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## **Lake St. Martin Outlet Channel Options: Wildlife Technical Report**



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**For Submission to:**  
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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** – unstratified glacial deposits consisting of clay, sand, gravel, and boulders intermingled in any proportion.

**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 Access Road and Outlet Channels Project (the Project) at the time of this writing.

This Wildlife Technical Report outlines the desktop review, field studies, and associated analysis conducted to describe existing environmental (baseline) conditions specific to wildlife populations and their habitat near the Lake St. Martin Outlet Channel (LSMOC) project components.

## **2 BACKGROUND**

The following background information was obtained from the *"Assiniboine River & Lake Manitoba Basins - Flood Mitigation Study LMB & LSM Outlet Channels Conceptual Design - Stage 2"* (KGS Group 2016) and personal communications with MI.

The LSMOC extends approximately 27 km from LSM to Lake Winnipeg and consists of three linear sections referred to as reaches. The first reach (Reach 1) extends approximately 8 km from LSM to Big Buffalo Lake. The Reach 1 emergency outlet channel was constructed in 2011 in response to high water levels on LM and LSM. The existing LSMOC Reach 1 is about 6 km long, extending from LSM to the fen habitat surrounding Big Buffalo Lake. The proposed permanent

LSMOC Reach 1 outlet channel would consist of upgrading the existing emergency outlet channel to a permanent status with additional capacity to provide a net increase in flow to LSM above the base condition of the existing Reach 1 channel. The proposed works would consist of widening the existing channel and extending it by about 2 km downstream to Big Buffalo Lake. A control structure would be constructed at the inlet of Reach 1 that would also act as a bridge to provide vehicle access to the north west side of the channel.

The second reach (Reach 2) extends approximately 8.6 km from Big Buffalo Lake and the outlet of Reach 1 to the Inlet of Reach 3. The first half of Reach 2 is located within the fen habitat that surrounds Big Buffalo Lake, which becomes inundated with operation of the LSM outlet channel. Water then follows the natural drainage path into Big Buffalo Creek up to its diversion point into Reach 3.

Several options have been proposed for Reach 2. One option included the construction of a dike only, without the need for deepening or widening the existing natural channel. The proposed alignment of the Reach 2 dike would extend approximately 8 km and follow the high ground north of the fen area that surrounds Buffalo Lake and west of Big Buffalo Creek. The purpose of the dike would be to contain the inundation within the fen area and the flow within Buffalo Creek.

During meetings and discussions with MI in April 2016, MI indicated that the Reach 2 alignment and dike options described for the original September 2015 assignment were being revisited. Three other channel alignment and/or dike options were being investigated, in addition to the Reach 2 dike option. The Reach 2 dike was referred to as Option 1, and the additional alignments were referred to as Option 2, Option 3 and Option 4. The three new options were added to examine other routes that could be used to manage flows from LSM to Lake Winnipeg, and included the construction of a new emergency channel to the east of the existing Reach 1 channel, which would tie into Reach 3 at Big Buffalo Creek. Other than the proposed lengths and locations, there were no other data available for the additional conceptual options at the time of this writing. As such, any analyses that required spatial data for the proposed option could not be conducted for the three new conceptual options.

The third reach (Reach 3) extends approximately 10 km from Big Buffalo Creek to Lake Winnipeg. The Reach 3 Emergency Channel was partially constructed in 2012 to divert flows away from the Dauphin River. However, due to extremely mild winter conditions, operation of the Reach 3 channel was not required; therefore, this channel currently remains in an incomplete condition. The existing Reach 3 Emergency Channel starts at Buffalo Creek and extends about 6 km, exiting into a forested and bog area where the land slopes downwards to Lake Winnipeg.

The completion of the Reach 3 channel would require deepening, widening and lengthening of the existing incomplete channel. There were two alignment options proposed to lengthen Reach 3 to Lake Winnipeg: extending the existing channel straight to Johnson Beach, or extending the

existing channel to the east side of Willow Point. Map 1 provides an overview of the Project components and Map 49 provides an illustration of the location of the conceptual Options 1 to 4.

### **3 ABORIGINAL TRADITIONAL KNOWLEDGE**

It is recognized that there are many wildlife species and areas of cultural significance to many First Nations peoples, and that these wildlife 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 wildlife 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 wildlife 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 warehouse. All spatial layers, other than the project features were obtained from publicly available data sources. Information collected was utilized for:

- The selection of spatial boundaries and selection of key species;
- 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 (LCC) for key species;
- Habitat modelling to identify potential habitat availability for key species and to guide field methods;
- Linear density analysis;
- Review of Provincial historical records of wildlife distributions within the Project study areas;
- 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 sections of this Terrestrial 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 method design, which are described in detail within the related section of this Terrestrial 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 survey (*Odocoileus virginianus*);
- 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**

### **6.1 Spatial Boundaries**

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 for a project are typically described for three spatial scales: a Project Footprint (PF), a Local Study Area (LSA) and a Regional Study Area (RSA). The PF is the physical space or directly affected area on which the Project components or activities are located; the LSA is the area beyond the Project footprint in which Project effects are measurable; and the RSA is the area beyond the LSA within which most indirect and cumulative effects would occur (CEAA 2015).

The conceptual design information provided in KGS Group (2016) indicated the following dimensions for the LSMOC channel options:

- Reach 1: length of about 6 km and Right of Way (RoW) width of 300 m;
- Reach 2 berm: length of about 8.6 km and RoW width of 500m;
- Reach 3 - Johnson Beach Option: length of about 9.7 km and RoW width of 200 m; and
- Reach 3 - Willow Point Option: length of about 10.6 km and RoW width of 275 m.

As such, the PF area for the LSMOC options was designated as the area encompassed by the total length of each of the LSMOC options and the total width of each of the LSMOC options, including the RoW.

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.

For the purpose of the wildlife studies, the LSA was defined as being the area within 5 km on either side of each of the LSMOC Options by the length of the channels RoWs as well as 5 km on either side of the proposed ASR RoW (Map 1). The size of the LSA 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 wildlife was designated as the total length of each of the LSMOC options with a width of 20 km from either side of the centreline of the LSMOC options (Map 1). This size for the RSA was selected based on a typical moose home range size of 40 square kilometres (km<sup>2</sup>) (Hundertmark, 1997). The rationale was that a 40 km<sup>2</sup> 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 km<sup>2</sup> and large home ranges in the hundreds of km<sup>2</sup> (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 km<sup>2</sup> 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 LSMOC, 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 LSMOC component of the Project, and illustrates the overlap in study areas that occurred due to the proximity of the other two Project components.

As noted in Section 1.1, MI was reviewing the proposed alignment for the Reach 2 dike option at the time of this writing. In addition to the Reach 2 dike option, three other channel alignment and/or dike options were being investigated. The Reach 2 dike was referred to as Option 1, and the additional alignments were referred to as Option 2, Option 3 and Option 4. The three new options were added to examine other routes that could be used to manage flows from LSM to Lake Winnipeg, and included the construction of a new emergency channel to the east of the existing Reach 1 channel, which would tie into Reach 3 at Big Buffalo Creek. Other than the proposed lengths and locations, there were no other data available for the additional conceptual options at the time of this writing. Map 49 provides an illustration of the location of the proposed lengths and locations for the conceptual Options 1 to 4.

## **6.2 Environmental Setting**

The RSA is located within the Boreal Plains Ecozone in Canada, generally characterized by gently rolling plains, moderately well-drained loamy soils, and continental climatic conditions, with cold winters and moderately warm summers (Smith et al., 1998). The RSA lies within the Interlake Plain as well as the Mid-Boreal Lowlands Ecoregions. The top upper edge of the Lake Manitoba Ecoregion overlaps with the northwest boundary of the RSA; however, given the overlap is very small, the landscape is most representative of the Interlake Plains and Mid-Boreal Lowland Ecoregions. A majority of the RSA falls within the Interlake Plains Ecoregion, which occurs in a narRoW strip of area that arcs broadly from its base at the southeastern edge of the Manitoba-USA border (and eastern edge of the Manitoba plain) northwestward to the Saskatchewan border at Red Deer Lake (Smith et. al, 1998). The LSA traverses two Ecodistricts: Sturgeon Bay (676) and Ashern (723), and the RSA traverses three Ecodistricts: Sturgeon Bay (676); Gypsumville (720); and Ashern (723). The Rural Municipality (RM) that borders the Project on the western side

is the RM of Grahamdale. Four First Nations also occur within the LSM area: Little Saskatchewan; Dauphin River; Pinaymootang; and Lake St. Martin.

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**<sup>1</sup> 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 Interlake Plain and mid-boreal lowland Ecoregions. A majority of the RSA lies within the Interlake 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), as described below.

#### 6.2.1 Gypsumville Ecodistrict (720)

The Gypsumville (720) Ecodistrict is located within the RSA, but falls outside the LSA (Map 2). This ecodistrict occupies a small area surrounding LSM 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 millimetres (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 banksiana*) prevails on drier sites (Smith et al., 1998). The principal sources of water in the ecodistrict are groundwater and surface water from LSM.

#### 6.2.2 Ashern Ecodistrict (723)

The Ashern (723) Ecodistrict is located within both the LSA and RSA (Map 2). The ecodistrict is between Lake Manitoba to the west and Lake Winnipeg to the east in the Interlake region (Smith

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<sup>1</sup> Words in bold are defined in the Glossary of Terms

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, sedge, and meadow grass 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).

### 6.2.3 Sturgeon Bay Ecodistrict (676)

The Sturgeon Bay (676) Ecodistrict is located within both the Local and RSAs (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).

### 6.2.4 Surficial Geology and Physiographic Setting

Geologic events during Manitoba's Paleozoic Era, which influenced many of the landforms in the RSA, 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 LSM—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.

### **6.2.5 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 *Forest Ecosystem Classification for Manitoba, Field Guide* (Zoladeski et al., 1995) provides a detailed species

relationship, for productive forest types, in terms of their commercial tree species compositions and common relationships for understory shrubs, herbs, and mosses.

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.

#### **6.2.6 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. Additionally, there is a portion to the north around Dauphin that has not been burnt at all within the last 84 years. In the LSA, the majority of the area was burnt in the 1970s and 1980s along with small patches between 1940 and 1949. Map 5 provides the fire history for the RSA.

#### **6.2.7 Wildlife and Habitat**

##### **6.2.7.1 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

[*Falci pennis 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 septentrionalis*) 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 list of known mammals that can be found in the Interlake Plain and the Mid-Boreal Lowland ecoregions is presented in Appendix A.

### **6.2.7.2      *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 cavernous 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 and moist environments in shrubby and wooded areas for the rest of the year. Of these frog and toad species, only the Northern Leopard frog is a species of conservation concern. 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 list of known amphibians and reptiles that can be found in the Interlake Plain and Mid-Boreal Lowland ecoregions is presented in Appendix B.

### **6.2.7.3      *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 Ecoregion is presented in Appendix C.

## **6.2.8 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 Terrestrial Wildlife Technical Report,

Species at Risk were defined as all species federally listed by SARA (SARA, 2015), species listed provincially under MESEA (MESEA, 2015), as well as species listed as very rare (provincial status of S1) or 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 ecoregions; 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 athabasca*) may have ranges that overlap with the Interlake Plain and Mid-boreal lowland ecoregions; however, their presence within the RSA is highly unlikely.

A number of bird species of conservation concern designated/assessed by COSEWIC, under SARA- federally, and/or MESEA- provincially, have ranges that do, or may, overlap with the Project Study Area (SARA, 2015). These species include bank swallow, barn swallow, bobolink, Canada warbler, common nighthawk, eastern whip-poor-will, eastern wood-pewee, golden-winged warbler, horned grebe, least bittern, 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 2006).

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.

The following table (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 caves, 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 km <sup>2</sup> )<br>Important prey species for large carnivores<br>e.g. wolves<br>Hunted by rights based and licensed hunters    |
|           | Elk         | Demonstrate large home ranges (50-400 km <sup>2</sup> )<br>Important prey species for large carnivores<br>e.g. wolves<br>Hunted by rights based and licensed hunters |

**Table 1: Summary of Key Species Selection and Rationale**

| Group                                 | Key Species                                                                                                                                                                                                                                                 | Rationale                                                                                                                                                                                                                             |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Furbearers                            | American marten                                                                                                                                                                                                                                             | Commonly trapped furbearer<br>Important trophic species<br>Representative of mature forest habitat                                                                                                                                    |
|                                       | American beaver                                                                                                                                                                                                                                             | Ecosystem engineer<br>Representative aquatic furbearer                                                                                                                                                                                |
| Bats                                  | Little brown myotis<br>Northern long-eared (northern myotis)                                                                                                                                                                                                | Listed as Endangered under SARA and/or under MESEA<br>Critical habitat for these species already identified in the Interlake region<br>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<br>large stick nests, tern colony, mineral licks                                                                                                                         | Critical wintering habitat<br>Critical breeding habitat<br>Species fidelity to dens and nests<br>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 Falcon, Red-headed Woodpecker, Short-eared Owl) | Some species listed as "threatened" or "engangered" SARA and/or MESEA<br>Key species selected as being representative of forest habitat types                                                                                         |
|                                       | 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 MESEA<br>Some species hunted by license and rights based hunters                                                                                                |
| Reptiles and Amphibians               | Northern leopard frog, red-sided garter snake                                                                                                                                                                                                               | Northern leopard frog Listed under SARA and MESEA<br>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 (Map 7).

There are four protected areas within the RSA where industrial activities are largely restricted: the Sturgeon Bay Provincial Park; 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). There is also a proposed transmission line that would be located near the terminus of the existing winter road and Reach 1 of the LSMOC (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. There were four lodges or outfitters identified: 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 quarrying sites in the RSA, the majority being quarry withdrawal activity and the remainder are quarry lease, private quarry permit, 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 quarry and current 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 of 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 recorded 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 21 on the west side of Lake Winnipeg and is adjacent to GHA 25 to the west, and GHA 16 to the north (Map 12). Boreal woodland caribou hunting is not permitted in GHA 16, 21 or 25 (MBSDa, 2015).

Moose are important big game animals for hunting within the RSA. Moose are valued for licensed hunting and rights-based subsistence hunting within the Local Study Area (e.g., Game Hunting Area [GHA] 21), but moose hunting is closed to licensed hunters in certain areas of the RSA (GHA 16 and 25) (MBSDa, 2015). Moose are an integral component of the ecosystem in their predator/prey relationships. Moose population sustainability is a specific concern in several GHAs in western Manitoba. Map 12 provides the delineation of GHAs within the RSA. Currently, licensed moose hunting is closed in all of GHA 16 and 25.

Elk are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from Manitoba Conservation and Water Stewardship (MBSD) during certain times of year for GHAs 21 and 25 (MBSDa, 2016). GHA 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 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, 21 and 25 (MBSDa, 2016). White-tailed deer in Zone B (including GHA 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 (MBSDa, 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 (MBSDa, 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 (MBSDa, 2016). GHA 16 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). MBSD licenses hunters for resident, non-resident, and foreign resident wolf hunting in GHA 16, 21, and 25 (MBSDa, 2016). GHA 16 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 are intersected by 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**

| <b>Fiscal Year</b> | <b>Gypsumville</b> |
|--------------------|--------------------|
| 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                  |
| 2013/2014          | 12                 |

The annual trapper data since 1996 for Gypsumville is provided in Table 3 (unpublished data, MBSDb, 2016). The highest number of species harvested from 1996 through to 2012 is muskrat, followed by American beaver and fisher. Coyotes were readily trapped as well as a small number of wolves. Also within 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 number of animals trapped along the Gypsumville RTL Block from 1996 to 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 Conservation

## 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.

As discussed in Section 2, at the time of reporting, there were no spatial data available for the conceptual Options 1 to 4 other than the relative lengths and locations of the conceptual options. As such, ground surveys were conducted for the LSMOC reaches and in the area of the conceptual options; however, habitat modelling and analyses for the conceptual Options 1 to 4 could not be conducted as there were no spatial data available at the time of this writing for the conceptual options.

## **9.1 LCC – Habitat Evaluation Methods**

During the projected life span of the Project, 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 (5 km LSA) the LSMOC works. The LCC coverytype analysis provides a quantitative assessment into the amount of habitat available within the LSA and RSA.

### **9.1.1 Methods**

The overall LCC coverytypes present within the LSA and RSA were calculated based on the spatial boundaries described in Section 5. The RSA LCC coverytypes were calculated based on a buffer zone of 20 km on either side of the LSMOCs, LMOC, and the proposed ASR 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 coverytypes were calculated based on a buffer zone of 5 km on either side of the LSMOCs, the LMOCs, and the proposed ASR 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 coverytypes (habitat) within the RSA and the LSA.

### **9.1.2 Results**

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

**Table 4: LCC Covertypes within the RSA and LSA**

| LCC-Cover Type                  | RSA                  |             | LSA (LSMOC)          |             |
|---------------------------------|----------------------|-------------|----------------------|-------------|
|                                 | Area km <sup>2</sup> | Percent (%) | Area km <sup>2</sup> | Percent (%) |
| 100-Herb                        | 118.26               | 1.74%       | 1.97                 | 0.17%       |
| 110-Grassland                   | 691.64               | 10.16%      | 6.06                 | 0.52%       |
| 121-Annual crops                | 28.21                | 0.41%       | 0.06                 | 0.01%       |
| 122-Perennial crops and Pasture | 70.02                | 1.03%       | 0.56                 | 0.05%       |
| 20-Water                        | 1500.20              | 22.04%      | 97.25                | 8.33%       |
| 211-Coniferous - Dense          | 415.19               | 6.10%       | 83.55                | 7.16%       |
| 212-Coniferous - Open           | 82.87                | 1.22%       | 20.10                | 1.72%       |
| 221-BroadLeaf - Dense           | 376.68               | 5.53%       | 21.91                | 1.88%       |
| 222-BroadLeaf - Open            | 205.63               | 3.02%       | 33.15                | 2.84%       |
| 231-MixedWood - Dense           | 264.79               | 3.89%       | 45.90                | 3.93%       |
| 33-Exposed Land                 | 17.74                | 0.26%       | 2.22                 | 0.19%       |
| 34-Developed                    | 43.20                | 0.63%       | 1.52                 | 0.13%       |
| 51-Shrub - Tall                 | 7.37                 | 0.11%       | 0.91                 | 0.08%       |
| 52-Shrub - Low                  | 1.87                 | 0.03%       | 0.00                 | 0.00%       |
| 81-Wetland Treed                | 117.04               | 1.72%       | 22.29                | 1.91%       |
| 82-Wetland Shrub                | 1997.31              | 29.35%      | 611.24               | 52.38%      |
| 83-Wetland Herb                 | 867.84               | 12.75%      | 218.34               | 18.71%      |
| Total Area                      | 6805.85              | 100.00%     | 1167.03              | 100.00%     |

The LCC covertypes associated with Reach 1, Reach 2, Reach 3 Johnson Beach, and Reach 3 Willow Point project alignments are provided in Table 5.

**Table 5: LCC Covertype Loss/Alteration associated with the Reach 1, Reach 2, Reach 3 Johnson Beach, and Reach 3 Willow Point Project Alignments**

| LCC-Cover Type                  | Reach 1<br>(300 m RoW) |             | Reach 2<br>(500 m RoW) |             | Johnson Beach<br>Option<br>(200 m RoW) |             | Willow Point Option<br>(275 m RoW) |             |
|---------------------------------|------------------------|-------------|------------------------|-------------|----------------------------------------|-------------|------------------------------------|-------------|
|                                 | Area km <sup>2</sup>   | Percent (%) | Area km <sup>2</sup>   | Percent (%) | Area km <sup>2</sup>                   | Percent (%) | Area km <sup>2</sup>               | Percent (%) |
| 100-Herb                        | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 110-Grassland                   | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 121-Annual crops                | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 122-Perennial crops and Pasture | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 20-Water                        | 0.06                   | 2.43%       | 0.00                   | 0.00%       | 0.03                                   | 1.77%       | 0.04                               | 1.29%       |
| 211-Coniferous - Dense          | 0.69                   | 28.22%      | 1.76                   | 38.36%      | 0.15                                   | 7.92%       | 0.23                               | 7.06%       |
| 212-Coniferous - Open           | 0.03                   | 1.10%       | 0.01                   | 0.16%       | 0.00                                   | 0.00%       | 0.00                               | 0.13%       |

**Table 5: LCC Covertypes Loss/Alteration associated with the Reach 1, Reach 2, Reach 3 Johnson Beach, and Reach 3 Willow Point Project Alignments**

| LCC-Cover Type        | Reach 1<br>(300 m RoW) |             | Reach 2<br>(500 m RoW) |             | Johnson Beach<br>Option<br>(200 m RoW) |             | Willow Point Option<br>(275 m RoW) |             |
|-----------------------|------------------------|-------------|------------------------|-------------|----------------------------------------|-------------|------------------------------------|-------------|
|                       | Area km <sup>2</sup>   | Percent (%) | Area km <sup>2</sup>   | Percent (%) | Area km <sup>2</sup>                   | Percent (%) | Area km <sup>2</sup>               | Percent (%) |
| 221-BroadLeaf - Dense | 0.03                   | 1.06%       | 0.01                   | 0.32%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 222-BroadLeaf - Open  | 0.00                   | 0.16%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 231-MixedWood - Dense | 0.22                   | 9.14%       | 0.18                   | 3.89%       | 0.12                                   | 6.41%       | 0.19                               | 5.82%       |
| 33-Exposed Land       | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 34-Developed          | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 51-Shrub -Tall        | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 52-Shrub - Low        | 0.00                   | 0.00%       | 0.00                   | 0.00%       | 0.00                                   | 0.00%       | 0.00                               | 0.00%       |
| 81-Wetland Treed      | 0.12                   | 4.97%       | 0.28                   | 6.08%       | 0.11                                   | 5.44%       | 0.16                               | 5.09%       |
| 82-Wetland Shrub      | 0.66                   | 27.11%      | 2.14                   | 46.77%      | 1.45                                   | 74.54%      | 2.41                               | 75.33%      |
| 83-Wetland Herb       | 0.63                   | 25.80%      | 0.20                   | 4.42%       | 0.08                                   | 3.92%       | 0.17                               | 5.28%       |
| Total Area            | 2.43                   | 100.00%     | 4.58                   | 100.00%     | 1.94                                   | 100.00%     | 3.21                               | 100.00%     |

## 9.2 Moose

Moose are the largest member of the ungulate family in North America. Key forage for moose include willow (*Salix* spp.) and aquatic plants found in riparian habitats, along with early successional vegetation.

The range of moose is extensive in Manitoba and they are being observed more readily in the prairie region (Manitoba Conservation, n.d.). Moose are typically associated with riparian habitat, especially containing willow, but in the absence of such habitat they select stands that originate after fire or logging, which feature early successional vegetation (Doerr, 1983). Other important habitat qualities include areas for aquatic feeding, areas of coniferous cover, and mineral licks (Palidwor et al., 1995). Winter habitat is a critical component of moose range. Cover is beneficial given it helps reduce snow depths and provides relief from thermal stress associated with open areas (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 and have been reported at levels of 0.4 moose/km<sup>2</sup> in high-quality 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 (Manitoba Conservation, n.d.).

### **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<sup>2</sup>) 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  $\pm$  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 design 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**

| <b>Species</b> | <b>Observations</b> | <b>Tracks</b> | <b>Total Points used to make Kernels</b> |
|----------------|---------------------|---------------|------------------------------------------|
| 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.

#### **9.2.5 Moose Track and Sign Survey Methods**

Multispecies ground surveys were conducted by two biologists to identify terrestrial mammals present near the LSMOC RoWs in June 2016. Based on moose habitat modelling conducted prior to field work, areas identified as representative of high quality moose habitat were investigated on foot by biologists on either side of the LSMOC RoWs along Reach 1 (300 m wide RoW), Reach 2 (500 m wide RoW), Reach 3 Johnson Beach Option (200 m wide RoW), Reach 3 Willow Point Option (275 m wide RoW), and Option 4 RoW. Biologists were taken by helicopter into areas that represented high-quality moose habitat that intersected the various LSMOC RoWs. In these modelled high-quality moose habitat areas 2 biologists in June 2016 (June 2-11) searched for moose signs by walking along either side of the RoW where overlap of quality moose habitat and the RoW existed. 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.

### 9.2.6 Moose Track and Sign Survey Results

Based on the ground investigations along the LSMOC RoWs in high quality moose habitat areas, only two moose tracks observed, both along Reach 1 RoW (Table 8).

**Table 8: Moose Track and Sign Survey Results**

| Type of Observation | Quantity | Location   |           |         |
|---------------------|----------|------------|-----------|---------|
|                     |          | UTM Y      | UTM X     | Area    |
| Moose Tracks        | 1        | 5747650.46 | 566448.37 | Reach 1 |
| Moose Tracks        | 1        | 5747402.87 | 565417.83 | Reach 1 |

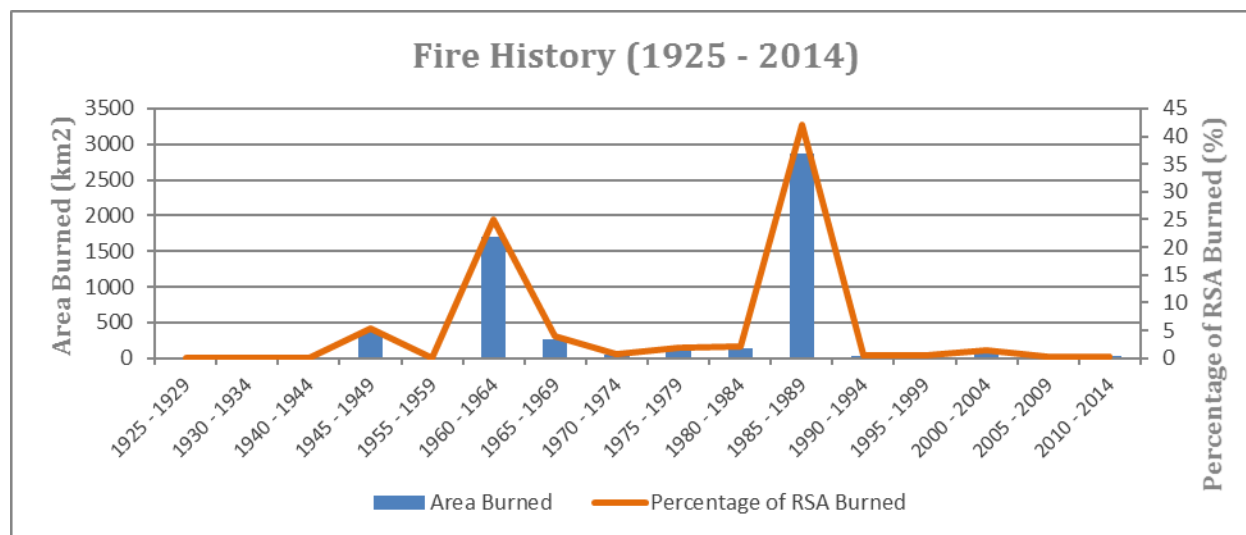
### 9.2.1 Fire History

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<sup>2</sup> (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<sup>2</sup> (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**



### 9.2.2 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.

### 9.2.3 Moose Habitat Modelling Results

Potential moose summer habitat was modeled for the RSA (Table 9). Potential moose winter habitat was modeled for the RSA (Table 10). 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 moose habitat may be lost or altered as a result of the LSMOC. Reach 1 is pre-existing with only little landscape change associated with making the Reach 1 option permanent, resulting in 0.12% of winter moose habitat loss/alteration. The Reach 2 option would result in 0.25% of loss or alteration to winter quality moose habitat, whereas Reach 3 with the Johnson Beach option would result in 0.04% of loss/alteration to winter quality moose habitat and Reach 3 with the Willow Point option would result in 0.05% of quality winter moose habitat loss or alteration.

**Table 9: Potential Moose Summer Habitat within the RSA and the Amount of Potential Moose Summer Habitat Loss Associated with the Project Reach Features**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Shrub - Tall    | 7.37                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Broadleaf Dense | 376.68                                         | 0.03                    | 0.01%          | 0.01                    | 0.004%         | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 264.79                                         | 0.22                    | 0.08%          | 0.18                    | 0.07%          | 0.12                                     | 0.05%          | 0.19                                    | 0.07%          |
| Total           | 648.84                                         | 0.25                    | 0.04%          | 0.19                    | 0.03%          | 0.12                                     | 0.02%          | 0.19                                    | 0.03%          |

**Table 10: Potential Moose Winter Habitat within the RSA and the Amount of Potential Moose Summer Habitat Loss Associated with the Project Reach Features**

| Habitat Type      | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                   |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Shrub - Tall      | 7.37                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Coniferous Sparse | 82.87                                          | 0.03                    | 0.03%          | 0.01                    | 0.01%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Coniferous Dense  | 415.19                                         | 0.69                    | 0.17%          | 1.76                    | 0.42%          | 0.15                                     | 0.04%          | 0.23                                    | 0.05%          |
| Mixedwood Dense   | 264.79                                         | 0.22                    | 0.08%          | 0.18                    | 0.07%          | 0.12                                     | 0.05%          | 0.19                                    | 0.07%          |
| Total             | 770.22                                         | 0.94                    | 0.12%          | 1.94                    | 0.25%          | 0.28                                     | 0.04%          | 0.42                                    | 0.05%          |

## 9.2.4 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. In summary, the authors identified a target threshold for linear disturbance for moose on a landscape scale at a density of 0.4 km/km<sup>2</sup> (i.e., linear disturbance features divided by the total area of interest) and a critical threshold density of 0.9 km/km<sup>2</sup>. 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.

### 9.2.4.1 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/km<sup>2</sup>).

### 9.2.4.2 Linear Density Results

The analyses conducted identified the current linear density for moose within the LSA and RSA to be 0.10 km<sup>2</sup> (LSA) and 0.22 km<sup>2</sup> (RSA) respectively (Table 11), both below the published Salmo et al. (2004) thresholds.

**Table 11: Baseline Linear Density within the RSA and LSA**

| Linear Feature                | RSA                  |                                      | LSA (LSMOC)          |                                      |
|-------------------------------|----------------------|--------------------------------------|----------------------|--------------------------------------|
|                               | Linear Features (km) | Linear Density (km/km <sup>2</sup> ) | Linear Features (km) | Linear Density (km/km <sup>2</sup> ) |
| Minor Roads                   | 818.44               | 0.12                                 | 10.47                | 0.01                                 |
| Major Roads                   | 245.57               | 0.04                                 | 7.59                 | 0.01                                 |
| Local Streets                 | 31.24                | 0.00                                 | 0                    | 0.00                                 |
| Transmission Lines            | 335.19               | 0.05                                 | 0                    | 0.00                                 |
| Municipal Road                | 9.98                 | 0.00                                 | 9.98                 | 0.01                                 |
| Idlwyld Road                  | 48.12                | 0.01                                 | 48.12                | 0.04                                 |
| Winter Road (proposed access) | 34.72                | 0.01                                 | 34.72                | 0.03                                 |
| Total                         | 1523.26              | 0.22                                 | 110.88               | 0.10                                 |

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 ( $\text{km}/\text{km}^2$ ) with the various proposed LSMOC. The analyses identified that, regardless of which channel or reach 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 (Table 12). Given the RSA is based on a typical moose home range size of  $40 \text{ km}^2$  (Hundertmark, 1997), linear density thresholds are best applied at the RSA scale.

**Table 12: Comparison of Linear Density within the RSA and LSA including Future Project Development Routes**

| Linear Development           | RSA                  |                                            | LSA                  |                                            |
|------------------------------|----------------------|--------------------------------------------|----------------------|--------------------------------------------|
|                              |                      |                                            | (LSMOC)              |                                            |
|                              | Linear Features (km) | Linear Density ( $\text{km}/\text{km}^2$ ) | Linear Features (km) | Linear Density ( $\text{km}/\text{km}^2$ ) |
| LMOC Route C Channel         | 11.480               | 0.0017                                     | 0.000                | 0.000                                      |
| LMOC Route D Channel         | 24.030               | 0.0035                                     | 0.000                | 0.000                                      |
| Reach 3 Johnson Beach Option | 9.540                | 0.0014                                     | 9.540                | 0.008                                      |
| Reach 3 Willow Point Option  | 11.420               | 0.0017                                     | 11.420               | 0.010                                      |
| Reach 1                      | 7.870                | 0.0012                                     | 7.870                | 0.007                                      |

### 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<sup>2</sup> 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 13). 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 13: 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        |

### 9.3.1 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, proposed ASR, and LSMOC RoWs. 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.

### **9.3.2 Aerial Elk Distribution Survey Conducted by MI Results**

The total length flown during the aerial elk distribution survey was 2,650 km. There were 16 elk observed (Table 14). Using observations and tracks, kernels of high use areas were identified within the RSA. There was very little elk activity identified within the LSA. The elk activity identified within the LSA was in the southwest corner of the LSA near Spearhill and the most southern portions of the proposed ASR.

**Table 14: Aerial Elk Distribution Survey Results within the RSA**

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

### **9.3.3 Elk Track and Sign Survey Methods**

Multispecies ground surveys were conducted by two biologists to identify terrestrial mammals present near the LSMOC RoWs in June 2016. Based on elk habitat modelling conducted prior to field work, there was little quality elk habitat identified to intersect with the LMOCs. In the few areas where modelled high-quality elk habitat did intersect with the LSMOC RoWs, biologists investigated the area on foot on either side of the LSMOC RoWs [Reach 1 (300 m wide RoW), Reach 2 (500 m wide RoW), Reach 3 Johnson Beach Option (200 m wide RoW), Reach 3 Willow Point Option (275 m wide RoW), and Option 4 RoW]. Biologists were taken by helicopter into areas that represented high-quality elk habitat that intersected the various LSMOC RoWs. In these modelled high-quality elk habitat areas 2 biologists in June 2016 (June 2-11) searched for elk signs by walking along either side of the RoW where overlap of quality elk habitat and the RoW existed. 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.

### **9.3.4 Elk Track and Sign Survey Results**

There were no signs of elk presence along the LSMOC RoWs investigated.

### **9.3.5 Elk Habitat Modelling Methods**

Elk habitat modelling was conducted using the LCC. The potential habitat for elk was modelled using a buffer of 300 m around all forested areas and selecting for all grasslands, annual crops, and perennial crops and pastures. Potential elk habitat models were conducted for the RSA (20 km buffer). These analyses were conducted based on the assumption that the existing Idlewyld forestry road and the municipal road were not expected to remove any additional habitat beyond the existing 20 m RoW within the RSA.

### 9.3.6 Elk Habitat Modelling Results

Potential elk habitat was modeled for the RSA (Table 15). The potential modelled elk habitat loss associated with the LSMOC Reach Options (Reach 1, Reach 2, Reach 3 Johnson Beach, and Reach 3 Willow Point option) is less than 0.05% of the overall potential modelled elk habitat available within the RSA.

**Table 15: Potential Elk Habitat within the RSA and the amount of Elk Habitat Loss associated with each LSMOC**

| Habitat Type                 | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Johnson Beach Option (200 m RoW) |                | Willow Point Option (275 m RoW) |                |
|------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|----------------------------------|----------------|---------------------------------|----------------|
|                              |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )          | Proportion (%) | Area (km <sup>2</sup> )         | Proportion (%) |
| Annual Crop                  | 10.14                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                             | 0.00%          | 0.00                            | 0.00%          |
| Broadleaf Dense              | 376.68                                         | 0.03                    | 0.01%          | 0.01                    | 0.004%         | 0.00                             | 0.00%          | 0.00                            | 0.00%          |
| Broadleaf Open               | 205.63                                         | 0.004                   | 0.002%         | 0.00                    | 0.00%          | 0.00                             | 0.00%          | 0.00                            | 0.00%          |
| Grassland                    | 450.28                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                             | 0.00%          | 0.00                            | 0.00%          |
| Perennial Crops and Pastures | 29.13                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                             | 0.00%          | 0.00                            | 0.00%          |
| Total                        | 1071.85                                        | 0.03                    | 0.003%         | 0.01                    | 0.001%         | 0.00                             | 0.00%          | 0.00                            | 0.00%          |

### 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 linear features offering complete (100%) coverage of the LSA, achieved by using parallel aerial survey north- south transects, flown at approximately 400 feet AGL and spaced at 500 m intervals allowing for 250m 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. Within the LSA, WTD activity was identified along the proposed ASR; however, there were no signs of WTD activity identified near the LSMOC RoWs.

**Table 16: Aerial WTD Distribution Survey Results within the RSA**

| <b>Species</b>    | <b>Observations</b> | <b>Tracks</b> | <b>Total Points used to make Kernels</b> |
|-------------------|---------------------|---------------|------------------------------------------|
| White Tailed Deer | 628                 | 3495          | 4123                                     |

#### **9.4.3 White-Tailed Deer Track and Sign Survey Methods**

Based on habitat use of WTD and their use of edge habitats, biologists searched for signs of WTD throughout all ground survey work along the LSMOC RoWs in conjunction with bird point counts and terrestrial mammal track and sign surveys. Further, given WTD often are found in areas occupied by both elk and moose, in areas where quality habitat for moose and elk were investigated, all incidental signs of WTD observations made were recorded.

#### **9.4.4 White-Tailed Deer Track and Sign Survey Results**

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

**Table 17: White-tailed Deer Activity Identified along LSMOC RoWs (Reach 1, Reach 2, Reach 3 Johnson Beach, and Reach 3 Willow Point)**

| Type of Observation | UTM Y      | UTM X     | Area          |
|---------------------|------------|-----------|---------------|
| Deer Tracks         | 5715281.63 | 542336.69 | LSM Shoreline |
| Deer Tracks         | 5738548.21 | 560468.71 | Reach 1       |
| Deer Tracks         | 5751079.66 | 572931.36 | Reach 3       |
| Deer Tracks         | 5753270.3  | 570517.76 | Reach 3       |
| Deer Tracks         | 5751870.3  | 569013.06 | Reach 3       |
| Deer Tracks         | 5747604.83 | 564751.96 | Reach 1       |
| Deer Tracks         | 5740552.75 | 554366.52 | Reach 1       |
| Deer Tracks         | 5736016.99 | 555521    | LSM Shoreline |

## 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 use areas were developed using volume-density kernel estimates using the kernels analysis tool in the Home Range Tools for ArcGIS (ESRI, 2012). Winter volume-density kernels that depict the core use areas for a variety of furbearers were determined to be the boundary of the 70% contour using the same analyses as described in the moose Section 8.2.3.

### 9.5.2 Furbearers Winter Aerial Survey Results

Maps 28 to Map 33 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 within the RSA. American beaver activity (lodges and dams) was identified in abundance (107 observations) throughout the LSA (Map 28). Similarly, American marten tracks were also identified in abundance (1581 track observations) throughout the LSA, except for the most southern portion of the LSA along the municipal road (Map 29). Otter activity was identified most prominently in the northern portion of the LSA (Map 30), whereas, hare activity was identified in abundance (3254 tracks identified) and throughout the LSA (Map 31). Where hare activity was identified, lynx activity was also identified, covering a majority of the LSA (Map 32). Coyote observations and tracks were also identified along the LSA in both the southern and northern portions of the LSA (Map 33).

**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 by two biologists to identify terrestrial mammals present near the RoW. Based on habitat modelling conducted prior to field work, from June 2-

June 11, 2016, biologists were taken by helicopter to areas of high quality marten habitat that were identified to intersect with the LSMOC RoWs. In areas where modelled high-quality marten habitat intersects the LSMOC RoWs, biologists walked transects on either side of the RoW, in search of signs of marten presence. Map 34 presents the modelled areas of high-quality marten habitat that intersect the LSMOC RoWs that were surveyed for signs of marten activity. 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.

In all areas where bird point counts and the terrestrial mammal track and sign surveys were conducted along the LSMOC RoWs, biologists looked for incidental signs of predator activity.

#### 9.5.4 Furbearer Track and Sign Survey Results

During the ground-based surveys, there were several signs of furbearer activity and presence identified (Table 19).

**Table 19: Furbearer Track and Sign Survey Results**

| Species Name          | Quantity | Location   |           | Area                    |
|-----------------------|----------|------------|-----------|-------------------------|
|                       |          | UTM Y      | UTM X     |                         |
| American beaver Lodge | 1        | 5738548.21 | 560468.71 | Reach 1                 |
| American beaver dam   | 1        | 5751175.37 | 568439.18 | Reach 3 (Johnson Beach) |
| American beaver dam   | 2        | 5751789.42 | 569721.23 | Reach 3 (Johnson Beach) |
| American beaver dam   | 1        | 5752304.18 | 570335.59 | Reach 3 (Johnson Beach) |
| Fox track             | 1        | 5751870.3  | 569013.06 | Reach 3 (Johnson Beach) |
| American beaver dam   | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Muskrat lodge         | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| American beaver run   | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Shore den             | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| American beaver lodge | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Raccoon tracks        | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Otter scat            | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Raccoon scat          | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Muskrat lodge         | 5        | 5718220.53 | 539297.42 | LSM Shoreline           |
| American beaver lodge | 2        | 5718220.53 | 539297.42 | LSM Shoreline           |
| American beaver lodge | 2        | 5726030.01 | 542618.08 | LSM Shoreline           |
| Coyote tacks          | 1        | 5740552.75 | 554366.52 | Reach 1                 |
| Fox track             | 1        | 5740552.75 | 554366.52 | Reach 1                 |

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 proposed ASR (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 proposed ASR LSA.

**Table 20: Predator Activity identified during Ground Surveys**

| Species Name      | Observation Type | Quantity | Location   |           | Area                    |
|-------------------|------------------|----------|------------|-----------|-------------------------|
|                   |                  |          | UTM Y      | UTM X     |                         |
| Bear Activity     | Observation      | 1        | 5715393.01 | 542181.92 | Lake SM Shoreline       |
| Wolf tracks       | Track            | 1        | 5751921.27 | 568943.3  | Reach 3 (Johnson Beach) |
| Black bear track  | Track            | 1        | 5751523.75 | 568438.04 | Reach 3 (Johnson Beach) |
| Wolf tracks       | Track            | 1        | 5751079.66 | 572931.36 | Reach 3 (Willow Point)  |
| Black bear tracks | Track            | 1        | 5751079.66 | 572931.36 | Reach 3 (Willow Point)  |
| Black bear tracks | Track            | 1        | 5753270.3  | 570517.76 | Reach 3 (Johnson Beach) |
| Wolf tracks       | Track            | 1        | 5753270.3  | 570517.76 | Reach 3 (Johnson Beach) |
| Wolf tracks       | Track            | 1        | 5751870.3  | 569013.06 | Reach 3 (Johnson Beach) |
| Wolf tracks       | Track            | 1        | 5747402.87 | 565417.83 | Reach 3 (Johnson Beach) |
| Wolf tracks       | Track            | 1        | 5747604.83 | 564751.96 | Reach 3 (Johnson Beach) |
| Black bear track  | Track            | 1        | 5740552.75 | 554366.52 | Reach 1                 |
| Wolf tracks       | Track            | 1        | 5740552.75 | 554366.52 | Reach 1                 |
| Wolf tracks       | Track            | 1        | 5742115.29 | 555545.49 | Reach 1                 |
| Wolf tracks       | Track            | 1        | 5743764.99 | 556828.59 | Reach 1                 |

### 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 understory. The habitat was selected within 200 m of creeks, rivers and water bodies 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

Habitat for American beavers is abundant and not limiting within the LSA and RSA. The American beaver habitat modeling conducted on the Reach Options in the LSA and RSA exposed only minor differences in the amount of potential habitat loss/alteration associated with each option (Table 21 and Table 22, Map 35). The most American beaver habitat loss is associated with Reach 2.

**Table 21: Potential American beaver Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Project Reach Features**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 24.99                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Broadleaf Open  | 9.26                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 17.30                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.01                                     | 0.05%          | 0.01                                    | 0.07%          |
| Wetland Shrub   | 154.43                                         | 0.10                    | 0.07%          | 0.81                    | 0.58%          | 0.17                                     | 0.12%          | 0.23                                    | 0.16%          |
| Total           | 205.98                                         | 0.10                    | 0.05%          | 0.81                    | 0.43%          | 0.18                                     | 0.10%          | 0.24                                    | 0.13%          |

**Table 22: Potential American beaver Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Project Linear Features**

| Habitat Type    | Total Modeled Habitat (LSM LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|----------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                    | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 4.19                                               | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Broadleaf Open  | 1.46                                               | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 2.84                                               | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.01                                     | 0.30%          | 0.01                                    | 0.44%          |
| Wetland Shrub   | 43.67                                              | 0.10                    | 0.33%          | 0.81                    | 2.62%          | 0.17                                     | 0.55%          | 0.23                                    | 0.75%          |
| Total           | 52.16                                              | 0.10                    | 0.28%          | 0.81                    | 2.27%          | 0.18                                     | 0.50%          | 0.24                                    | 0.68%          |

### 9.5.6.2 American marten

Based on habitat modelling, there is 81.72 km<sup>2</sup> of quality American marten habitat within the LSA (Map 36). No American marten habitat loss or alteration is anticipated as a result of the Project Reach features within the RSA and very little habitat loss within the LSA (Table 23 and Table 24).

**Table 23: Potential American marten Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Project Reach Features**

| Habitat Type     | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                  |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Coniferous Dense | 110.59                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Coniferous Open  | 43.65                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense  | 94.59                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total            | 248.83                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 24: Potential American marten Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Project Reach Features**

| Habitat Type     | Total Modeled Habitat (LSM LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------|----------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                  |                                                    | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Coniferous Dense | 34.87                                              | 0.57                    | 1.68%          | 0.97                    | 2.85%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Coniferous Open  | 18.86                                              | 0.02                    | 0.12%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense  | 27.99                                              | 0.19                    | 0.76%          | 0.06                    | 0.26%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total            | 81.72                                              | 0.78                    | 1.03%          | 1.03                    | 1.36%          | 0.00                                     | 0.00%          | 0.00                                    | 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 conducted January 31- February 6, 2016, 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 openings. Locations of these sightings were recorded within the RSA during the winter aerial survey for further investigation of these sights on foot during spring and summer field work, 2016 (Table 25)

**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                                     | LSMOC Reach 1           |
| Potential Hibernacula 2 | Southeast of Lake St. Martin FN | 3.41                                     | Proposed ASR            |
| Potential Hibernacula 3 | Southeast of Lake St. Martin FN | 3.32                                     | Proposed ASR            |
| Potential Hibernacula 4 | Southeast of Lake St. Martin FN | 3.47                                     | Proposed ASR            |
| Potential Hibernacula 5 | Southeast of Lake St. Martin FN | 4.09                                     | Proposed ASR            |
| Potential Hibernacula 6 | Southeast of Lake St. Martin FN | 1.44                                     | Proposed ASR            |
| Potential               | Southeast of Lake St. Martin FN | 2.62                                     | Proposed 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 1 and 2 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 1: Possible bat hibernacula identified within the Access Road LSA. Photograph taken by EcoLogic Environmental Inc. on June 8, 2016



Photograph 2: Possible bat hibernacula identified within the Access road 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 (pers. Comm., 2016), bat specialist at the University of Winnipeg, 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 activity to locate potential bat hibernacula, bat species presence in an area, and to assess for 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 Proposed 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  $>0.05$  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 26<sup>th</sup>, 2016. For this deployment, locations along the Idylwild Road (Map 38) 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 proposed ASR in order to determine whether little brown bats may be swarming closer to the proposed ASR, which may be indicative of potential hibernaculum closer to the proposed ASR than the original recorder deployment sites located 2.9 km from the proposed 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 17<sup>th</sup>, 2016. Once recovered, the recorders were analyzed using the Kaleidoscope Pro 4 Analysis Software.

There were three bat species that were identified on the bat recording unit deployed. 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 (2015) and under MESEA (2015). 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 was 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 Proposed ASR, the LSMOCs, as well as other landscape features.

**Table 27: Elevation of Project Features within the LSA**

| <b>Location</b>     | <b>Elevation Min (masl)</b> | <b>Elevation Max (masl)</b> |
|---------------------|-----------------------------|-----------------------------|
| 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                         |

**Table 27: Elevation of Project Features within the LSA**

| Location                                | Elevation Min (masl) | Elevation Max (masl) |
|-----------------------------------------|----------------------|----------------------|
| Quarry Lease 2                          | 282                  | 282                  |
| Quarry Lease 3                          | 285                  | 285                  |
| Quarry Lease 4                          | 285                  | 285                  |
| 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 proposed ASR, however, given bats were also recorded along the proposed 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 (20 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.

### **9.7.2 Avian Species Habitat Modeling Results**

#### **9.7.2.1 American White Pelican**

The American white pelican 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 the habitat model, there is 729.98 km<sup>2</sup> of available American white pelican habitat 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 American white pelican available within the LSA and RSA (Table 28 and Table 29).

**Table 28: Potential American White Pelican Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW) |                | Reach 2 (500 m RoW) |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|---------------------|----------------|---------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km2)          | Proportion (%) | Area (km2)          | Proportion (%) | Area (km2)                               | Proportion (%) | Area (km2)                              | Proportion (%) |
| Grassy Marshes         | 68.60                                          | 0.02                | 0.04%          | 0.00                | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 34.07                                          | 0.00                | 0.00%          | 0.06                | 0.17%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                  | 627.32                                         | 0.03                | 0.01%          | 0.00                | 0.00%          | 0.23                                     | 0.04%          | 0.28                                    | 0.04%          |
| Total                  | 729.98                                         | 0.06                | 0.01%          | 0.06                | 0.01%          | 0.23                                     | 0.03%          | 0.28                                    | 0.04%          |

**Table 29: Potential American White Pelican Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the LSMOCs**

| Habitat Type           | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW) |                | Reach 2 (500 m RoW) |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|---------------------|----------------|---------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km2)          | Proportion (%) | Area (km2)          | Proportion (%) | Area (km2)                               | Proportion (%) | Area (km2)                              | Proportion (%) |
| Grassy Marshes         | 6.65                                           | 0.02                | 0.36%          | 0.00                | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 8.66                                           | 0.00                | 0.00%          | 0.06                | 0.66%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                  | 44.90                                          | 0.03                | 0.07%          | 0.00                | 0.00%          | 0.23                                     | 0.51%          | 0.28                                    | 0.62%          |
| Total                  | 60.21                                          | 0.06                | 0.09%          | 0.06                | 0.10%          | 0.23                                     | 0.38%          | 0.28                                    | 0.46%          |

### 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 a number of National Parks in Canada (SARA, 2015).

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 in 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 or sand banks. 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. Based on the habitat model, there is 220.17 km<sup>2</sup> of habitat available for bank swallow within the RSA. There is extremely small to no bank swallow habitat potentially lost/alterd by the LSMOC linear features (Table 30 and Table 31).

**Table 30: Potential Bank Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                                  | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                               |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Wet Meadow                                    | 109.03                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                                         | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Townsites/Residential Sites                   | 31.89                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Gravel Pits/Mine sites                        | 8.73                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Fence lines (Community Pastures), fire guards | 1.92                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                                         | 220.17                                         | 0.02                    | 0.01%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 31: Potential Bank Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                                  | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                               |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Wet Meadow                                    | 0.40                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                                         | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Townsites/Residential Sites                   | 0.14                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Gravel Pits/Mine sites                        | 1.11                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Fence lines (Community Pastures), fire guards | 0.02                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                                         | 8.32                                           | 0.02                    | 0.29%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

### 9.7.2.3 Barn Swallow

The barn swallow, listed as threatened under SARA, is readily adapted to nesting under eaves of houses, under bridges, and inside buildings such as barns. The barn swallow prefers agricultural regions and migrates 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, and gravel pits and mine sites. Based on the habitat model, there is 69.96 km<sup>2</sup> of habitat for the barn swallow within the RSA. There is no barn swallow habitat potentially lost/alterd by the LSMOC linear features (Table 32 and Table 33).

**Table 32: Potential Barn Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                     | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|----------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                  |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Precipitous Slopes/Fragile Sites | 0.27                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Abandoned Cultivated Land        | 16.79                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Dry Upland Ridge Prairie         | 3.32                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Townsites/Residential Sites      | 31.89                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Gravel Pits/Mine Sites           | 8.73                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| River Banks                      | 8.95                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                            | 69.96                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 33: Potential Barn Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                     | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|----------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                  |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Precipitous Slopes/Fragile Sites | 0.00                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Abandoned Cultivated Land        | 2.82                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Dry Upland Ridge Prairie         | 0.00                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Townsites/Residential Sites      | 0.14                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Gravel Pits/Mine Sites           | 1.11                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| River Banks                      | 0.00                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                            | 4.07                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

#### 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 and rivers. Based on the habitat model, there is 219.66 km<sup>2</sup> of habitat for black-crowned night-heron within the RSA. The only potential black-crowned night-heron habitat lost/alterd by the LSMOCs is associated with the development of Reach 1 and Reach 2 and the degree of loss/alteration associated with these options is a very small percentage of the overall black-crowned night-heron habitat available (Table 34 and

Table 35). There is very little black-crowned night heron habitat anticipated to be lost or altered by Reach 3 Johnson Beach or Reach 3 Willow Point options at 0.05% and 0.005% respectively.

**Table 34: Potential Black-Crowned Night-Heron Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type          | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                       |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Grassy Marshes        | 68.6                                           | 0.02                    | 0.04%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Mud/Salt Flats        | 31.4                                           | 0.01                    | 0.03%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches      | 5.78                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood | 34.07                                          | 0                       | 0.00%          | 0.06                    | 0.17%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Dugouts/Water holes   | 1                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Rivers                | 8.95                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Shorelines/Islands    | 69.86                                          | 0.05                    | 0.07%          | 0.06                    | 0.09%          | 0.1                          | 0.14%          | 0.01                        | 0.01%          |
| Total                 | 219.66                                         | 0.08                    | 0.04%          | 0.12                    | 0.05%          | 0.1                          | 0.05%          | 0.01                        | 0.005%         |

**Table 35: Potential Black-Crowned Night-Heron Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration with LSMOCs**

| Habitat Type          | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                       |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Grassy Marshes        | 6.65                                           | 0.02                    | 0.36%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Mud/Salt Flats        | 8.11                                           | 0.01                    | 0.12%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches      | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood | 8.66                                           | 0                       | 0.00%          | 0.06                    | 0.66%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Dugouts/Water holes   | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Rivers                | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Shorelines/Islands    | 6.92                                           | 0.05                    | 0.72%          | 0.06                    | 0.87%          | 0.1                          | 1.45%          | 0.01                        | 0.14%          |
| Total                 | 30.38                                          | 0.08                    | 0.26%          | 0.12                    | 0.39%          | 0.1                          | 0.33%          | 0.01                        | 0.03%          |

### 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 under SARA (SARA, 2015).

The bobolink potential habitat was modelled using the FRI focusing on cultivated lands, pasture lands, and marshes.

Based on the habitat model, there is 671.25 km<sup>2</sup> of habitat available for the bobolink within the RSA. The only potential habitat lost/alterd by the LSMOCs is associated with the development of Reach 1 and the degree of loss/alteration with the Reach 1 option is a very small percentage of the overall bobolink habitat available (Table 36 and Table 37). There is no anticipated loss or alteration of bobolink habitat associated with Reach 2, Reach 3 Johnson Beach, or Reach 3 Willow Point.

**Table 36: Potential Bobolink Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                   | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|--------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Hayland - Cultivated           | 292.97                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Cropland - Cultivated          | 59.69                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Pastureland - Domestic Animals | 233.20                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Abandoned Cultivated Land      | 16.79                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                          | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                          | 671.25                                         | 0.02                    | 0.004%         | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 37: Potential Bobolink Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                   | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|--------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                                |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Hayland - Cultivated           | 2.18                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Cropland - Cultivated          | 0.39                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Pastureland - Domestic Animals | 2.16                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Abandoned Cultivated Land      | 2.82                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                          | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                          | 14.20                                          | 0.02                    | 0.17%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

### 9.7.2.6 *Canada Warbler*

Canada warbler is a migratory songbird listed as threatened under SARA (2015), threatened under MESEA (2015), and ranked 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), then rapidly migrating in pairs (males typically arrive slightly ahead of females), and 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 habitat model, there is 498.18 km<sup>2</sup> of Canada warbler habitat available within the RSA. The amount of potential Canada warbler habitat loss/alteration associated with the project is a very small percentage of the overall Canada warbler habitat available within the RSA and LSA (Table 38 and Table 39).

**Table 38: Potential Canada Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 346.94                                         | 0.01                    | 0.002%         | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 151.24                                         | 0.002                   | 0.001%         | 0.00                    | 0.00%          | 0.05                                     | 0.03%          | 0.09                                    | 0.06%          |
| Total           | 498.18                                         | 0.01                    | 0.002%         | 0.00                    | 0.00%          | 0.05                                     | 0.01%          | 0.09                                    | 0.02%          |

**Table 39: Potential Canada Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 18.48                                          | 0.01                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 18.76                                          | 0.002                   | 0.01%          | 0.00                    | 0.00%          | 0.05                                     | 0.26%          | 0.09                                    | 0.45%          |
| Total           | 37.24                                          | 0.01                    | 0.03%          | 0.00                    | 0.00%          | 0.05                                     | 0.13%          | 0.09                                    | 0.23%          |

### 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 the habitat model, there is 327.45 km<sup>2</sup> of Caspian tern habitat available within the RSA. The degree of potential loss/alteration with the LSMOCs is a very small percentage of the overall Caspian tern habitat available (Table 40 and Table 41).

**Table 40: Potential Caspian Tern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type          | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                 | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Drainage Ditches      | 5.78                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Flood | 34.07                                          | 0.00                    | 0.00%          | 0.06                    | 0.17%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Dugouts/Water Holes   | 1.00                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                 | 218.01                                         | 0.21                    | 0.09%          | 0.00                    | 0.00%          | 0.11                                     | 0.05%          | 0.14                                    | 0.06%          |
| Total                 | 327.45                                         | 0.23                    | 0.07%          | 0.06                    | 0.02%          | 0.11                                     | 0.03%          | 0.14                                    | 0.04%          |

**Table 41: Potential Caspian Tern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type          | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                 | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Drainage Ditches      | 0.02                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Flood | 8.66                                           | 0.00                    | 0.00%          | 0.06                    | 0.66%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Dugouts/Water Holes   | 0.02                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                 | 18.89                                          | 0.21                    | 1.09%          | 0.00                    | 0.00%          | 0.11                                     | 0.60%          | 0.14                                    | 0.74%          |
| Total                 | 34.24                                          | 0.23                    | 0.67%          | 0.06                    | 0.17%          | 0.11                                     | 0.33%          | 0.14                                    | 0.41%          |

### 9.7.2.8 *Common Nighthawk*

Common nighthawk is a migratory songbird listed as threatened under MESEA (2015), SARA (2015) 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). There is a recovery strategy for the common nighthawk in Canada (SARA, 2015) which highlights the threat assessment associated with accidental mortality of common nighthawk with vehicles as medium level of concern and habitat loss resulting from development as an unknown level of concern.

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 were used to model potential habitat.

Based on the habitat model, there is 119.19 km<sup>2</sup> of common nighthawk habitat available within the RSA. The degree of potential habitat loss/alteration associated with the LSMOCs is a very small percentage of the overall common nighthawk habitat available (Table 42 and Table 43).

**Table 42: Potential Common Nighthawk Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                 |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Coniferous Open | 82.87                                          | 0.03                    | 0.03%          | 0.01                    | 0.01%          | 0                            | 0.00%          | 0.004                       | 0.01%          |
| Exposed Land    | 17.74                                          | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Grassland       | 18.58                                          | 0                       | 0.00%          |                         | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total           | 119.19                                         | 0.03                    | 0.03%          | 0.01                    | 0.01%          | 0                            | 0.00%          | 0.004                       | 0.00%          |

**Table 43: Potential Common Nighthawk Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                 |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Coniferous Open | 20.1                                           | 0.03                    | 0.13%          | 0.01                    | 0.04%          | 0                            | 0.00%          | 0.004                       | 0.02%          |
| Exposed Land    | 2.22                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Grassland       | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total           | 22.32                                          | 0.03                    | 0.12%          | 0.01                    | 0.03%          | 0                            | 0.00%          | 0.004                       | 0.02%          |

#### 9.7.2.9 Eastern Whip-Poor-Will

Eastern whip-poor-will is a migratory songbird listed as threatened under MESEA (2015), SARA (2015), and is uncommon (S3B) in Manitoba (MCDRC, 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 mixedwood dense. Based on the habitat model, there is 310.55 km<sup>2</sup> of Eastern whip-poor-will habitat available within the RSA. No Eastern whip-poor-will habitat loss/alteration is anticipated with the development of the LSMOCs (Table 44 and Table 45).

**Table 44: Potential Eastern Whip-Poor-Will Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Open  | 185.82                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 124.73                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total           | 310.55                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 45: Potential Eastern Whip-Poor-Will Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Open  | 30.92                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 12.34                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total           | 43.26                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

#### 9.7.2.10 Eastern Wood-Pewee

Eastern wood-pewee is a common (S4B) (MCDIC, 2015) migratory songbird not listed under SARA or MESEA, but 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 the habitat model, there is 641.47 km<sup>2</sup> of eastern wood-pewee habitat available within the RSA. The degree of potential Eastern wood-pewee habitat loss/alteration associated with the LSMOCs is a very small percentage of the overall eastern wood-pewee habitat available (Table 46 and Table 47).

**Table 46: Potential Eastern Wood-Pewee Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 376.68                                         | 0.03                    | 0.01%          | 0.01                    | 0.004%         | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 264.79                                         | 0.22                    | 0.08%          | 0.18                    | 0.07%          | 0.12                                     | 0.05%          | 0.19                                    | 0.07%          |
| Total           | 641.47                                         | 0.25                    | 0.04%          | 0.19                    | 0.03%          | 0.12                                     | 0.02%          | 0.19                                    | 0.03%          |

**Table 47: Potential Eastern Wood-Pewee Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 21.91                                          | 0.03                    | 0.12%          | 0.01                    | 0.07%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 45.90                                          | 0.22                    | 0.48%          | 0.18                    | 0.39%          | 0.12                                     | 0.27%          | 0.19                                    | 0.41%          |
| Total           | 67.81                                          | 0.25                    | 0.37%          | 0.19                    | 0.28%          | 0.12                                     | 0.18%          | 0.19                                    | 0.28%          |

### 9.7.2.11 Golden-Winged Warbler

Golden-winged warblers, which are listed as threatened under MESEA (2015) and SARA (2015) and is uncommon (S3B) in Manitoba (MCDRC, 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). They are likely to be present in the LSA and are assessed as a species of special concern by COSEWIC.

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 the habitat model, there is 556.93 km<sup>2</sup> of golden-winged warbler habitat available within the RSA. The degree of potential loss/alteration with LSMOCs is a small percentage of the overall golden-winged warbler habitat available (Table 48 and Table 49).

**Table 48: Potential Golden-Winged Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                             |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Tamarack Larch Treed Muskeg | 58.03                                          | 0.00                    | 0.00%          | 0.13                    | 0.23%          | 0.04                                     | 0.07%          | 0.05                                    | 0.09%          |
| Willow                      | 198.78                                         | 0.02                    | 0.01%          | 0.09                    | 0.04%          | 0.04                                     | 0.02%          | 0.01                                    | 0.01%          |
| Dwarf Birch                 | 122.49                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Wet Meadow                  | 109.03                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                       | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                       | 556.93                                         | 0.04                    | 0.01%          | 0.22                    | 0.04%          | 0.08                                     | 0.01%          | 0.07                                    | 0.01%          |

**Table 49: Potential Golden-Winged Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                             |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Tamarack Larch Treed Muskeg | 5.73                                           | 0.00                    | 0.00%          | 0.13                    | 2.29%          | 0.04                                     | 0.74%          | 0.05                                    | 0.90%          |
| Willow                      | 29.70                                          | 0.02                    | 0.06%          | 0.09                    | 0.29%          | 0.04                                     | 0.13%          | 0.01                                    | 0.05%          |
| Dwarf Birch                 | 59.60                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Wet Meadow                  | 0.40                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Marsh                       | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                       | 102.07                                         | 0.04                    | 0.04%          | 0.218                   | 0.213%         | 0.081                                    | 0.080%         | 0.066                                   | 0.065%         |

### 9.7.2.12 *Horned Grebe*

The horned grebe is listed as a species of special concern by SARA (2015) but is listed 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 floods and rivers.

Based on the habitat model, there is 139.51 km<sup>2</sup> of horned grebe habitat available within the RSA. The potential habitat lost/alterd by the LSMOCs is a small percentage of the overall horned grebe habitat available (Table 50 and Table 51).

**Table 50: Potential Horned Grebe Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                        |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Marsh                  | 68.6                                           | 0.02                    | 0.04%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Sand Beaches           | 5.07                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0.01                         | 0.19%          | 0                           | 0.00%          |
| Gravel Pits/Mine sites | 8.73                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches       | 5.78                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood  | 34.07                                          | 0                       | 0.00%          | 0.06                    | 0.17%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Dugouts/Water Holes    | 1                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Rivers                 | 8.95                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Small Lakes            | 7.31                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total                  | 139.51                                         | 0.02                    | 0.02%          | 0.06                    | 0.04%          | 0.01                         | 0.01%          | 0                           | 0.00%          |

**Table 51: Potential Horned Grebe Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                        |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Marsh                  | 6.65                                           | 0.02                    | 0.36%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Sand Beaches           | 0.32                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0.01                         | 2.96%          | 0                           | 0.00%          |
| Gravel Pits/Mine sites | 1.11                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches       | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood  | 8.66                                           | 0                       | 0.00%          | 0.06                    | 0.66%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Dugouts/Water Holes    | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Rivers                 | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Small Lakes            | 0.98                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total                  | 17.76                                          | 0.02                    | 0.14%          | 0.06                    | 0.34%          | 0.01                         | 0.06%          | 0                           | 0.00%          |

#### 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.

Based on the habitat model, there is 102.66 km<sup>2</sup> of least bittern habitat available within the RSA. The degree of potential loss/alteration associated with LSMOCs is a very small percentage of the overall least bittern habitat available (Table 52 and Table 53).

**Table 52: Potential Least Bittern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                  | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 34.07                                          | 0.00                    | 0.00%          | 0.06                    | 0.17%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                  | 102.66                                         | 0.02                    | 0.02%          | 0.06                    | 0.06%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

**Table 53: Potential Least Bittern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                  | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 8.66                                           | 0.00                    | 0.00%          | 0.06                    | 0.66%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                  | 15.31                                          | 0.02                    | 0.16%          | 0.06                    | 0.38%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |

#### 9.7.2.14 *Olive-sided Flycatcher*

Olive-sided flycatcher is a migratory songbird listed as threatened under SARA (2015), MESEA (2015), and is uncommon in Manitoba (S3B) (MCDRC, 2015). 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 solitarily 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 habitat model, there is 2,197.22 km<sup>2</sup> of olive-sided flycatcher habitat available within the RSA. The overall potential habitat loss/alteration associated with the LSMOCs is a very small percentage of the overall olive-sided flycatcher habitat available within the RSA (Table 54 and Table 55).

**Table 54: Potential Olive-Sided Flycatcher Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Coniferous Open | 82.87                                          | 0.03                    | 0.03%          | 0.01                    | 0.01%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Wetland Shrub   | 1997.31                                        | 0.66                    | 0.03%          | 2.14                    | 0.11%          | 1.45                                     | 0.07%          | 2.41                                    | 0.12%          |
| Wetland Treed   | 117.04                                         | 0.12                    | 0.10%          | 0.28                    | 0.24%          | 0.11                                     | 0.09%          | 0.16                                    | 0.14%          |
| Total           | 2197.22                                        | 0.81                    | 0.04%          | 2.43                    | 0.11%          | 1.55                                     | 0.07%          | 2.58                                    | 0.12%          |

**Table 55: Potential Olive-Sided Flycatcher Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Coniferous Open | 20.10                                          | 0.03                    | 0.13%          | 0.01                    | 0.04%          | 0.00                                     | 0.00%          | 0.00                                    | 0.02%          |
| Wetland Shrub   | 611.24                                         | 0.66                    | 0.11%          | 2.14                    | 0.35%          | 1.45                                     | 0.24%          | 2.41                                    | 0.40%          |
| Wetland Treed   | 22.29                                          | 0.12                    | 0.54%          | 0.28                    | 1.25%          | 0.11                                     | 0.47%          | 0.16                                    | 0.73%          |
| Total           | 653.64                                         | 0.81                    | 0.12%          | 2.43                    | 0.37%          | 1.55                                     | 0.24%          | 2.58                                    | 0.39%          |

#### **9.7.2.15 Peregrine Falcon**

The peregrine falcon is listed by SARA (2015) as a species of special concern, as endangered under MESEA (2015) and as 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 km/hr (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). For the peregrine falcon, using the LCC, dense broadleaf and mixedwood stands were used to model potential habitat.

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 (NLHS, 2016) indicate a “big ridge” within the LSA; 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. Based on the habitat model, there is 641.47 km<sup>2</sup> of peregrine falcon habitat available within the RSA. The degree of potential loss/alteration with the LSMOCs is a very small percentage of the overall peregrine falcon habitat available within the RSA (Table 56 and Table 57).

**Table 56: Potential Peregrine Falcon Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 376.68                                         | 0.03                    | 0.01%          | 0.01                    | 0.004%         | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 264.79                                         | 0.22                    | 0.08%          | 0.18                    | 0.07%          | 0.12                                     | 0.05%          | 0.19                                    | 0.07%          |
| Total           | 641.47                                         | 0.25                    | 0.04%          | 0.19                    | 0.03%          | 0.12                                     | 0.02%          | 0.19                                    | 0.03%          |

**Table 57: Potential Peregrine Falcon Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type    | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                 |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Broadleaf Dense | 21.91                                          | 0.03                    | 0.12%          | 0.01                    | 0.07%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Mixedwood Dense | 45.90                                          | 0.22                    | 0.48%          | 0.18                    | 0.39%          | 0.12                                     | 0.27%          | 0.19                                    | 0.41%          |
| Total           | 67.81                                          | 0.25                    | 0.37%          | 0.19                    | 0.28%          | 0.12                                     | 0.18%          | 0.19                                    | 0.28%          |

#### 9.7.2.16 Piping Plover

The piping plover is very rare (S1B) in Manitoba (MCDRC, 2015) and is listed as endangered under SARA (2015) and MESEA (2015). 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 LM, LSM, and Lake Winnipeg.

The amount of potential habitat for piping plover is limited to the shorelines of LM, LSM, and Lake Winnipeg within the RSA. The degree of loss/alteration with the LSMOC Reaches is very small to non-existent in the RSA (between 0.01 and 0.00 km<sup>2</sup>) and LSA (between 0.01 and 0.00 km<sup>2</sup>) (Table 58 and Table 59).

**Table 58: Potential Piping Plover Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type   | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300m ROW)      |                | Reach 2 (500m ROW)      |                | Reach 3 Johnson Beach Option (200m ROW) |                | Reach 3 Willow Point Option (275m ROW) |                |
|----------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|-----------------------------------------|----------------|----------------------------------------|----------------|
|                |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) | Area (km <sup>2</sup> )                | Proportion (%) |
| Mud/Salt Flats | 19.03                                          | 0.01                    | 0.05%          | 0.00                    | 0.00%          | 0.00                                    | 0.00%          | 0.00                                   | 0.00%          |
| Sand Beaches   | 4.65                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.01                                    | 0.21%          | 0.00                                   | 0.00%          |
| Total          | 23.68                                          | 0.01                    | 0.04%          | 0.00                    | 0.00%          | 0.01                                    | 0.04%          | 0.00                                   | 0.00%          |

**Table 59: Potential Piping Plover Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type   | Total Modeled Habitat (LSM LSA) in Km <sup>2</sup> | Reach 1 (300m ROW) |                | Reach 2 (500m ROW) |                | Reach 3 Johnson Beach Option (200m ROW) |                | Reach 3 Willow Point Option (275m ROW) |                |
|----------------|----------------------------------------------------|--------------------|----------------|--------------------|----------------|-----------------------------------------|----------------|----------------------------------------|----------------|
|                |                                                    | Area (km2)         | Proportion (%) | Area (km2)         | Proportion (%) | Area (km2)                              | Proportion (%) | Area (km2)                             | Proportion (%) |
| Mud/Salt Flats | 2.77                                               | 0.01               | 0.36%          | 0.00               | 0.00%          | 0.00                                    | 0.00%          | 0.00                                   | 0.00%          |
| Sand Beaches   | 0.32                                               | 0.00               | 0.00%          | 0.00               | 0.00%          | 0.01                                    | 2.95%          | 0.00                                   | 0.00%          |
| Total          | 3.10                                               | 0.01               | 0.32%          | 0.00               | 0.00%          | 0.01                                    | 0.31%          | 0.00                                   | 0.00%          |

### 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) (MCDL, 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, and American beaver floods.

Based on the habitat model, there is 38.3 km<sup>2</sup> of red-headed woodpecker habitat available within the RSA. The only habitat lost/alterd by the LSMOCs is associated with the development of Reach 2, and the degree of loss/alteration with Reach 2 is a very small percentage of the overall red-headed woodpecker habitat available (Table 60 and Table 61).

**Table 60: Potential Red-Headed Woodpecker Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                                  | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                                               |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                                               |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Recreational sites                            | 1.33                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Shelter Belts                                 | 0.83                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Fence lines (Community Pastures), fire guards | 1.92                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches                              | 5.78                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood                         | 9.86                                           | 0                       | 0.00%          | 0.06                    | 0.17%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Grassland                                     | 18.58                                          | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total                                         | 38.3                                           | 0                       | 0.00%          | 0.06                    | 0.13%          | 0                            | 0.00%          | 0                           | 0.00%          |

**Table 61: Potential Red-Headed Woodpecker Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                                  | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1                 |                | Reach 2                 |                | Reach 3 Johnson Beach Option |                | Reach 3 Willow Point Option |                |
|-----------------------------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------|----------------|-----------------------------|----------------|
|                                               |                                                | (300 m RoW)             |                | (500 m RoW)             |                | (200 m RoW)                  |                | (275 m RoW)                 |                |
|                                               |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )      | Proportion (%) | Area (km <sup>2</sup> )     | Proportion (%) |
| Recreational sites                            | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Shelter Belts                                 | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Fence lines (Community Pastures), fire guards | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Drainage Ditches                              | 0.02                                           | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| American beaver Flood                         | 8.66                                           | 0                       | 0.00%          | 0.06                    | 0.66%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Grassland                                     | 0                                              | 0                       | 0.00%          | 0                       | 0.00%          | 0                            | 0.00%          | 0                           | 0.00%          |
| Total                                         | 8.7                                            | 0                       | 0.00%          | 0.06                    | 0.66%          | 0                            | 0.00%          | 0                           | 0.00%          |

#### 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 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 owl 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 the habitat model, there is 1,747.76 km<sup>2</sup> of short-eared owl habitat available within the RSA. The degree of potential loss/alteration associated with the LSMOCs is a very small percentage of the overall short-eared owl habitat available within the RSA (Table 62 and Table 63).

**Table 62: Potential Short-Eared Owl Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                             |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Herb                        | 118.26                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Grassland                   | 691.64                                         | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Perennial Crops and Pasture | 70.02                                          | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Wetland Herb                | 867.84                                         | 0.63                    | 0.07%          | 0.20                    | 0.02%          | 0.08                                     | 0.01%          | 0.17                                    | 0.02%          |
| Total                       | 1747.76                                        | 0.63                    | 0.04%          | 0.20                    | 0.01%          | 0.08                                     | 0.004%         | 0.17                                    | 0.01%          |

**Table 63: Potential Short-Eared Owl Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type                | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                             |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Herb                        | 6.06                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Grassland                   | 1.97                                           | 0.00                    | 0.00%          | 0.00                    | 0.000%         | 0.00                                     | 0.000%         | 0.00                                    | 0.000%         |
| Perennial Crops and Pasture | 0.56                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Wetland Herb                | 218.34                                         | 0.63                    | 0.29%          | 0.20                    | 0.09%          | 0.08                                     | 0.03%          | 0.17                                    | 0.08%          |
| Total                       | 226.92                                         | 0.63                    | 0.28%          | 0.20                    | 0.09%          | 0.08                                     | 0.03%          | 0.17                                    | 0.07%          |

### 9.7.2.19 Trumpeter Swan

Trumpeter swan is a migratory water bird not listed under SARA (2015) but is 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.

Based on the habitat model, there is 706.57 km<sup>2</sup> of trumpeter swan habitat available within the RSA. The potential habitat lost/alterated in association with the LSMOCs is a small percentage of the overall trumpeter swan habitat available (Table 64 and Table 65).

**Table 64: Potential Trumpeter Swan Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type          | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                 | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Flood | 34.07                                          | 0.00                    | 0.00%          | 0.06                    | 0.17%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                 | 594.96                                         | 0.24                    | 0.04%          | 0.00                    | 0.00%          | 0.11                                     | 0.02%          | 0.14                                    | 0.02%          |
| Rivers                | 8.95                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                 | 706.57                                         | 0.26                    | 0.04%          | 0.06                    | 0.01%          | 0.11                                     | 0.02%          | 0.14                                    | 0.02%          |

**Table 65: Potential Trumpeter Swan Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type          | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|-----------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                       |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Marsh                 | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Flood | 8.66                                           | 0.00                    | 0.00%          | 0.06                    | 0.66%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Water                 | 47.98                                          | 0.24                    | 0.50%          | 0.00                    | 0.00%          | 0.11                                     | 0.24%          | 0.14                                    | 0.29%          |
| Rivers                | 0.00                                           | 0.00                    | 0.00%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                 | 63.29                                          | 0.26                    | 0.41%          | 0.06                    | 0.09%          | 0.11                                     | 0.18%          | 0.14                                    | 0.22%          |

### 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 ranked as uncommon in Manitoba (S3B) (MCDC, 2015) and 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.

Based on the habitat model, there is 541.49 km<sup>2</sup> of yellow rail habitat available within the RSA. The degree of potential loss/alteration associated with the LSMOCs is a very small percentage of the overall yellow rail habitat available within the RSA (Table 66 and Table 67).

**Table 66: Potential Yellow Rail Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (RSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Muskeg                 | 438.83                                         | 0.70                    | 0.16%          | 0.07                    | 0.02%          | 0.11                                     | 0.02%          | 0.10                                    | 0.02%          |
| Marsh                  | 68.60                                          | 0.02                    | 0.04%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 34.07                                          | 0.00                    | 0.00%          | 0.06                    | 0.17%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                  | 541.49                                         | 0.72                    | 0.13%          | 0.13                    | 0.02%          | 0.11                                     | 0.02%          | 0.10                                    | 0.02%          |

**Table 67: Potential Yellow Rail Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with LSMOCs**

| Habitat Type           | Total Modeled Habitat (LSA) in Km <sup>2</sup> | Reach 1 (300 m RoW)     |                | Reach 2 (500 m RoW)     |                | Reach 3 Johnson Beach Option (200 m RoW) |                | Reach 3 Willow Point Option (275 m RoW) |                |
|------------------------|------------------------------------------------|-------------------------|----------------|-------------------------|----------------|------------------------------------------|----------------|-----------------------------------------|----------------|
|                        |                                                | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> ) | Proportion (%) | Area (km <sup>2</sup> )                  | Proportion (%) | Area (km <sup>2</sup> )                 | Proportion (%) |
| Muskeg                 | 154.36                                         | 0.70                    | 0.45%          | 0.07                    | 0.04%          | 0.11                                     | 0.07%          | 0.10                                    | 0.07%          |
| Marsh                  | 6.65                                           | 0.02                    | 0.36%          | 0.00                    | 0.00%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| American beaver Floods | 8.66                                           | 0.00                    | 0.00%          | 0.06                    | 0.66%          | 0.00                                     | 0.00%          | 0.00                                    | 0.00%          |
| Total                  | 169.67                                         | 0.72                    | 0.43%          | 0.13                    | 0.07%          | 0.11                                     | 0.06%          | 0.10                                    | 0.06%          |

### 9.7.3 Manitoba Breeding Bird Atlas Surveys

The Manitoba Breeding Bird Atlas (MBBA) has conducted bird survey work within the RSA. Map 41 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 (MBBA, 2015) by downloading the survey data for each tile of interest. Map 42 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 alignment.

**Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 42)**

| 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 |                        |                        |                       |          |
| 6      | Forest and Water SAR | 14NB56 | Bobolink               | Eastern Whip-poor-will | Yellow Rail            |                        |                        |                       |          |

**Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 42)**

| Region | Category             | Square | Species1               | Species2               | Species3               | Species4           | Species5               | Species6              | Species7           |
|--------|----------------------|--------|------------------------|------------------------|------------------------|--------------------|------------------------|-----------------------|--------------------|
| 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           |                    |                        |                       |                    |
| 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 |                        |                    |                        |                       |                    |

**Table 68: MB Breeding Bird Survey Results for Avian Species at Risk (Table data corresponds with Map 42)**

| Region | Category             | Square | Species1               | Species2               | Species3               | Species4               | Species5    | Species6 | Species7 |
|--------|----------------------|--------|------------------------|------------------------|------------------------|------------------------|-------------|----------|----------|
| 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  |                        |                        |             |          |          |

### 9.7.1 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 in conjunction with bird point count surveys and terrestrial mammal track and sign surveys conducted along the LSMOC RoWs (See Section 8.2.4).

### 9.7.2 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 along the LSMOC RoWs in June 2016, there were several nests identified (Table 69 Map 43).

There were several tern colonies and shorebird nesting islands and reefs identified during the aerial survey work conducted within the RSA during June 2016. Nesting islands for cormorants and shorebirds were identified in the 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 LSMOC Reach 1 and between 11.6-13.1 km from the proposed ASR.

A substantial heron rookery was identified on an island on Lake St. Martin located a linear distance of 15.78 km from LSMOC Reach 1 and 14.9 km from the proposed ASR

**Table 69: Raptor and Bird Nest Search Results**

| Type of Observation                     | Quantity | Location   |           | Project Area            |
|-----------------------------------------|----------|------------|-----------|-------------------------|
|                                         |          | UTM Y      | UTM X     |                         |
| Nesting Island                          | 1        | 5729852.96 | 542601.95 | LSM Shoreline           |
| Nesting Island                          | 1        | 5726646.16 | 542856.99 | LSM Shoreline           |
| Bald Eagle Nest                         | 1        | 5726267.98 | 542849.91 | LSM Shoreline           |
| Nesting Cormorant                       | 1        | 5725373.62 | 541688.75 | LSM Shoreline           |
| Nesting Island                          | 2        | 5725373.62 | 541688.75 | LSM Shoreline           |
| Nesting Pelicans                        | 8        | 5726983.52 | 543330.19 | LSM Shoreline           |
| Goose Nests                             | 10       | 5735148.85 | 555295.5  | LSM Shoreline           |
| Bald Eagle Nest                         | 2        | 5735580.02 | 554131.14 | LSM Shoreline           |
| Small Stick Nest (4-6 inch diameter)    | 1        | 5735236.68 | 553610.92 | LSM Shoreline           |
| Eagle Nest                              | 1        | 5734880.4  | 553379.68 | LSM Shoreline           |
| Raven Nest                              | 1        | 5733955.87 | 552262.82 | LSM Shoreline           |
| Bald Eagle Nest                         | 1        | 5733156.72 | 549867.13 | LSM Shoreline           |
| Medium Stick Nests (8-10 inch diameter) | 3        | 5733818.85 | 549257.07 | LSM Shoreline           |
| Medium Stick Nests (8-10 inch diameter) | 2        | 5731756.1  | 549871.73 | LSM Shoreline           |
| Medium Stick Nests (8-10 inch diameter) | 1        | 5732087.62 | 548726.07 | LSM Shoreline           |
| Small Stick Nests (4-6 inch diameter)   | 2        | 5731893.21 | 548603.24 | LSM Shoreline           |
| Bald Eagle Nest                         | 1        | 5731350.13 | 546274.27 | LSM Shoreline           |
| Small Stick Nests (4-6 inch diameter)   | 1        | 5733836.41 | 544651.19 | LSM Shoreline           |
| Bald Eagle Nest                         | 1        | 5732963.09 | 543297.33 | LSM Shoreline           |
| Bald Eagle Nest                         | 1        | 5753241    | 570568    | Reach 3 (Johnson Beach) |
| Nesting Snag                            | 1        | 5711007.37 | 554411.62 | Proposed ASR            |
| Nesting Snag                            | 1        | 5710059.03 | 556811.29 | Proposed ASR            |

### **9.7.3 Pedestrian Bird Nest Search Methods**

Ground nest searches were conducted in conjunction with avian point counts and terrestrial mammal track and sign surveys between June 2, 2016 and June 11, 2016. Biologists travelled by helicopter to numerous locations along the LSMOC RoWs in association with avian point count surveys and the mammal track and sign surveys. Each biologist searched the tree line along the RoW (varying widths depending on the LSMOC) for signs of stick nests and nesting snags. In areas where biologists stopped to conduct terrestrial mammal track and sign surveys as well as to conduct avian point counts, biologists investigated those areas for nesting activity. 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.

### **9.7.4 Pedestrian Bird Nest Search Results**

Several nests were identified during the aerial nest searches within the LSA (conducted Jan-Feb 2016 and June 2016) as well as along the LSMOC RoWs during ground nest searches conducted in June 2016. Based on the collective results from these nest search survey types, Table 70 presents the nest type and the project feature the nest is closest to.

Many incidental bird observations and vocal calls were identified during the ground-based nest searches and the terrestrial mammal track and sign surveys. All bird species that were identified (both through incidental observation and/or through Point Count methodologies) are presented in Section 8.7.5 (Species At Risk identified) and Appendix E (complete listing of all birds identified within the LSA).

### **9.7.1 Songbird and Waterbird 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 along the LSMOC RoWs from June 2, 2016 and June 11, 2016. There were 21-point count survey locations along the LSMOC RoWs (Reach 1 = 4, Reach 2 dike = 2, Reach 3 WP = 1, Reach 3 JB = 4, and Reach 2 Option 4 = 10 and LSM Shoreline = 3). Map 44 presents the locations of the point count survey sites along the LSMOC RoWs.

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). Given the remote location of the LSMOC RoWs with only helicopter access, evening point counts for species such as yellow rail could not be conducted.

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.

Additional point count surveys were conducted along the proposed ASR within LSA.

### 9.7.2 Songbird and Waterbird Point Count Survey Results

Several bird species were observed and heard during the songbird and waterbird point count surveys as well as incidental bird observations while conducting the bird nest searches and the terrestrial mammal track and sign surveys along the LSMOC RoWs. All of the bird species identified during the point counts as well as all incidental bird observations made within the LSA are provided in Appendix E, Map 45.

Further, there were a few bird species at risk that were identified during the surveys within the LSA including: American white pelican, bank swallows, common nighthawk, and trumpeter swans. There were three trumpeter swans observed within the LSA along the proposed ASR. The trumpeter swan is not listed under SARA (2015) but is listed as very rare in Manitoba (S1B) (MCDL, 2015) and endangered under MESEA (2015). One swan was alone, while the other two appeared to be a pair, all three of which were swimming in a large pond alongside the proposed ASR. Table 70 presents the listed bird species identified within the LSA.

**Table 70: Avian Listed Species Identified within the LSA**

| Common Name            | Scientific Name                  | Observation Type | Quantity | Area         |
|------------------------|----------------------------------|------------------|----------|--------------|
| Bank swallow           | <i>Riparia riparia</i>           | Observation      | 1        | LSA          |
| Common nighthawk       | <i>Chordeiles minor</i>          | Observation      | 1        | LSA          |
| Trumpeter swan         | <i>Cygnus buccinator</i>         | Observation      | 1        | Proposed ASR |
| Trumpeter swan         | <i>Cygnus buccinator</i>         | Observation      | 2        | Proposed ASR |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | Observation      | 1        | Reach 1      |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | Observation      | 2        | Reach 1      |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | Observation      | 6        | Reach 1      |
| American white pelican | <i>Pelecanus erythrorhynchos</i> | Observation      | 7        | Reach 1      |

### 9.7.3 Piping Plover Survey Methods

Piping plover surveys were conducted along sandy beach shorelines where potential piping plover habitat exists by aerial survey on June 11, 2016. Locations for potential habitat were identified based on the habitat modeling conducted prior to the field surveys. 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). 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). The aerial survey was flown using a helicopter at low height and low speed along all sandy beach shorelines as well as along the sparse vegetation above the high-water mark to investigate for piping plover nests. 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.

#### 9.7.4 Piping Plover Survey Results

There were no piping plover observations or signs of their activity identified within the LSA or RSA. The birds that were observed and signs of bird activity that were observed during the piping plover surveys are provided in Table 71. The Caspian tern, a species of conservation concern, was identified during the piping plover surveys (Table 72) within the RSA but not within the LSMOC LSA.

**Table 71: Piping Plover Survey Results**

| Point Count<br>Number/Waypoint | Species Name | Observation Type | Quantity | Location   |           |               |     |
|--------------------------------|--------------|------------------|----------|------------|-----------|---------------|-----|
|                                |              |                  |          | UTM Y      | UTM X     | Area          |     |
| W 047                          | Black Tern   | Observation      | 20       | 5718978.63 | 538523.56 | LSM Shoreline | RSA |
| W 202                          | Black Tern   | Observation      | 1        | 5738616.91 | 553935.47 | LSM Shoreline | LSA |
| W 302                          | Black Tern   | Observation      | 1        | 5732897.69 | 542881.41 | LSM Shoreline | RSA |
| W 052                          | Caspian Tern | Observation      | 10       | 5725373.62 | 541688.75 | LSM Shoreline | RSA |
| W 054                          | Caspian Tern | Observation      | 100      | 5729852.96 | 542601.95 | LSM Shoreline | RSA |
| W 047                          | Common Tern  | Observation      | 20       | 5718978.63 | 538523.56 | LSM Shoreline | RSA |
| W 054                          | Common Tern  | Observation      | 100      | 5729852.96 | 542601.95 | LSM Shoreline | RSA |
| PC 103                         | Common Tern  | Observation      | 10       | 5739909.99 | 550476.50 | LSM Shoreline | LSA |
| PC 105                         | Common Tern  | Observation      | 2        | 5737432.00 | 556752.51 | LSM Shoreline | LSA |
| PC 106                         | Common Tern  | Observation      | 1        | 5736016.99 | 555521.00 | LSM Shoreline | LSA |
| PC 107                         | Common Tern  | Observation      | 1        | 5736537.00 | 552973.00 | LSM Shoreline | LSA |
| W 203                          | Common Tern  | Observation      | 1        | 5738393.75 | 554470.87 | LSM Shoreline | LSA |
| W 204                          | Common Tern  | Observation      | 1        | 5738384.69 | 554674.21 | LSM Shoreline | LSA |
| W 207                          | Common Tern  | Observation      | 4        | 5738370.81 | 555624.20 | LSM Shoreline | LSA |
| W 225                          | Common Tern  | Observation      | 1        | 5735128.12 | 556319.89 | LSM Shoreline | LSA |
| W 229                          | Common Tern  | Observation      | 1        | 5736322.35 | 555524.35 | LSM Shoreline | LSA |
| W 242                          | Common Tern  | Observation      | 1        | 5735273.86 | 553812.42 | LSM Shoreline | LSA |
| W 243                          | Common Tern  | Observation      | 1        | 5735236.68 | 553610.92 | LSM Shoreline | LSA |
| W 249                          | Common Tern  | Observation      | 1        | 5733624.70 | 551938.89 | LSM Shoreline | RSA |
| W 254                          | Common Tern  | Observation      | 1        | 5733085.55 | 550315.48 | LSM Shoreline | RSA |
| W 266                          | Common Tern  | Observation      | 1        | 5732124.17 | 550082.70 | LSM Shoreline | RSA |
| W 270                          | Common Tern  | Observation      | 1        | 5731806.05 | 549183.82 | LSM Shoreline | RSA |
| W 276                          | Common Tern  | Observation      | 3        | 5731537.99 | 548005.47 | LSM Shoreline | RSA |

**Table 71: Piping Plover Survey Results**

| Point Count Number/Waypoint | Species Name    | Observation Type | Quantity | Location   |           |               |     |
|-----------------------------|-----------------|------------------|----------|------------|-----------|---------------|-----|
|                             |                 |                  |          | UTM Y      | UTM X     | Area          |     |
| W 286                       | Common Tern     | Observation      | 1        | 5731911.20 | 545715.91 | LSM Shoreline | RSA |
| W 302                       | Common Tern     | Observation      | 1        | 5732897.69 | 542881.41 | LSM Shoreline | RSA |
| W 046                       | Franklin's Gull | Observation      | 30       | 5720002.38 | 538467.51 | LSM Shoreline | RSA |
| W 050                       | Franklin's Gull | Observation      | 1        | 5717394.10 | 539764.75 | LSM Shoreline | RSA |
| W 052                       | Franklin's Gull | Observation      | 60       | 5725373.62 | 541688.75 | LSM Shoreline | RSA |
| W 054                       | Franklin's Gull | Observation      | 1        | 5729852.96 | 542601.95 | LSM Shoreline | RSA |
| PC 103                      | Franklin's Gull | Observation      | 2        | 5739909.99 | 550476.50 | LSM Shoreline | LSA |
| PC 106                      | Franklin's Gull | Observation      | 4        | 5736016.99 | 555521.00 | LSM Shoreline | LSA |
| PC 107                      | Franklin's Gull | Observation      | 50       | 5736537.00 | 552973.00 | LSM Shoreline | LSA |
| W 193                       | Franklin's Gull | Observation      | 1        | 5709716.75 | 537150.20 | LSM Shoreline | RSA |
| W 209                       | Franklin's Gull | Observation      | 1        | 5738294.11 | 556705.37 | LSM Shoreline | LSA |
| W 211                       | Franklin's Gull | Observation      | 4        | 5737998.09 | 557049.10 | LSM Shoreline | LSA |
| W 219                       | Franklin's Gull | Observation      | 3        | 5735768.41 | 557269.39 | LSM Shoreline | LSA |
| W 246                       | Franklin's Gull | Observation      | 2        | 5734671.46 | 552934.37 | LSM Shoreline | LSA |
| W 247                       | Franklin's Gull | Observation      | 2        | 5734089.55 | 552330.36 | LSM Shoreline | RSA |
| W 264                       | Franklin's Gull | Observation      | 1        | 5732720.44 | 549634.44 | LSM Shoreline | RSA |
| W 267                       | Franklin's Gull | Observation      | 30       | 5731756.10 | 549871.73 | LSM Shoreline | RSA |
| W 294                       | Franklin's Gull | Observation      | 2        | 5732408.43 | 545546.83 | LSM Shoreline | RSA |
| W 045                       | Herring Gull    | Observation      | 1        | 5718925.15 | 538548.98 | LSM Shoreline | RSA |
| PC 114                      | Herring Gull    | Observation      | 1        | 5738234.90 | 556249.19 | LSM Shoreline | LSA |
| W 245                       | Herring Gull    | Observation      | 2        | 5734709.67 | 553229.84 | LSM Shoreline | LSA |

## 9.8 Reptiles and Amphibians

### 9.8.1 Amphibian Point Count Survey Methods

Point count surveys for amphibians were conducted between June 2 and June 11, 2016 along the LSMOC RoWs. Pre-determined sites for amphibians were selected based on specific habitat features such as wetlands, marshlands, beaver floods, potholes, and small waterbodies along the LSMOC RoWs. Point counts were conducted in the early morning (between 6:00-10:00 am) based on the methods of the Sensitive Species Inventory Protocol Guidelines (AESRD, 2013). Given the remote location of the LSMOC RoWs, only accessible by helicopter, evening surveys could not be conducted.

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 six amphibian point count locations conducted along the LSMOC RoWs.

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

The results of the amphibian point count survey identified several observations and vocalizations of several species of amphibians (Table 72, Map 46), all of which are common species. There were no amphibian species of conservation concern identified within the LSMOC LSA.

**Table 72: Amphibian Point Count Survey Results**

| Point Count Number/<br>Waypoint | Species Name       | Observation Type | Quantity | Location  |           |                         |
|---------------------------------|--------------------|------------------|----------|-----------|-----------|-------------------------|
|                                 |                    |                  |          | UTM Y     | UTM X     | Area                    |
| PC 87                           | Boreal Chorus Frog | Vocal            | 1        | 5753270.3 | 570517.76 | Reach 3 (Johnson Beach) |
| PC 87                           | Wood Frog          | Observation      | 1        | 5753270.3 | 570517.76 | Reach 3 (Johnson Beach) |
| PC 111                          | Boreal Chorus Frog | Vocal            | 1        | 5749469.6 | 557058.53 | Reach 2                 |
| PC 109                          | Wood Frog          | Observation      | 1        | 5747604.8 | 564751.96 | Reach 2                 |
| PC 102                          | Wood Frog          | Vocal            | 2        | 5747604.8 | 564751.96 | Reach 1                 |
| PC 90                           | Wood Frog          | Observation      | 3        | 5747604.8 | 564751.96 | Reach 1                 |

### 9.8.3 Reptile Hibernacula Survey 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 and terrestrial mammal track and sign surveys, biologists looked for possible reptile hibernacula.

In addition to the ground based surveys conducted along the LSMOC RoWs, a combination of aerial and ground-based surveys were conducted within the LSA to investigate for potential bat hibernacula. Methods used for these studies are described in the bat Section 8.6. These searches allowed for additional investigation for reptile hibernacula.

#### 9.8.4 Reptile Hibernacula Survey Results

Results from the reptile hibernacula surveys identified two areas of limestone depressions with multiple sinkholes that were considered to have high potential as snake hibernacula. A red-sided garter snake was also observed near one of the potential snake dens identified (Table 73). Photograph 3 represents a potential snake hibernaculum identified during the surveys. The linear distance of the potential snake hibernaculum is 14.4 km from Reach 1 and 4.1 km from proposed ASR. Further monitoring is required to confirm these sites as active snake hibernacula.

**Table 73: Reptile Hibernacula Survey Results**

| Species Name        | Observation Type | Quantity | Location   |           | Area |
|---------------------|------------------|----------|------------|-----------|------|
|                     |                  |          | UTM Y      | UTM X     |      |
| Garter Snake        | Observation      | 1        | 5725598.44 | 550141.36 | LSA  |
| Potential Snake Den | Observation      | 1        |            |           | LSA  |
| Potential Snake Den | Observation      | 1        |            |           | LSA  |

Photograph 3: Potential snake hibernacula identified within 5km of the Forestry Road. Photograph taken by EcoLogic Environmental Inc. on June 8, 2016



#### 9.9 Ecologically Sensitive Sites

In consideration of a future EIA, baseline data were gathered on a number of ecologically sensitive sites such as mammal dens, large stick nests, tern colonies, mineral licks, rookeries, as well as

potential bat and snake hibernacula (Table 1). During all field surveys (winter aerial multi-species survey, ground based bird and amphibian surveys, and June 2016 aerial shoreline surveys), searches were conducted for the presence of these ecologically sensitive sites within the LSA and RSA.

A substantial heron rookery was identified on an island on Lake St. Martin located a linear distance of 15.78 km from LSMOC Reach 1 and 14.9 km from the proposed ASR (Table 74). Photograph 4 presents the blue heron rookery identified within the RSA on an island on Lake St. Martin.

**Table 74: 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



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 cormorants and shorebirds were identified in the 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 LSMOC Reach 1 and between 11.6-

13.1 km from the proposed ASR. Photograph 5 presents one of the cormorant nesting islands identified. Photograph 6 presents a bald eagle nest located where Reach 3 Willow Point intersects Lake Winnipeg.

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



Photograph 6: Bald Eagle nest located at the end of Reach 3 (Willow Point) at the shoreline of Lake Winnipeg.  
Photograph taken by Ecologic Environmental Inc. on June 10, 2016



Table 75 presents the Ecologically Sensitive Sites identified within the LSA and RSA.

**Table 75: Ecologically Sensitive Sites Identified within the LSA and RSA**

| Species Name               | Observation Type | Quantity | Area                   |
|----------------------------|------------------|----------|------------------------|
| Nesting Cormorants         | Observation      | 1        | LSM Shoreline          |
| Nesting Pelicans           | Observation      | 8        | LSM Shoreline          |
| Nesting Island             | Observation      | 1        | LSM Shoreline          |
| Heron Rookery              | Observation      | 1        | LSM Shoreline          |
| Nesting Island             | Observation      | 1        | LSM Shoreline          |
| Rookery                    | Observation      | 1        | LSM Shoreline          |
| Otter run                  | Observation      | 1        | Reach 3 (Willow Point) |
| Possible snake hibernacula | Observation      | 1        | LSA                    |
| Eagle Nest                 | Observation      | 1        | LSM Shoreline          |
| Bald Eagle Nest            | Observation      | 2        | LSM Shoreline          |
| Large Eagle Nest           | Observation      | 1        | LSM Shoreline          |
| Eagle Nest                 | Observation      | 1        | LSM Shoreline          |

**Table 75: Ecologically Sensitive Sites Identified within the LSA and RSA**

| Species Name | Observation Type | Quantity | Area                    |
|--------------|------------------|----------|-------------------------|
| Stick Nest   | Observation      | 1        | LSM Shoreline           |
| Stick Nest   | Observation      | 2        | LSM Shoreline           |
| Eagle Nest   | Observation      | 1        | LSM Shoreline           |
| Stick Nest   | Observation      | 1        | LSM Shoreline           |
| Eagle Nest   | Observation      | 1        | LSM Shoreline           |
| Eagle Nest   | Observation      | 1        | Reach 3 (Johnson beach) |

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

## 10 SUMMARY

This Wildlife Technical Report was developed for the LSMOC 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 mammal, avian, reptile and amphibian presence and distribution within the LSA and the RSA. Habitat modelling was conducted for moose, elk, and white-tailed deer. Despite moose summer and winter habitat not being 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 identified throughout the LSA and the RSA.

The analyses conducted identified the current linear density for moose within the LSA and RSA to be 0.10 km<sup>2</sup> and 0.22 km<sup>2</sup> 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 channel or reach route option 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 was located in the southern portion of the RSA and was not significantly associated with the LSA or PF. During field investigations signs of elk activity were observed only in the southwestern portion of the LSA. 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. WTD activity was abundant within the LSA, although not associated with the northern portion of the LSA – the LSMOC options area.

Habitat modelling on American beaver and American marten identified their habitat types were not limited within the LSA or the RSA. American beaver and American marten activity were found

to be abundant within the LSA, along with an abundance of hare and lynx. Otter activity was found most predominantly in the northern portion of the LSA.

Habitat modelling was conducted on 20 key avian species exhibiting the available habitat for these bird within the RSA and LSA. These models were validated during field surveys. Three avian Species At Risk were identified within the LSA: the bank swallow, the common night hawk, and the trumpeter swan.

Potentially active snake hibernacula were identified within the LSA, as well as potentially previous and currently active bat hibernacula. Bat recorders deployed within the LSA and along the existing LSMOC Access Road identified the presence of Little Brown and Northern Long-eared bats during the months of August, September, and October, suggesting the area is likely being used for hibernation. Further investigation of the area is required to determine the location and extent to which the LSA may be used for bat hibernation, specifically by Little Brown and Northern Long-eared bats, both Species At Risk.

There were no large mammal dens nor mineral lick identified within the LSA; however, a heron rookery and cormorant and gull nesting islands were identified on LSM, outside of the LSA but within the RSA.

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

| Common Name        | Scientific Name                  | Conservation Listing (SARA, MESEA, MBCDC) |
|--------------------|----------------------------------|-------------------------------------------|
| Raccoon            | <i>Procyon lotor</i>             | S5                                        |
| Red fox            | <i>Vulpes vulpes</i>             | S5                                        |
| Red squirrel       | <i>Tamisciurus hudsonicus</i>    | S5                                        |
| River otter        | <i>Lontra canadensis</i>         | S5                                        |
| Short-tailed shrew | <i>Blarina brevicauda</i>        | S5                                        |
| Silver-haired bat  | <i>Lasionycteris noctivagans</i> | S3S4B                                     |
| Snowshoe hare      | <i>Lepus americanus</i>          | S5                                        |
| Star-nosed mole    | <i>Condylura cristata</i>        | S3                                        |
| Striped skunk      | <i>Mephitis mephitis</i>         | S5                                        |
| White-tailed deer  | <i>Odocoileus virginianus</i>    | S5                                        |
| Woodchuck          | <i>Marmota monax</i>             | S5                                        |
| Wood bison         | <i>Bos bison athabasca</i>       | 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     | <i>Ambystoma laterale</i>             | S3S4                                     |
| Eastern Tiger Salamander    | <i>Ambystoma tigrinum tigrinum</i>    | S2                                       |
| Canadian Toad               | <i>Anaxyrus hemiophrys</i>            | S4                                       |
| Grey tree frog              | <i>Hyla versicolor</i>                | S4S5                                     |
| Boreal chorus frog          | <i>Pseudacris maculata</i>            | S5                                       |
| Wood frog                   | <i>Rana sylvatica</i>                 | S5                                       |
| Smooth green snake          | <i>Liophorophis vernalis</i>          | S3S4                                     |
| Northern leopard frog       | <i>Lithobates pipiens</i>             | Special Concern - Schedule 1 - S4        |
| Western plains garter snake | <i>Thamnophis radix haydenii</i>      | S4                                       |
| Red-sided garter snake      | <i>Thamnopsis sirtalis parietalis</i> | 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               | <i>Empidonax alnorum</i>         | S5B                                       |
| American avocet                | <i>Recurvirostra americana</i>   | S4B                                       |
| American bittern               | <i>Botaurus lentiginosus</i>     | S5B                                       |
| American coot                  | <i>Fulica americana</i>          | S5B                                       |
| American crow                  | <i>Corvus brachyrhynchos</i>     | S5B, SUN                                  |
| American golden-plover         | <i>Pluvialis dominica</i>        | S4B, SUM                                  |
| American goldfinch             | <i>Spinus tristis</i>            | S5B                                       |
| American kestrel               | <i>Falco sparverius</i>          | S4B                                       |
| American redstart              | <i>Setophaga ruticilla</i>       | S5B                                       |
| American robin                 | <i>Turdus migratorius</i>        | S5B                                       |
| American three-toed woodpecker | <i>Picoides dorsalis</i>         | S5                                        |
| American tree sparrow          | <i>Spizella arborea</i>          | S5B, SUM                                  |
| American white pelican         | <i>Pelecanus erythrorhynchos</i> | S3S4B                                     |
| American wigeon                | <i>Anas americana</i>            | S4B                                       |
| American woodcock              | <i>Scolopax minor</i>            | S4B                                       |
| Bald eagle                     | <i>Haliaeetus leucocephalus</i>  | S5B, SUN                                  |
| Baltimore oriole               | <i>Icterus galbula</i>           | S4B                                       |
| Bank swallow                   | <i>Riparia riparia</i>           | Threatened – no schedule                  |
| Barn swallow                   | <i>Hirundo rustica</i>           | Threatened – no schedule – S4B            |
| Barred owl                     | <i>Strix varia</i>               | S4B                                       |
| Bay-breasted warbler           | <i>Setophaga castanea</i>        | S5B                                       |
| Belted kingfisher              | <i>Megasceryle alcyon</i>        | S5B                                       |
| Black tern                     | <i>Chlidonias niger</i>          | S4B                                       |
| Black-and-white warbler        | <i>Mniotilta varia</i>           | S5B                                       |
| Black-billed cuckoo            | <i>Coccyzus erythrophthalmus</i> | S5B                                       |
| Black-billed magpie            | <i>Pica hudsonia</i>             | S4                                        |
| Blackburnian warbler           | <i>Setophaga fusca</i>           | S5B                                       |
| Black-capped chickadee         | <i>Poecile atricapillus</i>      | S5                                        |
| Black-crowned night heron      | <i>Nycticorax nycticorax</i>     | S3S4B                                     |
| Blackpoll warbler              | <i>Setophaga striata</i>         | S5B, SUM                                  |
| Black-throated blue warbler    | <i>Setophaga caerulescens</i>    | SNA                                       |

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

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

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

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

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

| Common Name               | Scientific Name                      | Conservation Listing (SARA, MESEA, MBCDC) |
|---------------------------|--------------------------------------|-------------------------------------------|
| White-breasted nuthatch   | <i>Sitta carolinensis</i>            | S5                                        |
| White-crowned sparrow     | <i>Zonotrichia leucophrys</i>        | S5B                                       |
| White-throated sparrow    | <i>Zonotrichia albicollis</i>        | S5B                                       |
| White-winged crossbill    | <i>Loxia leucoptera</i>              | S5                                        |
| Willet                    | <i>Tringa semipalmata</i>            | S4B                                       |
| Wilson's phalarope        | <i>Phalaropus tricolor</i>           | S4B                                       |
| Wilson's snipe            | <i>Gallinago delicata</i>            | S5B                                       |
| Wilson's warbler          | <i>Cardellina pusilla</i>            | S5B, SUM                                  |
| Winter wren               | <i>Troglodytes hiemalis</i>          | S5B                                       |
| Wood duck                 | <i>Aix sponsa</i>                    | S5B                                       |
| Yellow rail               | <i>Coturnicops noveboracensis</i>    | Special Concern –Schedule 1 – S3S4B       |
| Yellow warbler            | <i>Setophaga petechia</i>            | S5B                                       |
| Yellow-bellied flycatcher | <i>Empidonax flaviventris</i>        | S5B                                       |
| Yellow-bellied sapsucker  | <i>Sphyrapicus varius</i>            | S5B                                       |
| Yellow-headed blackbird   | <i>Xanthocephalus xanthocephalus</i> | S4B                                       |
| Yellow-rumped warbler     | <i>Setophaga coronata</i>            | S5B                                       |
| Yellow-throated vireo     | <i>Vireo flavifrons</i>              | 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              | <p>11 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (5 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1233#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1233#ot10</a></p>                                                                                                                                                                                                                                                                                                         |
| Barn Swallow              | <p>18 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (12 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1147#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1147#ot10</a></p>                                                                                                                                                                                                                                                                                                        |
| Black-crowned night heron | Not Listed under SARA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Bobolink                  | <p>12 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (5 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1087#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1087#ot10</a></p>                                                                                                                                                                                                                                     |
| Caspian Tern              | No Documents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Canada warbler            | <p>28 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (7 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (12 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1008#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1008#ot10</a></p> |

| Species                | Federal Recovery Documents Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chimney Swift          | <p>21 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (4 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (8 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Factsheet</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=951#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=951#ot10</a></p>             |
| Common Nighthawk       | <p>32 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (12 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (11 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=986#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=986#ot10</a></p> |
| Eastern Whip-poor-will | <p>21 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (5 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (7 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1047#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1047#ot10</a></p> |
| Eastern Wood-pewee     | <p>13 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (7 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1198#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1198#ot10</a></p>                                                                                                                                                                                                                                                                                                        |

| Species               | Federal Recovery Documents Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Golden-winged Warbler | <p>26 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (3 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (14 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Critical Habitat Descriptions in the Canada Gazette</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=942#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=942#ot10</a></p> |
| Grasshopper Sparrow   | <p>7 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (1 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1241#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1241#ot10</a></p>                                                                                                                                                                                                                                                                                                                                     |
| Horned Grebe          | <p>9 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (2 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1045#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1045#ot10</a></p>                                                                                                                                                                                                                                                                 |
| Least Bittern         | <p>19 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (2 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (3 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (7 record(s) found.)</li> <li>• <a href="#">Critical Habitat Descriptions in the Canada Gazette</a> (2 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=51#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=51#ot10</a></p>                                                                                                                                           |

| Species                | Federal Recovery Documents Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Loggerhead Shrike      | <p>18 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (2 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (2 record(s) found.)</li> <li>• <a href="#">Orders</a> (3 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (2 record(s) found.)</li> <li>• <a href="#">Critical Habitat Descriptions in the Canada Gazette</a> (2 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=38#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=38#ot10</a></p> |
| Northern Parula        | No Documents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| Olive-sided Flycatcher | <p>35 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (17 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (8 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Exceptions</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=999#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=999#ot10</a></p>                                       |
| Peregrine Falcon       | <p>7 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">Orders</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (6 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=29#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=29#ot10</a></p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Piping Plover          | <p>18 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Strategies</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (5 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (6 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Residence Description</a> (1 record(s) found.)</li> <li>• <a href="#">Critical Habitat Descriptions in the Canada Gazette</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=686#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=686#ot10</a></p>                                                                                                                                    |

| Species               | Federal Recovery Documents Available                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Red-headed Woodpecker | <p>14 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (2 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Permits and Related Agreements</a> (4 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=57#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=57#ot10</a></p> |
| Rusty Blackbird       | <p>18 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (9 record(s) found.)</li> <li>• <a href="#">Management Plans</a> (1 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=907#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=907#ot10</a></p>             |
| Short-eared Owl       | <p>15 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (1 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Action Plans</a> (6 record(s) found.)</li> <li>• <a href="#">Management Plans</a> (1 record(s) found.)</li> <li>• <a href="#">Orders</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> <li>• <a href="#">Recovery Document Posting Plans</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=60#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=60#ot10</a></p>               |
| Trumpeter Swan        | No Documents                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Yellow Rail           | <p>8 record(s) found.</p> <ul style="list-style-type: none"> <li>• <a href="#">COSEWIC Status Reports</a> (2 record(s) found.)</li> <li>• <a href="#">COSEWIC Assessments</a> (2 record(s) found.)</li> <li>• <a href="#">Response Statements</a> (1 record(s) found.)</li> <li>• <a href="#">Management Plans</a> (1 record(s) found.)</li> <li>• <a href="#">COSEWIC Annual Reports</a> (1 record(s) found.)</li> <li>• <a href="#">Consultation Documents</a> (1 record(s) found.)</li> </ul> <p><a href="http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=574#ot10">http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=574#ot10</a></p>                                                                                                                                                                                                                  |

## Appendix E: Song Bird and Water Bird Survey Results within the LSMOC LSA

| Point<br>Count<br>Number | Common Name      | Scientific Name           | Point Type  | Total<br>Count | Location |        | Area                          |
|--------------------------|------------------|---------------------------|-------------|----------------|----------|--------|-------------------------------|
|                          |                  |                           |             |                | UTM_Y    | UTM_X  |                               |
| Incidental               | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5739875  | 558908 | Option 4                      |
| 112                      | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5739875  | 558908 | Option 4                      |
| 113                      | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5738965  | 557833 | Reach 1                       |
| 86                       | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5739779  | 556772 | Reach 1                       |
| 88                       | Alder flycatcher | Empidonax alnorum         | Vocal       | 0              | 5751080  | 572931 | Reach 3<br>(Willow<br>Point)  |
| 87                       | Alder flycatcher | Empidonax alnorum         | Vocal       | 0              | 5753270  | 570518 | Reach 3<br>(Johnson<br>Beach) |
| 110                      | Alder flycatcher | Empidonax alnorum         | Vocal       | 0              | 5747151  | 560447 | Reach 2                       |
| 93                       | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5733379  | 560604 | Proposed<br>ASR               |
| 99                       | Alder flycatcher | Empidonax alnorum         | Observation | 1              | 5703477  | 560140 | Proposed<br>ASR               |
| 100                      | Alder flycatcher | Empidonax alnorum         | Vocal       | 0              | 5687199  | 558338 | Proposed<br>ASR               |
| Incidental               | American pelican | Pelecanus erythrorhynchos | Observation | 2              | 5733757  | 550791 | Lake SM<br>Shoreline          |
| Incidental               | American pelican | Pelecanus erythrorhynchos | Observation | 1              | 5733347  | 550837 | Lake SM<br>Shoreline          |
| Incidental               | American pelican | Pelecanus erythrorhynchos | Observation | 1              | 5732344  | 549872 | Lake SM<br>Shoreline          |
| Incidental               | American pelican | Pelecanus erythrorhynchos | Observation | 5              | 5733728  | 550941 | Lake SM<br>Shoreline          |
| Incidental               | American pelican | Pelecanus erythrorhynchos | Observation | 1              | 5731886  | 547490 | Lake SM<br>Shoreline          |
| Incidental               | American robin   | Turdus migratorius        | Vocal       | 0              | 5687060  | 549112 | Proposed<br>ASR               |
| 116                      | American robin   | Turdus migratorius        | Vocal       | 0              | 5742214  | 560778 | Option 4                      |
| 103                      | American robin   | Turdus migratorius        | Observation | 1              | 5739910  | 550477 | Lake SM<br>Shoreline          |
| 106                      | American robin   | Turdus migratorius        | Observation | 1              | 5736017  | 555521 | Lake SM<br>Shoreline          |
| 111                      | American robin   | Turdus migratorius        | Vocal       | 0              | 5749470  | 557059 | Reach 2                       |
| 85                       | American robin   | Turdus migratorius        | Observation | 1              | 5723591  | 553834 | Proposed<br>ASR               |
| Incidental               | Bald eagle       | Haliaeetus leucocephalus  | Observation | 1              | 5722839  | 543201 | Lake SM<br>Shoreline          |
| Incidental               | Bald eagle       | Haliaeetus leucocephalus  | Observation | 1              | 5735768  | 557269 | Lake SM<br>Shoreline          |

| Point Count Number | Common Name            | Scientific Name          | Point Type  | Total Count | Location |        | Area              |
|--------------------|------------------------|--------------------------|-------------|-------------|----------|--------|-------------------|
|                    |                        |                          |             |             | UTM_Y    | UTM_X  |                   |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 2           | 5735244  | 555778 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5735504  | 554326 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 2           | 5735580  | 554131 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5731886  | 547490 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 2           | 5731153  | 546654 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5732963  | 543297 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5732221  | 542125 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5733188  | 549848 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5733086  | 545177 | Lake SM Shoreline |
| Incidental         | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5732428  | 543800 | Lake SM Shoreline |
| 102                | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5740553  | 554367 | Reach 1           |
| 106                | Bald eagle             | Haliaeetus leucocephalus | Observation | 1           | 5736017  | 555521 | Lake SM Shoreline |
| Incidental         | Bank swallow           | Riparia riparia          | Observation | 1           | 5687031  | 546340 | Proposed ASR      |
| Incidental         | Black-capped chickadee | Poecile atricapillus     | Observation | 1           | 5739875  | 558908 | Option 4          |
| Incidental         | Black-capped chickadee | Poecile atricapillus     | Observation | 1           | 5714267  | 553269 | Proposed ASR      |
| 112                | Black-capped chickadee | Poecile atricapillus     | Observation | 1           | 5739875  | 558908 | Option 4          |
| 113                | Black-capped chickadee | Poecile atricapillus     | Observation | 1           | 5738965  | 557833 | Reach 1           |
| 111                | Black-capped chickadee | Poecile atricapillus     | Vocal       | 0           | 5749470  | 557059 | Reach 2           |
| 92                 | Black-capped chickadee | Poecile atricapillus     | Observation | 1           | 5736946  | 561827 | Proposed ASR      |
| 85                 | Black-capped chickadee | Poecile atricapillus     | Vocal       | 0           | 5723591  | 553834 | Proposed ASR      |
| Incidental         | Blue heron             | Ardea herodias           | Observation | 1           | 5710268  | 555098 | Proposed ASR      |
| Incidental         | Blue heron             | Ardea herodias           | Observation | 1           | 5738235  | 556249 | Lake SM Shoreline |
| Incidental         | Blue heron             | Ardea herodias           | Observation | 1           | 5738361  | 556967 | Lake SM Shoreline |
| Incidental         | Blue heron             | Ardea herodias           | Observation | 1           | 5737998  | 557049 | Lake SM Shoreline |

| Point Count Number | Common Name      | Scientific Name     | Point Type  | Total Count | Location |        | Area              |
|--------------------|------------------|---------------------|-------------|-------------|----------|--------|-------------------|
|                    |                  |                     |             |             | UTM_Y    | UTM_X  |                   |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5735838  | 557830 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5736144  | 555941 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5736322  | 555524 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 3           | 5732703  | 550301 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5731591  | 548446 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 3           | 5731367  | 548438 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5731165  | 547039 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 2           | 5735522  | 555489 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 1           | 5731652  | 545914 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 2           | 5733086  | 546008 | Lake SM Shoreline |
| Incidental         | Blue heron       | Ardea herodias      | Observation | 2           | 5732408  | 545547 | Lake SM Shoreline |
| 95                 | Blue jay         | Cyanocitta cristata | Observation | 1           | 5730167  | 561347 | Proposed ASR      |
| 85                 | Blue jay         | Cyanocitta cristata | Observation | 1           | 5723591  | 553834 | Proposed ASR      |
| 85                 | Blue jay         | Cyanocitta cristata | Vocal       | 0           | 5723591  | 553834 | Proposed ASR      |
| Incidental         | Blue-winged teal | Anas discors        | Observation | 4           | 5734620  | 555387 | Lake SM Shoreline |
| Incidental         | Blue-winged teal | Anas discors        | Observation | 2           | 5733147  | 542143 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 2           | 5734671  | 552934 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 1           | 5732888  | 549509 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 2           | 5731583  | 546169 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 4           | 5731570  | 549601 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 2           | 5733250  | 545746 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 1           | 5733408  | 544582 | Lake SM Shoreline |
| Incidental         | Canada goose     | Branta canadensis   | Observation | 2           | 5732232  | 544671 | Lake SM Shoreline |
| 85                 | Canada goose     | Branta canadensis   | Vocal       | 0           | 5723591  | 553834 | Proposed ASR      |

| Point<br>Count<br>Number | Common Name               | Scientific Name                   | Point Type  | Total<br>Count | Location |        | Area                 |
|--------------------------|---------------------------|-----------------------------------|-------------|----------------|----------|--------|----------------------|
|                          |                           |                                   |             |                | UTM_Y    | UTM_X  |                      |
| 92                       | Canada goose              | <i>Branta canadensis</i>          | Observation | 1              | 5736946  | 561827 | Proposed<br>ASR      |
| 100                      | Canada goose              | <i>Branta canadensis</i>          | Observation | 1              | 5694669  | 559679 | Proposed<br>ASR      |
| 99                       | Canada goose              | <i>Branta canadensis</i>          | Observation | 1              | 5701527  | 559259 | Proposed<br>ASR      |
| 100                      | Canada goose              | <i>Branta canadensis</i>          | Vocal       | 0              | 5687199  | 558338 | Proposed<br>ASR      |
| 99                       | Canada goose<br>gosling   | <i>Branta canadensis</i>          | Observation | 1              | 5701527  | 559259 | Proposed<br>ASR      |
| Incidental               | Caspian Tern              | <i>Hydroprogne caspia</i>         | Observation | 2              | 5738617  | 553935 | Lake SM<br>Shoreline |
| 106                      | Cedar waxwing             | <i>Bombycilla<br/>cedrorum</i>    | Observation | 1              | 5736017  | 555521 | Lake SM<br>Shoreline |
| 102                      | Chestnut-sided<br>warbler | <i>Setophaga<br/>pensylvanica</i> | Vocal       | 0              | 5691758  | 559058 | Proposed<br>ASR      |
| Incidental               | Chestnut sided<br>warbler | <i>Setophaga<br/>pensylvanica</i> | Vocal       | 0              | 5698137  | 558770 | Proposed<br>ASR      |
| 116                      | Clay-colored<br>sparrow   | <i>Spizella pallida</i>           | Vocal       | 0              | 5742214  | 560778 | Option 4             |
| 100                      | Clay-colored<br>sparrow   | <i>Spizella passerina</i>         | Vocal       | 0              | 5687199  | 558338 | Proposed<br>ASR      |
| 85                       | Clay-colored<br>sparrow   | <i>Spizella passerina</i>         | Vocal       | 0              | 5723591  | 553834 | Proposed<br>ASR      |
| 97                       | Clay-colored<br>sparrow   | <i>Spizella passerina</i>         | Vocal       | 0              | 5710417  | 556251 | Proposed<br>ASR      |
| 100                      | Clay-colored<br>sparrow   | <i>Spizella pallida</i>           | Vocal       | 0              | 5687199  | 558338 | Proposed<br>ASR      |
| Incidental               | Common<br>merganser       | <i>Mergus merganser</i>           | Observation | 2              | 5735726  | 556073 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 1              | 5687120  | 554435 | Proposed<br>ASR      |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Vocal       | 0              | 5687060  | 549112 | Proposed<br>ASR      |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 2              | 5738235  | 556249 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 4              | 5736448  | 557286 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 3              | 5734634  | 556861 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 1              | 5733956  | 552263 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Observation | 2              | 5732124  | 550083 | Lake SM<br>Shoreline |
| Incidental               | Common raven              | <i>Corvus corax</i>               | Vocal       | 0              | 5687100  | 553225 | Proposed<br>ASR      |
| 112                      | Common raven              | <i>Corvus corax</i>               | Observation | 1              | 5739846  | 558732 | Option 4             |
| 121                      | Common raven              | <i>Corvus corax</i>               | Observation | 1              | 5742390  | 559257 | Option 4             |

| Point<br>Count<br>Number | Common Name         | Scientific Name     | Point Type  | Total<br>Count | Location |        | Area                 |
|--------------------------|---------------------|---------------------|-------------|----------------|----------|--------|----------------------|
|                          |                     |                     |             |                | UTM_Y    | UTM_X  |                      |
| 114                      | Common raven        | Corvus corax        | Observation | 1              | 5738235  | 556249 | Option 4             |
| 107                      | Common raven        | Corvus corax        | Observation | 1              | 5736537  | 552973 | Lake SM<br>Shoreline |
| 100                      | Common raven        | Corvus corax        | Observation | 1              | 5687199  | 558338 | Proposed<br>ASR      |
| 102                      | Common raven        | Corvus corax        | Observation | 1              | 5691758  | 559058 | Proposed<br>ASR      |
| 105                      | Common sandpiper    | Actitis hypoleucos  | Observation | 1              | 5737432  | 556753 | Option 4             |
| 120                      | Common sandpiper    | Actitis hypoleucos  | Observation | 1              | 5743765  | 556829 | Reach 1              |
| 109                      | Common snipe        | Gallinago gallinago | Observation | 1              | 5747605  | 564752 | Reach 3              |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 2              | 5738235  | 556249 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 1              | 5738617  | 553935 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 3              | 5738385  | 554674 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 4              | 5738371  | 555624 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 1              | 5735128  | 556320 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 1              | 5733625  | 551939 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 5              | 5731806  | 549184 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 3              | 5731538  | 548005 | Lake SM<br>Shoreline |
| Incidental               | Common tern         | Sterna hirundo      | Observation | 1              | 5732898  | 542881 | Lake SM<br>Shoreline |
| Incidental               | Common yellowthroat | Geothlypis trichas  | Vocal       | 0              | 5687060  | 549112 | Proposed<br>ASR      |
| 86                       | Common yellowthroat | Geothlypis trichas  | Observation | 1              | 5739779  | 556772 | Reach 1              |
| 95                       | Common yellowthroat | Geothlypis trichas  | Observation | 1              | 5730167  | 561347 | Proposed<br>ASR      |
| 97                       | Common yellowthroat | Geothlypis trichas  | Observation | 1              | 5710417  | 556251 | Proposed<br>ASR      |
| 85                       | Common yellowthroat | Geothlypis trichas  | Vocal       | 0              | 5723591  | 553834 | Proposed<br>ASR      |
| 102                      | Common yellowthroat | Geothlypis trichas  | Vocal       | 0              | 5691758  | 559058 | Proposed<br>ASR      |
| 85                       | Common yellowthroat | Geothlypis trichas  | Vocal       | 0              | 5711007  | 554412 | Proposed<br>ASR      |
| 92                       | Common yellowthroat | Geothlypis trichas  | Observation | 1              | 5736946  | 561827 | Proposed<br>ASR      |
| Incidental               | Cormorant           | Phalacrocoracidae   | Observation | 30             | 5732021  | 548904 | Lake SM<br>Shoreline |

| Point Count Number | Common Name         | Scientific Name          | Point Type  | Total Count | Location |        | Area                    |
|--------------------|---------------------|--------------------------|-------------|-------------|----------|--------|-------------------------|
|                    |                     |                          |             |             | UTM_Y    | UTM_X  |                         |
| Incidental         | Cormorant           | Phalacrocoracidae        | Observation | 1           | 5732108  | 544960 | Lake SM Shoreline       |
| Incidental         | Cormorant           | Phalacrocoracidae        | Observation | 200         | 5733757  | 550791 | Lake SM Shoreline       |
| Incidental         | Eastern phoebe      | Sayornis phoebe          | Observation | 1           | 5710402  | 556378 | Proposed ASR            |
| Incidental         | Eastern phoebe      | Sayornis phoebe          | Observation | 1           | 5687182  | 557455 | Proposed ASR            |
| 88                 | Eastern phoebe      | Sayornis phoebe          | Vocal       | 0           | 5751080  | 572931 | Reach 3 (Willow Point)  |
| 116                | Eastern wood-pewee  | Contopus virens          | Vocal       | 0           | 5742214  | 560778 | Option 4                |
| Incidental         | Franklin's gull     | Leucophaeus pipixcan     | Vocal       | 0           | 5708145  | 559233 | Proposed ASR            |
| Incidental         | Franklin's gull     | Leucophaeus pipixcan     | Observation | 1           | 5738294  | 556705 | Lake SM Shoreline       |
| Incidental         | Greater yellow legs | Tringa melanoleuca       | Observation | 3           | 5710998  | 554416 | Proposed ASR            |
| Incidental         | Green-winged teal   | Anas carolinensis        | Observation | 2           | 5732124  | 550083 | Lake SM Shoreline       |
| Incidental         | Green-winged teal   | Anas carolinensis        | Observation | 2           | 5731806  | 549184 | Lake SM Shoreline       |
| Incidental         | Green-winged teal   | Anas carolinensis        | Observation | 2           | 5736287  | 557447 | Lake SM Shoreline       |
| 120                | Hawk                | Unkown Species           | Observation | 1           | 5743765  | 556829 | Reach 1                 |
| 111                | Hawk                | Unkown Species           | Observation | 0           | 5749470  | 557059 | Reach 2                 |
| 85                 | Hawk                | Unkown Species           | Observation | 0           | 5711007  | 554412 | Proposed ASR            |
| Incidental         | Hawk sp.            | Unkown Species           | Observation | 1           | 5731874  | 552217 | Lake SM Shoreline       |
| 108                | House sparrow       | Passer domesticus        | Observation | 1           | 5747403  | 565418 | Reach 3 (Johnson Beach) |
| 88                 | Immature bald eagle | Haliaeetus leucocephalus | Observation | 1           | 5751080  | 572931 | Reach 3 (Willow Point)  |
| 86                 | Immature bald eagle | Haliaeetus leucocephalus | Observation | 1           | 5739779  | 556772 | Reach 1                 |
| Incidental         | Killdeer            | Charadrius vociferus     | Observation | 1           | 5735768  | 557269 | Lake SM Shoreline       |
| Incidental         | Killdeer            | Charadrius vociferus     | Observation | 1           | 5735143  | 557176 | Lake SM Shoreline       |
| Incidental         | Killdeer            | Charadrius vociferus     | Observation | 1           | 5735149  | 555296 | Lake SM Shoreline       |
| Incidental         | Killdeer            | Charadrius vociferus     | Observation | 1           | 5732999  | 549837 | Lake SM Shoreline       |

| Point<br>Count<br>Number | Common Name      | Scientific Name      | Point Type  | Total<br>Count | Location |        | Area                 |
|--------------------------|------------------|----------------------|-------------|----------------|----------|--------|----------------------|
|                          |                  |                      |             |                | UTM_Y    | UTM_X  |                      |
| Incidental               | Killdeer         | Charadrius vociferus | Vocal       | 0              | 5732888  | 549509 | Lake SM<br>Shoreline |
| Incidental               | Killdeer         | Charadrius vociferus | Vocal       | 0              | 5732124  | 550083 | Lake SM<br>Shoreline |
| Incidental               | Killdeer         | Charadrius vociferus | Vocal       | 0              | 5731234  | 546333 | Lake SM<br>Shoreline |
| Incidental               | Killdeer         | Charadrius vociferus | Vocal       | 0              | 5731995  | 545207 | Lake SM<br>Shoreline |
| 112                      | Killdeer         | Charadrius vociferus | Observation | 1              | 5739846  | 558732 | Option 4             |
| 112                      | Killdeer         | Charadrius vociferus | Vocal       | 0              | 5739846  | 558732 | Option 4             |
| 102                      | Killdeer         | Charadrius vociferus | Observation | 1              | 5740553  | 554367 | Reach 1              |
| 106                      | Killdeer         | Charadrius vociferus | Observation | 1              | 5736017  | 555521 | Lake SM<br>Shoreline |
| 119                      | Killdeer         | Charadrius vociferus | Observation | 1              | 5742115  | 555545 | Reach 1              |
| 90                       | Killdeer         | Charadrius vociferus | Observation | 1              | 5745560  | 557625 | Reach 1              |
| 92                       | Least flycatcher | Empidonax minimus    | Observation | 1              | 5736946  | 561827 | Proposed<br>ASR      |
| Incidental               | Lesser scaup     | Aythya affinis       | Observation | 1              | 5736322  | 555524 | Lake SM<br>Shoreline |
| Incidental               | Lesser scaup     | Aythya affinis       | Observation | 2              | 5732088  | 548726 | Lake SM<br>Shoreline |
| 100                      | Lesser scaup     | Aythya affinis       | Observation | 1              | 5694669  | 559679 | Proposed<br>ASR      |
| Incidental               | Mallard          | Anas platyrhynchos   | Vocal       | 0              | 5687100  | 553225 | Proposed<br>ASR      |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 1              | 5738235  | 556249 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 1              | 5738332  | 555693 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 2              | 5738294  | 556705 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 1              | 5737624  | 557372 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 5              | 5736287  | 557447 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 8              | 5735143  | 557176 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 2              | 5734634  | 556861 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 2              | 5736144  | 555941 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 3              | 5735955  | 555463 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 2              | 5735149  | 555296 | Lake SM<br>Shoreline |
| Incidental               | Mallard          | Anas platyrhynchos   | Observation | 4              | 5735274  | 553812 | Lake SM<br>Shoreline |

| Point Count Number | Common Name | Scientific Name       | Point Type  | Total Count | Location |        | Area                    |
|--------------------|-------------|-----------------------|-------------|-------------|----------|--------|-------------------------|
|                    |             |                       |             |             | UTM_Y    | UTM_X  |                         |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 1           | 5735237  | 553611 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5734710  | 553230 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5734671  | 552934 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5734090  | 552330 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5733012  | 549909 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 4           | 5733328  | 549768 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 4           | 5732888  | 549509 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5732124  | 550083 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 4           | 5731570  | 549601 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5731588  | 549382 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 2           | 5731806  | 549184 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 1           | 5732088  | 548726 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 1           | 5733795  | 545365 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 1           | 5731995  | 545207 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 4           | 5732235  | 544493 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 4           | 5730813  | 542673 | Lake SM Shoreline       |
| Incidental         | Mallard     | Anas platyrhynchos    | Observation | 1           | 5731812  | 547013 | Lake SM Shoreline       |
| 100                | Mallard     | Anas platyrhynchos    | Observation | 1           | 5687199  | 558338 | Proposed ASR            |
| 97                 | Mallard     | Anas platyrhynchos    | Observation | 1           | 5710255  | 555771 | Proposed ASR            |
| Incidental         | Marsh wren  | Cistothorus palustris | Vocal       | 0           | 5710305  | 555930 | Proposed ASR            |
| Incidental         | Marsh wren  | Cistothorus palustris | Observation | 2           | 5733209  | 550629 | Lake SM Shoreline       |
| Incidental         | Marsh wren  | Cistothorus palustris | Observation | 1           | 5731591  | 548446 | Lake SM Shoreline       |
| 116                | Marsh wren  | Cistothorus palustris | Vocal       | 0           | 5742214  | 560778 | Option 4                |
| 127                | Marsh wren  | Cistothorus palustris | Observation | 1           | 5751870  | 569013 | Reach 3 (Johnson Beach) |

| Point<br>Count<br>Number | Common Name            | Scientific Name           | Point Type  | Total<br>Count | Location |        | Area                          |
|--------------------------|------------------------|---------------------------|-------------|----------------|----------|--------|-------------------------------|
|                          |                        |                           |             |                | UTM_Y    | UTM_X  |                               |
| Incidental               | Mourning dove          | <i>Zenaida macroura</i>   | Vocal       | 0              | 5687060  | 549112 | Proposed<br>ASR               |
| Incidental               | Northern flicker       | <i>Colaptes auratus</i>   | Observation | 1              | 5714267  | 553269 | Proposed<br>ASR               |
| Incidental               | Northern flicker       | <i>Colaptes auratus</i>   | Observation | 1              | 5687058  | 549219 | Proposed<br>ASR               |
| Incidental               | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5687100  | 553225 | Proposed<br>ASR               |
| 113                      | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5738965  | 557833 | Reach 1                       |
| 90                       | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5745560  | 557625 | Reach 1                       |
| 86                       | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5739779  | 556772 | Reach 1                       |
| 91                       | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5737271  | 558257 | Reach 1                       |
| 87                       | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5753270  | 570518 | Reach 3<br>(Johnson<br>Beach) |
| 127                      | Ovenbird               | <i>Seiurus</i>            | Vocal       | 0              | 5751870  | 569013 | Reach 3<br>(Johnson<br>Beach) |
| 93                       | Ovenbird               | <i>Seiurus</i>            | Observation | 1              | 5733379  | 560604 | Proposed<br>ASR               |
| 92                       | Ovenbird               | <i>Seiurus</i>            | Observation | 1              | 5736946  | 561827 | Proposed<br>ASR               |
| 89                       | Ovenbird               | <i>Seiurus</i>            | Observation | 1              | 5741405  | 564254 | Proposed<br>ASR               |
| Incidental               | Pileated<br>woodpecker | <i>Hylatomus pileatus</i> | Observation | 1              | 5687077  | 550817 | Proposed<br>ASR               |
| 112                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5739846  | 558732 | Option 4                      |
| 86                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5739779  | 556772 | Reach 1                       |
| 91                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5737271  | 558257 | Reach 1                       |
| 120                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5743765  | 556829 | Reach 1                       |
| 108                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5747403  | 565418 | Reach 3<br>(Johnson<br>Beach) |
| 109                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5747605  | 564752 | Reach 3                       |
| 110                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5747151  | 560447 | Reach 2                       |
| 110                      | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5747151  | 560447 | Reach 2                       |
| 93                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Observation | 1              | 5733379  | 560604 | Proposed<br>ASR               |
| 92                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Observation | 1              | 5736946  | 561827 | Proposed<br>ASR               |
| 85                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5723591  | 553834 | Proposed<br>ASR               |
| 97                       | Red-eyed vireo         | <i>Vireo olivaceus</i>    | Vocal       | 0              | 5710417  | 556251 | Proposed<br>ASR               |

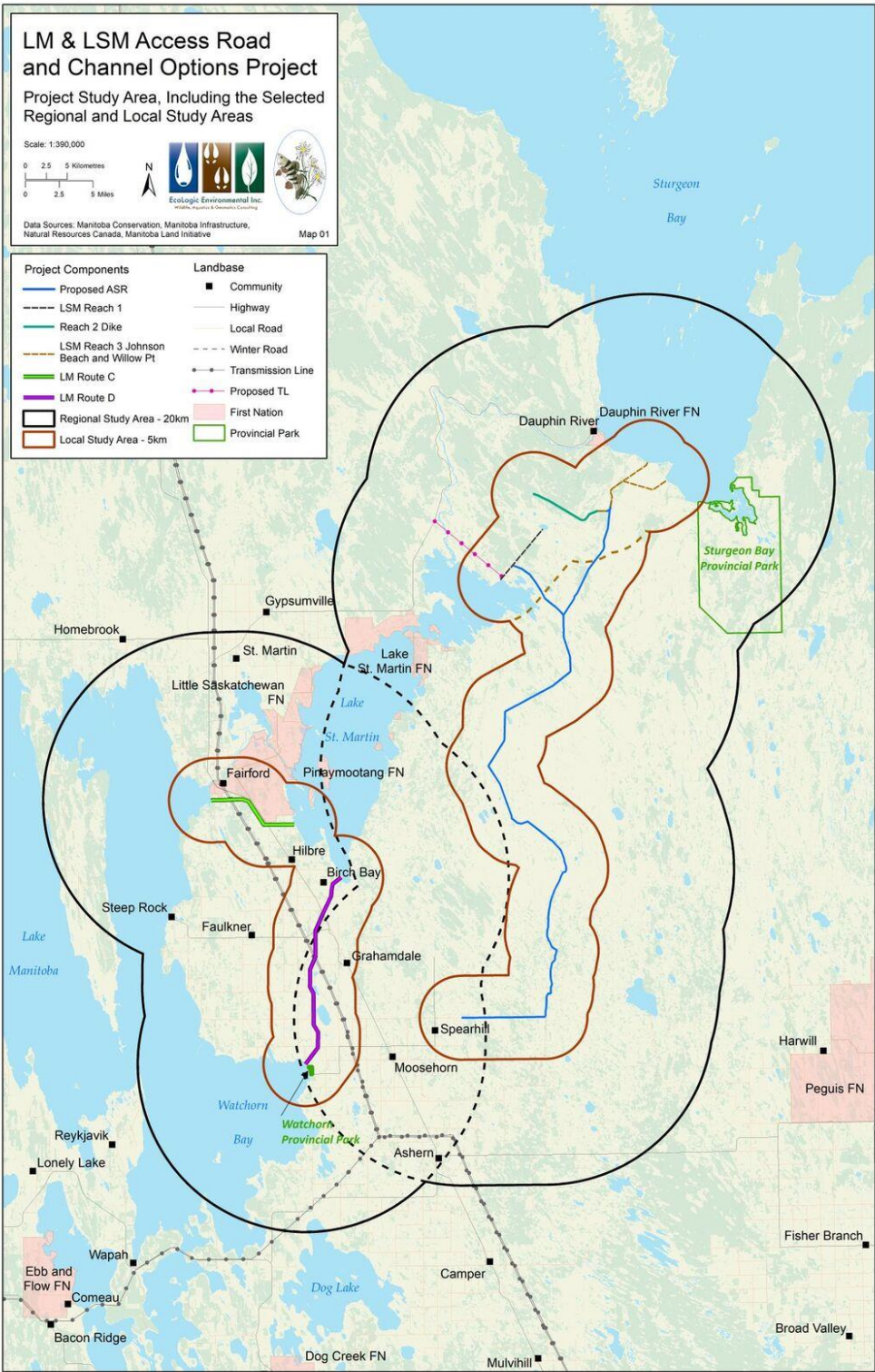
| Point Count Number | Common Name          | Scientific Name     | Point Type  | Total Count | Location |        | Area              |
|--------------------|----------------------|---------------------|-------------|-------------|----------|--------|-------------------|
|                    |                      |                     |             |             | UTM_Y    | UTM_X  |                   |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5738617  | 553935 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0           | 5710268  | 555098 | Proposed ASR      |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5710325  | 555019 | Proposed ASR      |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5710305  | 555930 | Proposed ASR      |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0           | 5687060  | 549112 | Proposed ASR      |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5739875  | 558908 | Option 4          |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5738235  | 556249 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5738294  | 556705 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5734284  | 557308 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5735023  | 556556 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 4           | 5735726  | 556073 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 4           | 5736379  | 555641 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 10          | 5735791  | 555613 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 3           | 5733328  | 549768 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5733611  | 549416 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5733086  | 546008 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0           | 5687100  | 553225 | Proposed ASR      |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 10          | 5738385  | 554674 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 10          | 5738337  | 555216 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 1           | 5737334  | 556855 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 2           | 5735274  | 553812 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 6           | 5732720  | 549634 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 4           | 5731806  | 549184 | Lake SM Shoreline |
| Incidental         | Red-winged blackbird | Agelaius phoeniceus | Observation | 4           | 5731911  | 545716 | Lake SM Shoreline |

| Point<br>Count<br>Number | Common Name          | Scientific Name     | Point Type  | Total<br>Count | Location |        | Area                    |
|--------------------------|----------------------|---------------------|-------------|----------------|----------|--------|-------------------------|
|                          |                      |                     |             |                | UTM_Y    | UTM_X  |                         |
| Incidental               | Red-winged blackbird | Agelaius phoeniceus | Observation | 4              | 5732108  | 544960 | Lake SM Shoreline       |
| Incidental               | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5731583  | 546169 | Lake SM Shoreline       |
| 105                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5737432  | 556753 | Option 4                |
| 121                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5742390  | 559257 | Option 4                |
| 112                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5739875  | 558908 | Option 4                |
| 114                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5738235  | 556249 | Option 4                |
| 87                       | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5753270  | 570518 | Reach 3 (Johnson Beach) |
| 87                       | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5753270  | 570518 | Reach 3 (Johnson Beach) |
| 87                       | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0              | 5753270  | 570518 | Reach 3 (Johnson Beach) |
| 108                      | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0              | 5747403  | 565418 | Reach 3 (Johnson Beach) |
| 127                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5751870  | 569013 | Reach 3 (Johnson Beach) |
| 103                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5739910  | 550477 | Lake SM Shoreline       |
| 106                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5736017  | 555521 | Lake SM Shoreline       |
| 107                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5736537  | 552973 | Lake SM Shoreline       |
| 119                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5742115  | 555545 | Reach 1                 |
| 120                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5743765  | 556829 | Reach 1                 |
| 113                      | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5738965  | 557833 | Reach 1                 |
| 90                       | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5745560  | 557625 | Reach 1                 |
| 86                       | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5739779  | 556772 | Reach 1                 |
| 91                       | Red-winged blackbird | Agelaius phoeniceus | Observation | 1              | 5737271  | 558257 | Reach 1                 |
| 127                      | Red-winged blackbird | Agelaius phoeniceus | Vocal       | 0              | 5751870  | 569013 | Reach 3 (Johnson Beach) |

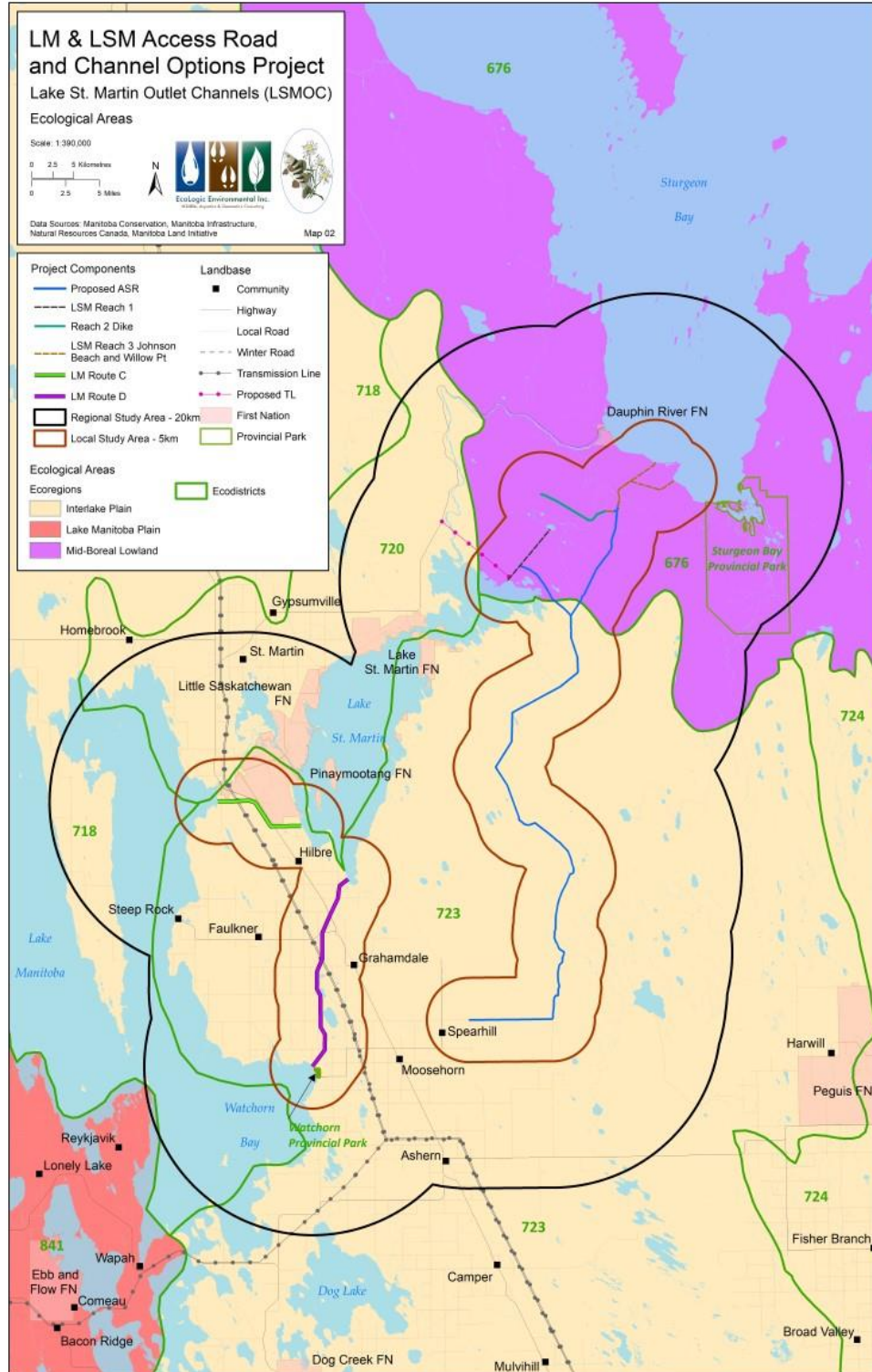
| Point Count Number | Common Name          | Scientific Name       | Point Type  | Total Count | Location |        | Area                    |
|--------------------|----------------------|-----------------------|-------------|-------------|----------|--------|-------------------------|
|                    |                      |                       |             |             | UTM_Y    | UTM_X  |                         |
| 95                 | Red-winged blackbird | Agelaius phoeniceus   | Observation | 1           | 5730167  | 561347 | Proposed ASR            |
| 89                 | Red-winged blackbird | Agelaius phoeniceus   | Observation | 1           | 5741405  | 564254 | Proposed ASR            |
| 100                | Red-winged blackbird | Agelaius phoeniceus   | Observation | 1           | 5687199  | 558338 | Proposed ASR            |
| 85                 | Red-winged blackbird | Agelaius phoeniceus   | Vocal       | 0           | 5723591  | 553834 | Proposed ASR            |
| 102                | Red-winged blackbird | Agelaius phoeniceus   | Vocal       | 0           | 5691758  | 559058 | Proposed ASR            |
| 120                | Rough legged hawk    | Buteo lagopus         | Observation | 1           | 5743765  | 556829 | Reach 1                 |
| 120                | Rough legged hawk    | Buteo lagopus         | Vocal       | 0           | 5743765  | 556829 | Reach 1                 |
| Incidental         | Sandhill crane       | Grus canadensis       | Observation | 1           | 5707021  | 560256 | Proposed ASR            |
| Incidental         | Sandhill crane       | Grus canadensis       | Observation | 2           | 5701988  | 559426 | Proposed ASR            |
| Incidental         | Sandhill crane       | Grus canadensis       | Observation | 1           | 5708145  | 559233 | Proposed ASR            |
| 85                 | Sedge wren           | Cistothorus platensis | Vocal       | 0           | 5711007  | 554412 | Proposed ASR            |
| 127                | Sora                 | Porzana carolina      | Vocal       | 0           | 5751870  | 569013 | Reach 3 (Johnson Beach) |
| 95                 | Sora                 | Porzana carolina      | Vocal       | 0           | 5730167  | 561347 | Proposed ASR            |
| 100                | Sora                 | Porzana carolina      | Vocal       | 0           | 5687199  | 558338 | Proposed ASR            |
| 97                 | Sora                 | Porzana carolina      | Vocal       | 0           | 5710417  | 556251 | Proposed ASR            |
| 86                 | Swainson's hawk      | Buteo swainsoni       | Observation | 1           | 5739779  | 556772 | Reach 1                 |
| 105                | Swamp sparrow        | Melospiza georgiana   | Observation | 1           | 5737432  | 556753 | Option 4                |
| 121                | Swamp sparrow        | Melospiza georgiana   | Observation | 1           | 5742390  | 559257 | Option 4                |
| 114                | Swamp sparrow        | Melospiza georgiana   | Vocal       | 0           | 5738182  | 557002 | Option 4                |
| 115                | Swamp sparrow        | Melospiza georgiana   | Vocal       | 0           | 5741453  | 560114 | Option 4                |
| 116                | Swamp sparrow        | Melospiza georgiana   | Vocal       | 0           | 5742214  | 560778 | Option 4                |
| 103                | Swamp sparrow        | Melospiza georgiana   | Observation | 1           | 5739910  | 550477 | Lake SM Shoreline       |
| 107                | Swamp sparrow        | Melospiza georgiana   | Observation | 1           | 5736537  | 552973 | Lake SM Shoreline       |
| 127                | Swamp sparrow        | Melospiza georgiana   | Vocal       | 0           | 5751870  | 569013 | Reach 3 (Johnson Beach) |
| 108                | Swamp sparrow        | Melospiza georgiana   | Vocal       | 0           | 5747403  | 565418 | Reach 3 (Johnson Beach) |

| Point Count Number | Common Name             | Scientific Name               | Point Type  | Total Count | Location |        | Area                    |
|--------------------|-------------------------|-------------------------------|-------------|-------------|----------|--------|-------------------------|
|                    |                         |                               |             |             | UTM_Y    | UTM_X  |                         |
| 109                | Swamp sparrow           | Melospiza georgiana           | Vocal       | 0           | 5747605  | 564752 | Reach 3                 |
| 85                 | Swamp sparrow           | Melospiza georgiana           | Vocal       | 0           | 5711007  | 554412 | Proposed ASR            |
| Incidental         | Tree swallow            | Tachycineta bicolor           | Vocal       | 0           | 5710325  | 555019 | Proposed ASR            |
| 120                | Tree swallow            | Tachycineta bicolor           | Observation | 1           | 5743765  | 556829 | Reach 1                 |
| 85                 | Trumpeter swan          | Cygnus buccinator             | Observation | 1           | 5725200  | 556781 | Proposed ASR            |
| 85                 | Trumpeter swan          | Cygnus buccinator             | Observation | 2           | 5721413  | 553579 | Proposed ASR            |
| 91                 | Veery                   | Catharus fuscescens           | Observation | 1           | 5737271  | 558257 | Reach 1                 |
| 87                 | Vesper sparrow          | Poocetes gramineus            | Vocal       | 0           | 5753270  | 570518 | Reach 3 (Johnson Beach) |
| 93                 | Vesper sparrow          | Poocetes gramineus            | Observation | 1           | 5733379  | 560604 | Proposed ASR            |
| 95                 | Vesper sparrow          | Poocetes gramineus            | Observation | 1           | 5730167  | 561347 | Proposed ASR            |
| Incidental         | Warbling vireo          | Vireo gilvus                  | Vocal       | 0           | 5687060  | 549112 | Proposed ASR            |
| 127                | White throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5751870  | 569013 | Reach 3 (Johnson Beach) |
| 109                | White throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5747605  | 564752 | Reach 3                 |
| 110                | White throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5747151  | 560447 | Reach 2                 |
| 93                 | White throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5733379  | 560604 | Proposed ASR            |
| 95                 | White throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5730167  | 561347 | Proposed ASR            |
| Incidental         | White-throated sparrow  | Zonotrichia albicollis        | Vocal       | 0           | 5710998  | 554416 | Proposed ASR            |
| Incidental         | Wilson's snipe          | Gallinago delicata            | Vocal       | 0           | 5687060  | 549112 | Proposed ASR            |
| Incidental         | Wilson's snipe          | Gallinago delicata            | Observation | 1           | 5739875  | 558908 | Option 4                |
| 105                | Yellow headed blackbird | Xanthocephalus xanthocephalus | Observation | 1           | 5737432  | 556753 | Option 4                |

## **Appendix F: Report Mapping**

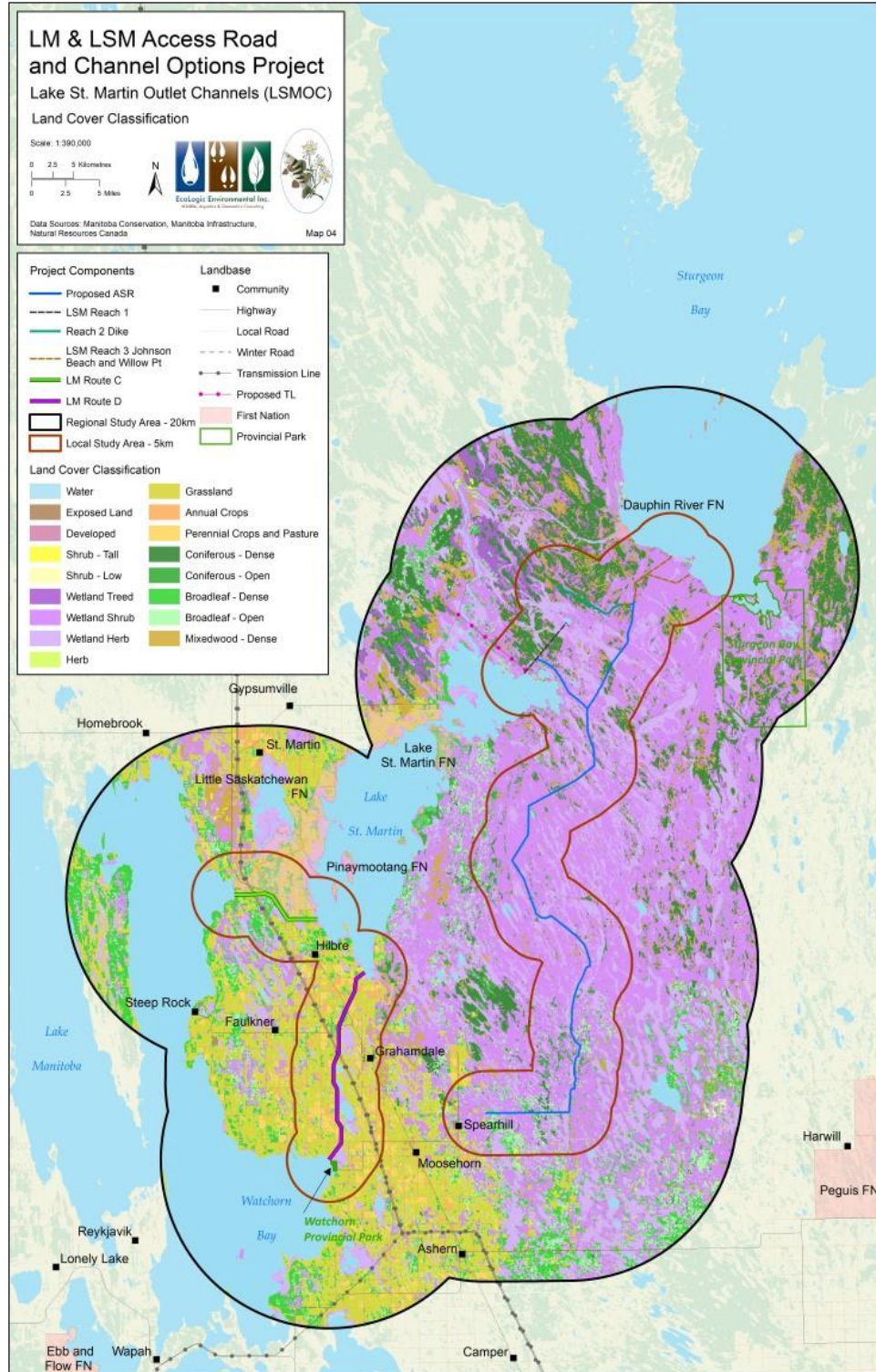


Map 1: Study Areas

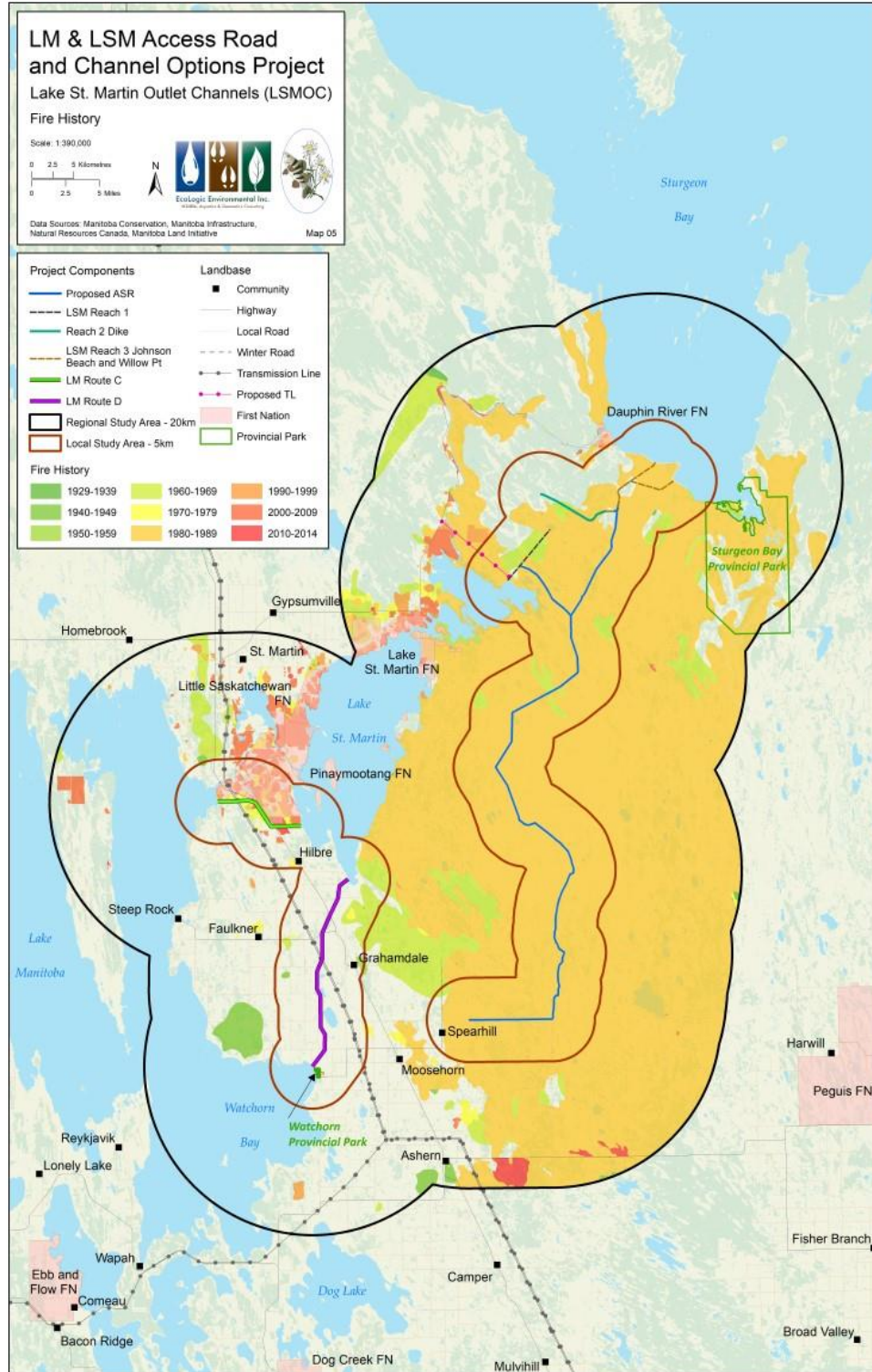


Map 2: Ecoregions within the LSA and RSA



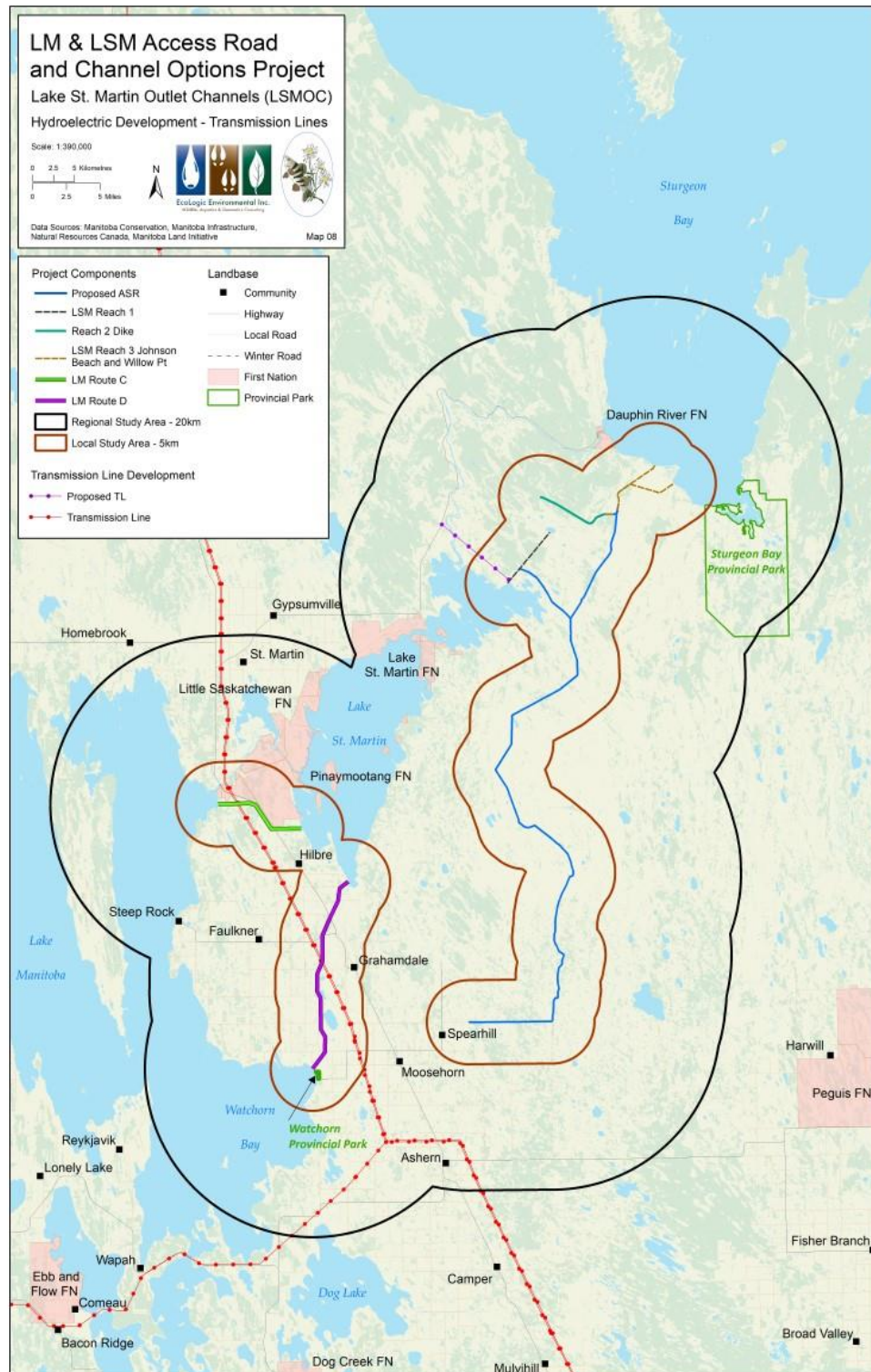


**Map 4: Land Cover Classification (LCC) within the LSA and RSA**

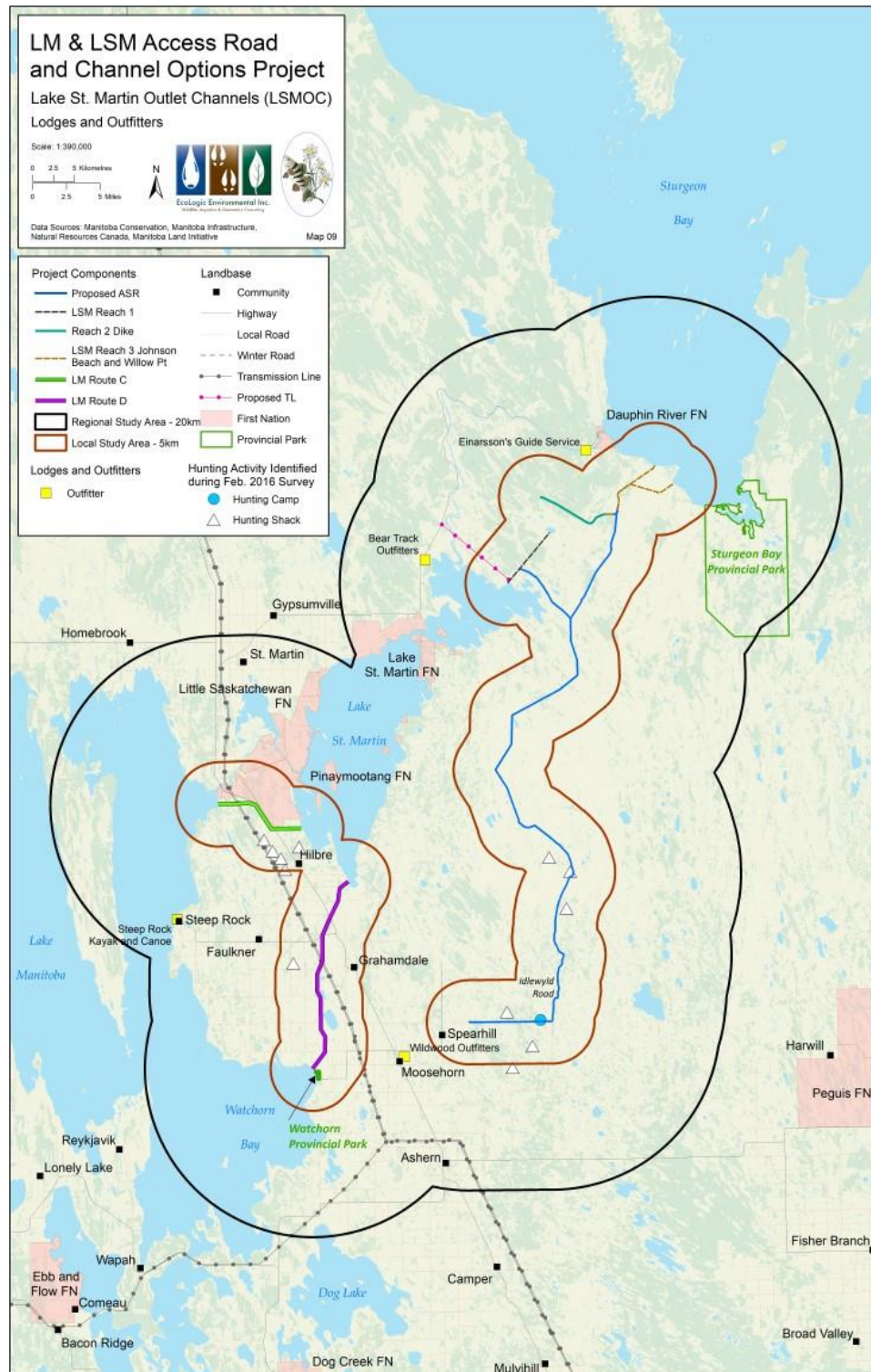


Map 5: Fire History within the LSA and RSA

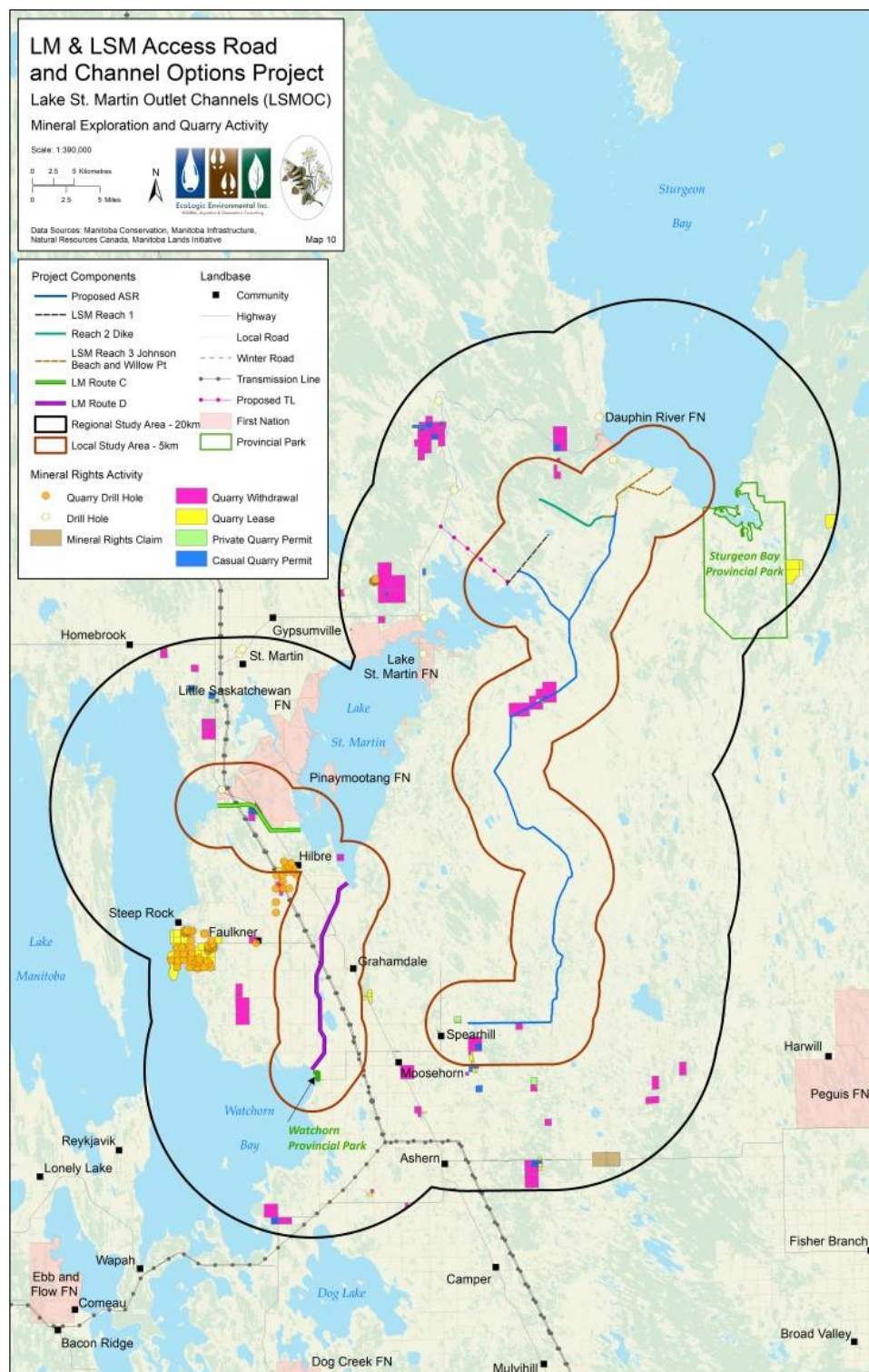




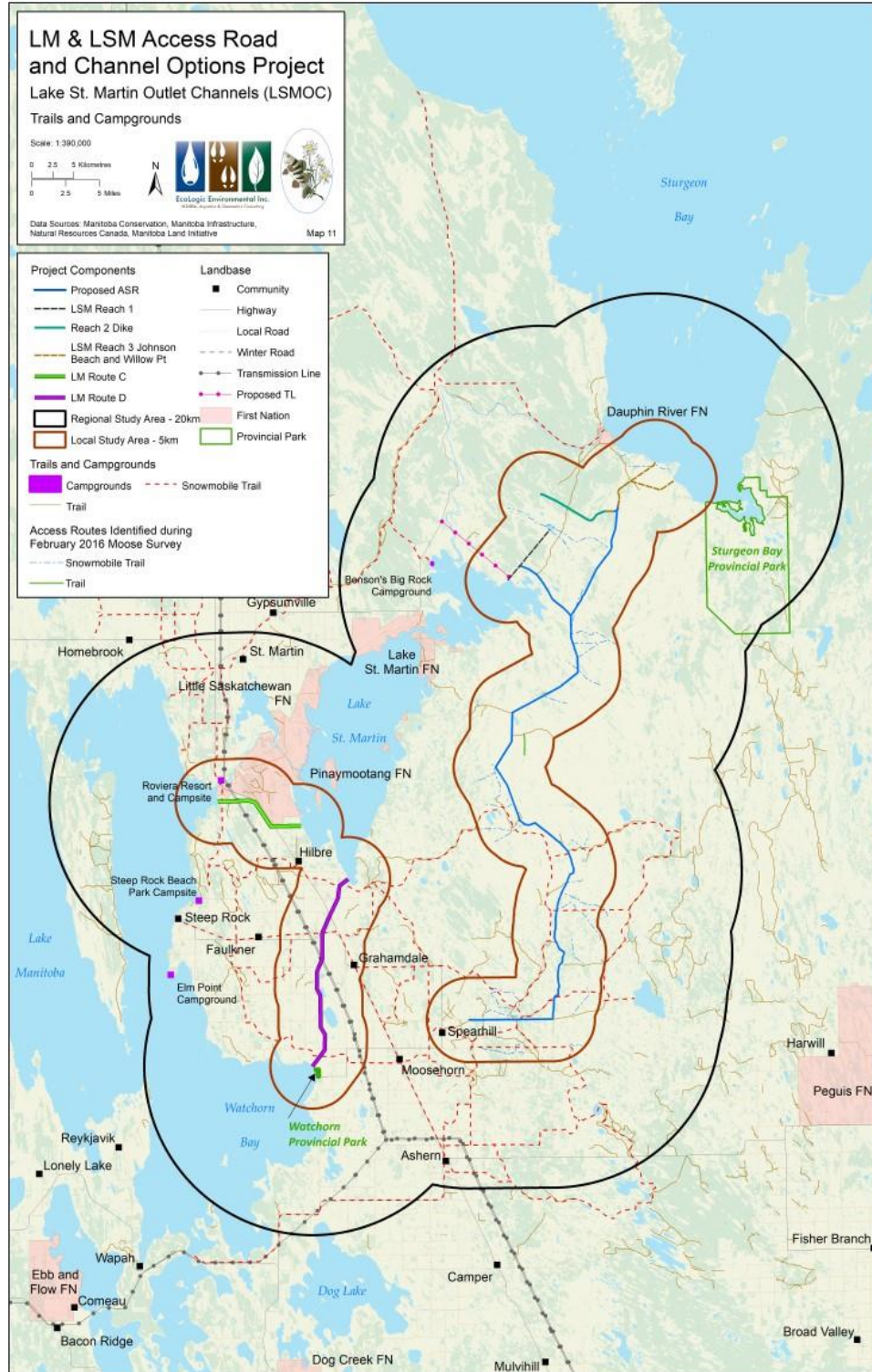
Map 8: Hydroelectric Development - Transmission Lines within the LSA and RSA



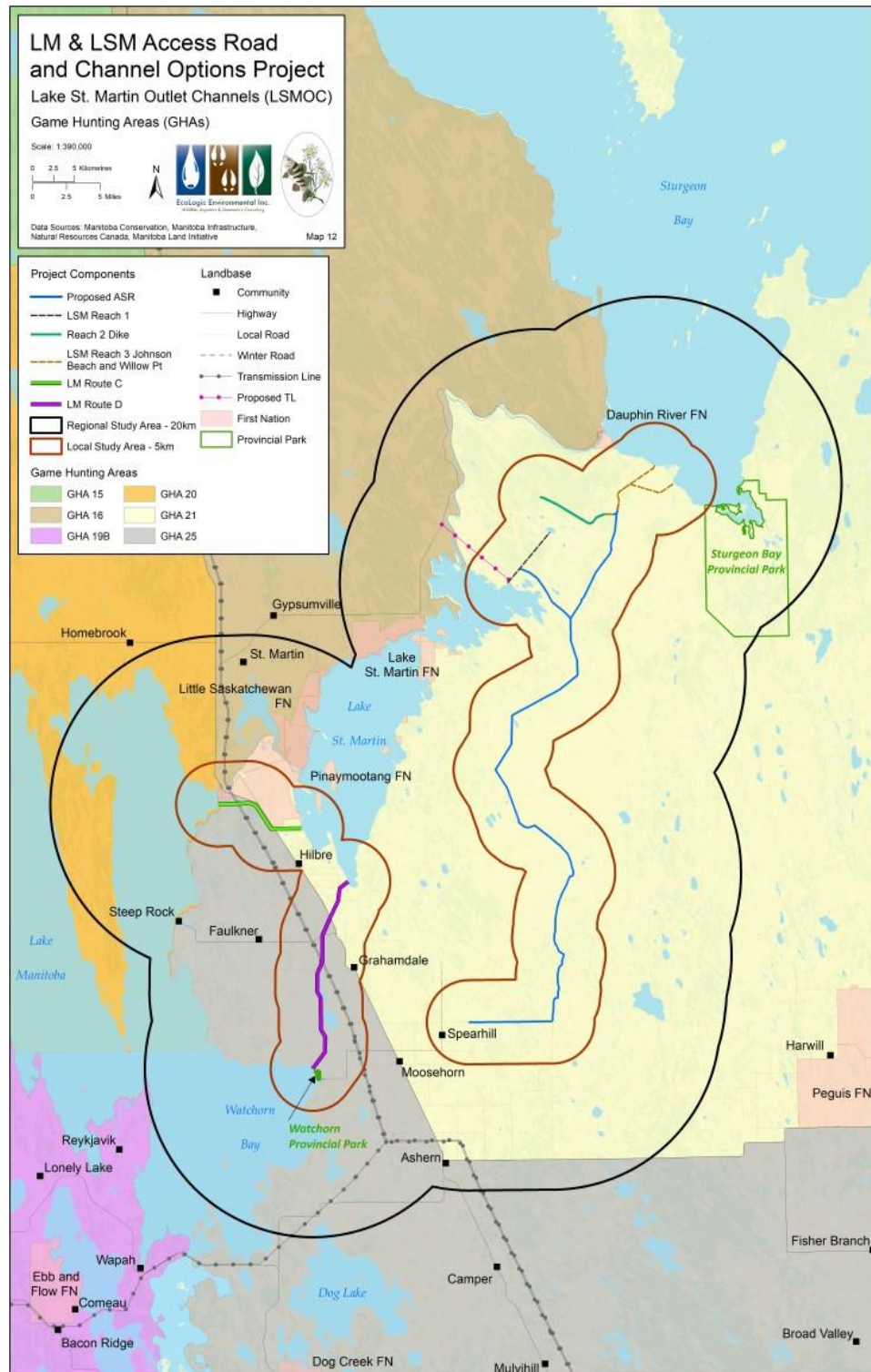
Map 9: Lodges and Outfitters within the LSA and RSA



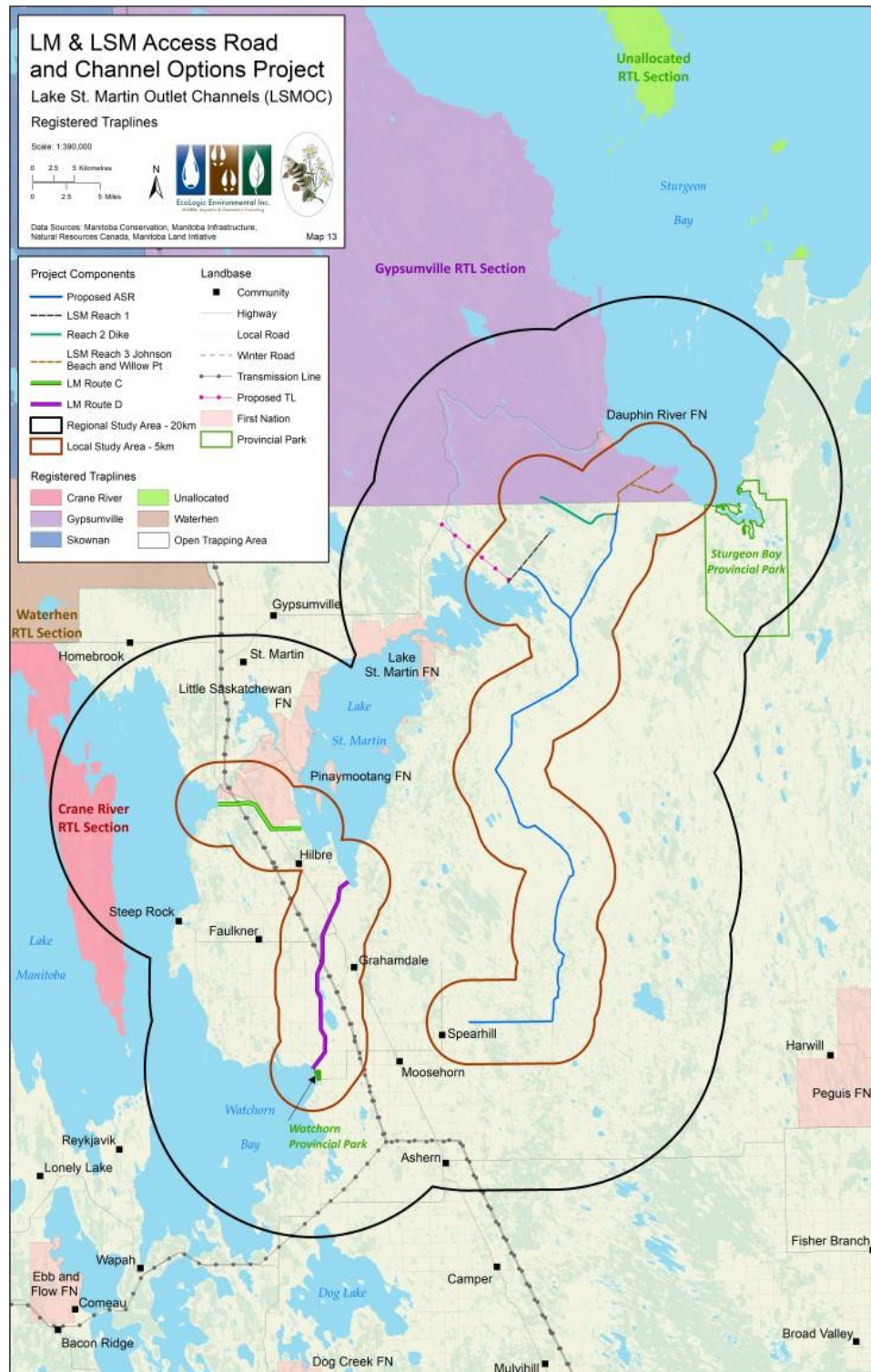
Map 10: Mineral Exploration and Quarry Activity within the LSA and RSA



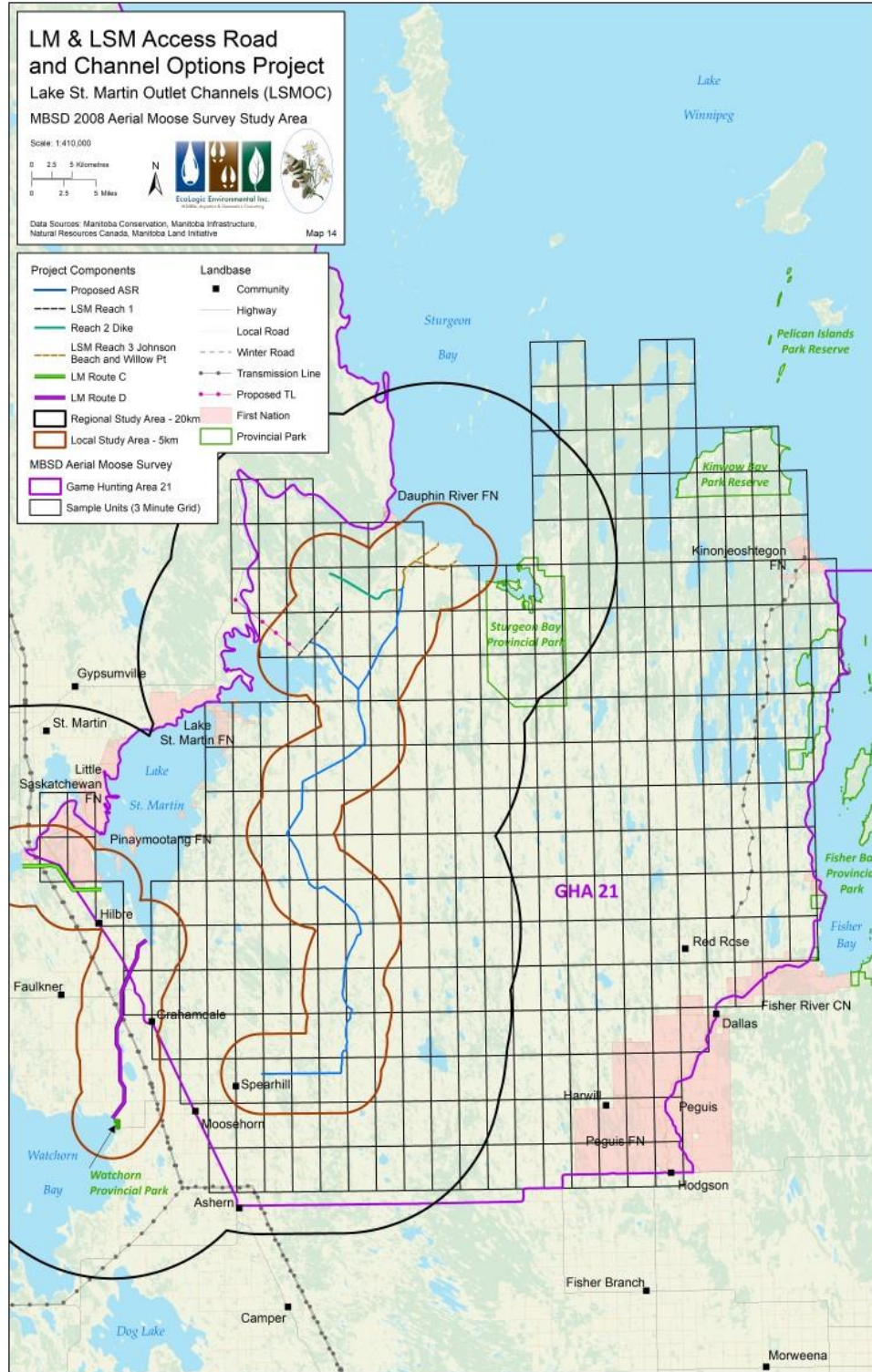
Map 11: Trails and Campgrounds within the LSA and RSA



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



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

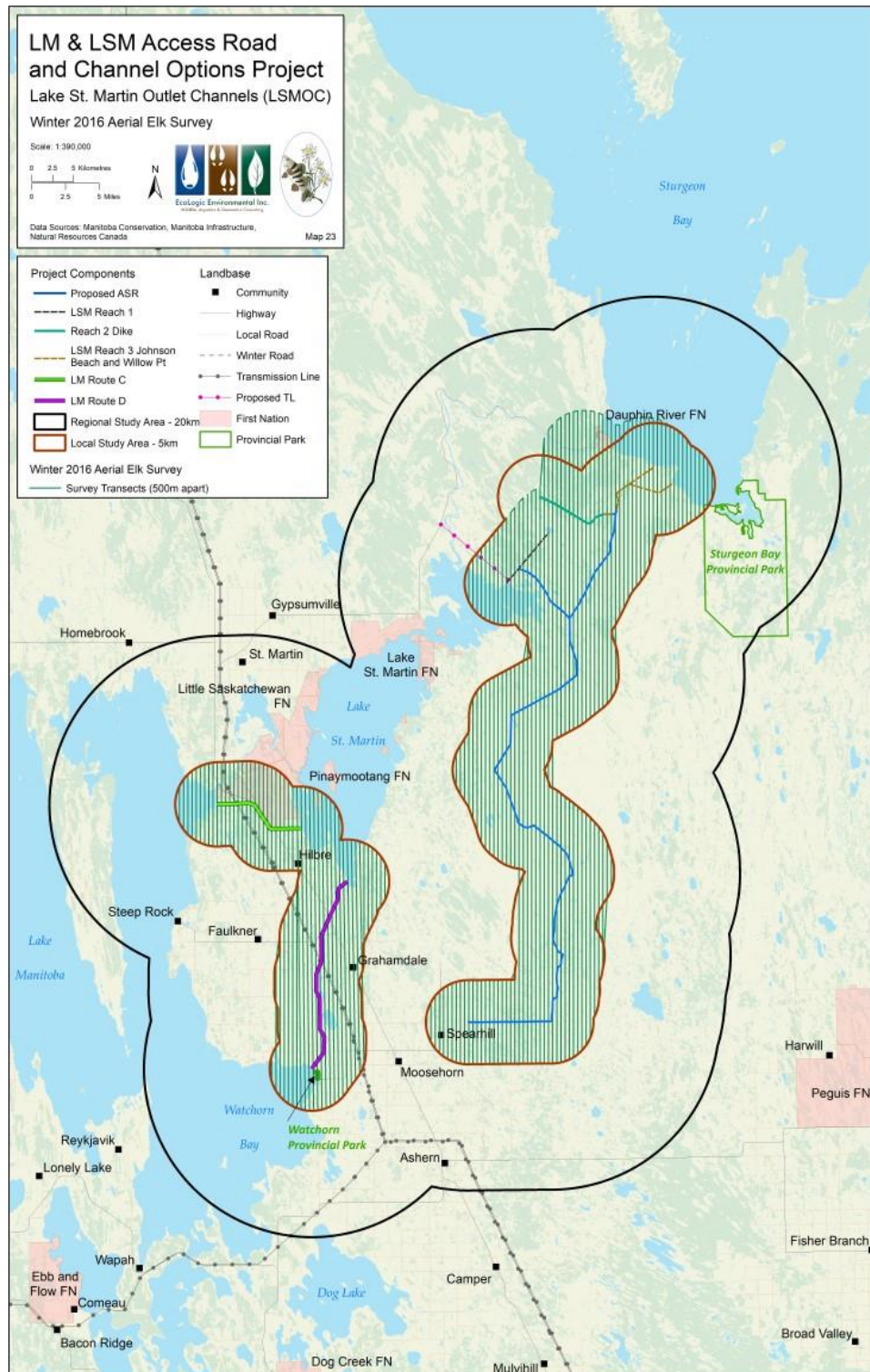


Map 14: Manitoba Sustainable Development (MBSD) 2008 Aerial Moose Survey Area

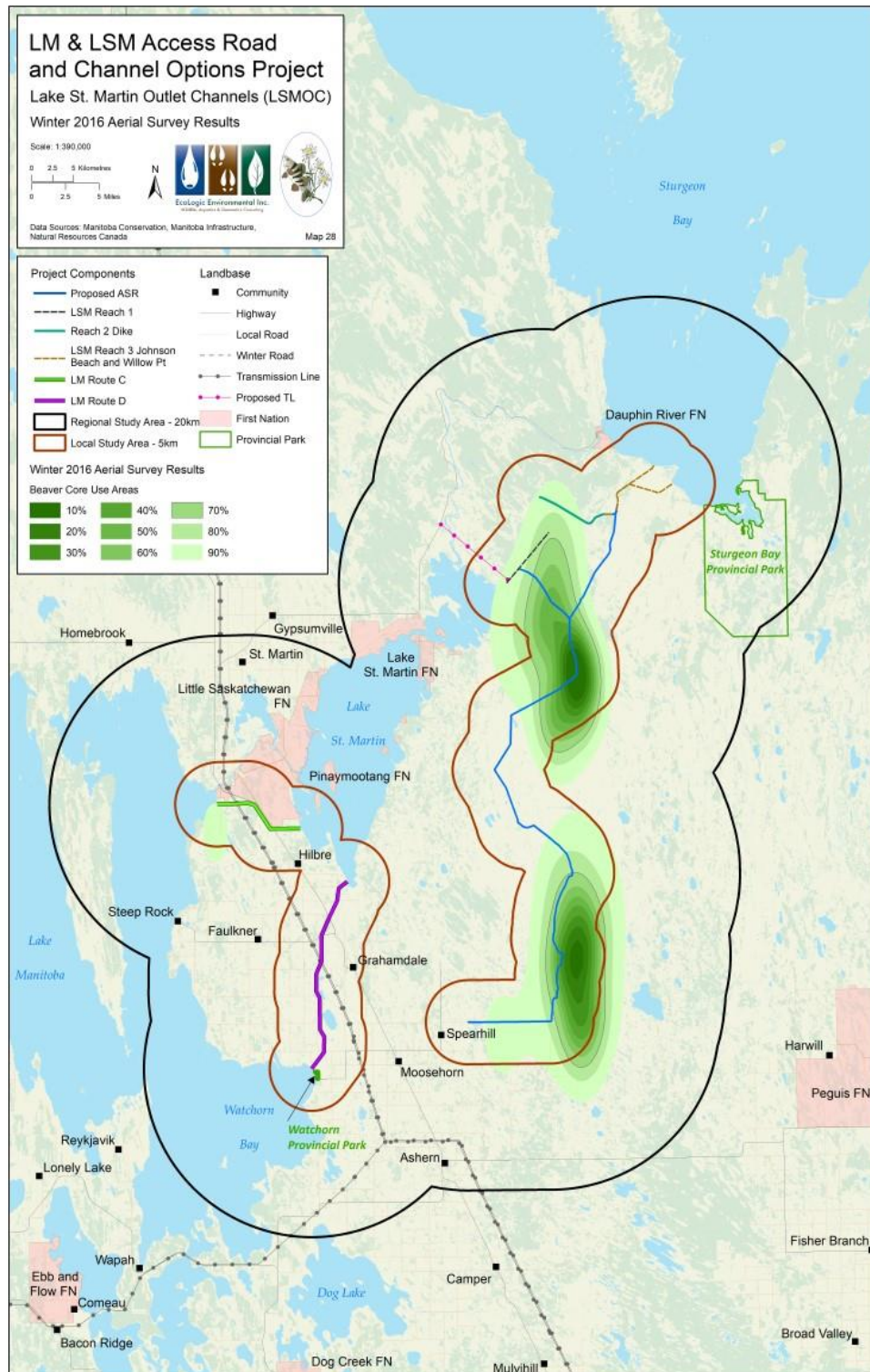




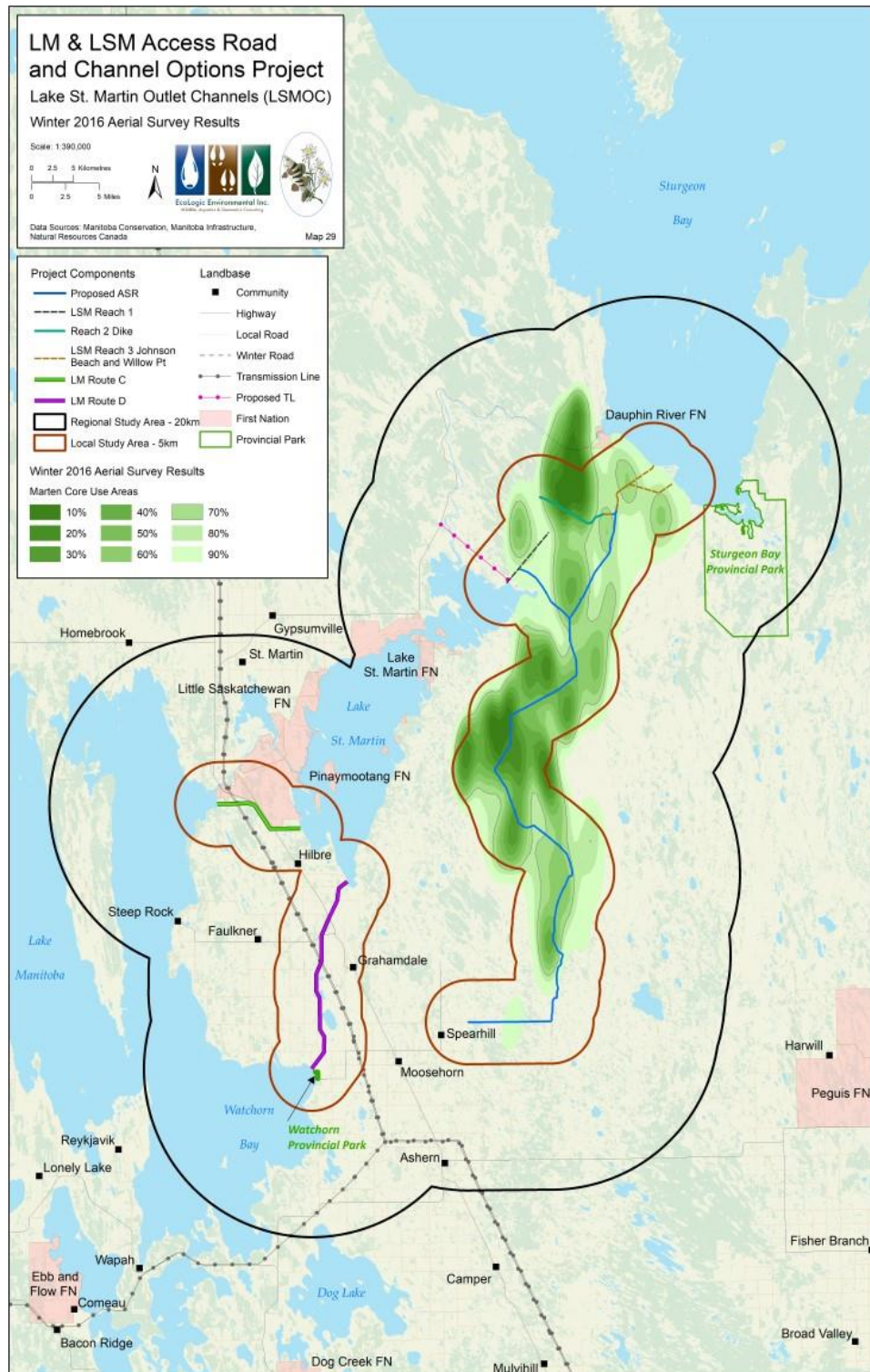
Map 21: Manitoba Sustainable Development (MBSD) Aerial Elk Survey Area



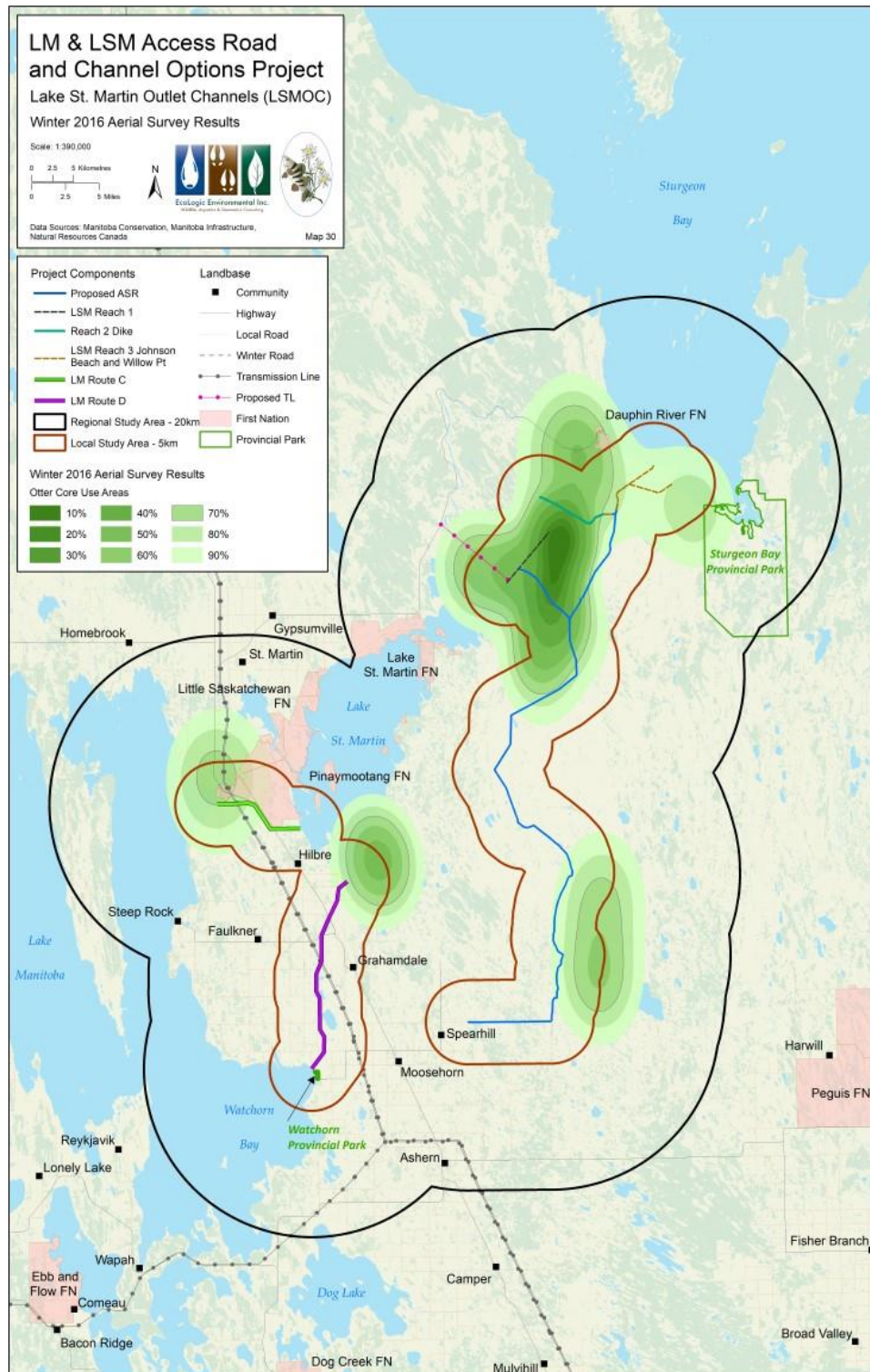
Map 23: Winter 2016 Aerial Elk Survey Area



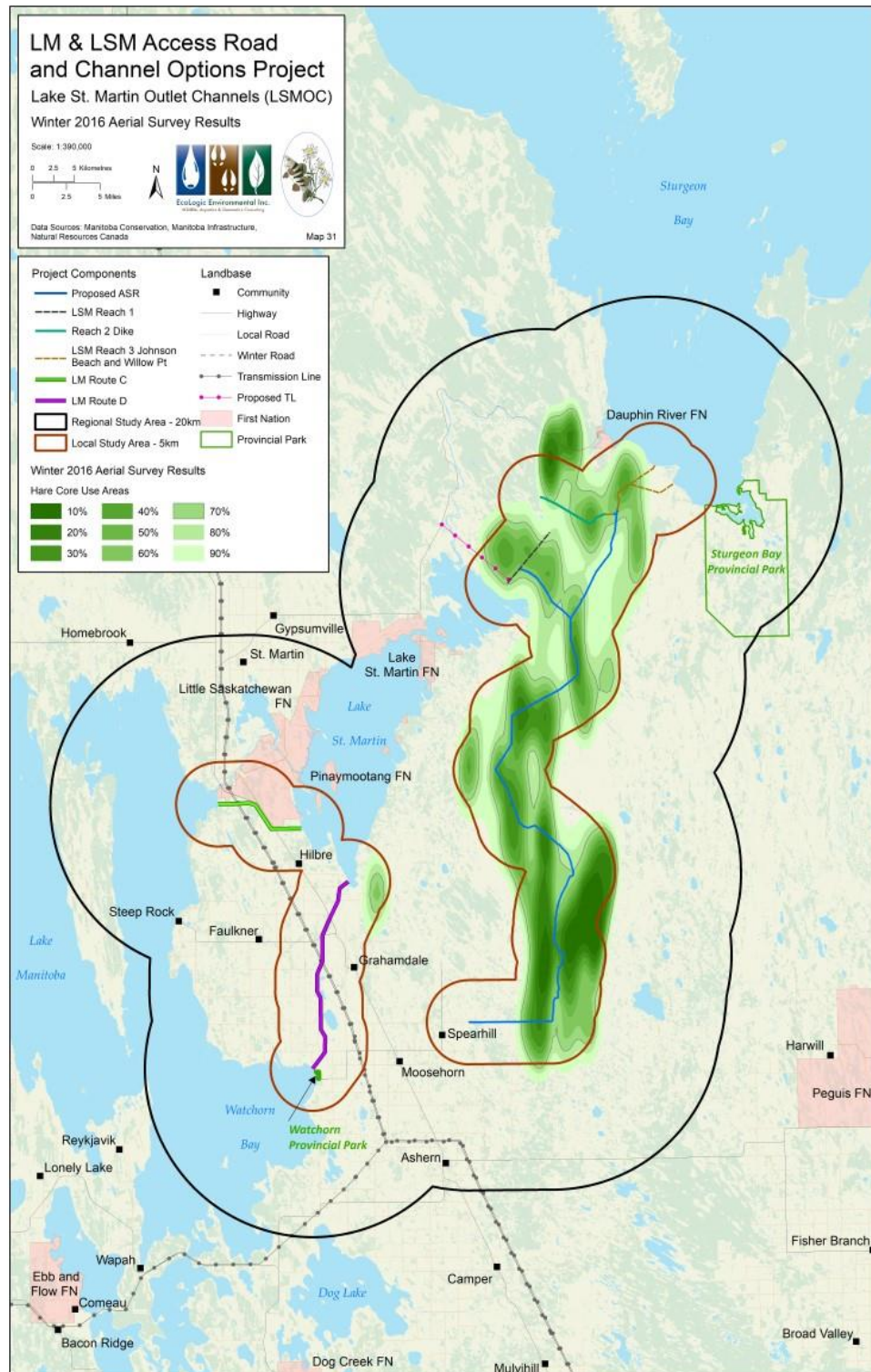
**Map 28: Beaver Aerial Survey Results**



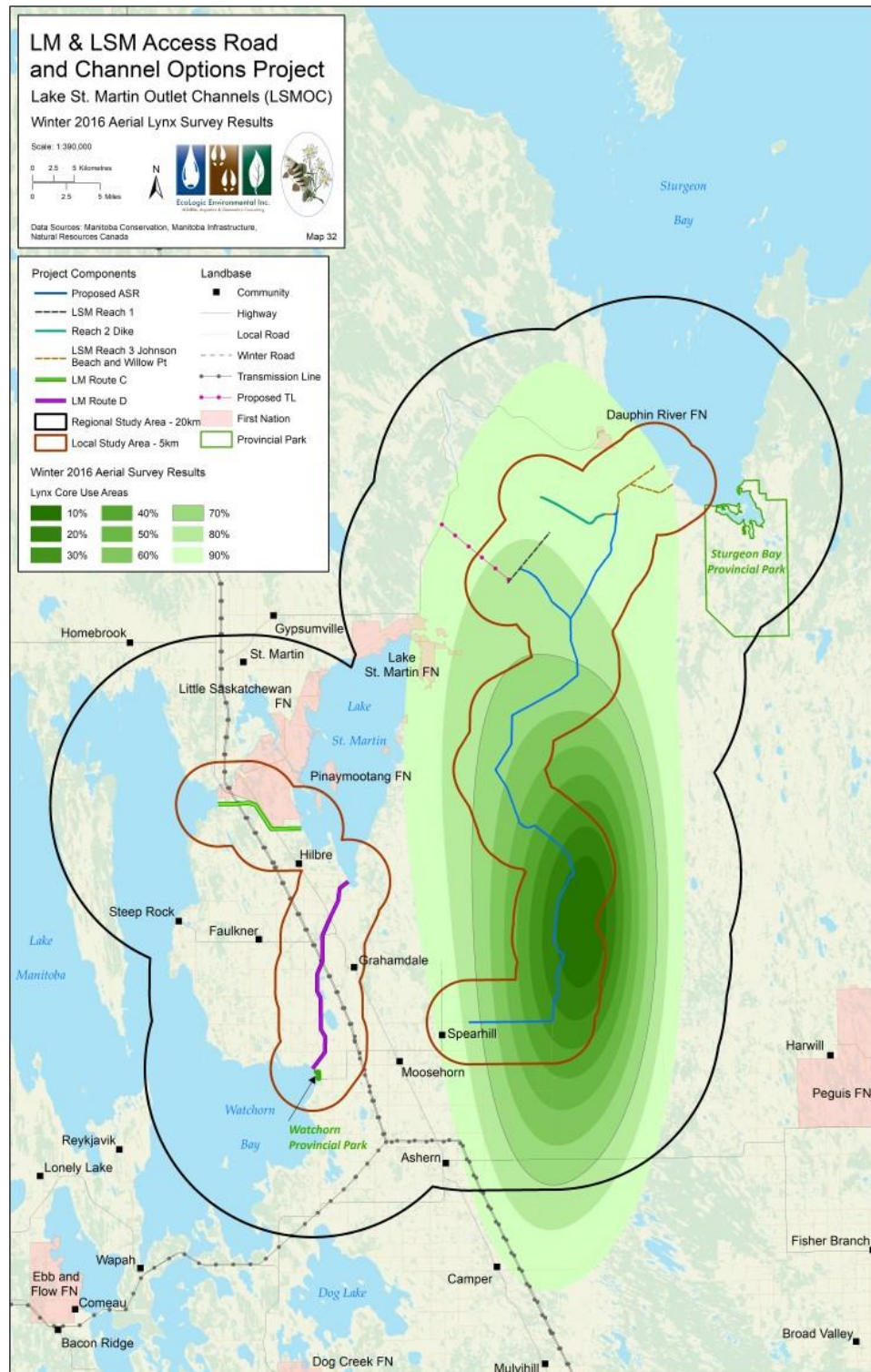
Map 29: Marten Aerial Survey Results



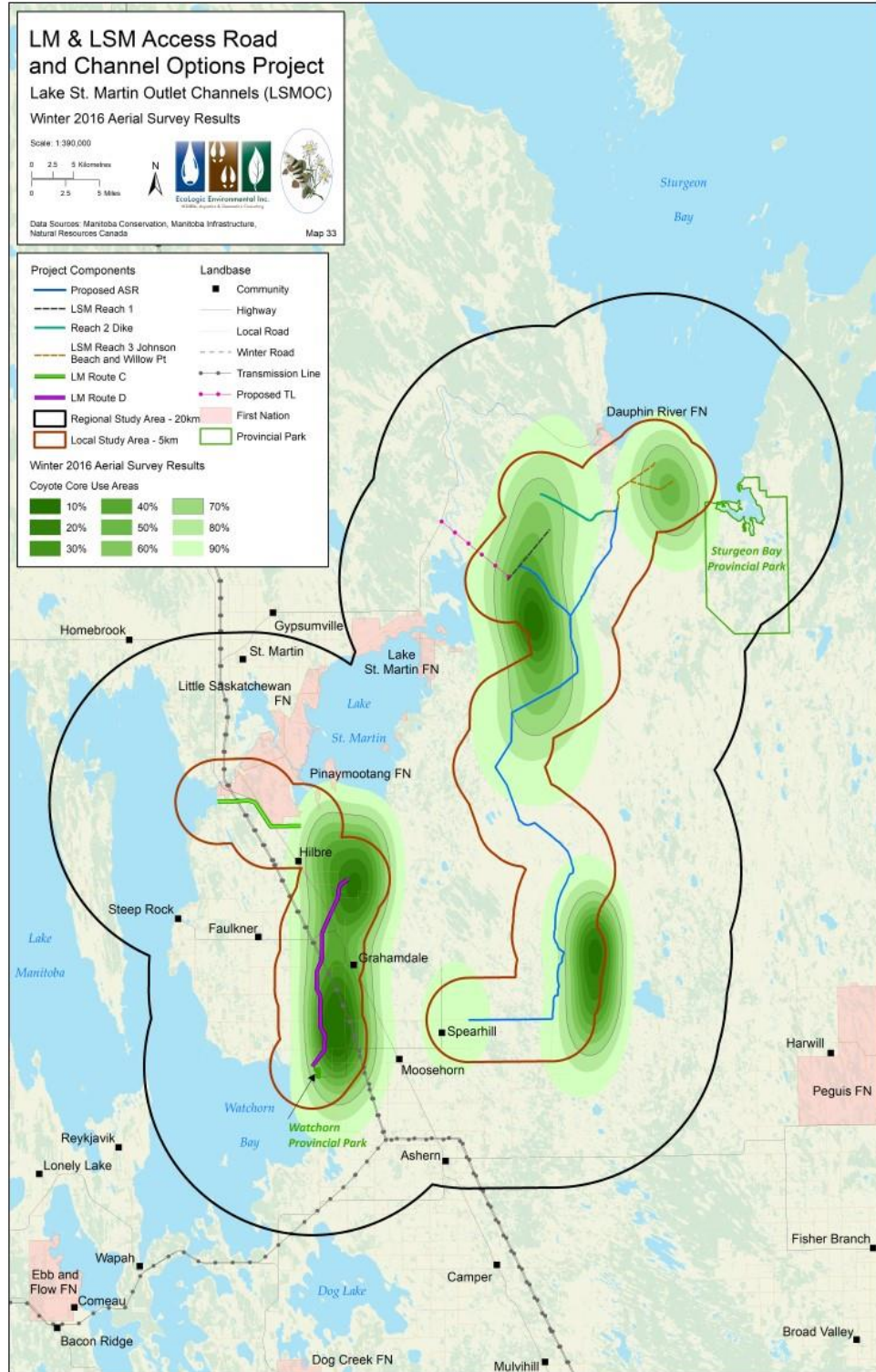
Map 30: Otter Aerial Survey Results



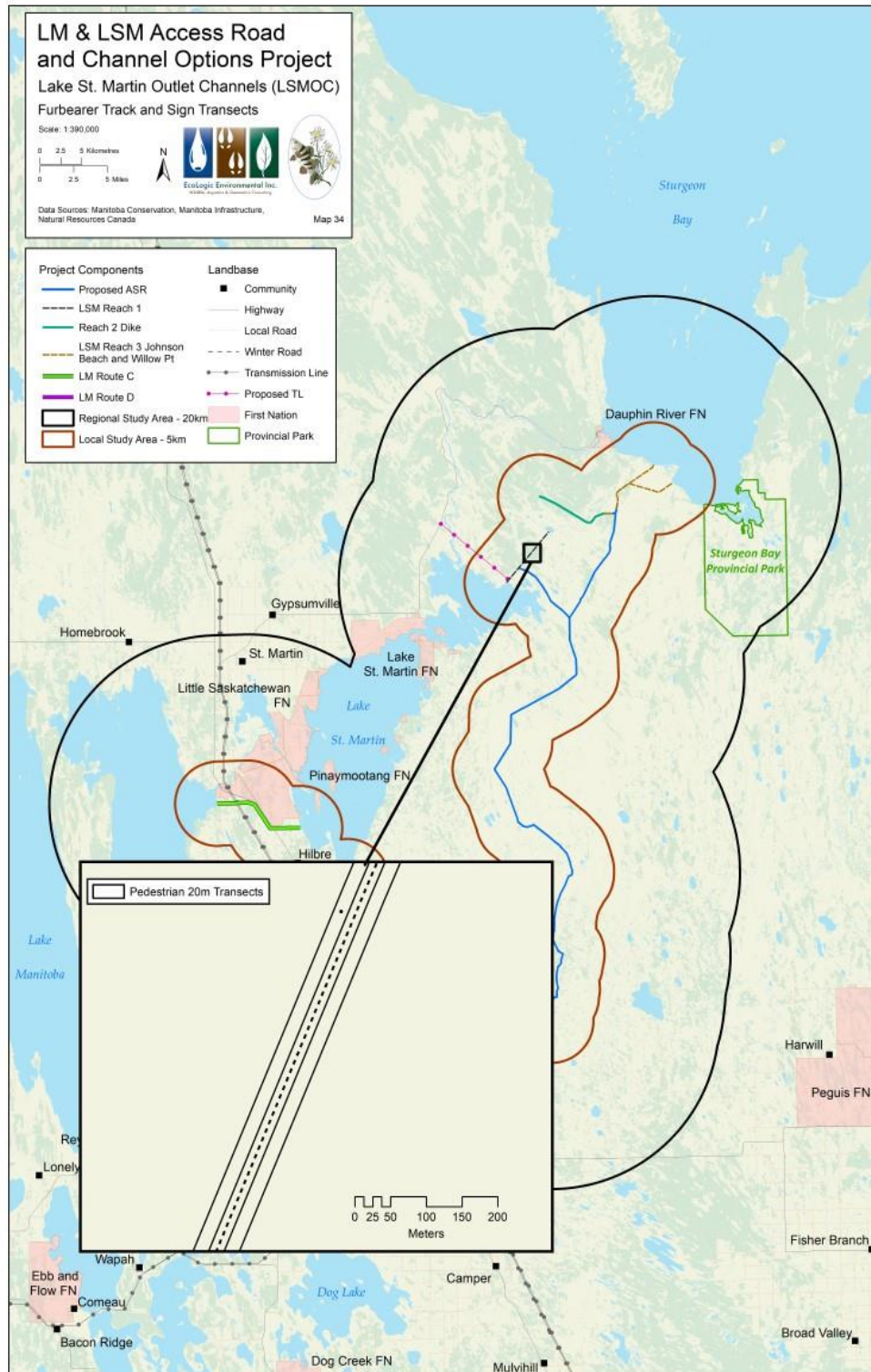
Map 31: Hare Aerial Survey Results



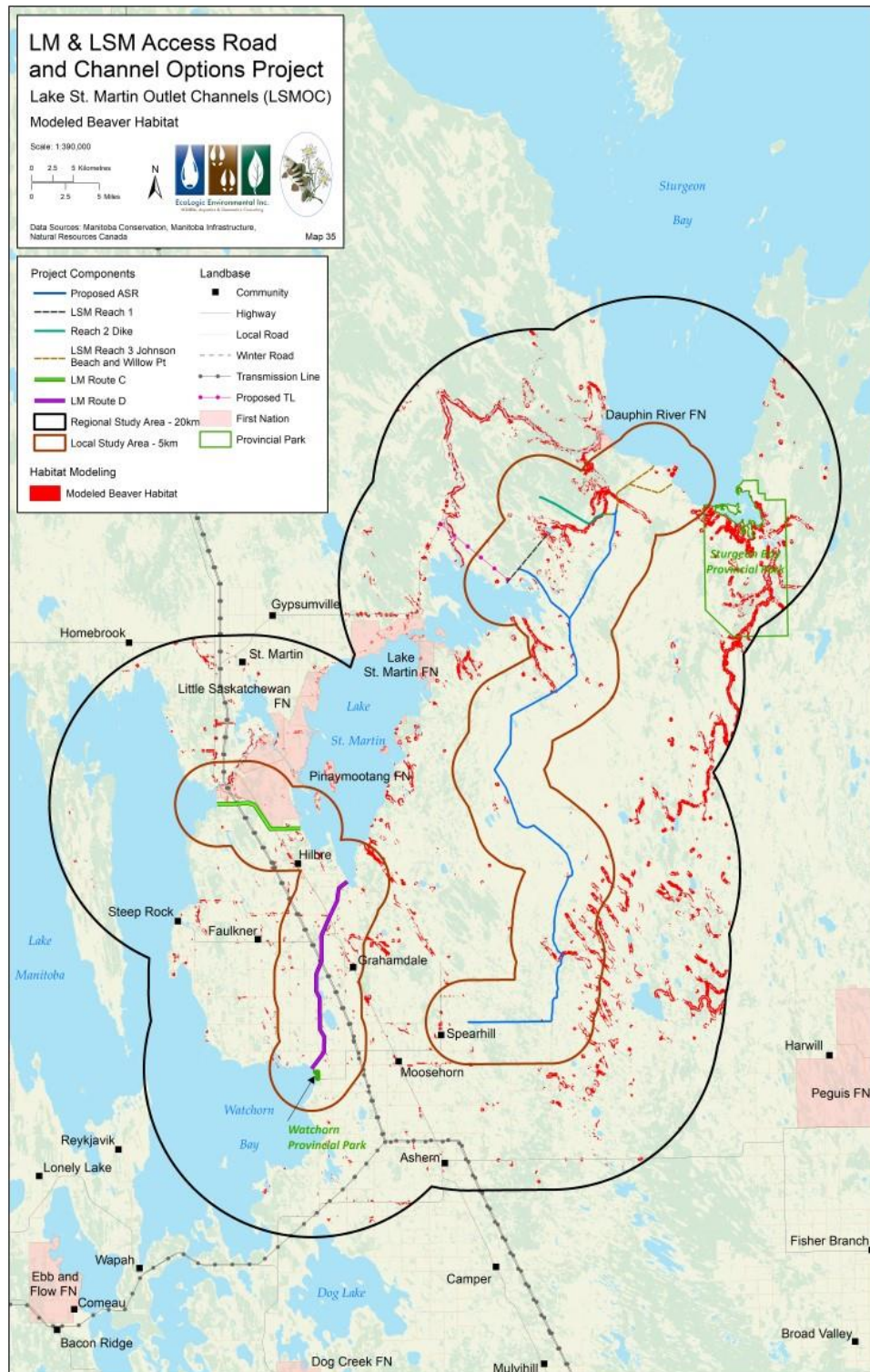
Map 32: Lynx Aerial Survey Results



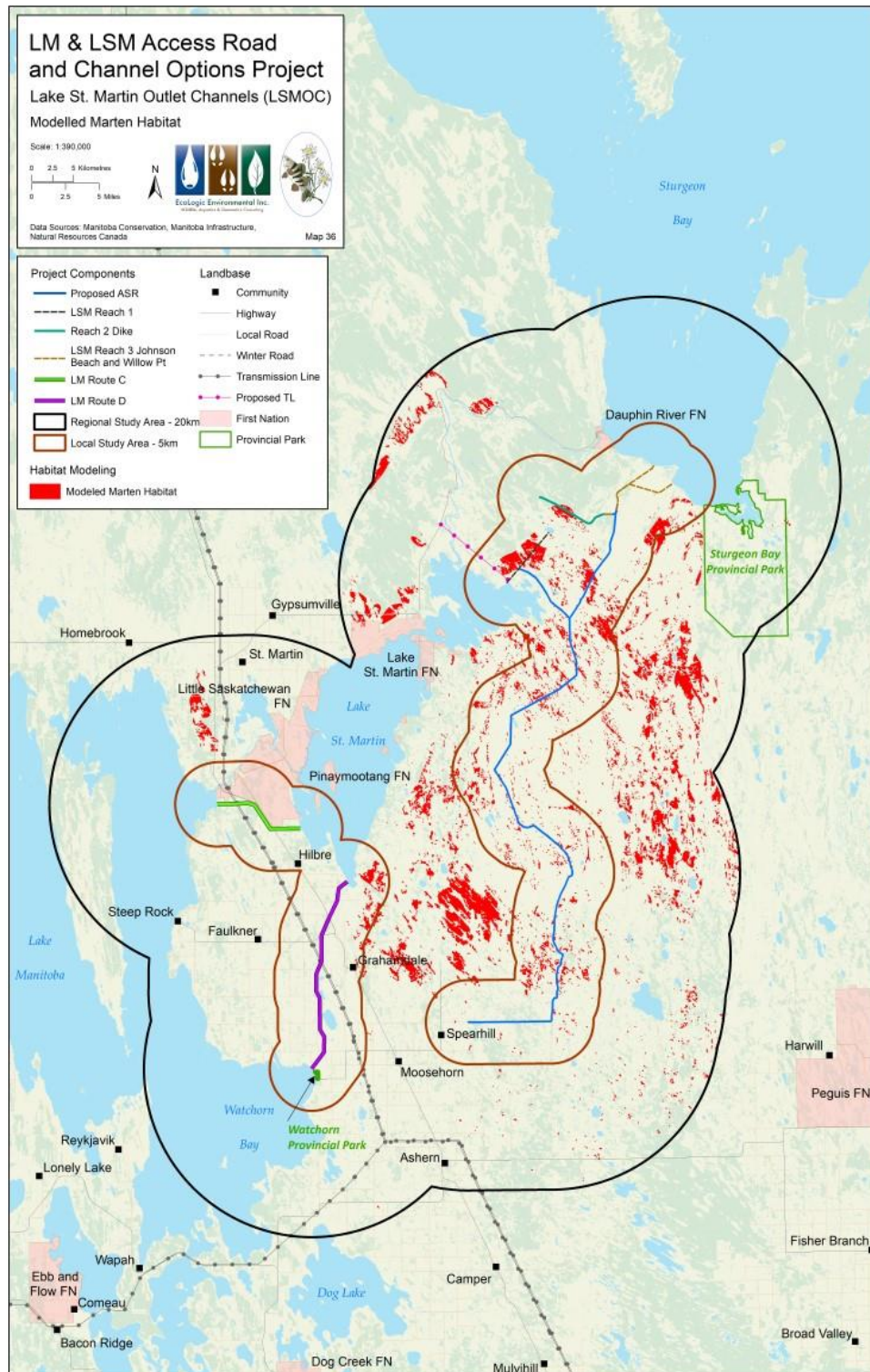
Map 33: Coyote Aerial Survey Results



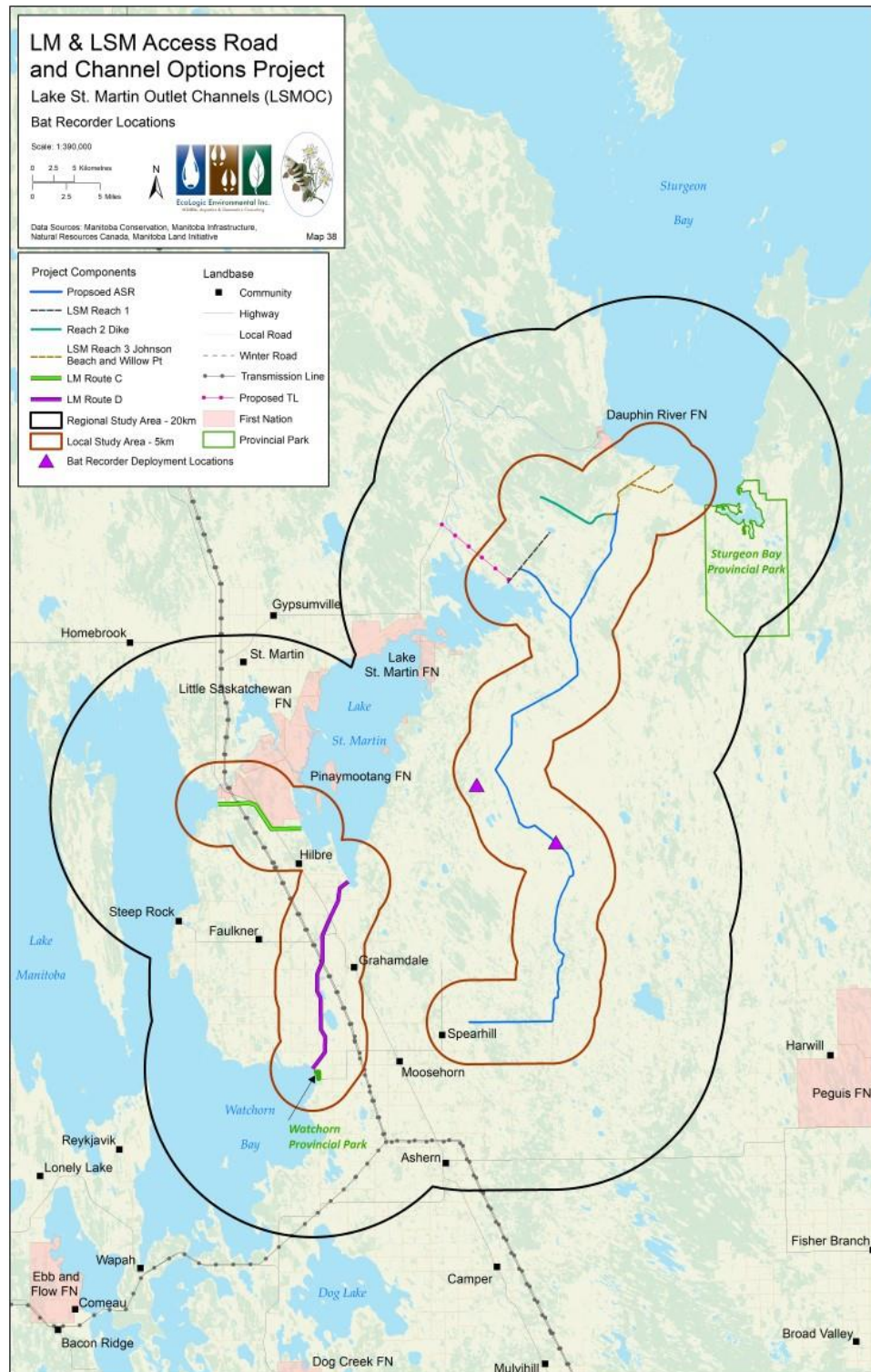
**Map 34: Furbearer Track and Sign Survey Transects**



**Map 35: Modeled Beaver Habitat**

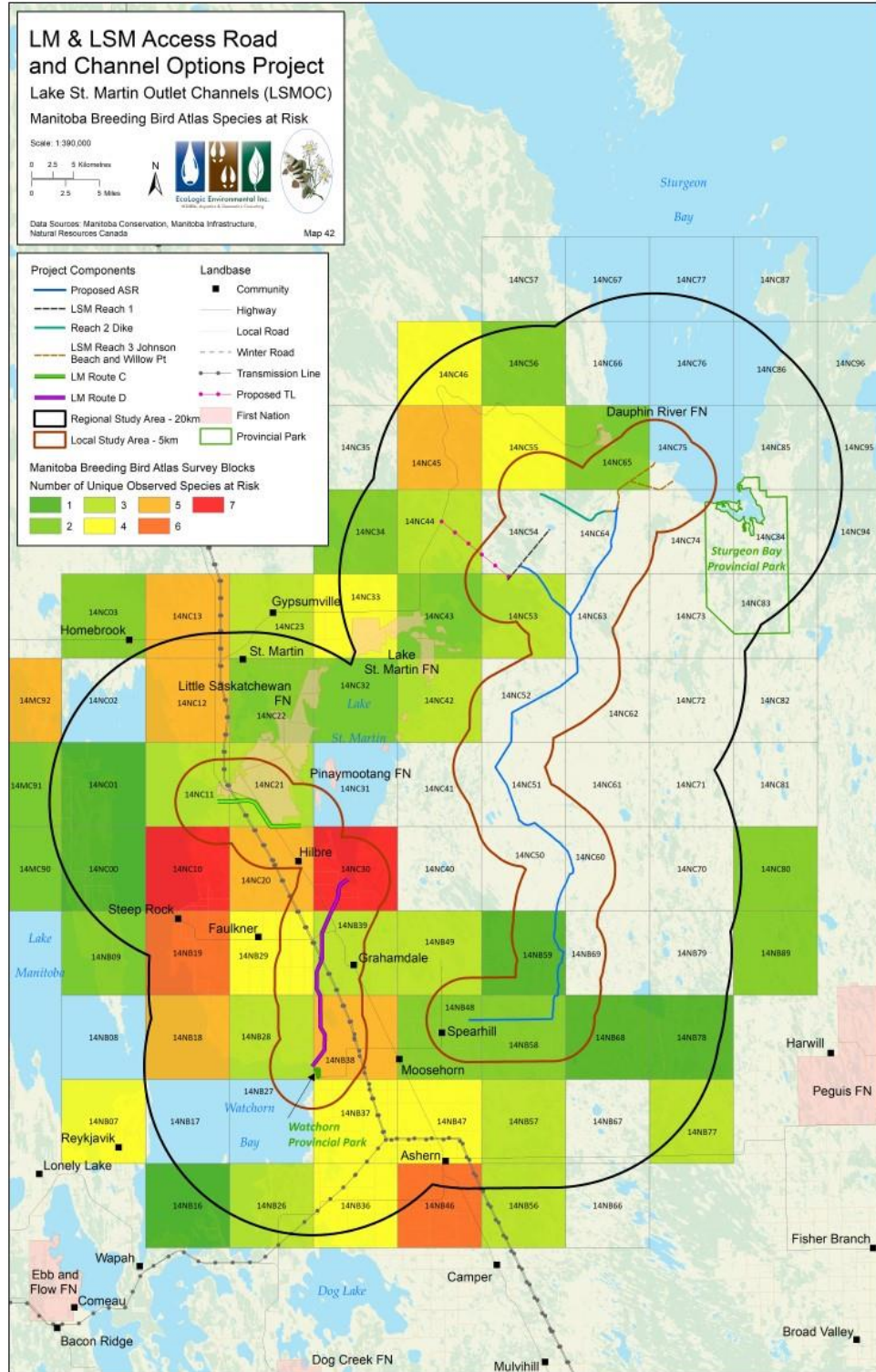


Map 36: Modeled Marten Habitat

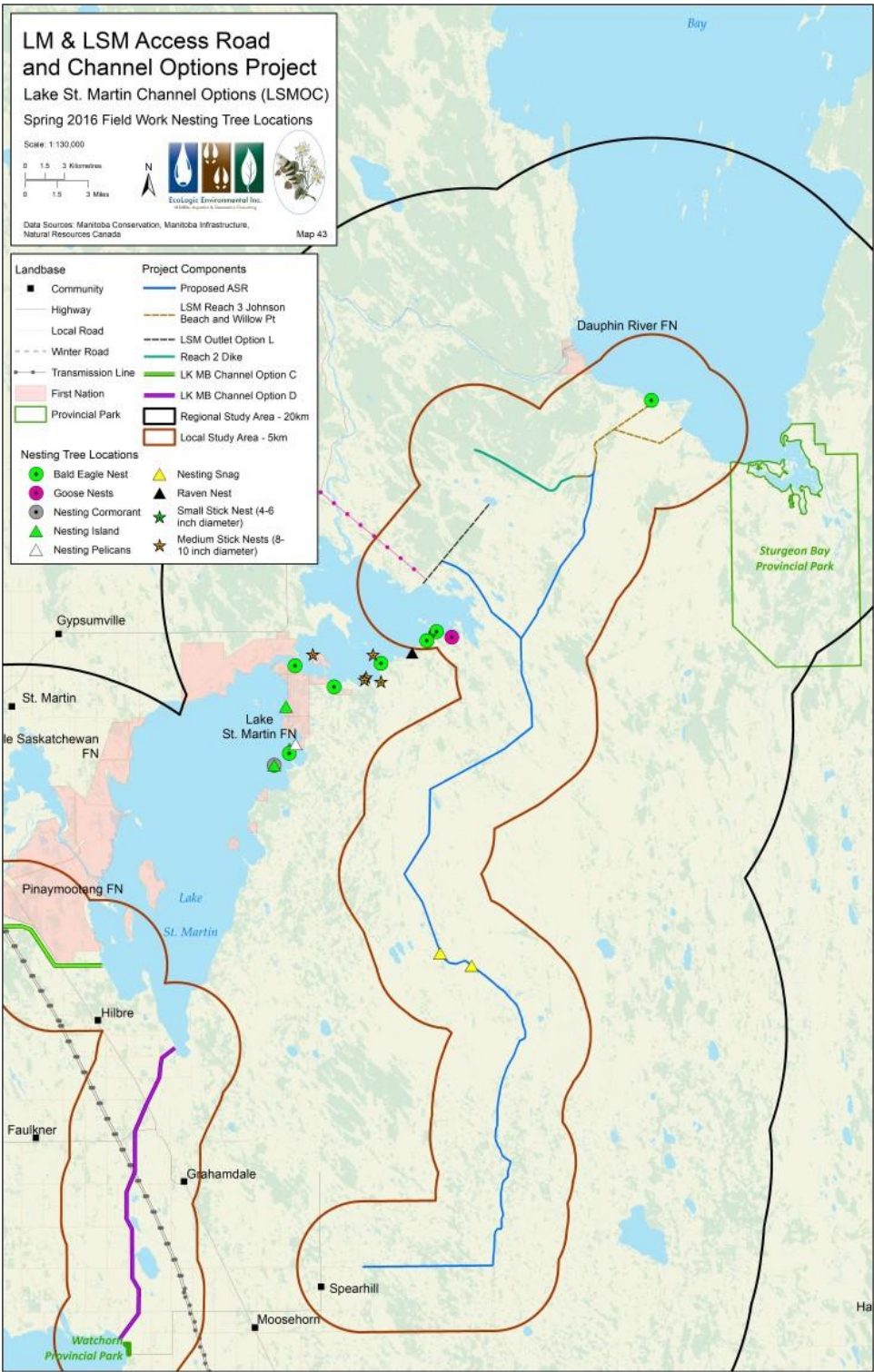


**Map 38: Bat Recorder Deployment Locations along the Proposed ASR**

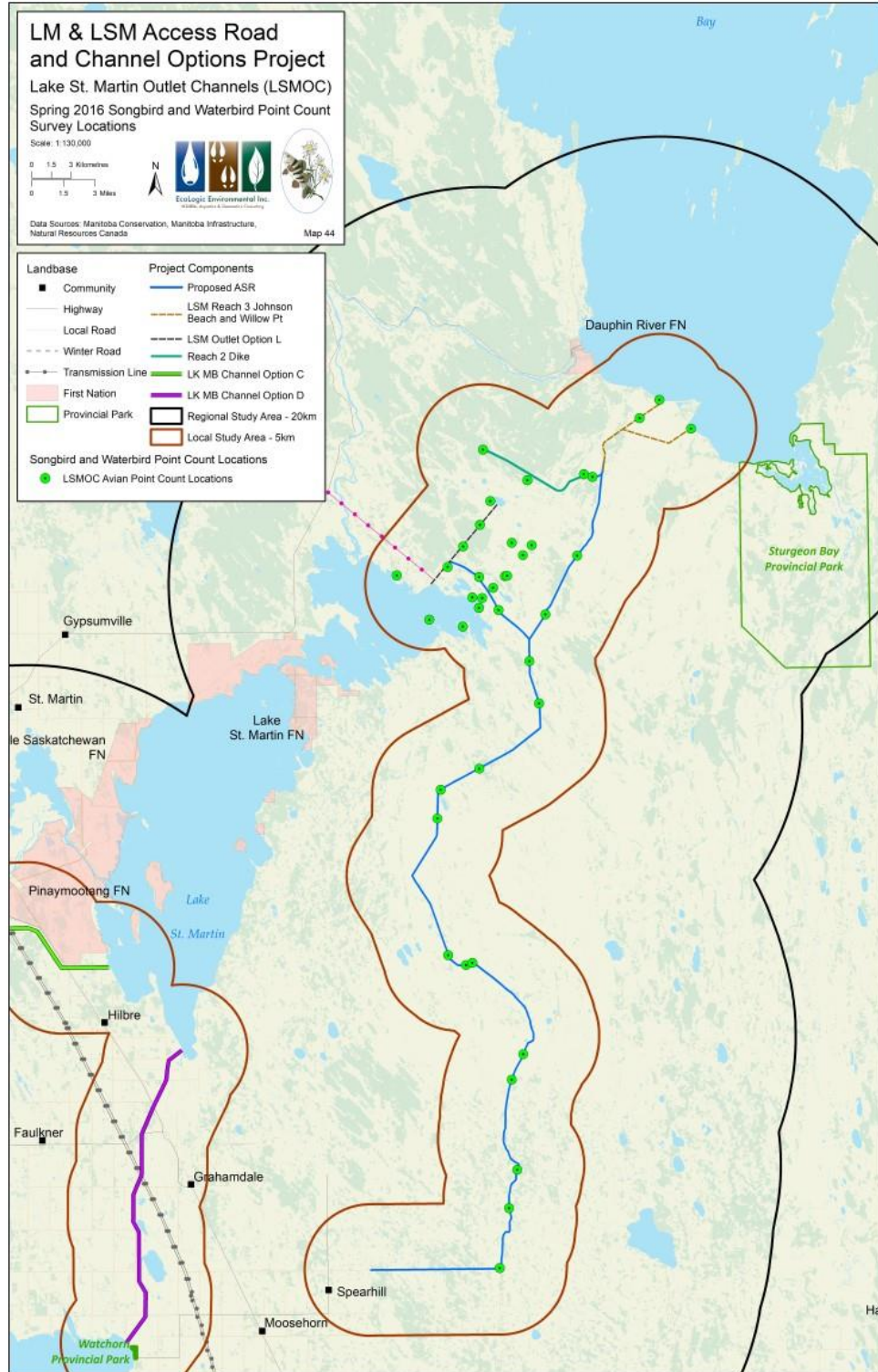




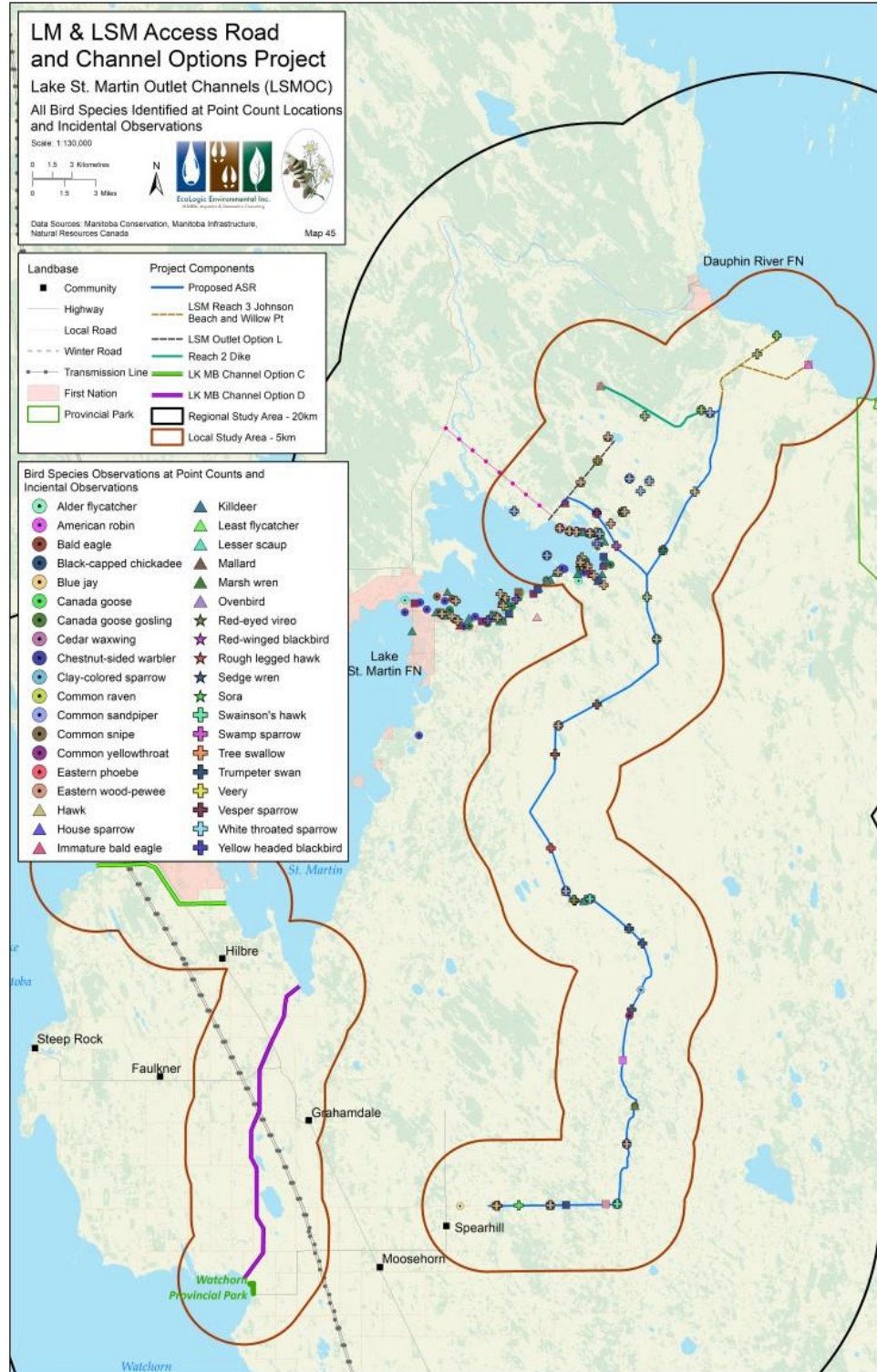
Map 42: Manitoba Breeding Bird Atlas (MBBA) Survey Results



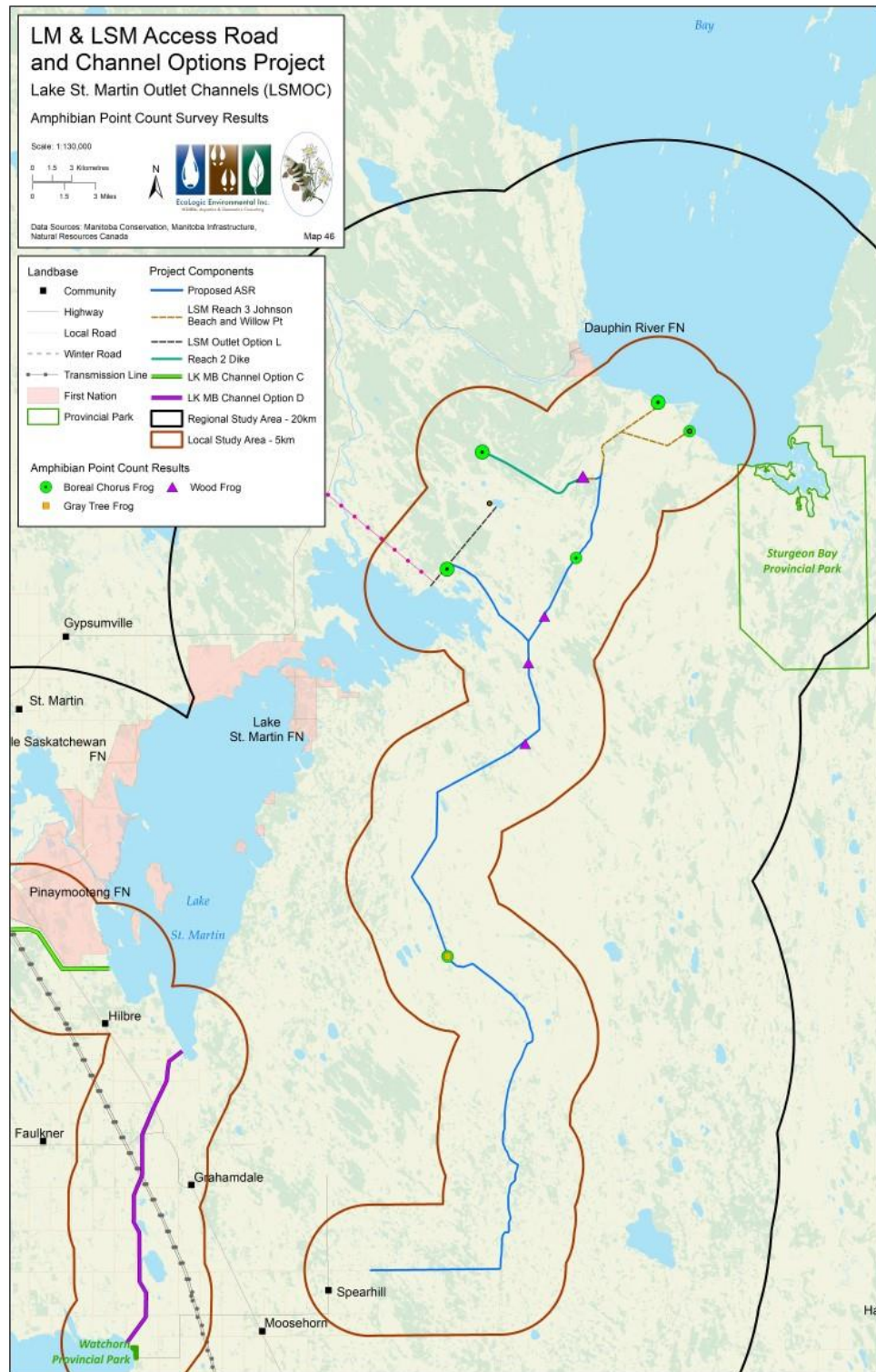
Map 43: Nesting Tree Locations Identified within the LSA



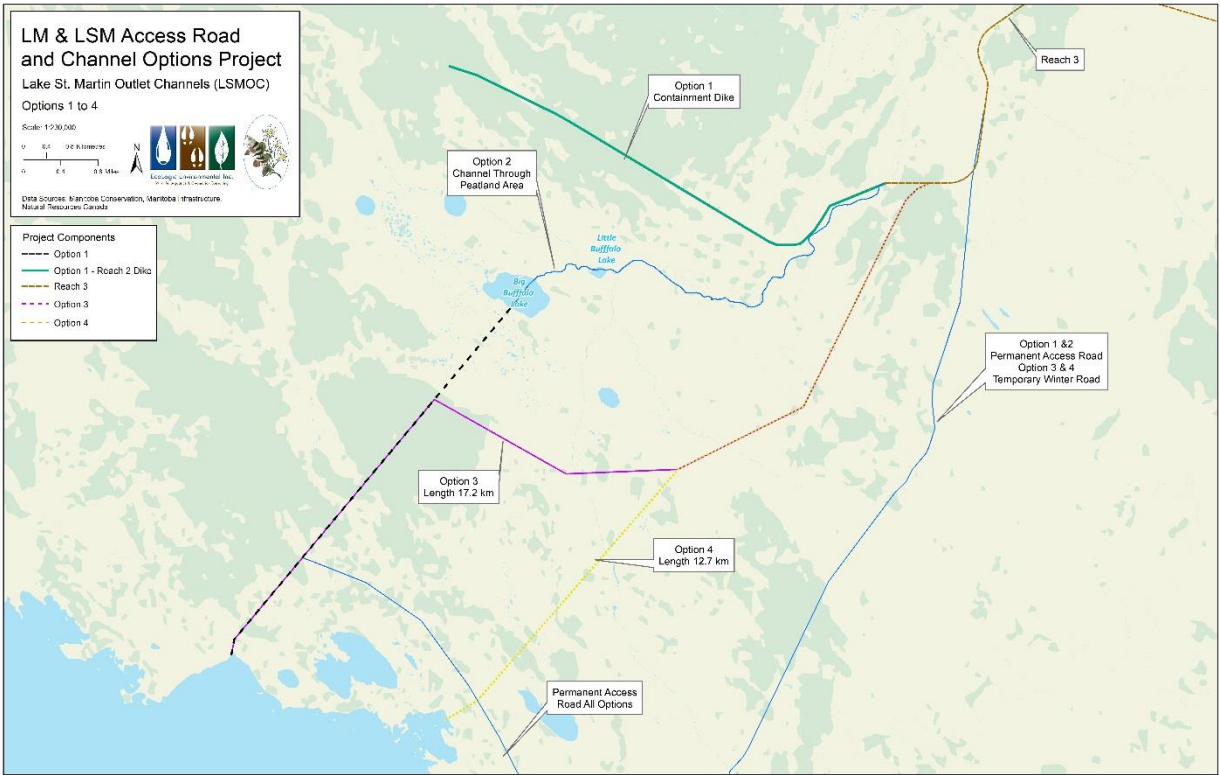
**Map 44: Spring 2016 Songbird and Waterbird Point Count Survey Locations**



Map 45: Point Count and Incidental Bird Observations within the LSA



**Map 46: Point Count and Incidental Amphibian Observations within the LSA**



Map 49: LSMOC Options 1 to 4