada goose	*Branta canadensis*	Observation	25	5712804	519053	Route C
C01	Canada goose	*Branta canadensis*	Observation	300	5712973	519353	Route C
C01	Common raven	*Corvus corax*	Observation	1	5712804	519053	Route C
C01	Franklin's gull	*Leucophaeus pipixcan*	Observation	3	5712804	519053	Route C
C01	Mallard	*Anas platyrhynchos*	Observation	200	5712973	519353	Route C
C01	Mallard	*Anas platyrhynchos*	Observation	2	5712804	519053	Route C
C01	Mourning dove	*Zenaida macroura*	Observation	2	5712804	519053	Route C
C01	Swainson's hawk	*Buteo swainsoni*	Observation	1	5712804	519053	Route C
C3	Black-capped chickadee	*Poecile atricapillus*	Observation	1	5713007	519662	Route C
C3	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5713002	519816	Route C
C3	Clay-colored sparrow	*Spizella pallida*	Observation	1	5713024	520076	Route C
C3	House sparrow	*Passer domesticus*	Vocalization	1	5713002	519816	Route C
C3	Mallard	*Anas platyrhynchos*	Observation	1	5713004	519740	Route C
C3	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5713002	519816	Route C
C3	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5713002	519816	Route C

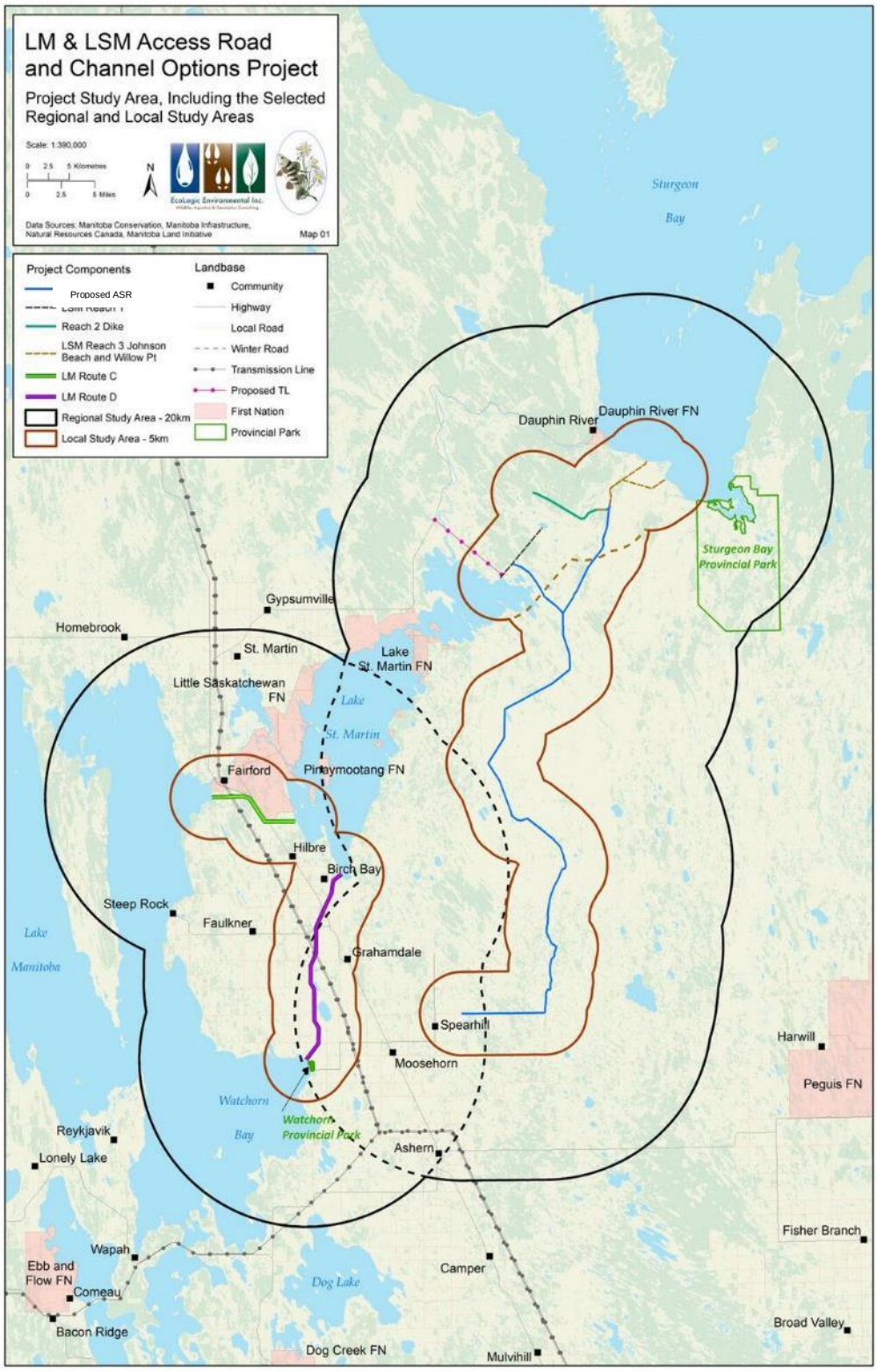
Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
C3	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5713024	520076	Route C
D54	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5692486	530538	Route D
D54	Eastern flycatcher	*Tyrannus tyrannus*	Vocalization	1	5692203	530492	Route D
D54	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5692486	530538	Route D
D54	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5692486	530538	Route D
D54	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5692486	530538	Route D
D54	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5692203	530492	Route D
C21	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5710011	526107	Route C
C21	Common raven	*Corvus corax*	Observation	1	5710011	526107	Route C
C21	Downy woodpecker	*Picoides pubescens*	Vocalization	1	5710011	526107	Route C
C21	Marsh wren	*Cistothorus palustris*	Observation	1	5710011	526107	Route C
C21	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5710011	526107	Route C
C21	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5710011	526107	Route C
C21	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5710011	526107	Route C
C19	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5710084	525540	Route C
C19	Swainson’s hawk	*Buteo swainsoni*	Observation	1	5710084	525540	Route C
C19	Swamp sparrow	*Melospiza georgiana*	Vocalization	1	5710084	525540	Route C
C19	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5710084	525540	Route C
C - 5	Eastern phoebe	*Sayornis phoebe*	Observation	2	5713021	520370	Route C
C15	American robin	*Turdus migratorius*	Observation	3	5711543	523807	Route C
C15	Chipping sparrow	*Spizella passerina*	Observation	1	5711605	523740	Route C
C15	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5711605	523740	Route C
C24	Downy woodpecker	*Picoides pubescens*	Vocalization	1	5710067	527105	Route C
C24	Warbling vireo	*Vireo gilvus*	Vocalization	1	5710067	527105	Route C
D69	Barn swallow	*Hirundo rustica*	Observation	2	5702313	533217	Route D
D69	Common raven	*Corvus corax*	Observation	1	5702738	533229	Route D
D69	Eastern flycatcher	*Tyrannus tyrannus*	Observation	2	5703098	533220	Route D
D69	Eastern phoebe	*Sayornis phoebe*	Observation	2	5702313	533217	Route D
D69	Franklin's gull	*Leucophaeus pipixcan*	Observation	5	5703098	533220	Route D
D69	Mallard	*Anas platyrhynchos*	Observation	3	5703098	533220	Route D
D69	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5703098	533220	Route D
D69	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5702738	533229	Route D
D69	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5702738	533229	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D69	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5702313	533217	Route D
D69	Swainson's hawk	*Buteo swainsoni*	Observation	1	5702738	533229	Route D
D69	Swamp sparrow	*Melospiza georgiana*	Observation	1	5703098	533220	Route D
D69	Tennessee warbler	*Leiothlypis peregrina*	Vocalization	1	5703098	533220	Route D
D69	Yellow warbler	*Setophaga petechia*	Observation	1	5703098	533220	Route D
D67	Canada goose	*Branta canadensis*	Observation	6	5700917	532553	Route D
D67	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5700917	532553	Route D
D67	Franklin's gull	*Leucophaeus pipixcan*	Observation	10	5700917	532553	Route D
D67	Marsh wren	*Cistothorus palustris*	Observation	3	5700917	532553	Route D
D67	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5700917	532553	Route D
D35	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5685235	530553	Route D
D35	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5685235	530553	Route D
D35	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5685391	530552	Route D
D42	American robin	*Turdus migratorius*	Observation	1	5688522	530535	Route D
D42	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5688784	530531	Route D
D42	Brown-headed cowbird	*Molothrus ater*	Observation	1	5688102	530536	Route D
D42	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5688159	530540	Route D
D42	House sparrow	*Passer domesticus*	Vocalization	1	5688159	530540	Route D
D42	Lesser scaup	*Aythya affinis*	Observation	4	5688784	530531	Route D
D42	Mallard	*Anas platyrhynchos*	Observation	2	5688784	530531	Route D
D42	Mallard	*Anas platyrhynchos*	Observation	2	5688522	530535	Route D
D42	Northern pintail	*Anas acuta*	Observation	1	5688784	530531	Route D
D42	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5688945	530662	Route D
D42	Red-winged blackbird	*Agelaius phoeniceus*	Observation	5	5688784	530531	Route D
D42	Red-winged blackbird	*Agelaius phoeniceus*	Observation	7	5688522	530535	Route D
D42	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5688159	530540	Route D
D42	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5688102	530536	Route D
D42	Tree swallow	*Tachycineta bicolor*	Observation	2	5688159	530540	Route D
D42	Warbling vireo	*Vireo gilvus*	Vocalization	1	5688159	530540	Route D
D42	Warbling vireo	*Vireo gilvus*	Vocalization	1	5688102	530536	Route D
C14	Alder Flycatcher	*Empidonax alnorum*	Observation	1	5711913	523679	Route C
C14	Chipping sparrow	*Spizella passerina*	Observation	1	5711913	523679	Route C
C14	Red-eyed vireo	*Vireo olivaceus*	Vocalization	4	5712038	523630	Route C

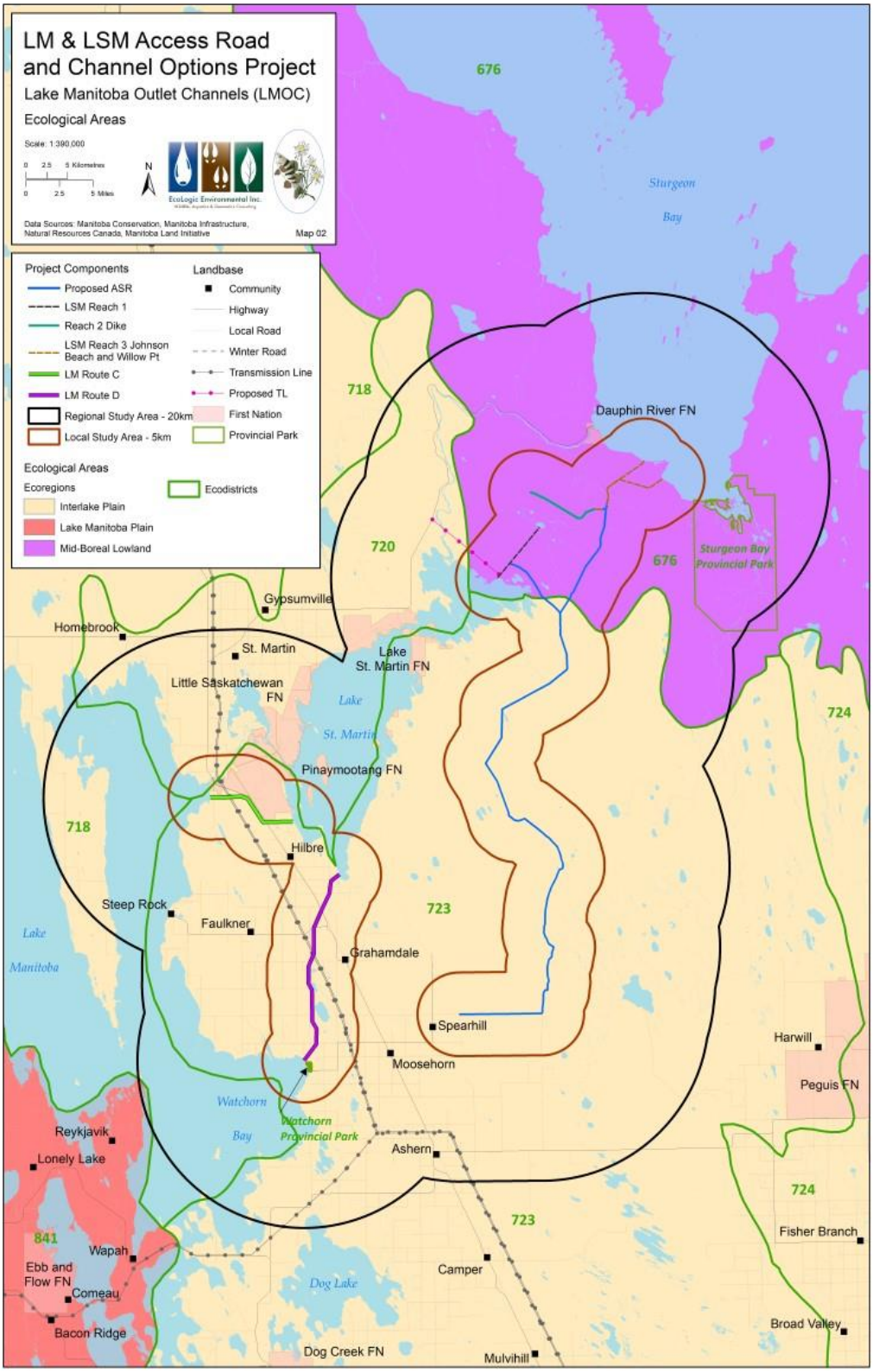
Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
C14	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5711823	523784	Route C
C14	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5712038	523630	Route C
C14	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5711913	523679	Route C
C22	Marsh wren	*Cistothorus palustris*	Observation	1	5710372	526608	Route C
C22	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5710372	526608	Route C
C22	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5710372	526608	Route C
D62	Ovenbird	*Seiurus aurocapilla*	Observation	1	5699030	531716	Route D
D62	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5699030	531716	Route D
D58	Bobolink	*Dolichonyx oryzivorus*	Observation	2	5696387	531044	Route D
D58	Canada goose	*Branta canadensis*	Observation	0	5696600	530843	Route D
D58	Common sandpiper	*Actitis hypoleucos*	Observation	1	5696600	530843	Route D
D58	Curlew sandpiper	*Calidris ferruginea*	Observation	1	5696387	531044	Route D
D58	Eastern kingbird	*Tyrannus tyrannus*	Observation	1	5696587	530935	Route D
D58	Eastern meadowlark	*Sturnella magna*	Vocalization	1	5696614	530660	Route D
D58	Northern flicker	*Colaptes auratus*	Vocalization	1	5696600	530843	Route D
D58	Northern saw-whet owl	*Aegolius acadicus*	Vocalization	1	5696387	531044	Route D
D58	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5696614	530660	Route D
D58	Ovenbird	*Seiurus aurocapilla*	Vocalization	1	5696600	530843	Route D
D58	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5696628	531009	Route D
D58	Savannah sparrow	*Passerculus sandwichensis*	Observation	1	5696387	531044	Route D
D58	Swamp sparrow	*Melospiza georgiana*	Vocalization	1	5696600	530843	Route D
D58	Vesper sparrow	*Pooecetes gramineus*	Observation	1	5696524	531047	Route D
D58	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5696600	530843	Route D
D66	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5700551	532406	Route D
D66	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5700231	532301	Route D
D66	Mourning dove	*Zenaida macroura*	Observation	3	5700231	532301	Route D
D66	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5700551	532406	Route D
D66	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5700551	532406	Route D
D73	Gadwell	*Anas strepera*	Observation	2	5696142	530999	Route D
D73	Lesser scaup	*Aythya affinis*	Observation	3	5696140	530999	Route D
D73	Mallard	*Anas platyrhynchos*	Observation	2	5696142	530999	Route D
D73	Mallard	*Anas platyrhynchos*	Observation	2	5696142	530999	Route D
D73	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5696142	530999	Route D

Point Count Location/Incidental	Common Name	Scientific Name	DataType	Quantity	UTM_Y	UTM_X	Area
D73	Swamp sparrow	*Melospiza georgiana*	Observation	1	5696142	530999	Route D
D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5703419	533658	Route D
D70	Warbler	*Unkown Species*	Observation	2	5703419	533658	Route D
D40	Blue winged teal	*Anas discors*	Observation	2	5687507	530537	Route D
D40	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5687507	530537	Route D
D38	Mallard	*Anas platyrhynchos*	Observation	1	5686629	530544	Route D
D38	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5686905	530543	Route D
D38	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5686905	530543	Route D
D38	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5686629	530544	Route D
D38	Warbling vireo	*Vireo gilvus*	Vocalization	1	5686905	530543	Route D
D36	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5685611	530549	Route D
D36	Swamp sparrow	*Melospiza georgiana*	Observation	1	5685611	530549	Route D
D36	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5685611	530549	Route D
D33	Bobolink	*Dolichonyx oryzivorus*	Observation	1	5683613	530713	Route D
D33	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5683609	531234	Route D
D33	Mallard	*Anas platyrhynchos*	Observation	2	5683613	530713	Route D
D33	Red-winged blackbird	*Agelaius phoeniceus*	Observation	10	5683609	531234	Route D
D33	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5683613	530713	Route D
D46D70	American white pelican	*Pelecanus erythrorhynchos*	Observation	14	5690595	530464	Route D
D46D70	Franklin's gull	*Leucophaeus pipixcan*	Observation	2	5690517	530495	Route D
D46D70	Marsh wren	*Cistothorus palustris*	Observation	2	5689972	530715	Route D
D46D70	Red-winged blackbird	*Agelaius phoeniceus*	Observation	4	5690096	530678	Route D
D46D70	Tree swallow	*Tachycineta bicolor*	Observation	2	5689967	530724	Route D

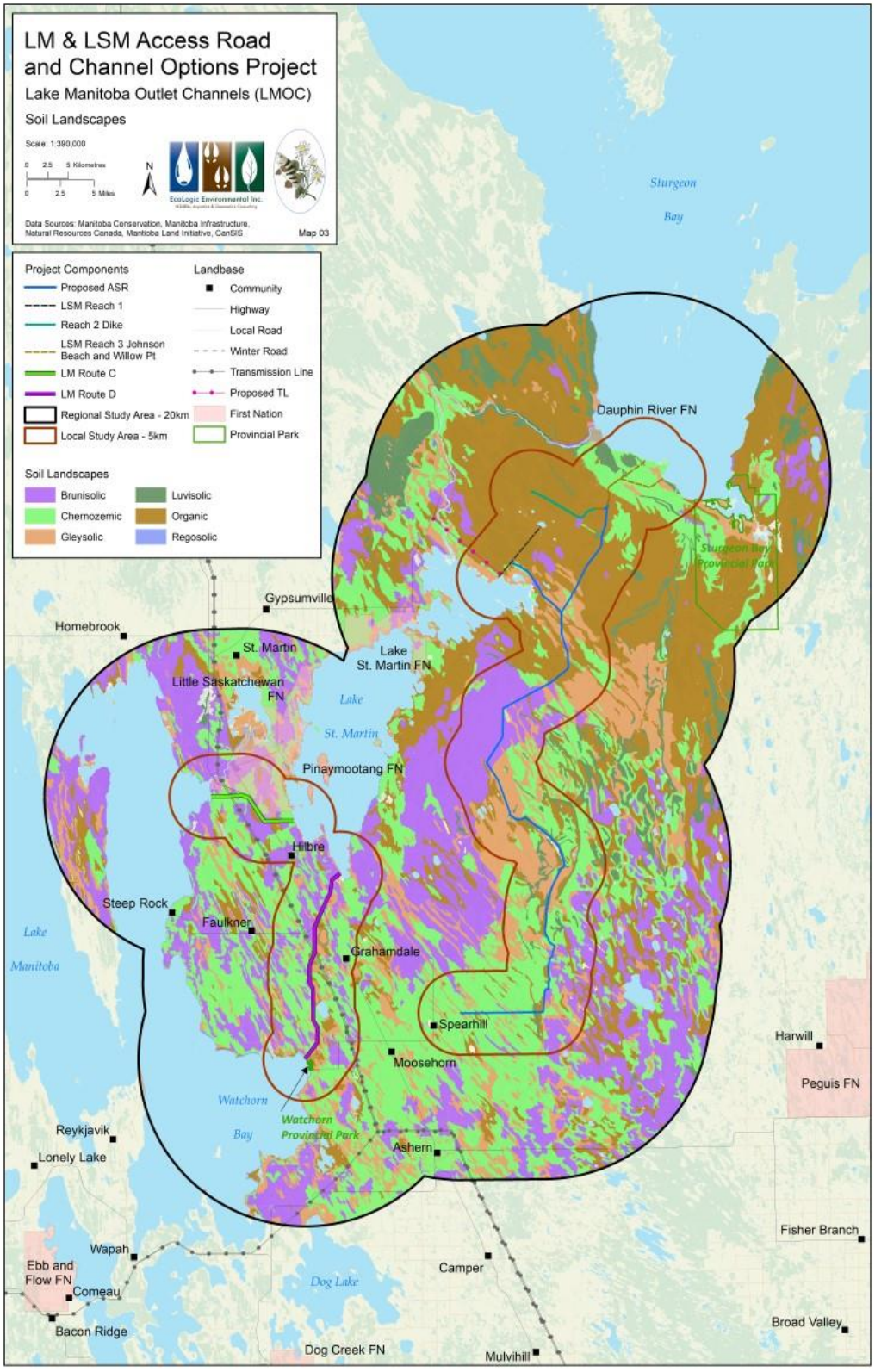
Appendix F: Report Mapping



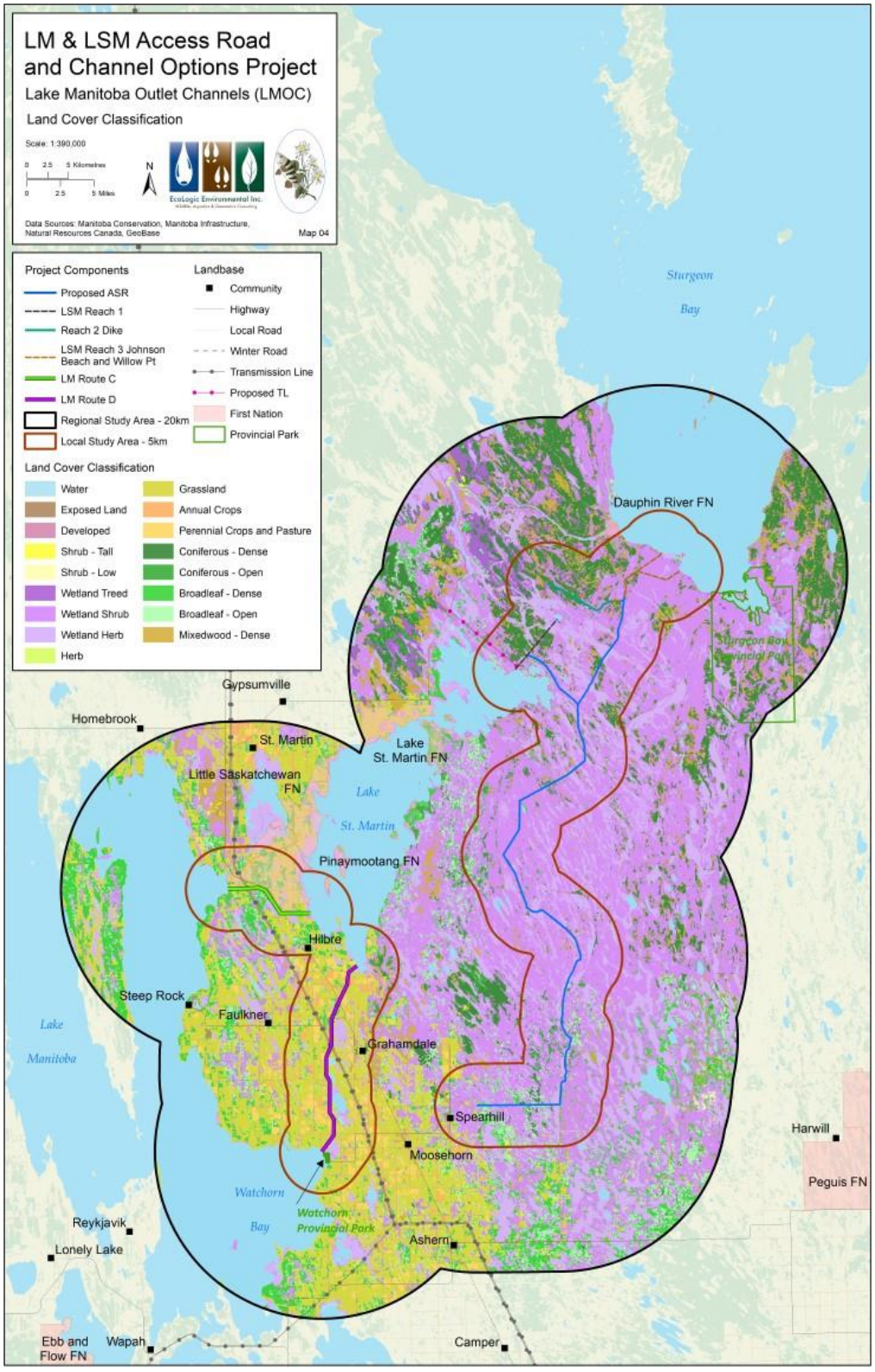
Map 1: MI Lake MB Project Study Areas



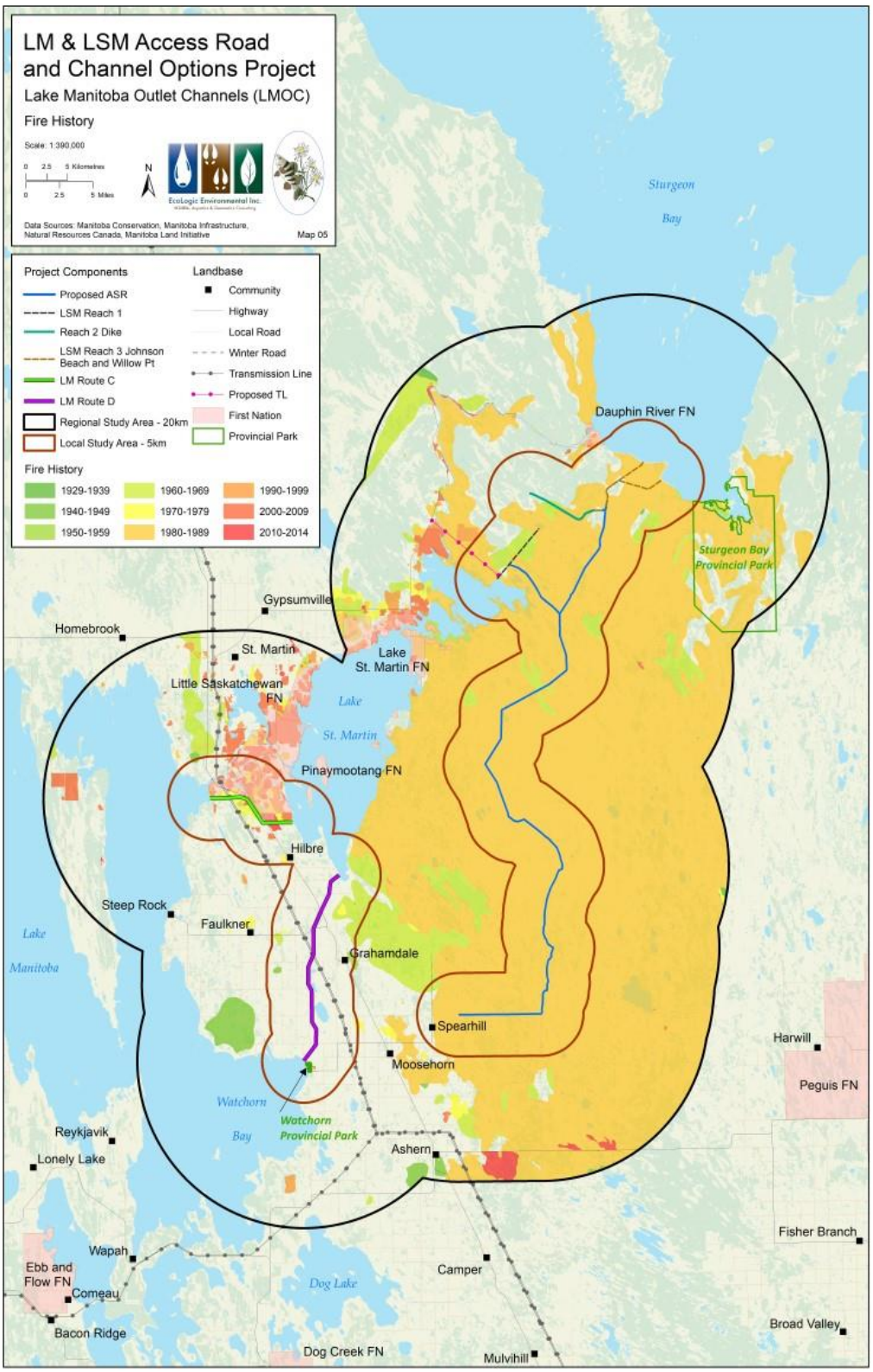
Map 2: MI Lake MB Ecodistricts



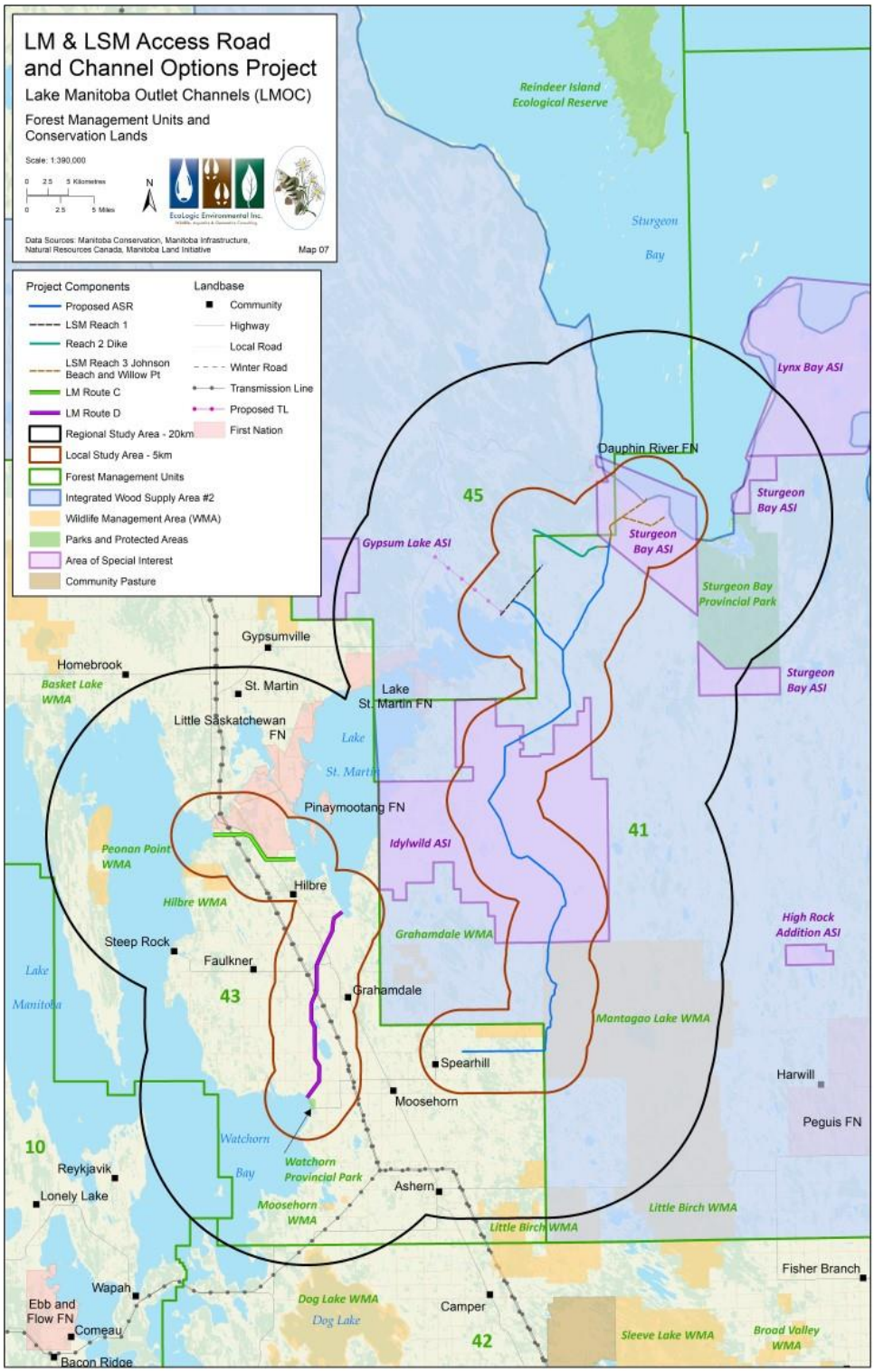
Map 3: MI Lake MB Soil Classifications



Map 4: Land Cover Classification (LCC) within the LSA and RSA

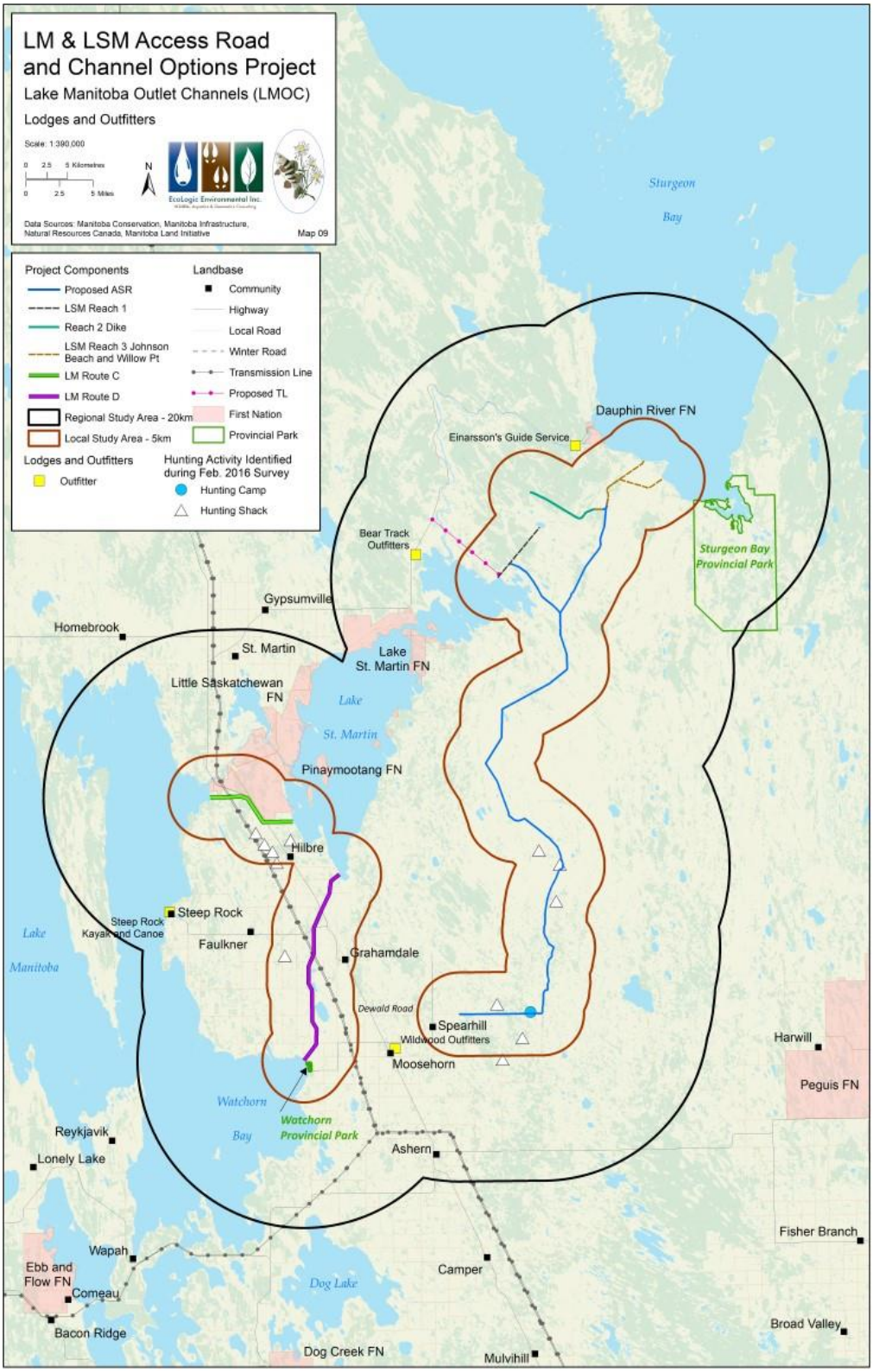


Map 5: Fire History within the LSA and RSA

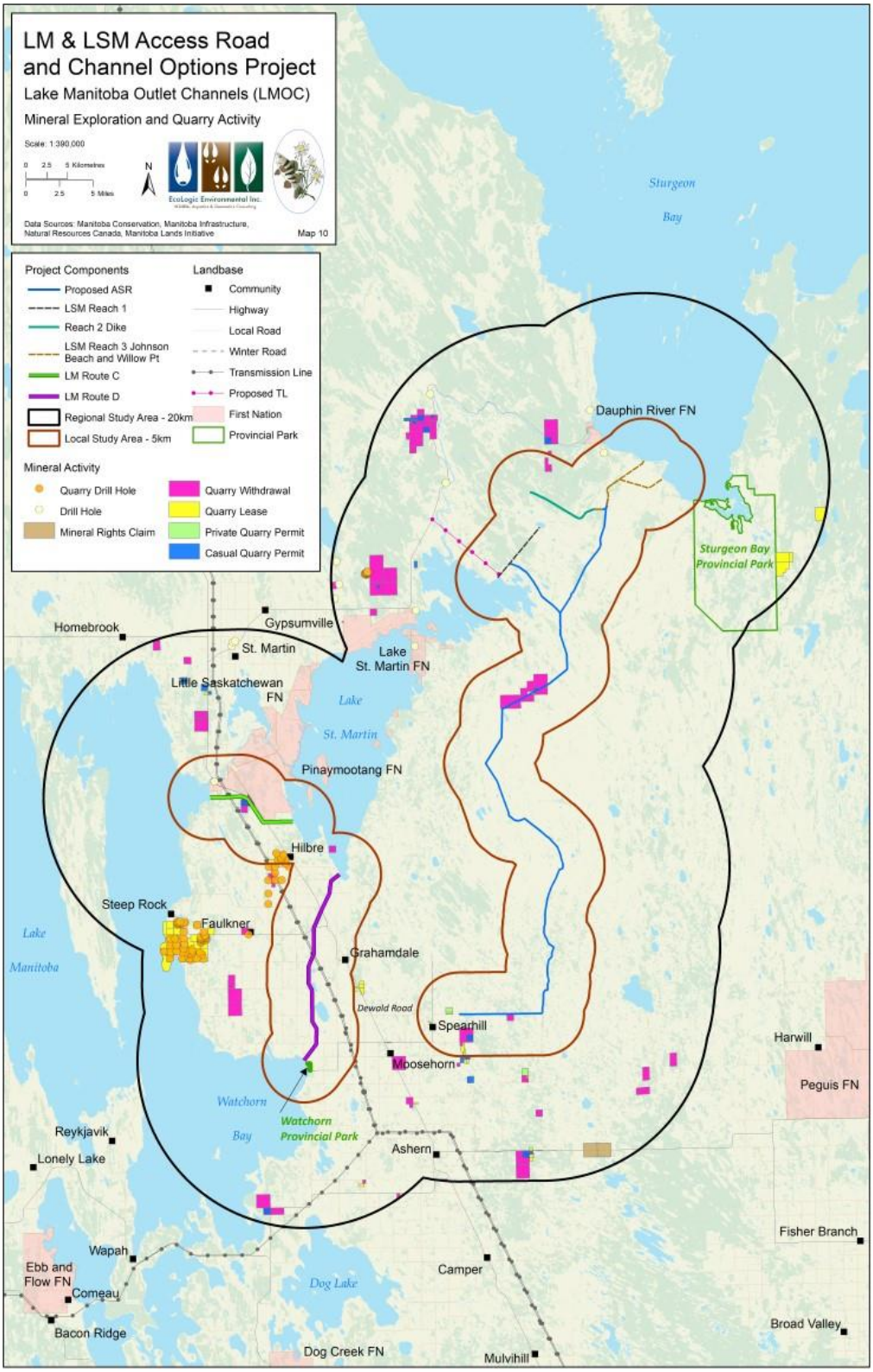


Map 7: Forestry Management Units (FMU) and Conservation Lands within the LSA and RSA

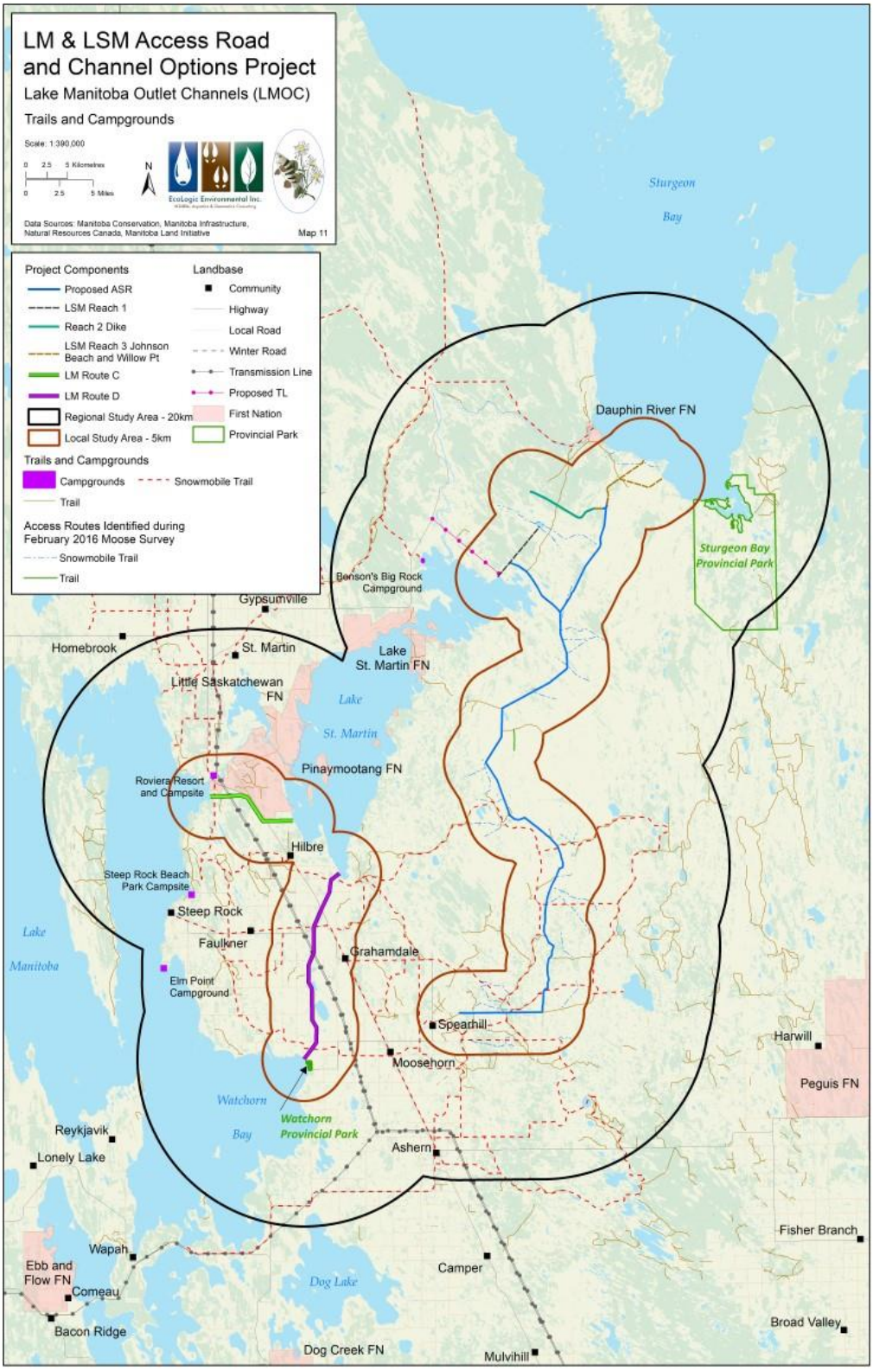
Map 8: Hydroelectric Development – Transmission Lines within the LSA and RSA



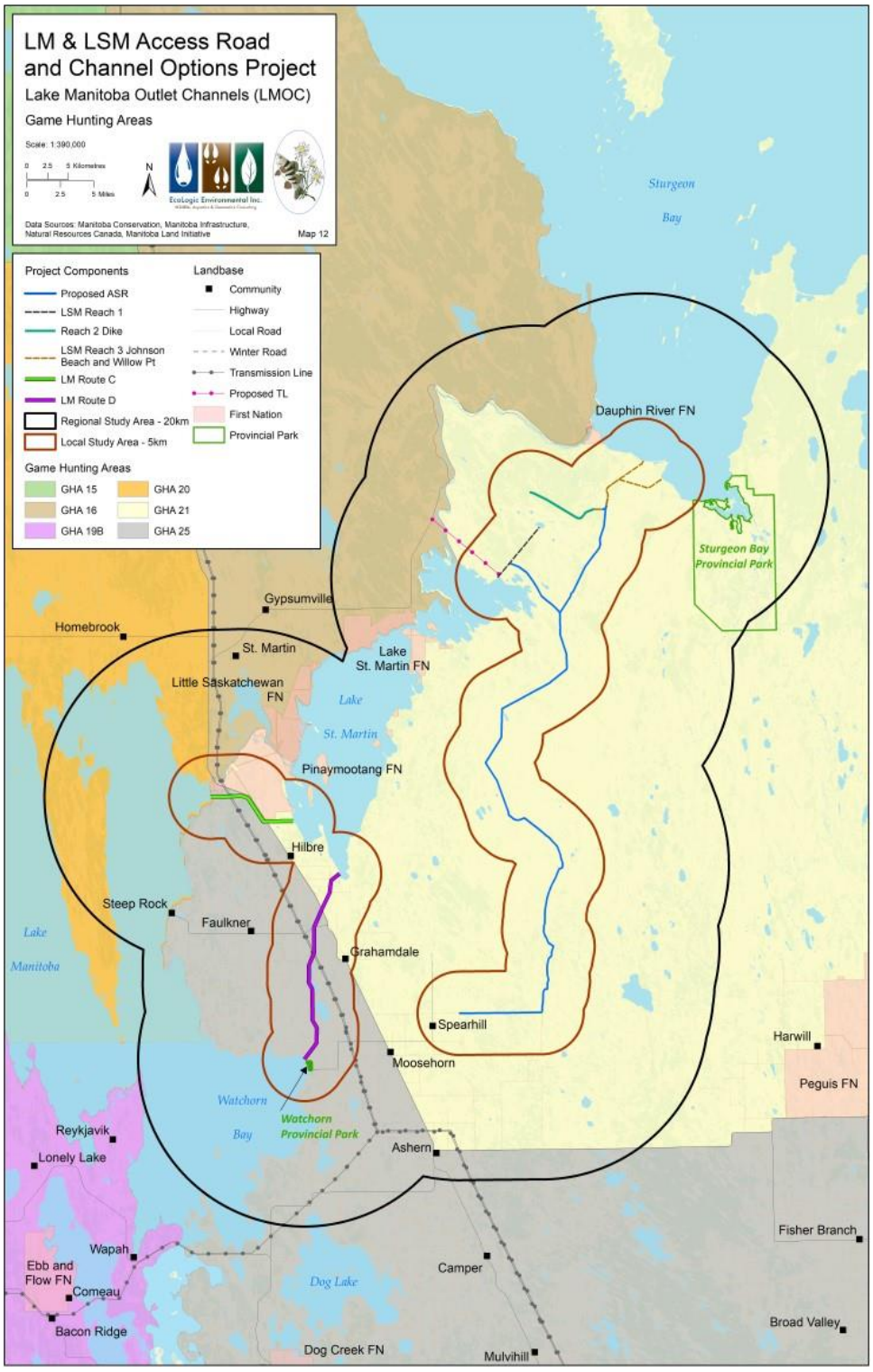
Map 9: Lodges and Outfitters within the LSA and RSA



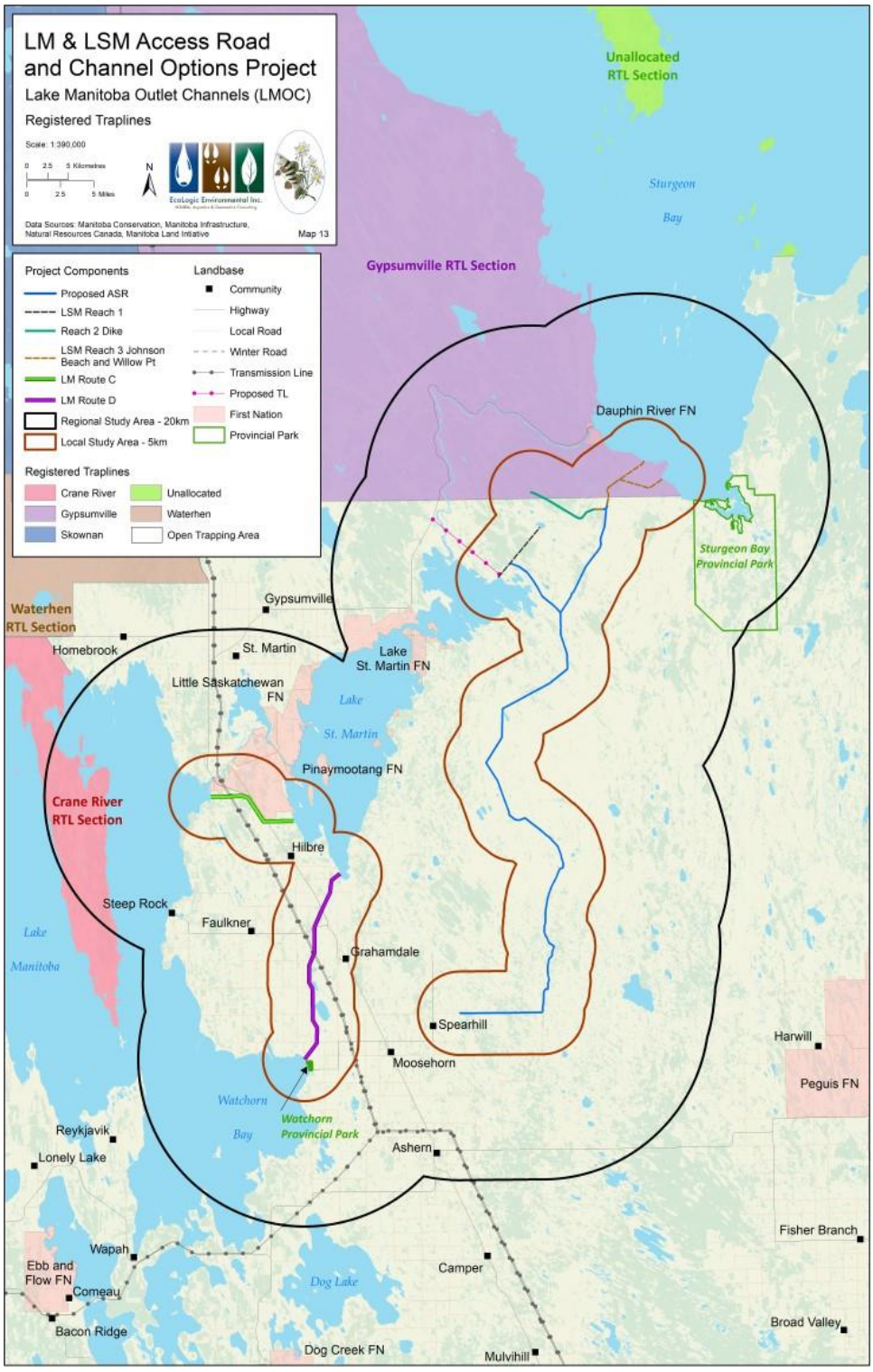
Map 10: Mineral Exploration and Quarry Activity within the LSA and RSA



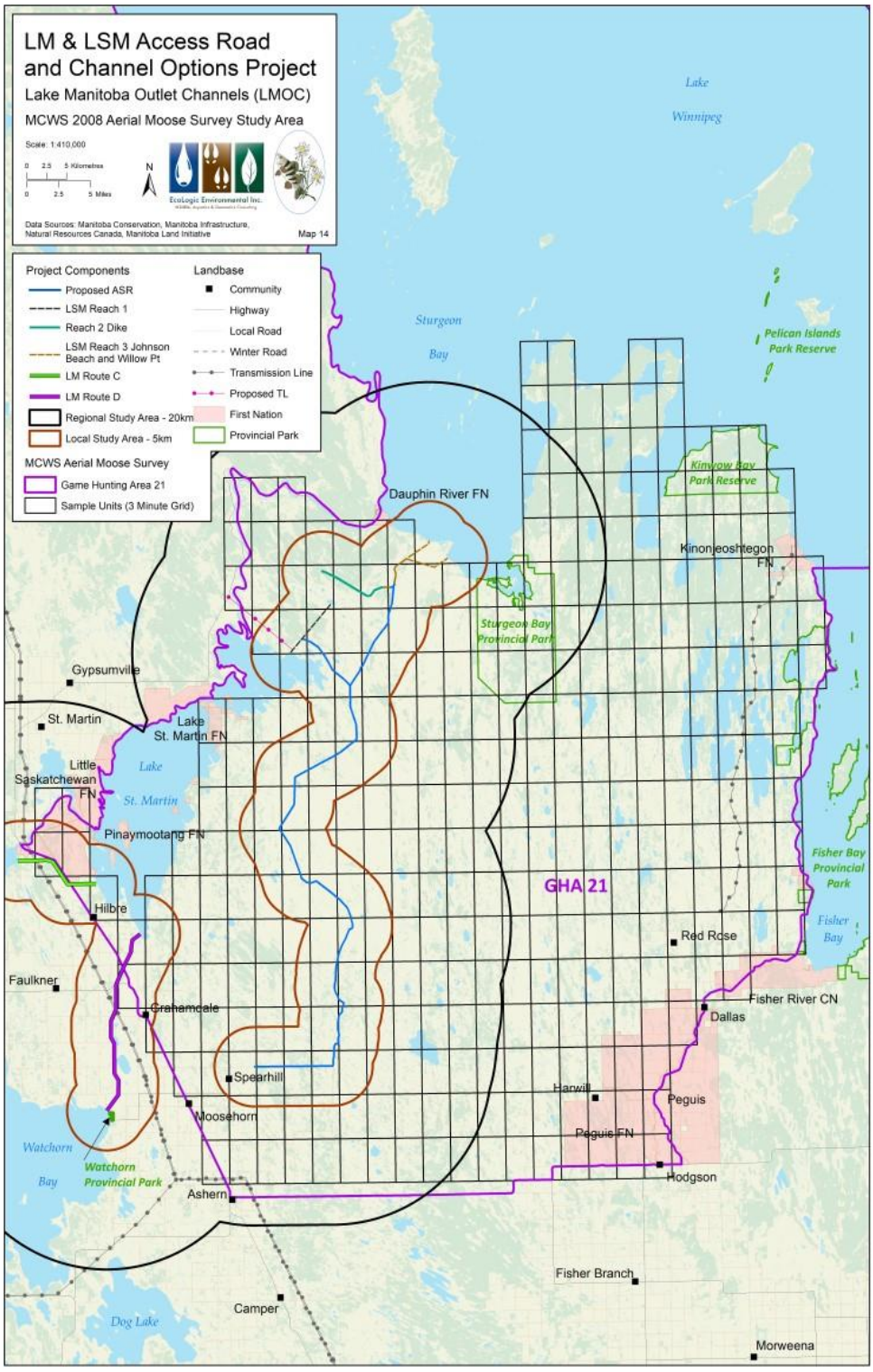
Map 11: Trails and Campgrounds within the LSA and RSA



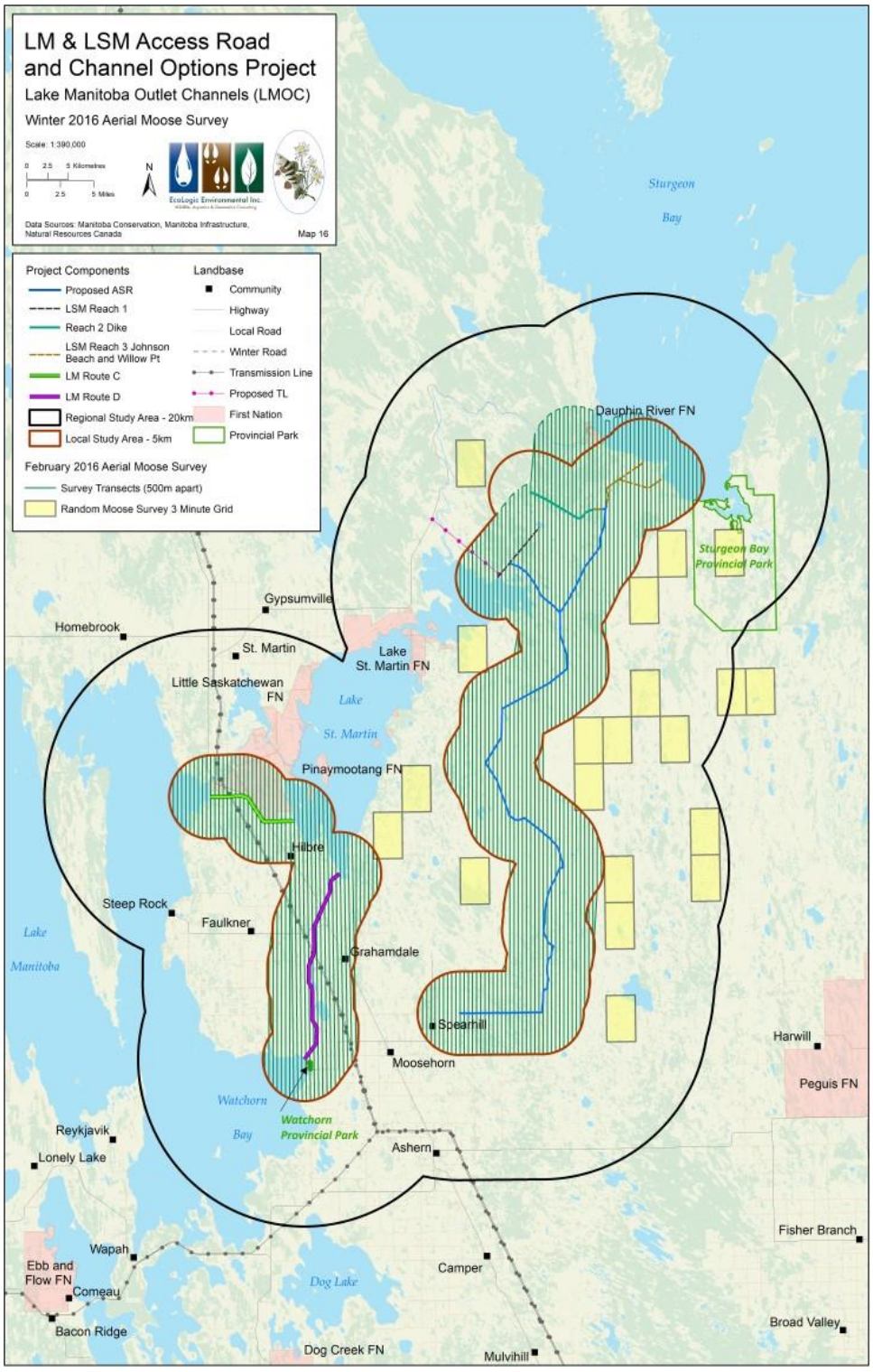
Map 12: Game Hunting Areas (GHAs) within the LSA and RSA



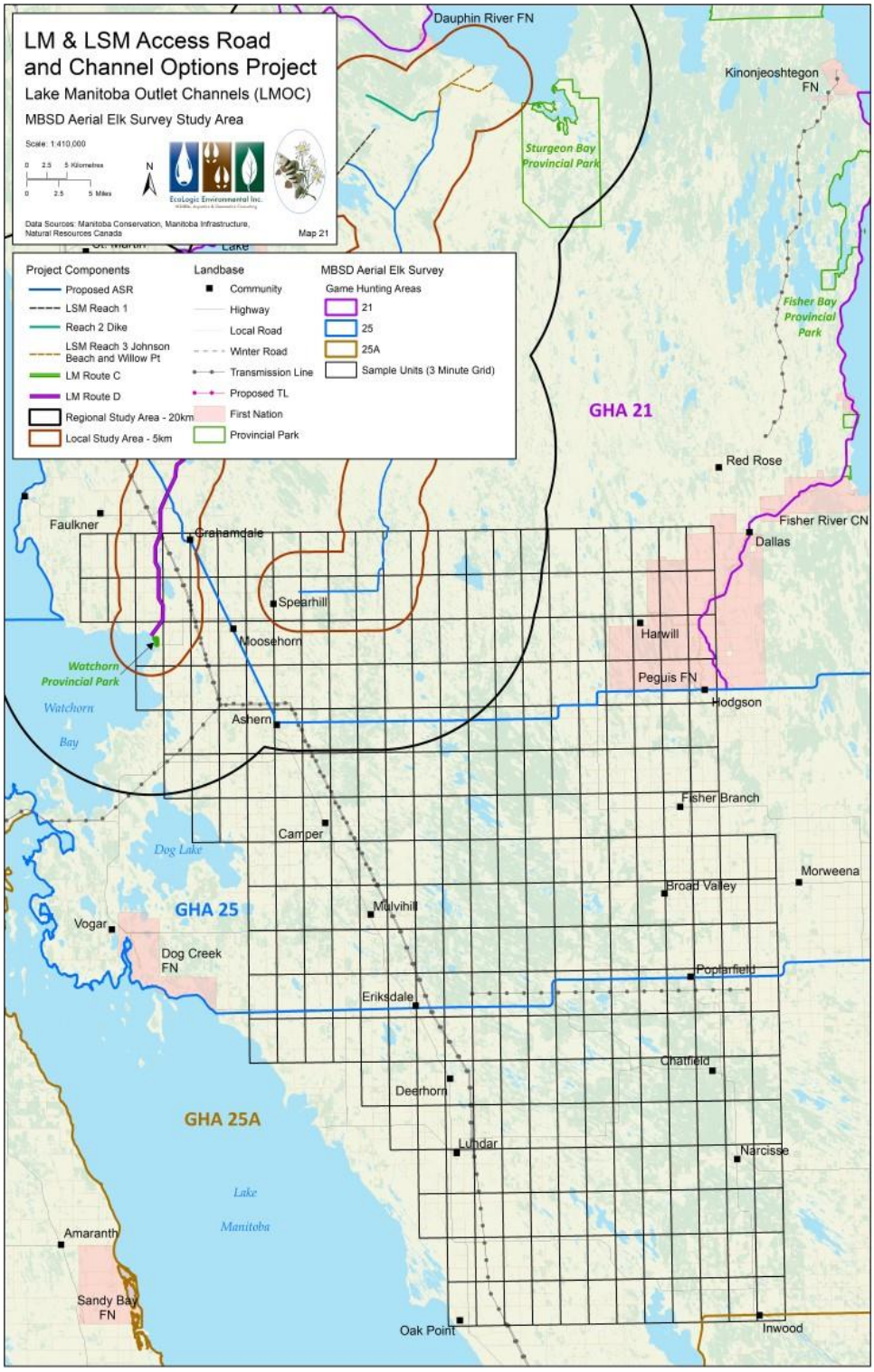
Map 13: Registered Traplines (RTLs) within the LSA and RSA



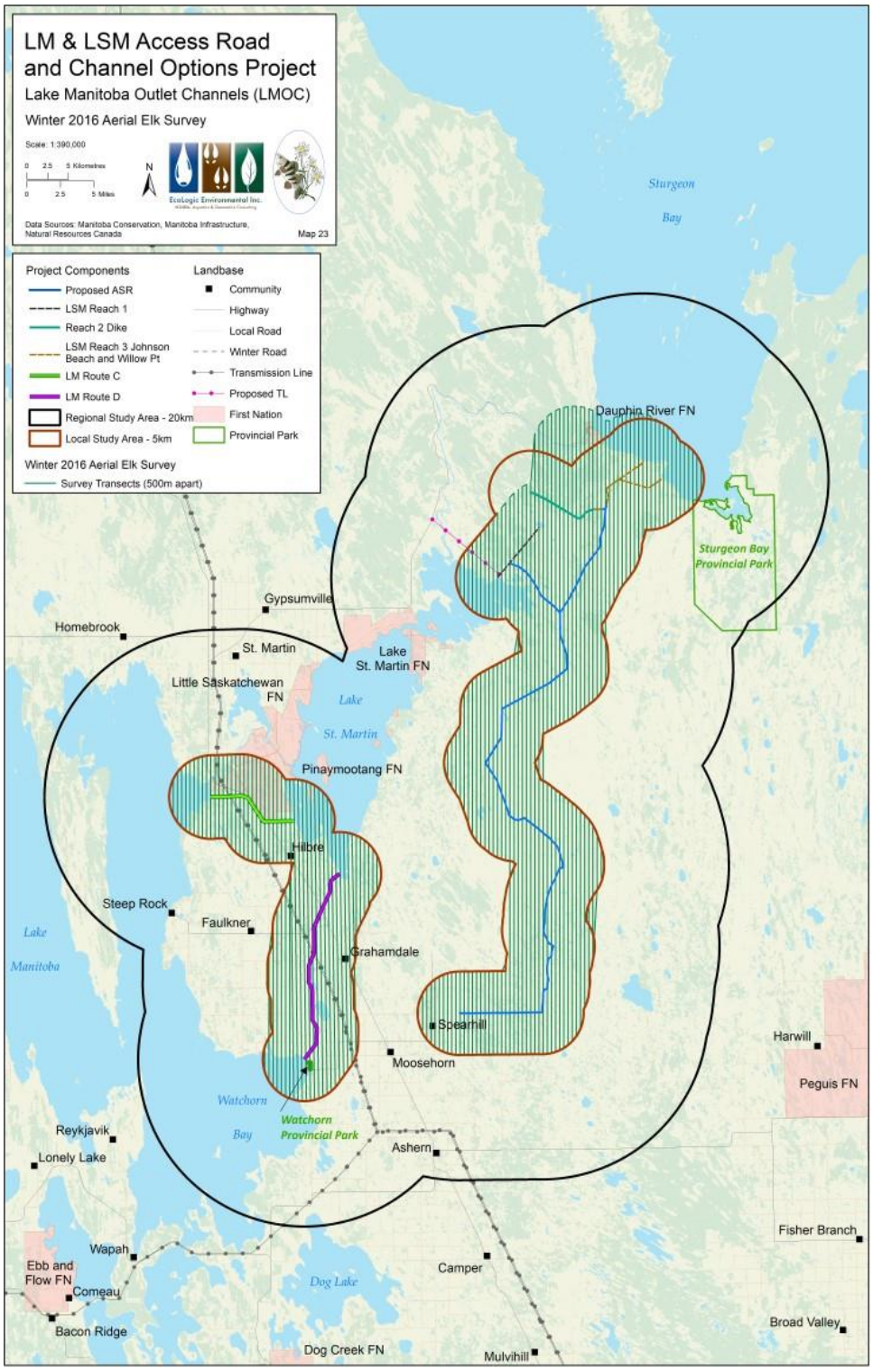
Map 14: MBSD 2008 Aerial Moose Survey Area



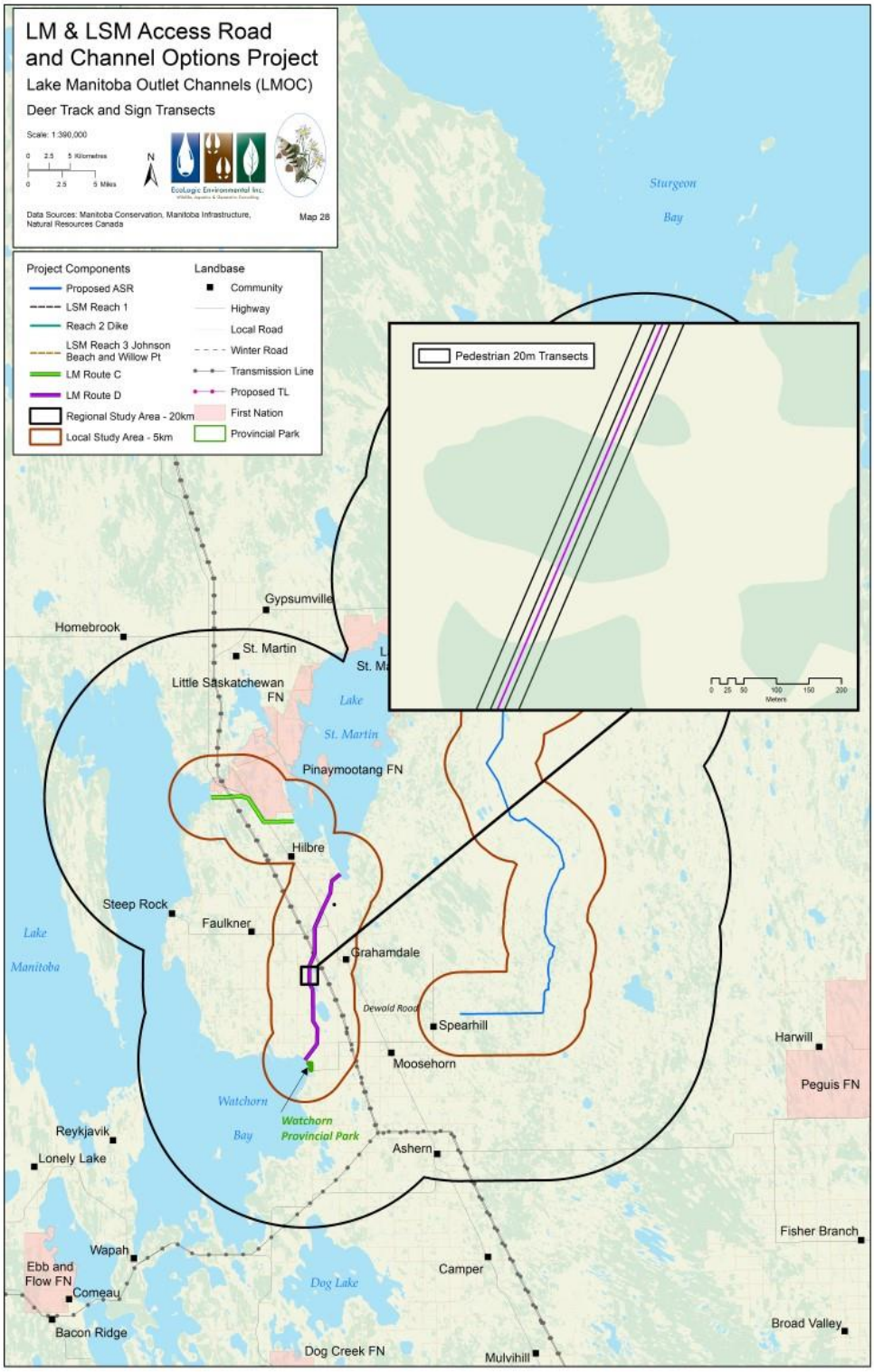
Map 16: Winter 2016, Aerial Moose Survey Transects



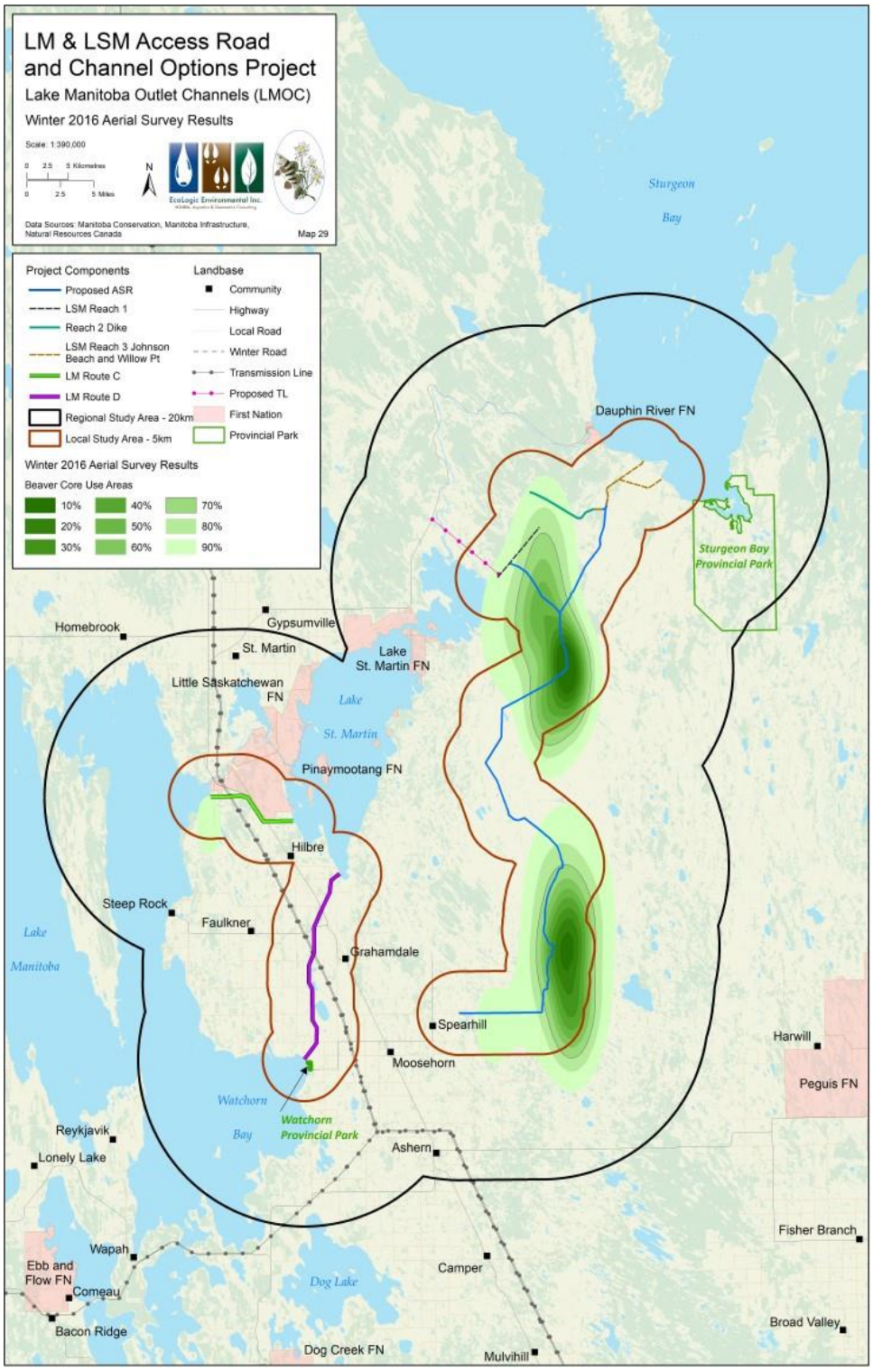
Map 21: MBSD Aerial Elk Survey Area



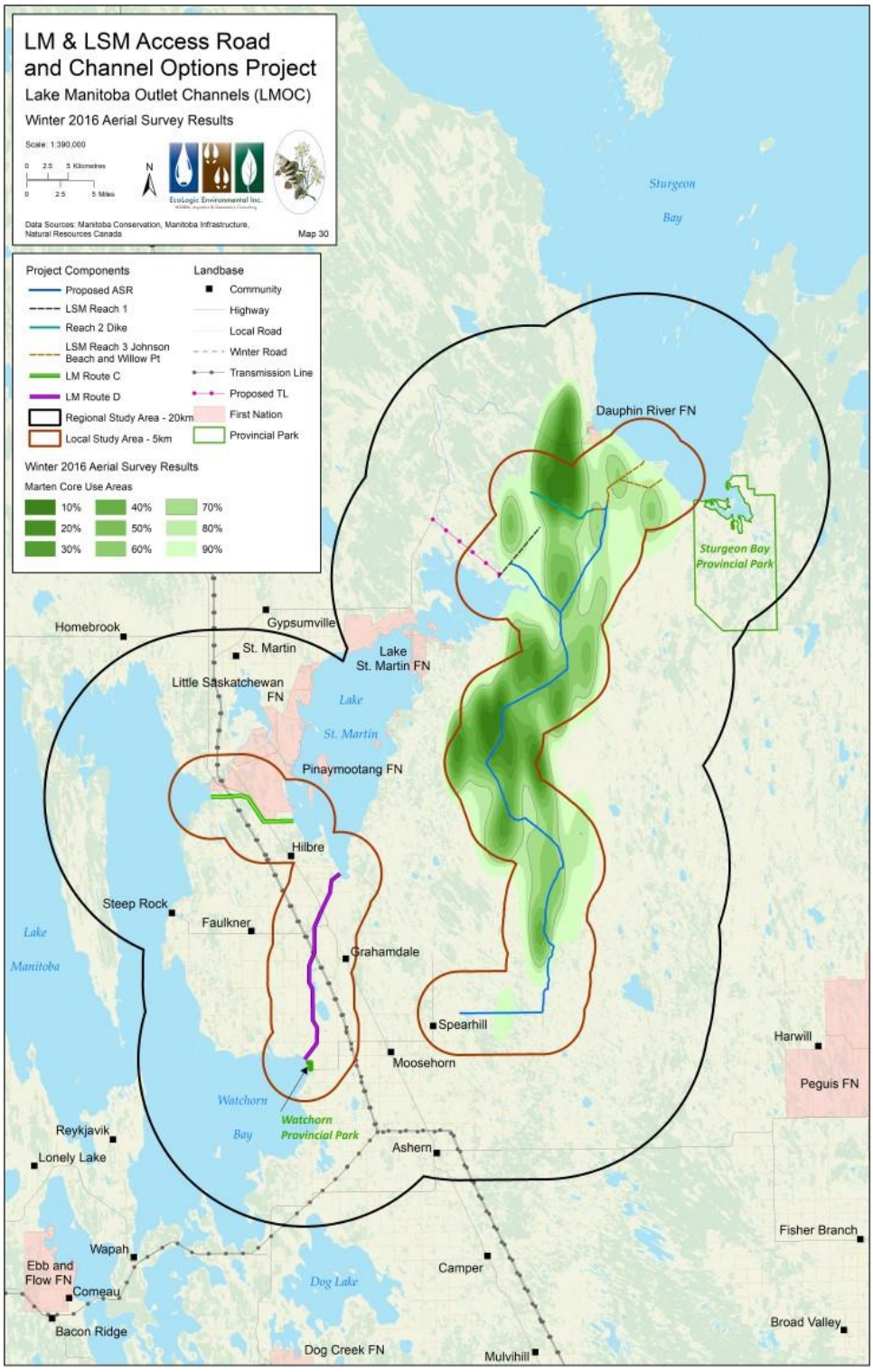
Map 23: Winter 2016 Aerial Elk Survey Area and Transects



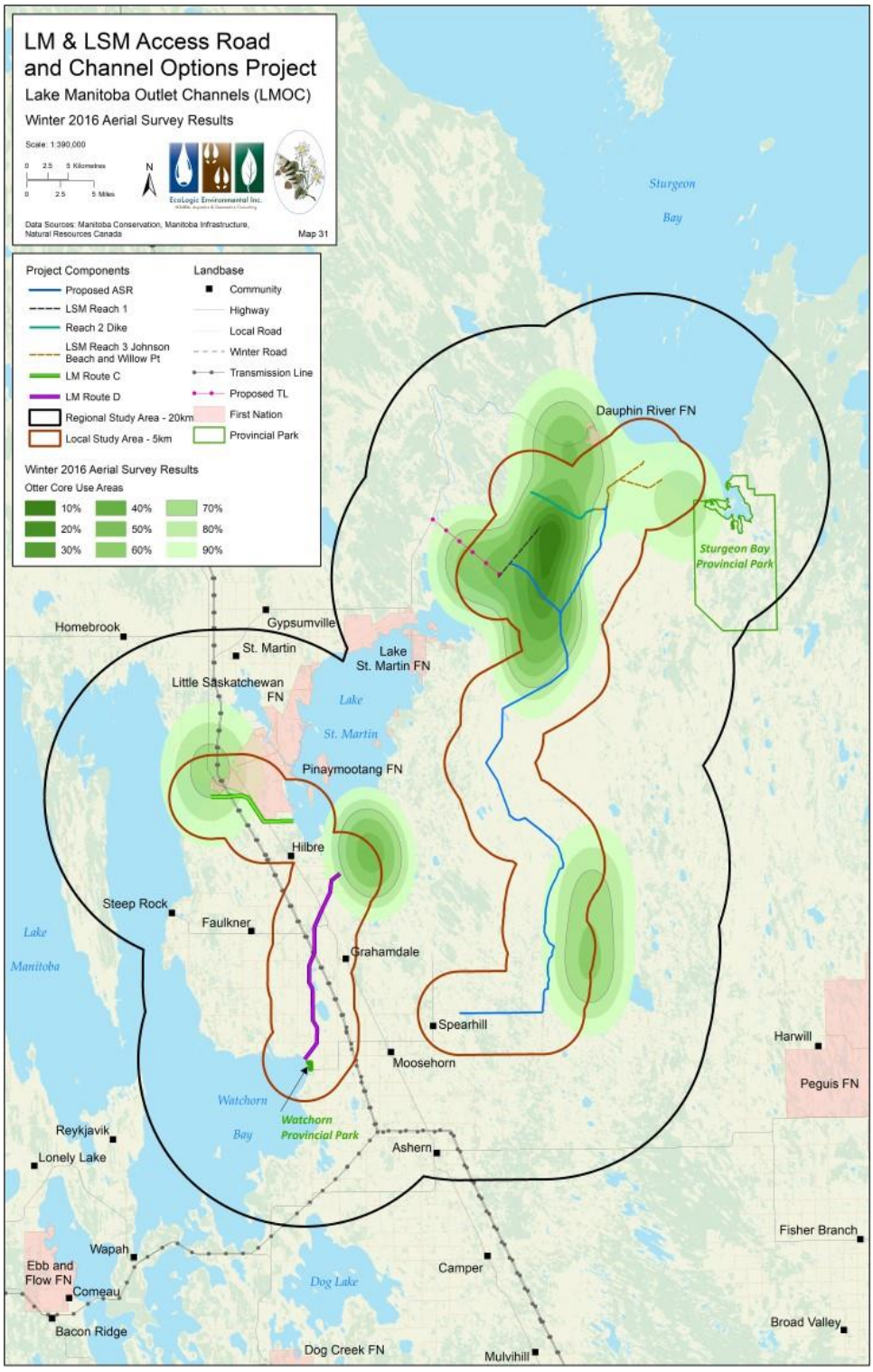
Map 28: White-tailed Deer Track and Sign Survey Transects



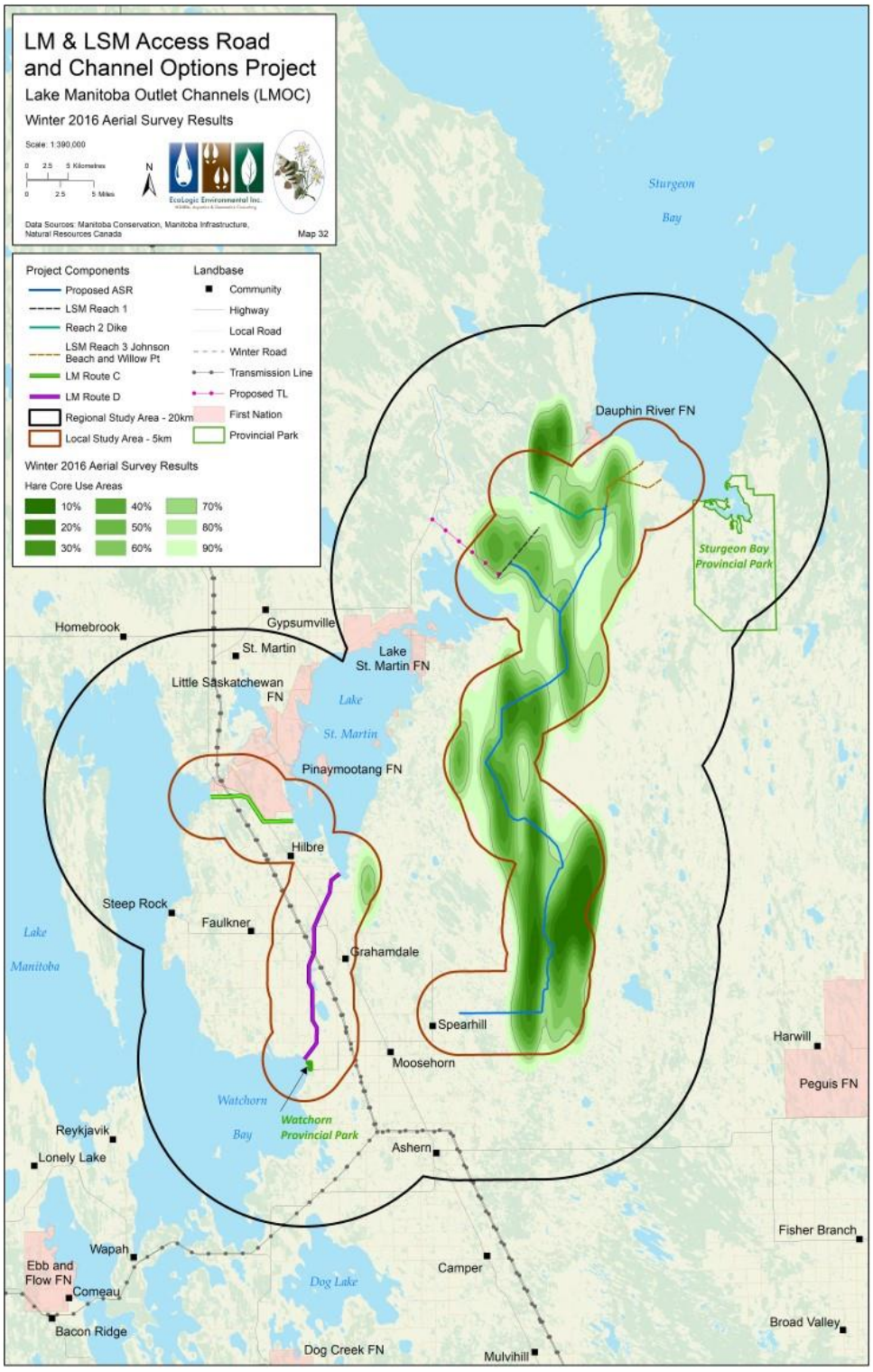
Map 29: Winter 2016 Aerial Survey Beaver Observations



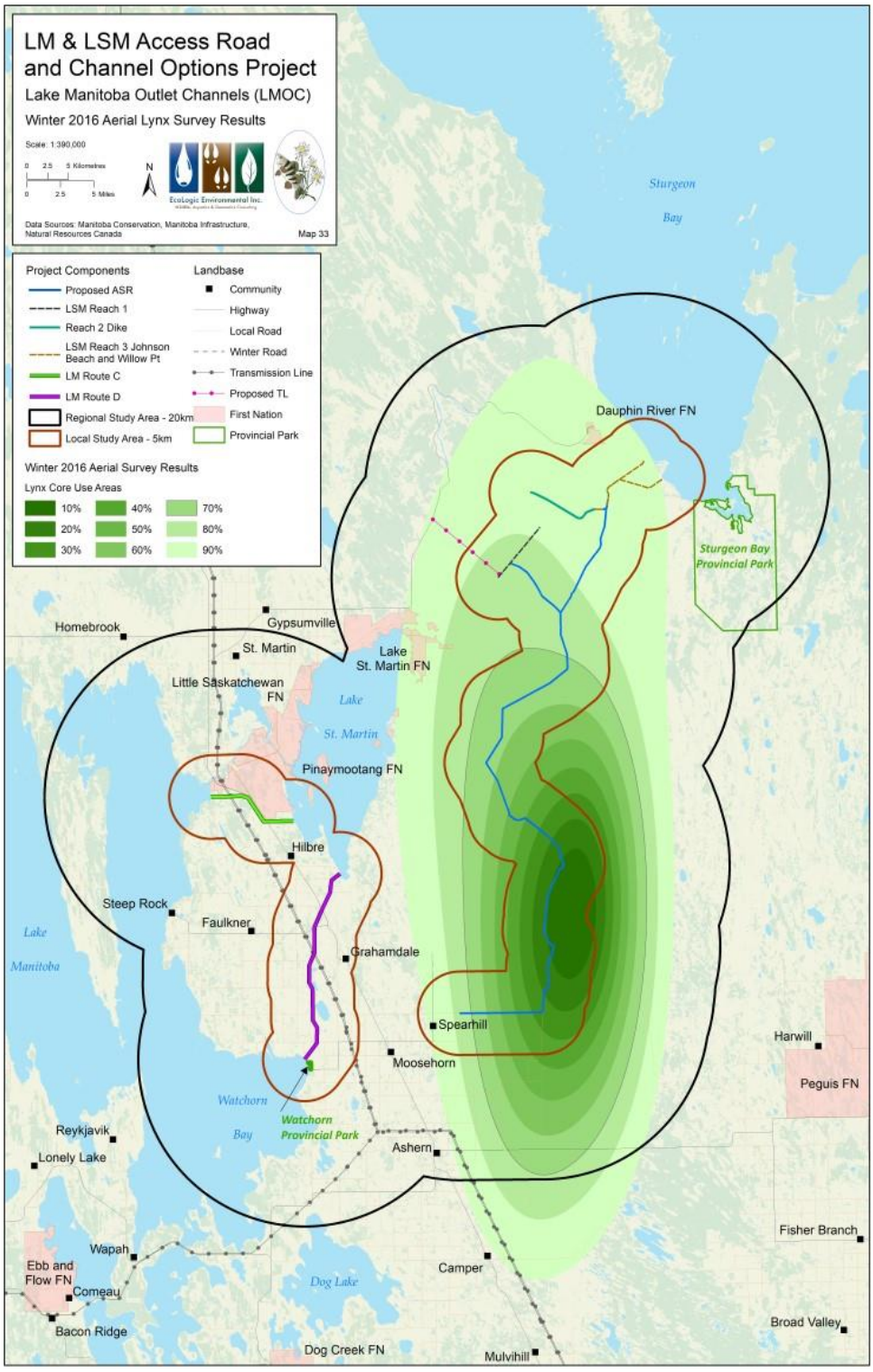
Map 30: Winter 2016 Aerial Survey Marten Observations



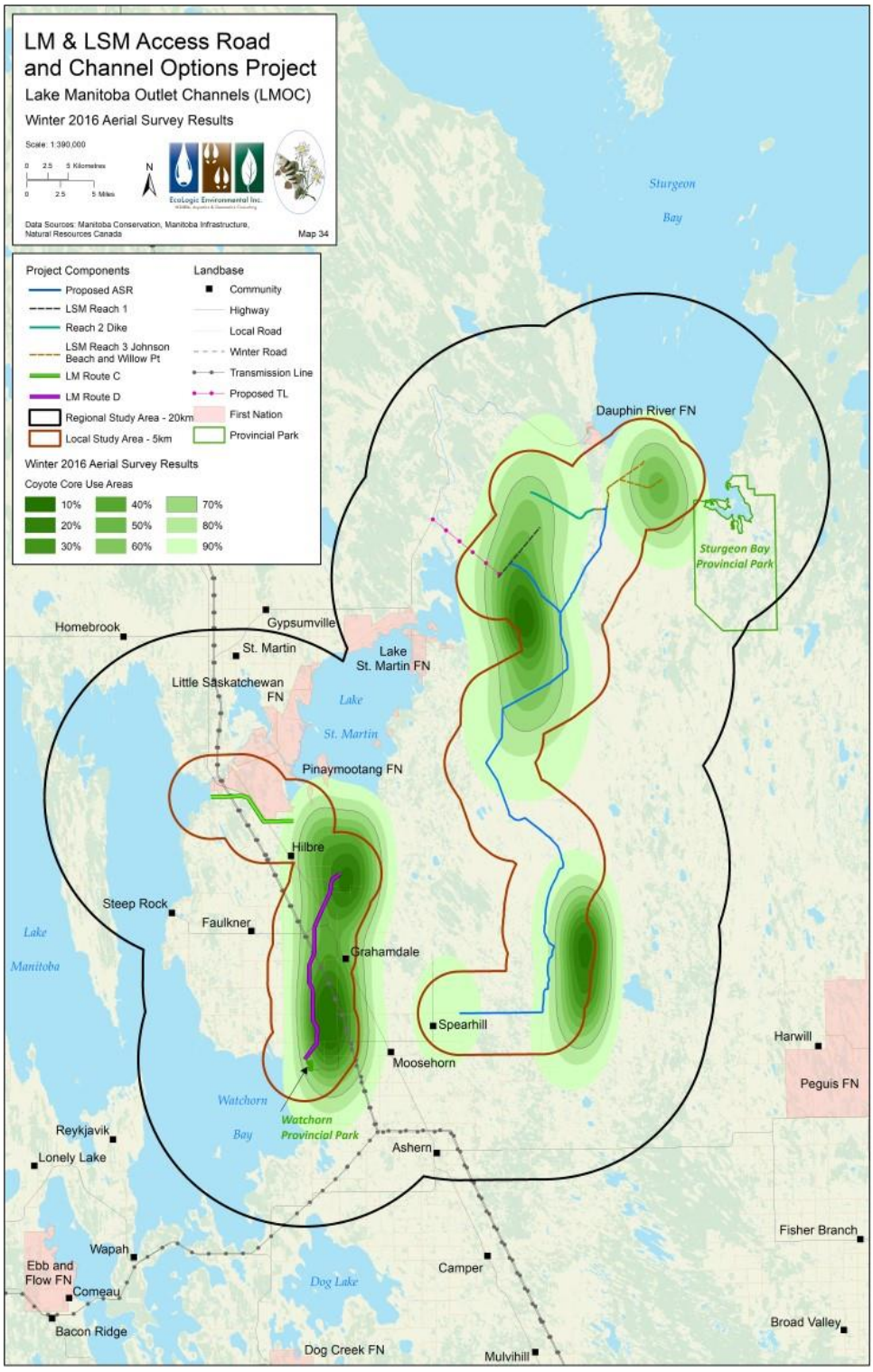
Map 31: Winter 2016 Aerial Survey Otter Observations



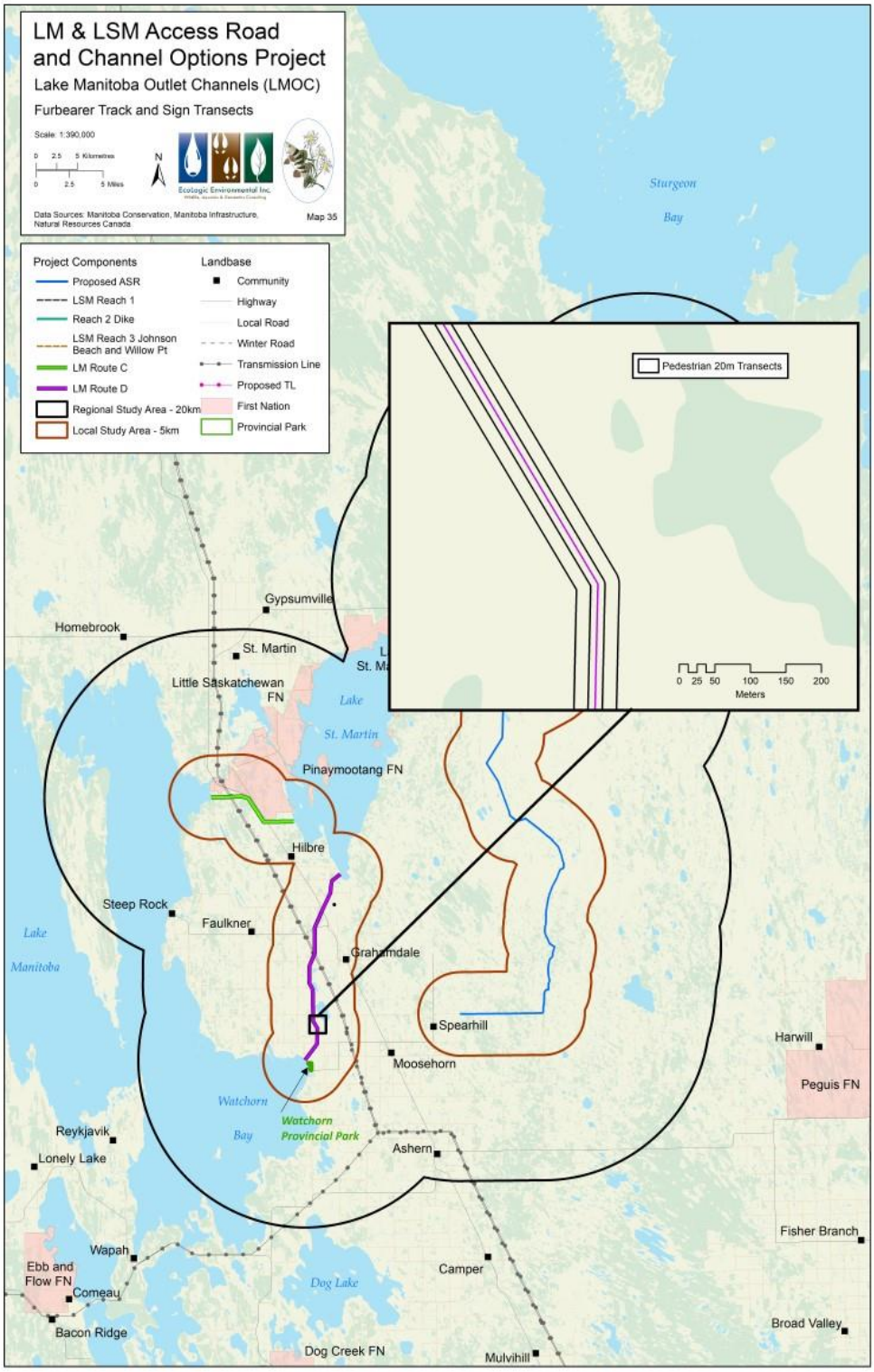
Map 32: Winter 2016 Aerial Survey Hare Observations



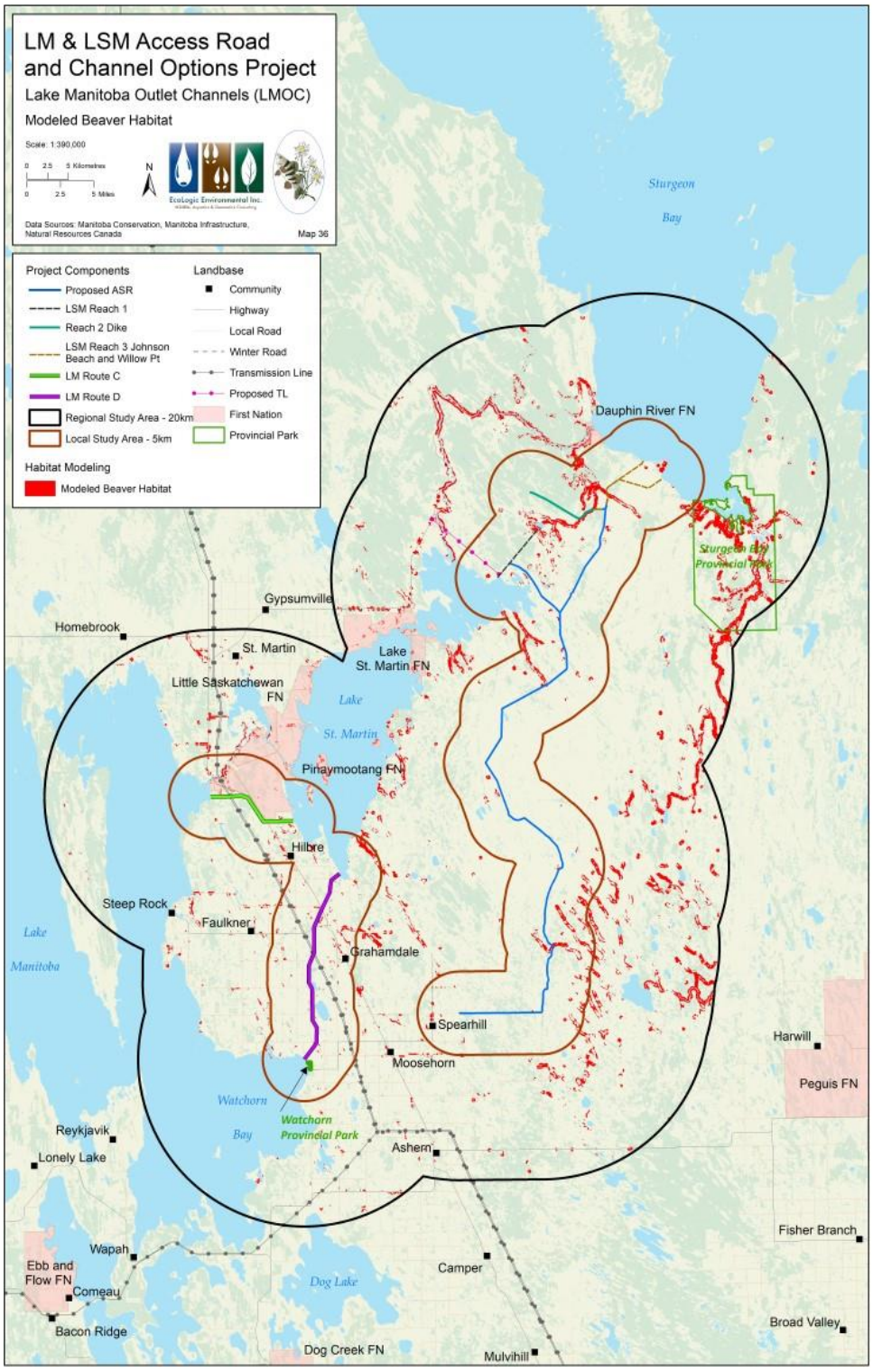
Map 33: Winter 2016 Aerial Survey Lynx Observations



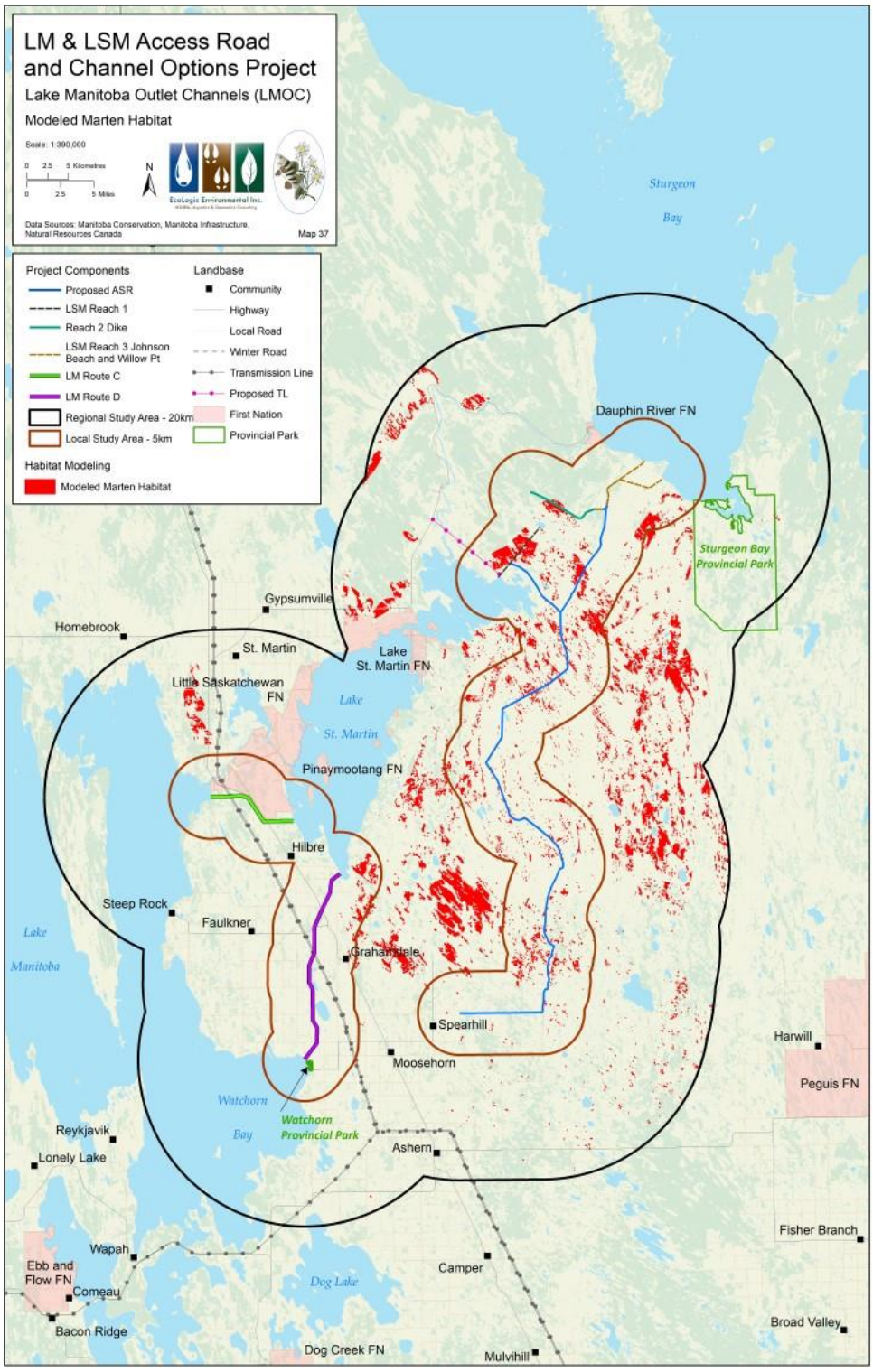
Map 34: Winter 2016 Aerial Survey Coyote Observations



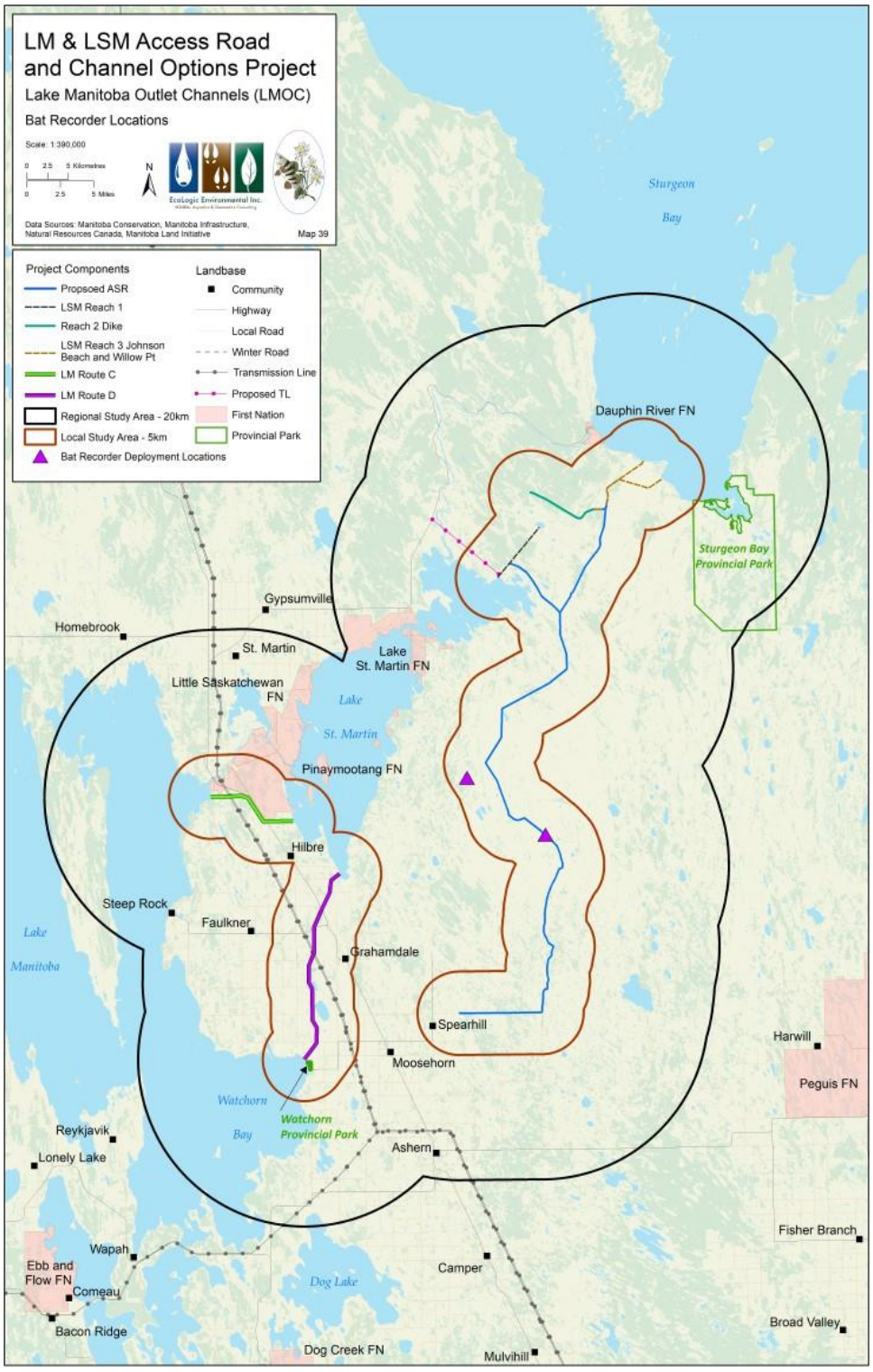
Map 35: Pedestrian Furbearer Track and Sign Survey Transects



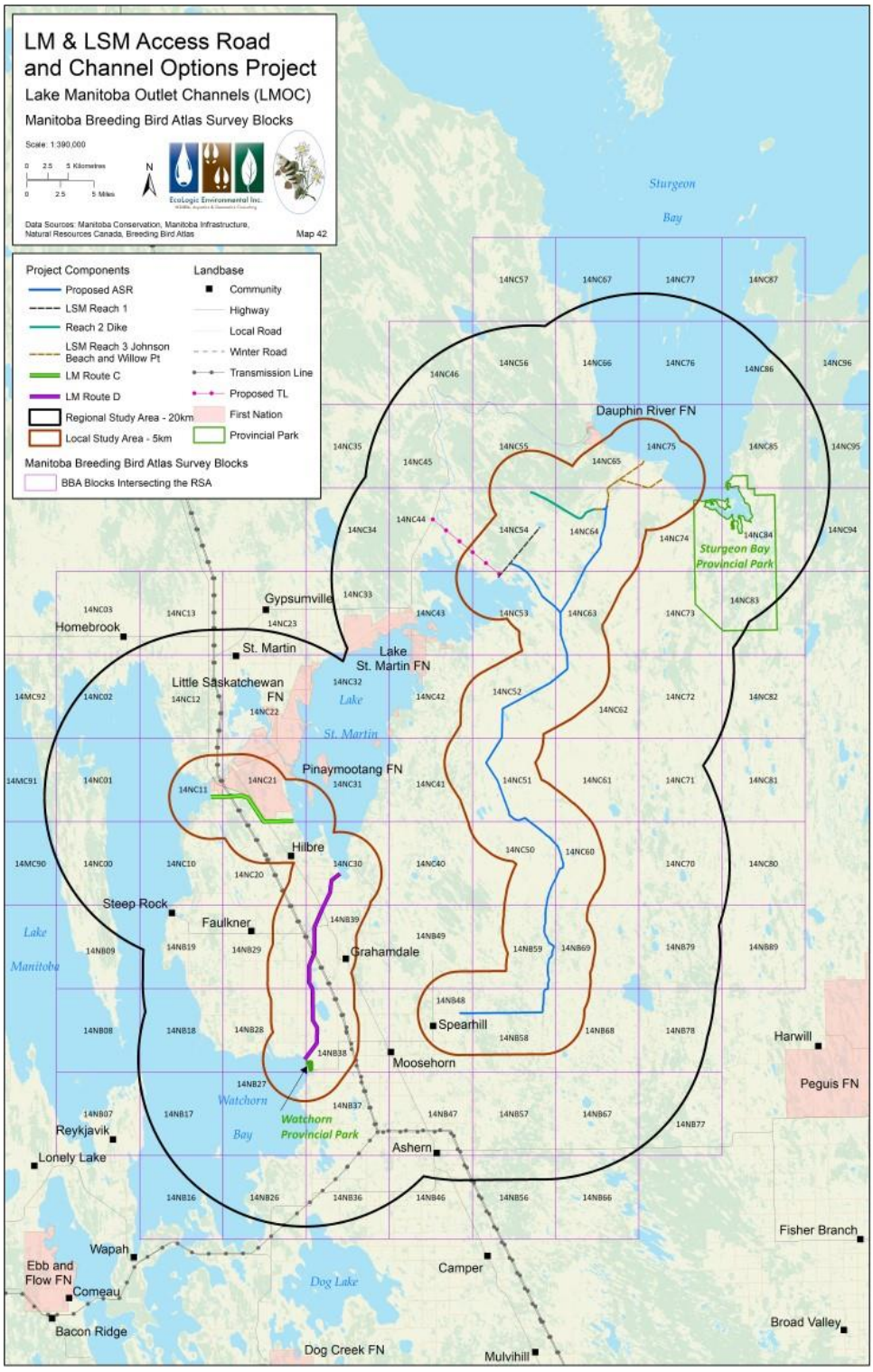
Map 36: Modeled Habitat for American Beaver within the LSA and RSA



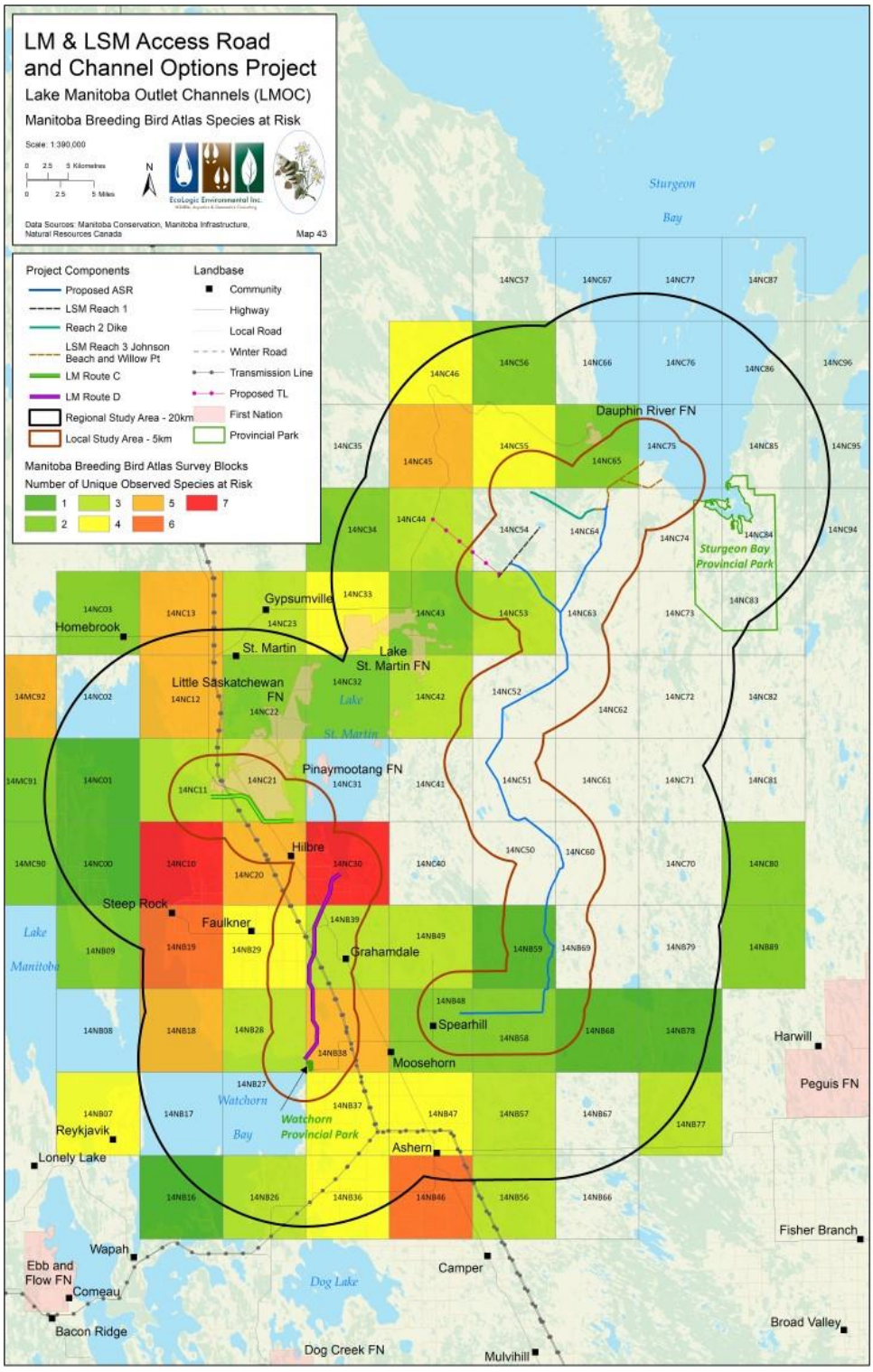
Map 37: Modeled Habitat for Marten within the LSA and RSA



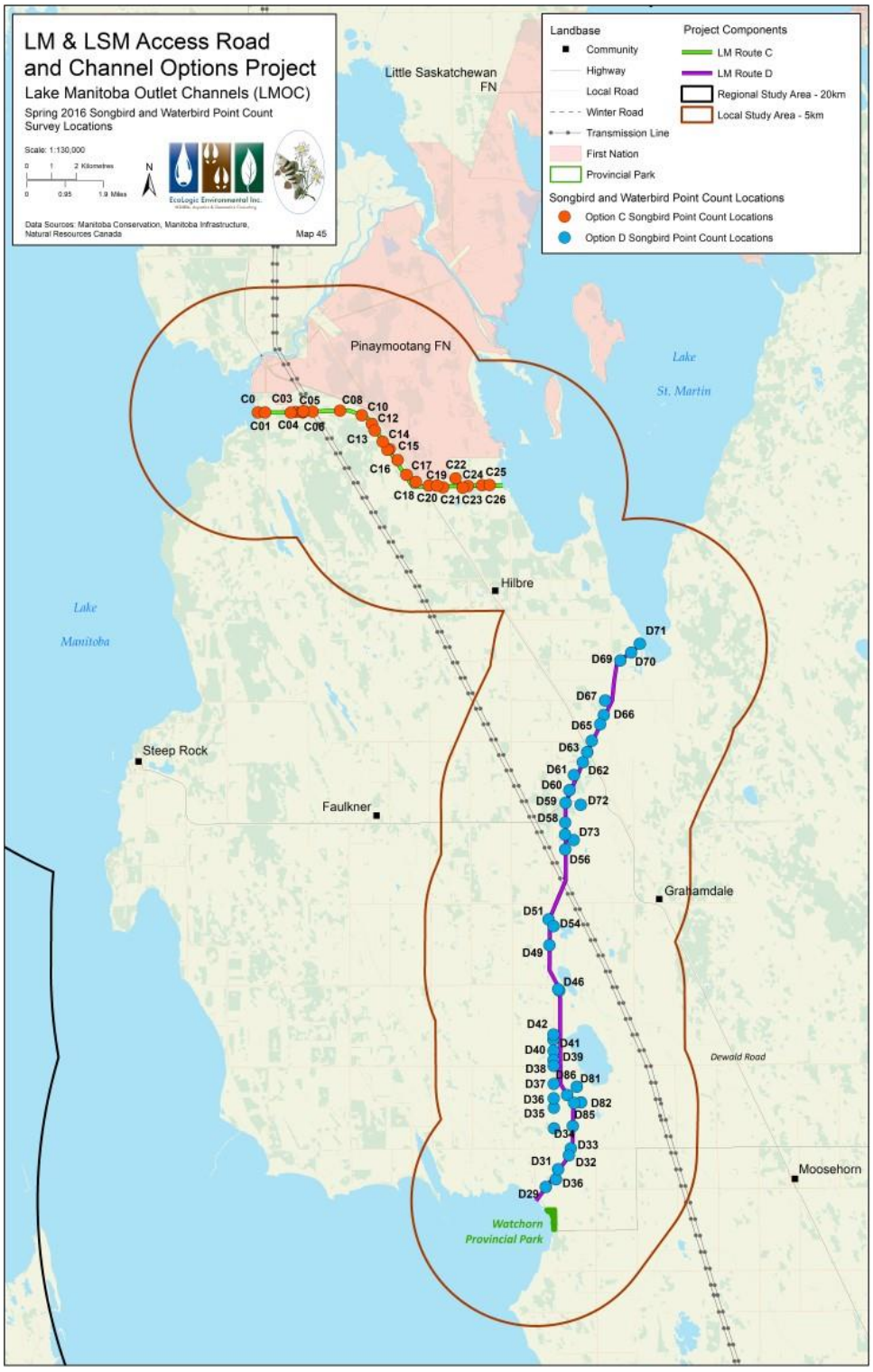
Map 39: Deployment Locations of Bat Recorders within the RSA



Map 42: Manitoba Breeding Bird Atlas Survey Area



Map 43: Manitoba Breeding Bird Atlas Observed Species at Risk



Map 45: Bird Point Count Locations