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Lake St. Martin Outlet Channel Proposed All Season Access Road: Wildlife Technical Report

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GLOSSARY OF TERMS

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

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

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

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

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

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

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

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

Glaciolacustrine* – Pertaining to glacial lakes.

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

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

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

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

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

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

Surficial geology* – The geology of surficial materials.

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

1 INTRODUCTION

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

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

- further development of the Lake St. Martin Outlet Channel (LSMOC), which involves development of a channel in the area referred to as Reach 2 and completion of the channel referred to as Reach 3;
- construction and operation of a new channel from Lake Manitoba to Lake St. Martin 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 the existing environmental (baseline) conditions specific to wildlife populations and their habitat for the ASR component of the Project.

2 BACKGROUND

As noted above, further development of a Lake St. Martin Outlet Channel (LSMOC) includes the requirement for an ASR in the area of the LSMOC to facilitate year-round vehicle, crew and equipment access. During previous construction and operation of the LSMOC, access to the area was restricted to winter roads extending from the end of Idylwild Road. The Idylwild road is an existing forestry road that runs north from Birch Lake Drive, which is a municipal road located east of the communities of Grahamdale and Spearhill and connects to Dewald Road. In an effort to improve area access, MI plans to construct an ASR on the existing municipal, resource and winter road alignments. The provision of an ASR to access the LSMOC will also require the upgrading and expansion of sections of the municipal road and the Idylwild forestry road. As such, the ASR

component of the Project (ASR Project) is defined as the works associated with the upgrading, construction and operation of the affected areas of the municipal road, the Idylwild forestry road, the LSMOC Reach 3 Winter Road Access and the LSMOC Reach 1 Access Road Alignment, to an ASR.

3 ABORIGINAL TRADITIONAL KNOWLEDGE

It is recognized that there are many wildlife species of significance to many First Nations peoples, and that the wildlife species 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 their habitat 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 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 the general vicinity of the Project; and

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

5 METHODS

5.1 Desktop Studies and Analysis

Historical and current wildlife (mammalian, avian, reptile, and amphibian) distribution data were obtained from Manitoba Sustainable Development (MBSD), the Manitoba Herps Atlas, Important

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

- The selection of spatial study area boundaries and selection of key species for assessment;
- Detailed listing of all wildlife, avian, reptile, and amphibian 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 (MBCDC) 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, avian, reptile, and amphibian distribution near the Project;
- Interviews with Resource Managers, Species Specialists (example: Dr. Craig Willis – Bat Specialist), and other information holders for important presence and absence information on key species; and

- Data collation with the development of a GIS database through acquisition of existing and available information. All spatial analysis and GIS data is compatible with ArcGIS 10.3. This database includes but is not limited to the following:

    - LCC;
    - Anthropogenic development inventories (nearby roads, transmission lines, communities);
    - Elevation data; and
    - Known wildlife distribution (terrestrial and aquatic wildlife include large mammals as well as small furbearers, avian (birds, bats), reptiles (snakes), and amphibian).

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

5.2 Field Studies

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

- Aerial moose (*Alces alces*), elk (*Cervus elaphus manitobensis*), and white-tailed deer (*Odocoileus virginianus*) survey;
- Aerial multispecies survey;
- Aerial shoreline survey (piping plover survey);
- Avian Point Count survey;
- Incidental 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 of a project are typically described at three spatial scales: a Project Footprint (PF), a Local Study Area (LSA) and a Regional Study Area (RSA). PF is the physical space or directly affected area in which the Project components or activities are located; the LSA is the area beyond the Project footprint in which potential Project effects are measurable; and the RSA is the area beyond the LSA within which most potential indirect and cumulative effects will occur (CEAA 2015).

The proposed ASR will have a gravel road base width of 7 m and a RoW width of 20 m (Lovie 2015, pers. comm.). Therefore, the PF for the proposed ASR was designated as the total length of the ASR, i.e., the length from the starting point of the affected areas of the municipal road to the end points of the LSMOC Reach 3 Winter Road Access and the LSMOC Reach 1 Access Road Alignment, times the total width of 20 m.

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

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

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

As noted in Section 1, the overall Project has three components and includes further development of the LSMOC; construction and operation of a new channel between LM and LSM; and the construction and operation of the proposed ASR. Although this report is focussed on the baseline information for the proposed ASR, 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 proposed LM Outlet Channels (LMOC), and the existing and planned LSMOC. Map 01 shows the designated PF, LSA and RSA for the ASR component of the Project, and illustrates the overlap in study areas that occurred due to the proximity of the other two Project components.

6.2 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). More specifically, the RSA is located within the Interlake Plain Ecoregion (155), 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 Lake St. Martin 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. In Manitoba, it extends from the southeast and north to encompass the entire east shore of Lake Winnipeg, curving up through the southern Interlake to the Manitoba-Saskatchewan borders (Smith et al., 1998). The ecozone is dominated by gently rolling uplands and lowlands including wetland and peatland areas.

The **surficial geology**[1] is deep, tending to mask the underlying bedrock layers of Cretaceous shales and Palaeozoic limestones and **dolomites** (Smith et al., 1998). The climate is continental, characterized by relatively warm but short summers and cold, snowy winters. Soils are dominated by **luvisols,** grading to **chernozems** in the south and **brunisols** and **organic cryosols** in the north (Zoladeski et al., 1995). The RSA lies within the Interlake Plain (155) 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 shown in Map 2 and as described below.

6.2.1 Gypsumville Ecodistrict (720) Ecodistrict

The Gypsumville (720) Ecodistrict is located within the RSA, but falls outside the LSA (Map 2). This ecodistrict occupies a small area surrounding Lake St. Martin between Lake Winnipeg and Lake Manitoba (Smith et al., 1998). The mean annual temperature is 1.3°C with an average growing season of 173 days. The mean annual precipitation is approximately 520 mm, of which about one-quarter falls as snow (Smith et al., 1998). The **physiography** of the region is mostly level to ridge till plain, partly covered with thin, **glaciolacustrine** clay deposits. Soils are typically imperfectly-drained, dark grey chernozems developed on strongly **calcareous**, loamy to clay **glacial till**; poorly-drained **gleysol** and black chernozem soils occur on shallower areas (Smith et al., 1998). Vegetation is dominated by forest stand mixtures of trembling aspen (*Populus tremuloides*), balsam poplar (*Populus balsamifera*), and white spruce (*Picea glauca*), while Jack pine (*Pinus banksiana*) prevails on drier sites (Smith et al., 1998). The principal sources of water in the ecodistrict are groundwater and surface water from Lake St. Martin.

6.2.2 Ashern Ecodistrict (723) Ecodistrict

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 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

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

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

6.2.3 Sturgeon Bay (676) Ecodistrict

The Sturgeon Bay (676) Ecodistrict is located within both the Local and RSA (Map 2). The ecodistrict encompasses most of the North Basin of Lake Winnipeg (Smith et al., 1998). The mean annual temperature is 0.3°C with an average growing season of 166 days. The mean annual precipitation is approximately 510 mm, of which slightly above one-quarter falls as snow (Smith et al., 1998). The ecodistrict slopes gently northeastward toward Lake Winnipeg (Smith et al., 1998). The physiography is the outcome of Glacial Lake Agassiz's retreat; wave action and iceberg scouring resulted in ridges of coarse-textured small rock (cobble and gravel) and finer-textured depressions (Smith et al., 1998). Soils of very poorly-drained shallow to deep moderately-decomposed **mesisols** dominate, but local areas of very poorly-drained sphagnum **fibrosols** and imperfectly-drained brunisols on glacial till ridges also occur (Smith et al., 1998). Black spruce *(Picea mariana*) dominates forest stands due to extensive bogs/fens (peatlands) and poorly-drained mineral soils (transitional areas) (Smith et al., 1998). Associated vegetation varies from mosses (e.g., *Sphagnum* spp.), **ericaceous** shrubs (e.g. Labrador Tea [*Rhododendron groenlandicum*]), swamp birch (*Betula pumila*), sedge, willow, and tamarack (*Larix laricina*) depending if characterized as a peatland or as a transitional area. Groundwater, the principal source of water in the ecodistrict, is from shallow sand and gravel aquifers associated with the glacial till deposits (Smith et al., 1998).

6.2.4 Surficial Geology and Physiographic Setting

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

The RSA is located just south of the localized permafrost zone (Lockery, 1984). The surficial geology can be described as very calcareous, stony (cobble or gravel), water-worked glacial till that is deep to shallow (20-30 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).

In assessing habitat for multiple wildlife species across the broad geographic landscape on the west side of Lake Winnipeg, it was necessary to adopt a habitat-based assessment tool that would provide relatively up-to-date imagery and land cover information over the entire region. The Manitoba FRI has been used in the development of Habitat Suitability Index Models (HSIs) for selected indicator species in Manitoba; however, FRI data are outdated and do not contain consistent attribute data between datasets or up to date forest fire history information.

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 of land 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 (*Pekania pennanti*), grey wolf (*Canis lupus*), least chipmunk (*Neotamias 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 many areas of Manitoba including the Project Study Areas. Moose are found particularly in forest, shrub and wetland habitats occupying much of the northern extent of Manitoba and increasingly

are more common in the southern prairie region of Manitoba where they were previously absent, including Spruce Woods and Turtle Mountain Provincial Parks. Their home range is typically 40 km^2 where they are associated with riparian habitat, predominantly featuring willow, a key forage species, and other habitats that feature areas of aquatic feeding, coniferous cover, and mineral licks (Gillingham and Parker, 2008). Such successional (newly emergent or young growth) 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). Cover is critical in winter to reduce snow depths and provide relief from heat stress in the summer. Moose are an integral component of the ecosystem in their predator/prey relationships. Moose population sustainability is a specific concern in several areas in western Manitoba.

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 to 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 stages of development 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 rather than dense unbroken forests (Reid, 2006). Coyotes are found throughout the RSA and feed upon small mammals and rodents, as well as scavenging on deer and larger ungulates. Coyotes, when banding together, can also take down these large animals (Caras, 1967).

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

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

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

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

There are also several species of bats that reside within and migrate through the RSA. These include the big brown bat (*Eptesicus fuscus*), hoary bat (*Lasiurus cinereus*), little brown myotis (*Myotis lucifugus*), northern long-eared (*Myotis septentionalis)* also called the northern myotis, eastern-red bat *(Lasiurus borealis)* and silver-haired bat (*Lasionycteris noctivagans*). The Silver-haired, the eastern-red and the hoary species are migratory species while the northern long-eared, big and little brown bat species are cave 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 bats (SARA, 2015) with three critical habitat areas for little brown bats identified in the Interlake area of Manitoba (Norquay et al., 2013). The proposed SARA Recovery Strategy for little brown bats identifies several potential threats to little brown bats 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 cave 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 Mid- Boreal Lowlands 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 (*Opheodrys 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 or 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 frops 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 Lowlands 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 listing of known birds that can be found in the Interlake Plain and Mid-Boreal Lowland ecoregions 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 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), rare (provincial status of S2), or uncommon (provincial status of S3) throughout their range as listed by the Manitoba Conservation Data Centre (MBCDC, 2015).

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

A number of bird species 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 listing of bird species at risk that are possibly found within the RSA is provided in Appendix D including 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 and MESEA. The northern leopard frog is listed as Special Concern under SARA. The eastern tiger salamander and the blue-spotted salamander are two other amphibian species of concern found within the RSA.

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

7 KEY SPECIES FOR ANALYSIS

The federal environmental assessment process typically includes the need for the identification of Valued Ecosystem Components (VECs) in the area of interest to focus the environmental assessment on key species or key components of the environment. The Canadian Environmental Assessment Agency (CEAA) defines a Valued Ecosystem Component as “the environmental

element of an ecosystem that is identified as having scientific, social, cultural, economic, historical, archaeological or aesthetic importance" (CEAA, 2012).

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

As such, the desktop and field studies for wildlife and wildlife habitat included the collection of baseline data for the wildlife species found in the Project Study Area, followed by the identification of a number of key wildlife species of interest and/or importance in the Project Study Area, to focus the analysis of potential habitat changes or other effects of the Project activities, and provide context for the future environmental assessment.

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 (~40km²) Important prey species for large carnivores e.g. wolves Hunted by rights-based and licensed hunters
	Elk	Demonstrate large home ranges (50-400 km²) Important prey species for large carnivores e.g. wolves Hunted by rights-based and licensed hunters

Table 1: Summary of Key Species Selection and Rationale

Group	Key Species	Rationale
Furbearers	American marten	Commonly trapped furbearer Important species for predatory/prey dynamics Representative of mature forest habitat
	American beaver	Ecosystem engineer Representative furbearer for aquatic habitat
Bats	Little brown myotis Northern long-eared (northern myotis)	Listed as Endangered under SARA and under MESEA Critical habitat for these species already identified in the Interlake region Geology within the RSA is conducive to support these species – representative of karst habitat
Ecologically Sensitive Wildlife Sites	Bat and snake hibernacula, terrestrial mammal dens (e.g. bears, wolves), rookeries large stick nests, mineral licks	Critical wintering habitat Critical breeding habitat Species fidelity to dens and nests Culturally significant sites
Migratory Birds	Forest Bird Species (including Barn Swallow, Bank Swallow, Bobolink, Canada Warbler, Common Nighthawk, Eastern Whip-Poor-Will, Eastern Wood-Pewee, Golden-winged Warbler, Olive-sided Flycatcher, Peregrine Falcon, Red-headed Woodpecker, Short-eared Owl)	Some species listed as "threatened" or "endangered" under SARA and/or MESEA Key species selected as 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 Some species hunted by rights-based and licensed hunters
Amphibian and Reptile	Northern leopard frog, red-sided garter snake	Northern leopard frog listed under SARA, and MESEA Red-sided garter snake species most commonly found snake within RSA

8 LAND AND RESOURCE USE IN RELATION TO LOCAL WILDLIFE

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 Park Reserve; and the Grahamdale, Mantagao Lake, and Little Birch Wildlife Management Areas (WMA) (Map 7).

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

8.2 Hydroelectric Transmission Development

Within the RSA, there is one existing transmission line that enters the RSA in the south and parallels PTH 6 northwards towards Gypsumville and other communities (Map 8). There is also a proposed transmission line that would be located near the terminus of the existing winter road and Reach 1 of the Lake St. Martin Outlet Channels (Map 8). Additional hydro transmission development may be required to power the Water Control Structures associated with the Project.

8.3 Lodges and Outfitters

There is one lodge/outfitter within the RSA and close to the LSA at the southern extent of the Lake St Martin Access Road (Map 9). This outfitter offers services for white-tailed deer, black bear, and game bird hunting. Map 9 also presents hunting stands and hunting shacks that were identified during field studies in 2016.

8.4 Quarries and Mining

There are many existing quarry sites in the RSA. The majority of the sites consist of quarry withdrawal activity and the remainder are quarry lease, private quarry permits, mining claims, and casual quarry permits. Within the LSA there are two quarry withdrawals, one quarry lease and

one casual quarry permit. Map 10 shows the locations of all publicly available information on current quarry and mining activity in the RSA.

8.5 Recreational Use Areas

There are a number of recreational and snowmobile trails located within the RSA. A spatial layer for the known and available recreational trails was acquired from the Natural Resources 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 16 to the north. Boreal woodland caribou hunting is not permitted in GHA 16, 21, or 25 (MBSD, 2015).

Moose are important big game animals for hunting within the RSA. Moose are valued for licensed hunting and rights-based subsistence hunting. Currently, licensed moose hunting is closed in all of GHA 16 and 25. Map 12 provides the delineation of GHAs within the RSA.

Elk are valued for rights-based subsistence harvesting and licenses for recreational hunters can be purchased from MBSD during certain times of year for GHAs 21 and 25 (MBSD, 2015). Game Hunting Areas 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 the MBSD for Zone B which is open to deer harvest during certain times of year for GHA 16, 21, and 25 (MBSD, 2015). An archery season for resident, non-resident, and foreign resident hunters is open for parts of September and again in late October to early November (MBSD, 2015). A general rifle season for white-tailed deer in Zone B for resident, non-resident, and foreign resident hunters is open from early-November to mid-November (MBSD, 2015). 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.

Manitoba Sustainable Development licenses hunters for resident, and non-resident bear hunting, along with registered outfitters for foreign resident bear hunting in GHA 16, 21, and 25 (MBSD, 2015). 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.

Manitoba Sustainable Development licenses hunters for resident, non-resident, and foreign resident wolf hunting in GHA 16, 21, and 25 (MBSD, 2015). 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. Coyotes have been designated for recreational hunting by MBSD and any hunter with a big game tag can can hunt coyote within GHA 16, 21 and 25 (MBSD, 2015).

GHA 16, 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 (MBSD, 2014). There are two RTL blocks that intersects the RSA, as well as one open trap area (Open Area #3). Map 13 provides an illustration of the RTLs within the RSA.

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

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

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

Fiscal Year	Gypsumville
1996/1997	6
1997/1998	20
1998/1999	19
1999/2000	9
2000/2001	11
2001/2002	11
2002/2003	8
2003/2004	8
2004/2005	9
2005/2006	10
2006/2007	13
2007/2008	10
2008/2009	14
2009/2010	8
2010/2011	5
2011/2012	7
2012/2013	6
2013/2014	12

The annual trapper data from 1996 to 2012 for Gypsumville is provided in Table 3 (unpublished data, MBSD, 2015). The highest number of species harvested between 1996 through to 2012 was muskrat, followed by American beaver and fisher. Coyotes were readily trapped as well as a small number of wolves. 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

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
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.

9.1 LCC – Habitat Evaluation

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

9.1.1 Methods

The overall LCC covertypes present within the LSA and RSA were calculated based on the spatial boundaries described in Section 5. The RSA LCC covertypes were calculated based on a buffer zone of 20 km on either side of the LSM (proposed ASR and LSMOCs) and LMB 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 LSM and LMB project features and the area beyond the predicted zone of impact. The LSA LCC covertypes were calculated based on a buffer zone of 5 km on either side of the LSM (proposed ASR and LSMOCs) and LMB project features. The LCC was clipped (only data within the buffer zone was used for analysis) to the area and the results were summarized as percentages of LCC covertypes (habitat) within the RSA and the LSA.

9.1.2 Results

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

Table 4: LCC Covertypes within the RSA and LSA

LCC-Cover Type	RSA		LSA (LSMOC Proposed ASR)	
	Area km^2	Percent (%)	Area km^2	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%

Table 4: LCC Covertypes within the RSA and LSA

LCC-Cover Type	RSA		LSA (LSMOC Proposed ASR)	
	Area km^2	Percent (%)	Area km^2	Percent (%)
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 the proposed ASR (20 m RoW) are provided in Table 5.

Table 5: LCC Covertype Loss/Alteration associated with the Proposed ASR

LCC-Cover Type	Proposed ASR (20 m RoW)	
	Area km^2	Percent (%)
100-Herb	0.00	0.00%
110-Grassland	0.01	0.29%
121-Annual crops	0.00	0.00%
122-Perennial crops and Pasture	0.00	0.00%
20-Water	0.00	0.00%
211-Coniferous - Dense	0.05	2.65%
212-Coniferous - Open	0.02	1.23%
221-BroadLeaf - Dense	0.05	2.55%
222-BroadLeaf - Open	0.04	2.06%
231-MixedWood - Dense	0.05	2.65%
33-Exposed Land	0.09	4.66%
34-Developed	0.18	9.90%
51-Shrub -Tall	0.00	0.14%
52-Shrub - Low	0.00	0.00%
81-Wetland Treed	0.01	0.72%
82-Wetland Shrub	1.15	62.15%
83-Wetland Herb	0.20	11.00%
Total Area	1.86	100.00%

9.2 Moose

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

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

9.2.1 Aerial Moose Distribution Survey Conducted by MBSD - Methods

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

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

Based on the observations, moose tracks and signs within each cell were assigned a high, medium, or low stratification rank (density prediction of animals) based on the amount of activity within each grid cell. This cell stratification of the survey area was completed before the second

sampling flight could occur. The sampling of random high, medium, and low-density cell blocks was then completed with a Bell 206 helicopter, flying 500 m transects within each of the randomly selected cells, allowing for 250 m of visibility on either side of the aircraft to obtain 100% coverage of the cell being flown. All observations, moose tracks and signs, were again recorded during the survey process.

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

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

9.2.2 Aerial Moose Distribution Survey Conducted by MBSD - Results

Table 6 provides a summary of the MBSD aerial moose survey results for GHA 21 in 1992, 1995, and 2008. Moose population estimates from the 1992, 1995, and 2008 MBSD aerial moose surveys in GHA 21 showed a total of 789 moose in 1992, a total of 1230 moose in 1995, and a total of 346 moose in 2008. During the 2008 aerial moose survey completed by MBSD within GHA 21, a total of 346 moose +/- 21.52% (with 95% confidence intervals) were found to be within GHA 21, with 98 bulls, 188 cows, and 59 calves identified during the survey (Table 6, Map 15). 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 (Map 15).

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 for MI - Methods

A winter aerial moose survey was conducted from January 31, 2016 to February 6, 2016 using a Bell 206 Jet Ranger flown by Custom Helicopters Inc. The aerial moose survey design adopted

the UTM grid survey methodologies used by MBSD. The aerial moose survey area conducted in 2016 was divided into two survey areas, one being an intensive survey area (the LSA) and a second area being a stratified random block survey area within the RSA. The study deign was adopted to determine the baseline distribution of moose in the LSA and RSA prior to construction.

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

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

9.2.4 Aerial Moose Distribution Survey Conducted for 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 (Map 17).

Table 7: Aerial Moose Distribution Survey Results within the RSA

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

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

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

9.2.1 Moose Track and Sign Survey Methods

Multispecies ground surveys were conducted by two biologists to identify terrestrial mammals present near the proposed ASR RoW. Biologists traveled very slowly along the RoW by ATV from June 2- June 11, 2016. Based on habitat modelling conducted prior to field work, biologists travelled to areas of high quality moose habitat along the 92.83 km RoW. In areas where modelled high-quality moose habitat intersects the proposed ASR RoW, biologists walked transects on either side of the RoW, spaced 20 m apart, in search of signs of moose presence. Map 18 presents the modelled areas of high-quality moose habitat that intersect the proposed ASR that were surveyed for signs of moose 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.

9.2.2 Moose Track and Sign Survey Results

During the ground surveys conducted within high quality moose habitat along the proposed ASR RoW in June 2016, only one moose track was observed (Table 8).

Table 8: Moose Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Moose Track	1	5736945.88	561826.54	Proposed ASR

9.2.1 Fire History

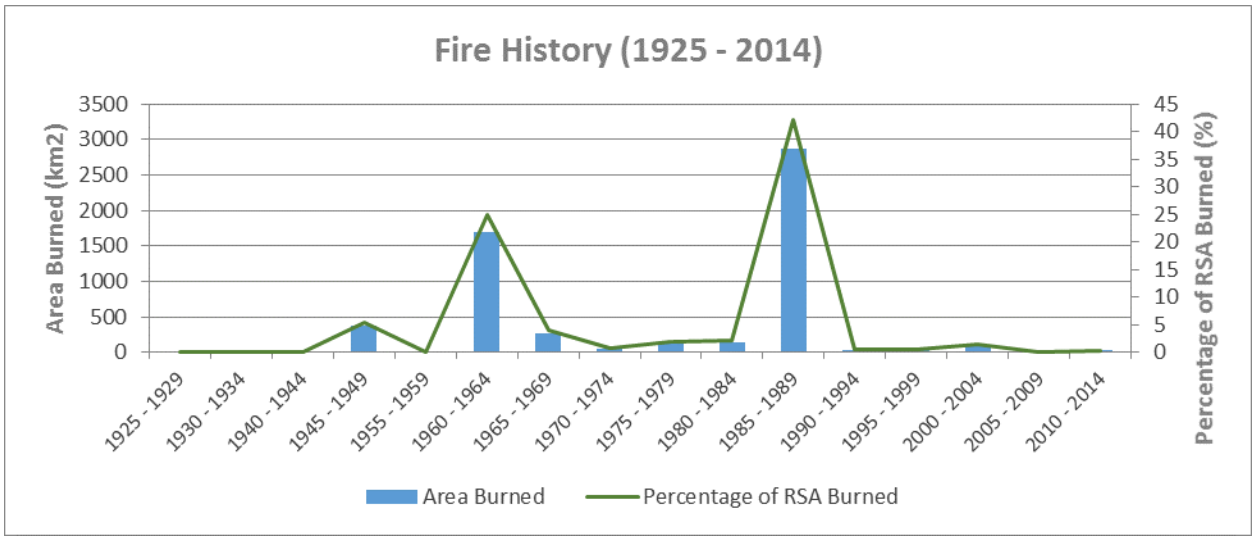
The spatial fire history data for the RSA was mapped and assessed for the timeframe between 1928 and 2013. This time frame was used given it was the timeframe of consistent data collected by the province and available for analysis. These spatial fire data that were obtained from the Manitoba Land Initiative (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^2 (Figure 1), thus providing a 5-year fire trend for the RSA over the majority of the last century.

Within the RSA, based on the fire history collected between 1928-2013, it would appear that a major burn cycle occurs every 20-25 years with approximately 1500-3000 km^2 (32-55% of total area) of mature habitat being burnt. Smaller burns are occurring during that time, however large

landscape burns appear to be on a 20-25 year cycle. As a result, within 5 to 10 years following a major fire event, successional vegetation offers quality moose habitat on the landscape. Given the last major burn event occurred in 1985-89, if the 20-25-year cycle occurs again, another major burn event should occur in 2015-2019 within the RSA. However, given that the only available spatial fire history data were from 1928 onward, there is limited information available to determine burn cycle events beyond the last 90-year period.

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

Figure 1: Fire History within the RSA



9.2.2 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 (Map 19, Table 9). Potential moose winter habitat was modeled for the RSA (Map 20, 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 summer and winter habitat modelling show very little (0.02%) moose habitat will be lost as a result of the proposed ASR.

Table 9: Potential Moose Summer Habitat within the RSA and the Amount of Potential Moose Summer Habitat Loss Associated with Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Shrub - Tall	7.37	0.00	0.04%
Broadleaf Dense	376.68	0.05	0.01%
Mixedwood Dense	264.79	0.05	0.02%
Total	648.84	0.10	0.02%

Table 10: Potential Moose Winter Habitat within the RSA and the Amount of Potential Moose Summer Habitat Loss Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Shrub - Tall	7.37	0.00	0.04%
Coniferous Sparse	82.87	0.02	0.03%
Coniferous Dense	415.19	0.05	0.01%
Mixedwood Dense	264.79	0.05	0.02%
Total	770.22	0.12	0.02%

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.

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

9.2.4.1 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/km²).

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^2 and 0.22 km^2 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 Proposed ASR)	
	Linear Features (km)	Linear Density (km/km^2)	Linear Features (km)	Linear Density (km/km^2)
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
Idylwild 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 (km/km^2) with the

various proposed Project channel and reach options. The analyses identified that, regardless of which channel or reach 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 (Table 12).

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

Linear Development	RSA		LSA (LSMOC Proposed ASR)	
	Linear Features(km)	Linear Density (km/km^2)	Linear Features (km)	Linear Density (km/km^2)
Option C Channel	11.48	0.0017	0	0.0000
Option D Channel	24.03	0.0035	0	0.0000
Reach 3 - Johnson Beach Option	9.54	0.0014	9.54	0.0082
Reach 3 - Willow Point Option	11.42	0.0017	11.42	0.0098

9.3 Elk

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

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

9.3.1 Aerial Elk Distribution Survey Conducted by MBSD Methods

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

low sample units. A population estimate is then generated upon the completion of the survey with a confidence interval based on the amount of observations identified within the random sampling.

9.3.2 Aerial Elk Distribution Survey Conducted by MBSD Results

Based on the initial 2013 stratification survey that had a total 315 sample units, 98 of the sample units were classified as low density, 152 were classified as medium density, and 65 of the sample units were classified as high density (Map 22). 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

9.3.3 Aerial Elk Distribution Survey Conducted for 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 proposed ASR, the LSMOC Options, and the LMOC Options. The intensive survey area offered complete (100%) coverage of the LSAs for these project linear features. The survey flight transects were spaced 500 m apart up to the 5km LSA boundary. Map 23 illustrates the intensive aerial distribution survey area for elk.

9.3.4 Aerial Elk Distribution Survey Conducted for MI - Results

The total length flown during the winter 2016 aerial elk distribution survey conducted for MI was 2,650 km. There were 16 elk observed (Table 14). Using observations and tracks, kernels were generated to show core use areas (Map 24). The elk were found in the southwestern portion of the RSA within the LMOC LSA and a small group of elk were identified within the LSMOC proposed ASR LSA just to the north of Spearhill.

Table 14: Aerial Elk Distribution Survey Results within the RSA

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

9.3.5 Elk Track and Sign Survey Methods

Multispecies ground surveys were conducted by two biologists to identify terrestrial mammals present near the RoW. Biologists traveled very slowly by ATV along the proposed ASR RoW from June 2- June 11, 2016. Based on habitat modelling conducted prior to field work, biologists travelled to areas of high quality elk habitat along the 92.83 km RoW. In areas where modelled high-quality elk habitat intersects the proposed ASR RoW, biologists walked transects on either side of the RoW, spaced 20 m apart in search of signs of elk presence. Map 25 presents the modelled areas of high-quality elk habitat that intersect the proposed ASR that were surveyed for signs of elk 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.

9.3.6 Elk Track and Sign Survey Results

During the ground surveys conducted in June 2016, the only sign of elk presence identified was one elk scat found on the RoW (Table 15).

Table 15: Elk Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Elk Scat	1	5716152.10	550973.27	Proposed ASR

9.3.7 Elk Habitat Modelling Methods

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

9.3.8 Elk Habitat Modelling Results

Potential elk habitat was modeled for the RSA (Map 26, Table 16). The amount of elk habitat that may be lost or altered as a result of the Project is a very small percentage of the overall elk habitat available within the RSA.

The elk habitat modeling conducted exposed essentially no loss or alteration of quality elk habitat associated with the proposed ASR.

Table 16: Potential Elk Habitat within the RSA and the Amount of Potential Habitat Loss Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km^2	Proposed ASR (20 m RoW)	
		Area (km^2)	Proportion (%)
Annual Crop (within 300 m of forest edge)	10.14	0.00	0.00%
Broadleaf Dense	175.58	0.02	0.01%
Broadleaf Open	205.08	0.00	0.00%
Grassland (within 300 m of forest edge)	450.16	0.00	0.00%
Perennial Crops and Pastures (within 30 m of forest edge)	29.14	0.00	0.00%
Total	870.1	0.02	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 Access Road 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 17). Using observations and tracks, kernels of core use areas were identified (Map 27).

Table 17: Aerial WTD Distribution Survey Results within the RSA

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

9.4.3 White-Tailed Deer Track and Sign Survey Methods

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 proposed ASR RoW in conjunction with bird point counts and terrestrial mammal track and sign surveys conducted. 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

There were several incidental signs of WTD activity identified along the proposed ASR (Table 18).

Table 18: White-tailed Deer Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
Deer	1	5726923.86	552327.64	Proposed ASR
Deer Scat	1	5716294.51	550938.89	Proposed ASR
Deer bones and skull	1	5715253.13	549411.25	Proposed ASR
Deer Scat	1	5720101.29	551127.29	Proposed ASR
Deer Tracks	1	5723590.50	553834.31	Proposed ASR
Deer Scat	1	5715995.97	550608.76	Proposed ASR
Deer Tracks	1	5687099.77	553225.31	Proposed ASR
Deer Tracks	1	5687198.77	558337.84	Proposed ASR
Deer Tracks	2	5703476.65	560140.44	Proposed ASR
Deer Tracks	1	5710998.47	554416.35	Proposed ASR

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 focal 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 are 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 woody plant but prefer 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 travel 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 for American beaver, American marten, otter, hare, lynx, and coyote created from the aerial survey data. Table 19 presents the observation and tracks for all furbearer species. American beaver activity (lodges/dams) was identified in abundance (107 observations) throughout the RSA (Map 28). Similarly, American marten tracks were also identified in abundance (1581 track observations) throughout the RSA, but there was no American marten activity identified within the LMOC LSA (Map 29). Otter activity was identified within the northern portion of the RSA (Map 30). Hare activity was identified in abundance within the LSA (Map 31) as well as lynx (Map 32). Coyote observations and tracks were also identified within the RSA (Map 33).

Table 19: 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. Biologists traveled very slowly along the proposed ASR RoW by ATV from June 2- June 11, 2016. Based on habitat modelling conducted prior to field work, biologists travelled to areas of high quality marten habitat along the 92.83 km RoW. In areas where modelled high-quality marten habitat intersects the proposed ASR RoW, biologists walked transects on either side of the RoW, spaced 20 m apart in search of signs of marten presence and mammal dens. Map 34 presents the modelled areas of high-quality marten habitat that intersect the proposed ASR 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.

9.5.4 Furbearer Track and Sign Survey Results

During the ground surveys conducted in June 2016, there were several incidental signs of furbearer activity as well as one small den identified (Table 20).

Table 20: Furbearer Track and Sign Survey Results

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Area
American beaver lodge	2	5726846.54	551157.25	Proposed ASR
Muskrat lodge	4	5726846.54	551157.25	Proposed ASR
Small den	1	5715947.60	550769.79	Proposed ASR
American beaver lodge	1	5726127.18	558567.29	Proposed ASR
Muskrat lodge	1	5726127.18	558567.29	Proposed ASR
American beaver lodge	1	5724300.24	554945.49	Proposed ASR
American beaver lodge	1	5695093.42	559807.41	Proposed ASR
American beaver dam	1	5695093.42	559807.41	Proposed ASR
American beaver lodge	2	5710255.04	555771.34	Proposed ASR
Hare observation	1	5695742.53	559092.73	Proposed ASR
Small den	1	5715258.75	549367.60	Proposed ASR
American beaver lodge	1	5726846.54	551157.25	Proposed ASR
American beaver lodge	1	5726127.18	558567.29	Proposed ASR
American beaver lodge	1	5724300.24	554945.49	Proposed ASR
American beaver lodge	1	5695093.42	559807.41	Proposed ASR
American beaver dam	1	5695093.42	559807.41	Proposed ASR

There were very few signs of bear and wolf presence identified during the ground searches (Table 21). Only three wolves were identified within the RSA during aerial survey, Lat 51.68165 and Long -98.231301). The aquatics team noted one wolf on April 29, 2016 on the forestry road,

approximately 9 km south of where the three wolves were sighted during the winter 2016 aerial survey (M. Lowdon, pers.comm., 2016). During the aerial survey conducted in October 2015, a large adult black bear was observed in the LSMOC and ASR LSA.

Table 21: Predator Species Observations made during the Multispecies Ground Survey

Observation Type		Quantity	Location		
			UTM Y	UTM X	Area
Bear Scat		1	5725569.28	550174.79	Proposed ASR
Wolf Scat		1	5716198.74	550955.47	Proposed ASR
Bear Activity		1	5715357.41	549559.74	Proposed ASR
Bear Activity		1	5715995.97	550608.76	Proposed ASR
Wolf Scat		1	5703476.65	560140.44	Proposed ASR
Bear Tracks		1	5710998.47	554416.35	Proposed ASR

9.5.5 Furbearer Habitat Modeling Methods

American beaver habitat, as our representative aquatic furbearer, and American marten habitat, as our representative terrestrial furbearer were modelled. Furbearer habitat modelling was conducted using the LCC. The potential habitat for American beaver was modelled using broadleaf and mixed wood stands, as well as stands dominated by willow shrub understory. Only habitat of these types within 200 m of creeks, rivers and water bodies was selected with stands that were less than 8 hectares (ha) in size. The potential habitat for American marten was modelled using mature coniferous and mixed wood stands that were older than 60 years. Fire layers were used to determine the age of the mature stands. The potential habitat for both of these species were modelled for the LSA as well as the RSA.

9.5.6 Furbearer Habitat Modeling Results

American beaver

Based on the habitat model, American beavers have 205.98 km² of available habitat within the RSA. The amount of American beaver habitat that will potentially be disturbed as a result of the proposed ASR is a very small percentage (0.01% and 0.02% respectively) of the overall American beaver habitat available within the RSA and LSA (Table 22 and Table 23, Map 35).

Table 22: Potential American beaver Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type (within 200 m of water)	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	24.99	0.00%	0.00%
Broadleaf Open	9.26	0.00%	0.00%
Mixedwood Dense	17.3	0.10%	0.01%
Wetland Shrub	154.43	1.00%	0.01%
Total	205.98	1.10%	0.01%

Table 23: Potential American beaver Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type (within 200 m of water)	Total Modeled Habitat (LAA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	4.19	0.00%	0.00%
Broadleaf Open	1.46	0.00%	0.00%
Mixedwood Dense	2.84	0.10%	0.04%
Wetland Shrub	43.67	1.00%	0.02%
Total	52.16	1.10%	0.02%

American marten

Based on habitat model there is 248.83 km² of American marten habitat available within the RSA. American marten habitat was modelled using mature coniferous and mixedwood stands that were older than 60 years. Fire layers were used to determine the age of the mature stands. The amount of American marten habitat that may be lost or altered as a result of the Project is a very small percentage of the overall American marten habitat available within the LSA and RSA (Map 36).

The amount of the overall American marten habitat potentially altered by the ASR component of the Project is a very small percentage (0.03% and 0.10%) of the overall available American marten habitat within the RSA and LSA (Table 24, Table 25, Map 36).

Table 24: Potential American marten Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type (older than 60 years)	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Coniferous Dense	110.59	0.02	0.02%
Coniferous Open	43.65	0.03	0.07%
Mixedwood Dense	94.59	0.03	0.03%
Total	248.83	0.08	0.03%

Table 25: Potential American marten Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type (Older than 60 years)	Total Modeled Habitat (LSA) in km^2	Proposed ASR (20 m RoW)	
		Area (km^2)	Proportion (%)
Coniferous Dense	34.87	0.02	0.06%
Coniferous Open	18.86	0.03	0.16%
Mixedwood Dense	27.99	0.03	0.11%
Total	81.72	0.08	0.10%

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. The 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 26).

Table 26: 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
Hibernacula 1	Northeast of Lake St. Martin FN	1.68	LSMOC Reach 1
Hibernacula 2	Southeast of Lake St. Martin FN	3.41	Proposed ASR
Hibernacula 3	Southeast of Lake St. Martin FN	3.32	Proposed ASR
Hibernacula 4	Southeast of Lake St. Martin FN	3.47	Proposed ASR
Hibernacula 5	Southeast of Lake St. Martin FN	4.09	Proposed ASR
Hibernacula 6	Southeast of Lake St. Martin FN	1.44	Proposed ASR
Hibernacula 7	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 26) 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 27). Photographs 1 and 2 are of potential bat hibernacula identified in June 2016.

Table 27: Potentially Active Bat Hibernacula Identified during Field Investigations

Species Name	Observation Type	Quantity	Area
Potential bat hibernacula	Observation	1	Proposed ASR
Bat guano 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 proposed ASR LSA. Photograph taken by EcoLogic Environmental Inc. on June 8, 2016

Photograph 2: Possible bat hibernacula identified within the proposed ASR LSA. Picture of the opening of one potential hibernacula. Photography taken by EcoLogic Environmental Inc. on June 8, 2016

Given the identification of potential bat hibernaculum within the RSA and based on discussions and consultation with Dr. Craig Willis (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. Map 37 presents the areas traversed on September 14, 2016.

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

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

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

Given little brown bats, listed as endangered under SARA, were identified on the bat recorders, a second deployment of the bat recorders (SM4BAT) was undertaken on September 26th, 2016. For this deployment, locations along the Idylwild Road 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 17th, 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.

Map 39 illustrates the known little brown bat critical habitat areas in comparison to the location of the identified potential hibernacula and the placement of the bat recorders during both deployments, which identified little brown bats and possibly northern long-eared bat recordings within the RSA. 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 (Map 39) and is located 23 km to the southeast of the other two smaller critical habitat areas identified in the Interlake for little brown bats (Map 39). 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 (Map 39).

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, Map 41). Understanding the relationship of landscape elevation to potential hibernaculum assists in understanding potential hibernacula abiotic environmental changes (humidity, temperature, moisture) that may occur as a result of landscape change in the area, such as potential ground water/surface water fluctuations. The elevation data were gathered from the CanVec dataset created by Natural Resources Canada, Earth Sciences Sector (Natural Resources Canada, 2016). Table 28 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 28: Elevation of Project Features within the LSA

Location	Elevation Min (masl)	Elevation Max (masl)
Drill Hole 1	227	227
Quarry Withdrawal 1	240	240
Quarry Withdrawal 2	255	260
Quarry Withdrawal 3	260	280
Quarry Withdrawal 4	255	265
Quarry Withdrawal 5	290	290

Table 28: Elevation of Project Features within the LSA

Location	Elevation Min (masl)	Elevation Max (masl)
Quarry Withdrawal 6	285	285
Quarry Withdrawal 7	285	285
Quarry Lease 1	270	270
Quarry Lease 2	282	282
Quarry Lease 3	285	285
Quarry Lease 4	285	285
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 modelling conducted for the American white pelican there is 729.98 of available habitat within the RSA. The amount of potential American white pelican habitat that may be lost or altered as a result of the ASR component of the Project is a very small percentage of the overall American white pelican available within the LSA (0.01%) and RSA (0.01%) (Table 29 and Table 30).

Table 29: Potential American White Pelican Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km^2	Proposed ASR (20 m RoW)	
		Area (km^2)	Proportion (%)
Grassy Marshes	68.60	0.00	0.00%
American beaver Floods	34.07	0.004	0.01%
Water	627.32	0.00	0.00%
Total	729.98	0.004	0.001%

Table 30: Potential American White Pelican Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km^2	Proposed ASR (20 m RoW)	
		Area (km^2)	Proportion (%)
Grassy Marshes	6.65	0.00	0.00%
American beaver Floods	8.66	0.004	0.04%
Water	44.90	0.00	0.00%
Total	60.21	0.004	0.01%

9.7.2.2 Bank Swallow

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

Based on habitat modelling conducted, there is 220.17 km²of available habitat for bank swallow within RSA. There is essentially no bank swallow habitat potentially lost/altered by the proposed ASR (Table 31 and Table 32).

Table 31: Potential Bank Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Wet Meadow	109.03	0.00	0.00%
Marsh	68.60	0.00	0.00%
Townsites/Residential Sites	31.89	0.00	0.00%
Gravel Pits/Mine sites	8.73	0.002	0.02%
Fence lines (Community Pastures), fire guards	1.92	0.00	0.00%
Total	220.17	0.002	0.001%

Table 32: Potential Bank Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Wet Meadow	0.40	0.00	0.00%
Marsh	6.65	0.00	0.00%
Townsites/Residential Sites	0.14	0.00	0.00%
Gravel Pits/Mine sites	1.11	0.002	0.16%
Fence lines (Community Pastures), fire guards	0.02	0.00	0.00%
Total	8.32	0.002	0.02%

9.7.2.3 Barn Swallow

The barn swallow (*Hirundo rustica*), listed as threatened by SARA, is readily adapted to nesting under eaves of houses, under bridges, and inside buildings such as barns. The barn swallow prefers agricultural regions where nesting is primarily in man-made structures such as abandoned structures, buildings and barns. As a result, barn swallows are often found in townsites, near bridges, barns, farm homes, and mine sites (Cornell Lab of Ornithology, 2016). Barn swallows migrate over winter to sugar cane fields, grain fields and marshes. The barn swallow potential habitat was modelled using the FRI focusing on all wet meadow, marsh, townsites/residential, fence lines, gravel pits, and mine sites where typical nesting structures are found.

Based on modelling, barn swallows have 69.96 km² of available habitat within the RSA. The only barn swallow habitat that may be lost/altered by the proposed ASR component of the Project is associated with the development of gravel pits and quarry sites and the degree of loss/alteration

is a very small percentage (0.01% in RSA, and 0.13% in LSA) of the overall barn swallow habitat available (Table 33 and Table 34).

Table 33: Potential Barn Swallow Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Precipitous Slopes/Fragile Sites	0.27	0.00	0.00%
Abandoned Cultivated Land	16.79	0.003	0.02%
Dry Upland Ridge Prairie	3.32	0.00	0.00%
Townsites/Residential Sites	31.89	0.00	0.00%
Gravel Pits/Mine Sites	8.73	0.002	0.02%
River Banks	8.95	0.00	0.00%
Total	69.96	0.01	0.01%

Table 34: Potential Barn Swallow Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Precipitous Slopes/Fragile Sites	0.00	0.00	0.00%
Abandoned Cultivated Land	2.82	0.003	0.12%
Dry Upland Ridge Prairie	0.00	0.00	0.00%
Townsites/Residential Sites	0.14	0.00	0.00%
Gravel Pits/Mine Sites	1.11	0.002	0.16%
River Banks	0.00	0.00	0.00%
Total	4.07	0.01	0.13%

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 modelling conducted, the amount of potential habitat for black-crowned night-heron is 219.66 km² within the RSA. There is little to no black-crowned night-heron habitat may be lost/altered by the proposed ASR (0.00%) of the overall black-crowned night-heron habitat available (Table 35 and Table 36).

Table 35: Potential Black-Crowned Night-Heron Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Grassy Marshes	68.6	0	0.00%
Mud/Salt Flats	31.4	0	0.00%
Drainage Ditches	5.78	0	0.00%
American beaver Flood	34.07	0.004	0.01%
Dugouts/Water holes	1	0	0.00%
Rivers	8.95	0	0.00%
Shorelines/Islands	69.86	0	0.00%
Total	219.66	0.004	0.00%

Table 36: Potential Black-Crowned Night-Heron Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Grassy Marshes	9.04	0	0.00%
Mud/Salt Flats	1.41	0	0.00%
Drainage Ditches	2.26	0	0.00%
American beaver Flood	0.93	0.004	0.04%
Dugouts/Water holes	0.21	0	0.00%
Rivers	0.7	0	0.00%
Shorelines/Islands	6.92	0	0.00%
Total	21.47	0.004	0.02%

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 modelling conducted, there is 671.25 km² of available habitat for the bobolink within the RSA. The degree of potential loss for bobolink habitat associated with the proposed ASR is extremely small (0.003 %) and represents a very small percentage of the overall bobolink habitat available (Table 37 and Table 38).

Table 37: Potential Bobolink Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Hayland - Cultivated	292.97	0.003	0.001%
Cropland - Cultivated	59.69	0.005	0.01%
Pastureland - Domestic Animals	233.20	0.006	0.003%
Abandoned Cultivated Land	16.79	0.003	0.02%
Marsh	68.60	0.00	0.00%
Total	671.25	0.02	0.003%

Table 38: Potential Bobolink Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Hayland - Cultivated	2.18	0.003	0.15%
Cropland - Cultivated	0.39	0.005	1.22%
Pastureland - Domestic Animals	2.16	0.006	0.29%
Abandoned Cultivated Land	2.82	0.003	0.12%
Marsh	6.65	0.00	0.00%
Total	14.20	0.02	0.13%

9.7.2.6 Canada Warbler

Canada warbler is a migratory songbird listed as threatened under SARA (2015) and threatened (S3B) under MBCDC (2015). It is found in various forest types, but is most abundant in wet, deciduous-coniferous forest with thick underbrush (MBBA, 2015). Generally, this species is uncommon in Manitoba, but has been found breeding throughout the southern boreal forest (along the Manitoba Escarpment in western Manitoba to the Whiteshell and Nopoming Provincial Park boundaries in the southeast) and north toward the Pas in scattered locations. This species may spend no more than a few months on its summer breeding grounds (i.e. it is one of the last species to arrive and among 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 CANDIS (Canadian Soil Info Service). Only the tree stands located on mineral soils were used for the model.

Based on the habitat modelling conducted, there is 498.18 km²of habitat available for the Canada warbler within the RSA. The amount of potential Canada warbler habitat loss/alteration associated with the proposed ASR is a very small percentage (0.01% in the RSA and 0.16% in the LSA) of the overall Canada warbler habitat available within the RSA and LSA (Table 39 and Table 40).

Table 39: Potential Canada Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	346.94	0.03	0.01%
Mixedwood Dense	151.24	0.02	0.02%
Total	498.18	0.06	0.01%

Table 40: Potential Canada Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	18.48	0.03	0.18%
Mixedwood Dense	18.76	0.02	0.13%
Total	37.24	0.06	0.16%

9.7.2.7 Caspian Tern

The Caspian tern is the world's largest tern and is listed as uncommon (S3S4B) 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 habitat modelling conducted, there is 327.45 km² of available habitat for Caspian tern within the RSA. The degree of potential loss/alteration with the ASR component of the Project is a very small percentage (0.001% within the RSA and 0.01% within the LSA) of the overall Caspian tern habitat available (Table 41 and Table 42).

Table 41: Potential Caspian Tern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km2)	Proportion (%)
Marsh	68.60	0.00	0.00%
Drainage Ditches	5.78	0.00	0.00%
American beaver Flood	34.07	0.004	0.01%
Dugouts/Water Holes	1.00	0.00	0.00%
Water	218.01	0.00	0.00%
Total	327.45	0.004	0.001%

Table 42: Potential Caspian Tern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Marsh	6.65	0.00	0.00%
Drainage Ditches	0.02	0.00	0.00%
American beaver Flood	8.66	0.004	0.04%
Dugouts/Water Holes	0.02	0.00	0.00%
Water	18.89	0.00	0.00%
Total	34.24	0.004	0.01%

9.7.2.8 Common Nighthawk

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

For the common nighthawk, using the LCC, dense and open coniferous stands with areas of open rock outcrop and exposed land and grasslands within 500m of fence lines and fire guards were used to model potential habitat. Based on the model, there is 119.19 km² of habitat available for the common nighthawk within the RSA. The degree of habitat loss/alteration is a very small percentage (0.11% within the RSA and 0.49 % within the LSA) of the overall common nighthawk habitat available (Table 43 and Table 44).

Table 43: Potential Common Nighthawk Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Coniferous Open	82.87	0.02	0.03%
Exposed Land	17.74	0.09	0.49%
Grassland	18.58	0	0.00%
Total	119.19	0.11	0.11%

Table 44: Potential Common Nighthawk Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Coniferous Open	20.1	0.02	0.11%
Exposed Land	2.22	0.09	3.89%
Grassland	0.9	0	0.00%
Total	23.22	0.11	0.49%

9.7.2.9 Eastern Whip-Poor-Will

Eastern whip-poor-will is a migratory songbird listed as threatened by MESEA, SARA, and is uncommon (S3B) in Manitoba (MCDC, 2015). It prefers to breed in semi-open or patchy forests with clearings, such as regenerating disturbed areas, upland deciduous or mixed-wood forests; this species occurs in a variety of similar forest-structure areas in Manitoba, but not wide-open spaces or dense forests (MBBA, 2015). The northern border of the breeding range is a diagonal stripe along the aspen parkland transition zone from southeastern Manitoba to eastern central Saskatchewan. Wintering grounds are in Mexico and Central America.

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

Based on the results of the habitat model, eastern whip-poor-will has 310.55 km² of available habitat within the RSA. The degree of potential loss/alteration with the Project is a very small percentage of the overall Eastern whip-poor-will habitat available at 0.02% within the RSA and 0.13% within the LSA. (Table 45 and Table 46).

Table 45: Potential Eastern Whip-Poor-Will Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Open	185.82	0.03	0.02%
Mixedwood Dense	124.73	0.02	0.02%
Total	310.55	0.05	0.02%

Table 46: Potential Eastern Whip-Poor-Will Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Open	30.92	0.03	0.11%
Mixedwood Dense	12.34	0.02	0.18%
Total	43.26	0.05	0.13%

9.7.2.10 Eastern Wood-Pewee

Eastern wood-pewee is a common (S4B) (MCDC, 2015) migratory songbird not listed under SARA or MBESEA, but is listed as Special Concern by COSEWIC. The Eastern wood-pewee is common in mature mixedwoods and deciduous forests, often including aspen stands in Manitoba,

and may be present in mature deciduous woods such as large aspen stands and along edges of fairly open woods; it also occurs in riparian forests, beach ridge forests, and sometimes well-wooded urban and rural parks, and southern boreal transitional forest, with a deciduous component, or sometimes jack pine and more open boreal forest types (MBBA, 2015). It is one of the last migrants in spring, and winters in the tropics of South America.

For the Eastern wood pewee, using the LCC, dense broadleaf and mixedwood stands were used to model potential habitat. Based on modelling, the potential habitat for Eastern wood-peewee is within the RSA is 641.47 km². The degree of Eastern wood-pewee habitat loss/alteration with respect to the proposed ASR is a very small percentage (0.02 % within the RSA and 0.14% within the LSA) of the overall Eastern wood-pewee habitat available (Table 47 and Table 48).

Table 47: Potential Eastern Wood-Pewee Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	376.68	0.05	0.01%
Mixedwood Dense	264.79	0.05	0.02%
Total	641.47	0.10	0.02%

Table 48: Potential Eastern Wood-Pewee Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	21.91	0.05	0.22%
Mixedwood Dense	45.90	0.05	0.11%
Total	67.81	0.10	0.14%

9.7.2.11 Golden-Winged Warbler

Golden-winged warblers, which are listed as threatened under MBESEA and SARA and is uncommon (S3B) in Manitoba (MCDC, 2015). They are found in dry uplands, swamp forests, marshes, scrubby bur-oak woodland, young willow-tamarack stands, and other early successional habitats including the fringes of the boreal forest in Manitoba (MBBA, 2015). They are likely to be found in the LSA. Golden-winged warblers can be found on and near lakes, rivers, marshes, and prairie wetlands in Manitoba (MBBA, 2015). 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 modelled for the golden-winged warbler, there is 556.93 km² of available habitat for the golden-winged warbler within the RSA. The degree of potential loss/alteration with the ASR component of the proposed ASR is a very small percentage (0.01% in the RSA and 0.07% within the LSA) of the overall golden-winged warbler habitat available (Table 49 and Table 50).

Table 49: Potential Golden-Winged Warbler Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Tamarack Larch Treed Muskeg	58.03	0.01	0.01%
Willow	198.78	0.03	0.01%
Dwarf Birch	122.49	0.04	0.03%
Wet Meadow	109.03	0.00	0.00%
Marsh	68.60	0.00	0.00%
Total	556.93	0.07	0.01%

Table 50: Potential Golden-Winged Warbler Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Tamarack Larch Treed Muskeg	5.73	0.01	0.00%
Willow	29.70	0.03	0.10%
Dwarf Birch	59.60	0.04	0.06%
Wet Meadow	0.40	0.00	0.00%
Marsh	6.65	0.00	0.00%
Total	102.07	0.07	0.07%

9.7.2.12 Horned Grebe

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

Based on habitat modelling conducted for horned grebe, there is 139.51 km² of available habitat within the RSA. The degree of loss/alteration associated with the proposed ASR is a very small percentage (0.004% within the RSA and 0.03% within the LSA) of the overall horned grebe habitat available (Table 51 and Table 52).

Table 51: Potential Horned Grebe Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Marsh	68.6	0	0.00%
Sand Beaches	5.07	0	0.00%
Gravel Pits/Mine sites	8.73	0.002	0.02%
Drainage Ditches	5.78	0	0.00%
American beaver Flood	34.07	0.004	0.01%
Dugouts/Water Holes	1	0	0.00%
Rivers	8.95	0	0.00%
Small Lakes	7.31	0	0.00%
Total	139.51	0.01	0.004%

Table 52: Potential Horned Grebe Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) ink	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Marsh	6.65	0	0.00%
Sand Beaches	0.32	0	0.00%
Gravel Pits/Mine sites	1.11	0.002	0.16%
Drainage Ditches	0.02	0	0.00%
American beaver Flood	8.66	0.004	0.04%
Dugouts/Water Holes	0.02	0	0.00%
Rivers	0	0	0.00%
Small Lakes	0.47	0	0.00%
Total	17.25	0.01	0.03%

9.7.2.13 Least Bittern

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

Based on habitat modelling conducted, there is 102.66 km² of available least bittern habitat within the RSA and the degree of loss/alteration with the proposed ASR is a very small percentage (0.004% and 0.002% respectively) of the overall least bittern habitat available (Table 53 and Table 54).

Table 53: Potential Least Bittern Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km2)	Proportion (%)
Marsh	68.60	0.00	0.00%
American beaver Floods	34.07	0.004	0.01%
Total	102.66	0.004	0.004%

Table 54: Potential Least Bittern Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in Km²	Proposed ASR (20m RoW)	
		Area (km2)	Proportion (%)
Marsh	6.65	0.00	0.00%
American beaver Floods	8.66	0.004	0.04%
Total	15.31	0.004	0.02%

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) (MCDC, 2015). It is found in open forest habitat (boreal wetland, western coniferous, or mixed wood 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 model, the olive-sided flycatcher has 2,197.22 km² of available habitat within the RSA. The overall habitat loss/alteration associated with the proposed ASR is a very small percentage (0.05% and 0.18% respectively) of the overall olive-sided flycatcher habitat available (Table 55 and Table 56).

Table 55: Potential Olive-Sided Flycatcher Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Coniferous Open	82.87	0.02	0.03%
Wetland Shrub	1997.31	1.15	0.06%
Wetland Treed	117.04	0.01	0.01%
Total	2197.22	1.19	0.05%

Table 56: Potential Olive-Sided Flycatcher Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in Km²	Proposed ASR (20 m RoW)	
		Area (km2)	Proportion (%)
Coniferous Open	20.10	0.02	0.11%
Wetland Shrub	611.24	1.15	0.19%
Wetland Treed	22.29	0.01	0.06%
Total	653.64	1.19	0.18%

9.7.2.15 Peregrine Falcon

The peregrine falcon is assessed by COSEWIC as a species of special concern, as endangered under MESEA, and very rare in the province of Manitoba (MBCDC, 2015). The peregrine falcon is known to be a “wanderer” that can dive from great heights at speeds of up to 320 kph (Vuilleumier, 2009). The peregrine falcon occupies a wide variety of habitats, such as open

valleys, cities with tall buildings, and along inland cliffs or mountain ranges, in all cases, requiring a high nesting perch for raising their young and hunting (Vuilleumier, 2009).

Peregrines require open spaces consistent with much of the terrain in southern Manitoba and traditionally nest at cliff locations. In southern Manitoba, where there is an absence of high cliffs, urban centres provide an alternative nesting habitat. Hydro structures such as transmission line poles often serve as vantage points in these fairly open and relatively flat landscapes. The entire landscape of the RSA has an overall topography that ranges from 220 to 310 metres above sea level (masl) with the winter road located along an upland glacial beach ridge. Historical accounts within the Heritage Resources technical report for the ASR component of the Project (NLHS, 2016) indicate an area referred to as the "Big Ridge" within the LSA; however, this is located along the winter road moraine. Therefore, that are no true cliffs or ridges that are tall enough within the RSA for peregrine falcon use.

For the peregrine falcon, using the LCC, dense broadleaf and mixed wood stands were used to model potential roosting habitat, as no nesting habitat occurs in the area.

During migration, they may use wooded habitats to roost and rest as they fly through an area. The amount of potential habitat for peregrine, based on the habitat modelling conducted is 641.47 km² within the RSA. The degree of loss/alteration with the proposed ASR is a very small percentage (0.02% and 0.14% respectively) of the overall peregrine falcon habitat available (Table 57 and Table 58).

Table 57: Potential Peregrine Falcon Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Broadleaf Dense	376.68	0.05	0.01%
Mixedwood Dense	264.79	0.05	0.02%
Total	641.47	0.10	0.02%

Table 58: Potential Peregrine Falcon Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km2)	Proportion (%)
Broadleaf Dense	21.91	0.05	0.22%
Mixedwood Dense	45.90	0.05	0.11%
Total	67.81	0.10	0.14%

9.7.2.16 Piping Plover

The piping plover is very rare in Manitoba (MCDC, 2015) and is listed as endangered by SARA and MESEA. Piping plover habitat primarily consists of open sandy beaches or rocky shorelines, often in areas of the beach that are dry and away from the water.

For the piping plover, the FRI was used, specifically modelling for sandy shores and/or mudflats/salt flats along shorelines within 150 m of LMB, LSM, and Lake Winnipeg.

The amount of potential habitat for piping plover is limited to the shorelines of LMB, LSM, and Lake Winnipeg within the RSA. There is no potential loss/alteration of habitat with the proposed ASR in the LSA or RSA (Table 59 and Table 60).

Table 59: Potential Piping Plover Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type (within 150 m of a large body of water)	Total Modeled Habitat (RSA) in km^2	Proposed ASR (20m RoW)	
		Area (km^2)	Proportion (%)
Mud/Salt Flats	19.03	0.00	0.00%
Sand Beaches	4.65	0.00	0.00%
Total	23.68	0.00	0.00%

Table 60: Potential Piping Plover Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

`Habitat Type (within 150 m of a large body of water)	Total Modeled Habitat (LSA) in km^2	Proposed ASR (20 m RoW)	
		Area (km^2)	Proportion (%)
Mud/Salt Flats	2.77	0.00	0.00%
Sand Beaches	0.32	0.00	0.00%
Total	3.10	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) (MCDC, 2015), listed as threatened under MESEA (2015) and SARA (2015) and likely to be present in the LSA. The red-headed woodpecker was modelled for potential habitat using the FRI with a focus on all recreational sites, water drainage areas, fence lines, American beaver floods, and grasslands within 500 m of fence lines and fireguards.

Based on the modelled habitat for red-headed woodpecker, there is 62.51 km² of available habitat within the RSA. The only potential habitat lost/altered by the Project linear features is associated with the development of the ASR, and the degree of loss/alteration with the proposed ASR is a very small percentage (0.01% and 0.04% respectively) of the overall red-headed woodpecker habitat available (Table 61 and Table 62).

Table 61: Potential Red-Headed Woodpecker Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Recreational sites	1.33	0.000	0.00%
Shelter Belts	0.83	0.000	0.00%
Fence lines (Community Pastures), fire guards	1.92	0.000	0.00%
Drainage Ditches	5.78	0.000	0.00%
American beaver Flood	34.07	0.004	0.01%
Grassland	18.58	0.000	0.00%
Total	62.51	0.004	0.01%

Table 62: Potential Red-Headed Woodpecker Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20 m RoW)	
		Area (km²)	Proportion (%)
Recreational sites	0.00	0.000	0.00%
Shelter Belts	0.00	0.000	0.00%
Fence lines (Community Pastures), fire guards	0.02	0.000	0.00%
Drainage Ditches	0.02	0.000	0.00%
American beaver Flood	8.66	0.004	0.04%
Grassland	0.90	0.000	0.00%
Total	9.60	0.004	0.04%

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 km² of available habitat within the RSA. The degree of potential loss/alteration with the proposed ASR is a very small percentage (0.01% and 0.09% respectively) of the overall short-eared owl habitat available (Table 63 and Table 64).

Table 63: Potential Short-Eared Owl Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Herb	118.26	0.00	0.00%
Grassland	691.64	0.005	0.001%
Perennial Crops and Pasture	70.02	0.00	0.00%
Wetland Herb	867.84	0.20	0.02%
Total	1747.76	0.21	0.01%

Table 64: Potential Short-Eared Owl Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km2)	Proportion (%)
Herb	6.06	0.00	0.00%
Grassland	1.97	0.005	0.27%
Perennial Crops and Pasture	0.56	0.00	0.00%
Wetland Herb	218.34	0.20	0.09%
Total	226.92	0.21	0.09%

9.7.2.19 Trumpeter Swan

Trumpeter swan is a migratory water bird not listed under SARA (2015) but is listed as very rare in Manitoba (S1B) (MCDC, 2015) and endangered under MESEA (2015). Despite its rarity, a number of sightings have occurred in Manitoba in recent years (MBBA, 2015). It prefers nesting is shallow wetlands with stable water levels, abundant and elevated nest sites, abundant and diverse aquatic invertebrates and/or plants, and low levels of human disturbance. Trumpeter swan typically mates for life, with females laying an egg every second day until they have a full clutch (average of five to six eggs). Migration to wintering grounds is complex and flown in short segments with long layovers and very few long flights; birds from western Canada fly east of the Rockies to the Yellowstone area following freeze up in late fall.

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

Based on the modelling, potential habitat for trumpeter swan within the RSA is 706.57 km². The degree of potential loss/alteration with the proposed ASR is a very small percentage (0.001% and 0.01% respectively) of the overall trumpeter swan habitat available (Table 65 and Table 66).

Table 65: Potential Trumpeter Swan Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Marsh	68.60	0.00	0.00%
American beaver Flood	34.07	0.004	0.01%
Water	594.96	0.00	0.00%
Rivers	8.95	0.00	0.00%
Total	706.57	0.004	0.001%

Table 66: Potential Trumpeter Swan Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in km²	Proposed ASR (20m RoW)	
		Area (km²)	Proportion (%)
Marsh	6.65	0.00	0.00%
American beaver Flood	8.66	0.004	0.04%
Water	47.98	0.00	0.00%
Rivers	0.00	0.00	0.00%
Total	63.29	0.004	0.01%

9.7.2.20 Yellow Rail

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

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

Based on the habitat modelling conducted, there is 541.49 km² of available habitat for yellow rails within the RSA. The degree of potential loss/alteration with the proposed ASR is a very small percentage (0.03% and 0.10% respectively) of the overall yellow rail habitat available (Table 67 and Table 68).

Table 67: Potential Yellow Rail Habitat within the RSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (RSA) in km²	Proposed ASR (20m RoW)	
		Area (km2)	Proportion (%)
Muskeg	438.83	0.17	0.04%
Marsh	68.60	0.00	0.00%
American beaver Floods	34.07	0.004	0.01%
Total	541.49	0.18	0.03%

Table 68: Potential Yellow Rail Habitat within the LSA and the Amount of Potential Habitat Loss/Alteration Associated with the Proposed ASR

Habitat Type	Total Modeled Habitat (LSA) in Km²	Proposed ASR (20m RoW)	
		Area (km2)	Proportion (%)
Muskeg	154.36	0.17	0.11%
Marsh	6.65	0.00	0.00%
American beaver Floods	8.66	0.004	0.04%
Total	169.67	0.18	0.10%

9.7.3 Manitoba Breeding Bird Atlas Surveys

The Manitoba Breeding Bird Atlas (MBBA) has conducted bird survey work within the RSA. Map 42 presents the grid map used by the MBBA showing where survey work has been conducted within the RSA. A full listing of all of the birds identified by the MBBA surveys can be

found at the Manitoba Breeding Bird Atlas website (MBBA, 2015) by downloading the survey data for each tile of interest. Map 42 and Table 70 provide the general location (by MBBA tile) and the bird species at risk (as outlined in Table 1) that were identified during the MBBA surveys conducted within the RSA. Note that the data in Table 69 correspond to the data provided in Map 42. The tiles that are colored red on Map 42 represent the areas with seven unique bird species at risk identified.

Table 69: MB Breeding Bird Survey Results for Avian Species at Risk (NB: Table data corresponds with Map 42 data)

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				

Table 69: MB Breeding Bird Survey Results for Avian Species at Risk (NB: Table data corresponds with Map 42 data)

Region	Category	Square	Species1	Species2	Species3	Species4	Species5	Species6	Species7
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				
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		

Table 69: MB Breeding Bird Survey Results for Avian Species at Risk (NB: Table data corresponds with Map 42 data)

Region	Category	Square	Species1	Species2	Species3	Species4	Species5	Species6	Species7
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					
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 along the proposed ASR RoW (See Section 8.7.3).

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 in June 2016, only two inactive nesting snags were identified (Table 70, Map 43).

Table 70: Aerial Raptor and Pedestrian-Based Nest Search Results along the Proposed ASR and within the LSA

Type of Observation	Quantity	Location		
		UTM Y	UTM X	Project Area
Nesting Snag	1	5711007.37	554411.62	Proposed ASR
Nesting Snag	1	5710059.03	556811.29	Proposed ASR
Eagle Nest	1	5753270.304	570517.764	LSA
Eagle Nest	1	5735580.018	554131.1408	LSA
Small Stick Nest (4-6in diameter)	1	5735236.684	553610.917	LSA
Eagle Nest	1	5734880.397	553379.677	LSA
Goose Nest	1	5735148.848	555295.5031	LSA

9.7.3 Pedestrian Bird Nest Search Methods

The 20 m RoW associated with the proposed ASR is not expected to be widened but disturbance associated with construction and vehicle traffic may be associated with the Project. To investigate for bird nesting along the proposed ASR RoW, ground nest searches were conducted between June 2, 2016 and June 11, 2016 in conjunction with bird point count surveys and multispecies mammal track and sign surveys.

The pedestrian nest search surveys were conducted by two biologists travelling slowly by ATV along the RoW. Each biologist was searching the tree line along the RoW 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) as well as along the proposed ASR RoW during ground nest searches conducted in June 2016. Based on the collective results from these nest search survey types, Table 71 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).

9.7.5 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 proposed ASR RoW from June 2, 2016 and June 11, 2016. There were ten-point count survey locations along the proposed ASR. Map 44 presents the locations of the point count survey sites along the proposed ASR.

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

The late evening point count surveys were conducted to assess for the potential presence of yellow rails as well as to document avian species more vocally active during evening such as the Eastern whip-poor-will, American woodcock, American bittern, common snipe, among others.

During these late evening point counts, biologists used trucks to access the point count locations. Using the model prediction of quality yellow rail habitat locations, there were four survey sites selected in high quality yellow rail habitat along the proposed ASR.

Additional point count surveys were conducted within the proposed ASR LSA in association with the LSMOC features.

9.7.6 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 proposed ASR RoW. 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 along the proposed ASR such as: bank swallows, common nighthawk, and trumpeter swans. There were three trumpeter swans observed. The trumpeter swan is not listed under SARA (2015) but is listed as very rare in Manitoba (S1B) (MCDC, 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.

There were no yellow rails identified during point count surveys or as incidental observations along the proposed ASR.

Based on point counts conducted within the LSA in closer proximity to the LSMOC features, there were a few additional Species At Risk identified, including the American white pelican. Table 71 presented the listed species identified along the proposed ASR RoW and within the LSA during point counts and as incidental observations made during nest searches as well as aerial survey work conducted in June 2016. Appendix E presents all bird species identified along the proposed ASR and LSA.

Table 71: Avian Listed Species Identified along the Proposed ASR RoW and the LSA

Species Name	Scientific Name	Observation Type	Quantity	Project Area
Bank swallow	*Riparia riparia*	Observation	1	LSA
Common nighthawk	*Chordeiles minor*	Observation	1	LSA
Trumpeter swan	*Cygnus buccinator*	Observation	1	Proposed ASR
Trumpeter swan	*Cygnus buccinator*	Observation	2	Proposed ASR
American white pelican	*Pelecanus erythrorhynchos*	Observation	1	LSA
American white pelican	*Pelecanus erythrorhynchos*	Observation	2	LSA
American white pelican	*Pelecanus erythrorhynchos*	Observation	6	LSA
American white pelican	*Pelecanus erythrorhynchos*	Observation	7	LSA

9.7.7 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.

9.7.8 Piping Plover Survey Results

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

9.8 Amphibians & Reptiles

9.8.1 Amphibian Point Count Survey Methods

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

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

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

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

Several species of frogs were overserved and/or heard during the amphibian point count surveys (Table 72, Map 46), all of which are common species. There were no amphibian Species At Risk identified along the proposed ASR RoW.

Table 72: Amphibian Point Count Survey Results along the Proposed ASR and within the LSA

Point Count Number/ Waypoint	Species Name	Observation Type	Quantity	Location		
				UTM Y	UTM X	Project Area
PC 93	Wood Frog	Observation	1	5733378.79	560604.01	Proposed ASR
PC 92	Wood Frog	Observation	1	5736945.88	561826.54	Proposed ASR
PC 89	Boreal Chorus Frog	Observation	1	5741405.25	564253.69	Proposed ASR
PC 94	Wood Frog	Vocalization	1	5727225.5	560347.97	Proposed ASR
PC 85	Boreal Chorus Frog	Observation	1	5711007.37	554411.62	Proposed ASR
PC 85	Boreal Chorus Frog	Observation	1	5710998.47	554416.35	Proposed ASR
PC 85	Gray Tree Frog	Vocalization	1	5710998.47	554416.35	Proposed ASR
PC 88	Boreal Chorus Frog	Vocalization	1	5751079.66	572931.36	LSA

9.8.3 Reptile Hibernacula Search Methods

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

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

9.8.4 Reptile Hibernacula Search Results

There were no incidental sightings of reptiles or potential reptile hibernacula identified during the ground-based surveys conducted along the proposed ASR RoW. However, the combination of aerial and ground based survey work conducted for bats (as described in Section 8.6) did identify two locations of suspected active snake hibernacula (limestone depressions with multiple sinkholes) as well as one observation of a red-sided garter snake found in close proximity to one of the potential snake dens identified (Table 73). The snake hibernacula where the red-sided garter snake was observed nearby was a linear distance of 14.4 km from LSMOC Reach 1 and

4.1 km from the proposed ASR. Photograph 3 represents a potential snake hibernaculum identified during the surveys. Further monitoring is required to confirm these sites as active snake hibernacula.

Table 73: Reptile Hibernacula Survey Results within the LSA

Species Name	Observation Type	Quantity	Location		Project Area
			UTM Y	UTM X	
Red-sided garter snake	Observation	1	5725598.44	550141.36	LSA
Potential snake hibernacula	Observation	1			LSA
Potential snake hibernacula	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 EIS, 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.

There were no mineral licks identified during any field studies conducted within the ASR LSA or 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 5: Cormorant nesting island identified on Lake St. Martin. Photo taken by EcoLogic Environmental Inc. on June 9, 2016

10 SUMMARY

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

Data were gathered from various agencies providing historical context to mammals, avian, reptile, and amphibian presence and distribution within the RSA. Habitat modelling was conducted for moose, elk, and white-tailed deer. Despite moose summer and winter habitat modelling showing quality habitat availability for moose within the RSA, the number of moose identified (n=14) during the 2016 winter aerial survey was low. A considerable amount of access trails was identified throughout the RSA (Section 7).

The analyses conducted identified the current linear density for moose within the LSA and RSA to be 0.10 km^2 and 0.22 km^2 respectively, both below the published Salmo et al. (2004) thresholds. The linear density analysis of Project-related linear developments within the LSA and RSA identified that, regardless of which LSMOC 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 elk were observed only in the southernwestern 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.

Habitat modelling on American beaver and American marten identified quality habitat for both species within the LSA. 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 predominately in the northern portion of the LSA.

Habitat modelling was conducted on focal avian species exhibiting the available habitat for these bird species within the RSA and LSA. Historically, surveys conducted by the BBA have identified several avian Species At Risk within the LSA and observations of the bank swallow, common nighthawk and trumpeter swans were made during the 2016 field investigations.

Potentially active snake hibernacula were identified within the LSA, as well as potential bat hibernacula. Further monitoring of these sites is required to determine potential use/activity. Bat recorders deployed within the LSA and along the proposed ASR identified the presence of little brown 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 bats.

There were no large mammal dens nor mineral lick identified within the LSA. A heron rookery was identified on an island on LSM, within the RSA, but outside of the LSA. A series of tern colonies and nesting islands and reefs for shore birds and cormorants were identified in the north eastern portion of LSM, within the RSA, but outside of the LSA.

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

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

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

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

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

MBCDC (2015) Definitions for Status Listing:

1 Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.

2 Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.

3 Uncommon throughout its range or in the province (21 to 100 occurrences).

4 Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (>100 occurrences).

5 Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.

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

H Historically known; may be rediscovered.

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

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

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

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

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

SARA (2015) Definitions for Status Listing:

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

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

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

Endangered: A wildlife species facing imminent extirpation or extinction.

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

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

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

MBCDC (2015) Definitions for Status Listing:

1 Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.

2 Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.

3 Uncommon throughout its range or in the province (21 to 100 occurrences).

4 Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (>100 occurrences).

5 Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.

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

H Historically known; may be rediscovered.

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

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

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

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

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

SARA (2015) Definitions for Status Listing:

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

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

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

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

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

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

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

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

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

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

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

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

MBCDC (2015) Definitions for Status Listing:

1 Very rare throughout its range or in the province (5 or fewer occurrences, or very few remaining individuals). May be especially vulnerable to extirpation.

2 Rare throughout its range or in the province (6 to 20 occurrences). May be vulnerable to extirpation.

3 Uncommon throughout its range or in the province (21 to 100 occurrences).

4 Widespread, abundant, and apparently secure throughout its range or in the province, with many occurrences, but the element is of long-term concern (>100 occurrences).

5 Demonstrably widespread, abundant, and secure throughout its range or in the province, and essentially impossible to eradicate under present conditions.

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

H Historically known; may be rediscovered.

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

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

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

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

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

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

SARA (2015) Definitions for Status Listing:

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

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

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

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

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

Appendix D: Avian Species at Risk Federal Recovery Documents

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

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

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

Species	Federal Recovery Documents Available
Grasshopper sparrow	7 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (1 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1241#ot10
Horned grebe	9 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=1045#ot10
Least bittern	19 record(s) found. • COSEWIC Status Reports (2 record(s) found.) • COSEWIC Assessments (2 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (3 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (7 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (2 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=51#ot10

Species	Federal Recovery Documents Available
Loggerhead shrike	18 record(s) found. • COSEWIC Status Reports (2 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (2 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (3 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (1 record(s) found.) • Consultation Documents (2 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (2 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=38#ot10
Northern parula	No Documents
Olive-sided flycatcher	35 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (17 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (8 record(s) found.) • Consultation Documents (1 record(s) found.) • Exceptions (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=999#ot10
Peregrine falcon	7 record(s) found. • Orders (1 record(s) found.) • Permits and Related Agreements (6 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=29#ot10

Species	Federal Recovery Documents Available
Piping plover	18 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • Response Statements (1 record(s) found.) • Recovery Strategies (1 record(s) found.) • Action Plans (5 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (6 record(s) found.) • Consultation Documents (1 record(s) found.) • Residence Description (1 record(s) found.) • Critical Habitat Descriptions in the Canada Gazette (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=686#ot10
Red-headed woodpecker	14 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (2 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Permits and Related Agreements (4 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=57#ot10
Rusty blackbird	18 record(s) found. • COSEWIC Status Reports (1 record(s) found.) • COSEWIC Assessments (1 record(s) found.) • Response Statements (1 record(s) found.) • Action Plans (9 record(s) found.) • Management Plans (1 record(s) found.) • Orders (2 record(s) found.) • COSEWIC Annual Reports (1 record(s) found.) • Consultation Documents (1 record(s) found.) • Recovery Document Posting Plans (1 record(s) found.) http://www.registrelep-sararegistry.gc.ca/species/speciesDetails_e.cfm?sid=907#ot10

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

Appendix E: Song Bird and Water Bird Point Count Survey Results

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
93	Alder flycatcher	*Empidonax alnorum*	Observation	1	5733379	560604	Proposed ASR
99	Alder flycatcher	*Empidonax alnorum*	Observation	1	5703477	560140	Proposed ASR
100	Alder flycatcher	*Empidonax alnorum*	Vocalization	1	5687199	558338	Proposed ASR
86	Alder flycatcher	*Empidonax alnorum*	Observation	1	5739779	556772	LSA
88	Alder flycatcher	*Empidonax alnorum*	Vocal	1	5751080	572931	LSA
87	Alder flycatcher	*Empidonax alnorum*	Vocal	1	5753270	570518	LSA
110	Alder flycatcher	*Empidonax alnorum*	Vocal	1	5747151	560447	LSA
Incidental	American robin	*Turdus migratorius*	Observation	1	5715948	550770	Proposed ASR
85	American robin	*Turdus migratorius*	Observation	1	5723591	553834	Proposed ASR
Incidental	American robin	*Turdus migratorius*	Observation	1	5687060	549112	Proposed ASR
103	American robin	*Turdus migratorius*	Observation	1	5739910	550476	LSA
106	American robin	*Turdus migratorius*	Observation	1	5736017	555521	LSA
111	American robin	*Turdus migratorius*	Vocal	1	5749470	557059	LSA
102	Bald eagle	*Haliaeetus leucocephalus*	Observation	1	5740553	554367	LSA
106	Bald eagle	*Haliaeetus leucocephalus*	Observation	2	5736017	555521	LSA
Incidental	Bank swallow	*Riparia riparia*	Observation	1	5687031	546340	Proposed ASR
92	Black-capped chickadee	*Poecile atricapillus*	Observation	1	5736946	561827	Proposed ASR
Incidental	Black-capped chickadee	*Poecile atricapillus*	Observation	1	5714267	553269	Proposed ASR
85	Black-capped chickadee	*Poecile atricapillus*	Vocalization	1	5723591	553834	Proposed ASR
Incidental	Black-capped chickadee	*Poecile atricapillus*	Vocalization	1	5721413	553579	Proposed ASR
111	Black-capped chickadee	*Poecile atricapillus*	Vocal	1	5749470	557059	LSA
95	Blue jay	*Cyanocitta cristata*	Observation	1	5730167	561347	Proposed ASR

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
85	Blue jay	*Cyanocitta cristata*	Observation	1	5723591	553834	Proposed ASR
85	Blue jay	*Cyanocitta cristata*	Vocalization	1	5723591	553834	Proposed ASR
Incidental	Blue jay	*Cyanocitta cristata*	Vocalization	1	5721413	553579	Proposed ASR
85	Canada goose	*Branta canadensis*	Vocalization	1	5723591	553834	Proposed ASR
92	Canada goose	*Branta canadensis*	Observation	1	5736946	561827	Proposed ASR
Incidental	Canada goose	*Branta canadensis*	Observation	15	5694669	559679	Proposed ASR
Incidental	Canada goose	*Branta canadensis*	Observation	2	5701527	559259	Proposed ASR
100	Canada goose	*Branta canadensis*	Tracks	1	5687199	558338	Proposed ASR
Incidental	Canada goose gosling	*Branta canadensis*	Observation	6	5701527	559259	Proposed ASR
106	Cedar waxwing	*Bombycilla cedrorum*	Observation	2	5736017	555521	LSA
102	Chestnut-sided warbler	*Setophaga pensylvanica*	Vocalization	1	5691758	559058	Proposed ASR
Incidental	Chestnut-sided warbler	*Setophaga pensylvanica*	Vocalization	1	5698137	558770	Proposed ASR
100	Chipping sparrow	*Spizella passerina*	Observation	1	5687199	558338	Proposed ASR
85	Chipping sparrow	*Spizella passerina*	Vocalization	1	5723591	553834	Proposed ASR
97	Chipping sparrow	*Spizella passerina*	Vocalization	1	5710417	556251	Proposed ASR
100	Clay-colored sparrow	*Spizella pallida*	Vocalization	1	5687199	558338	Proposed ASR
Incidental	Common nighthawk	*Chordeiles minor*	Observation	1	5716257	550948	Proposed ASR
Incidental	Common raven	*Corvus corax*	Observation	1	5725569	550175	Proposed ASR
Incidental	Common raven	*Corvus corax*	Observation	4	5687031	546340	Proposed ASR
100	Common raven	*Corvus corax*	Observation	2	5687199	558338	Proposed ASR
102	Common raven	*Corvus corax*	Observation	1	5691758	559058	Proposed ASR
Incidental	Common raven	*Corvus corax*	Observation	1	5687120	554435	Proposed ASR
Incidental	Common raven	*Corvus corax*	Observation	1	5687060	549112	Proposed ASR
Incidental	Common raven	*Corvus corax*	Vocalization	1	5687100	553225	Proposed ASR

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
107	Common raven	*Corvus corax*	Observation	2	5736537	552973	LSA
114	Common raven	*Corvus corax*	Observation	1	5738235	556249	LSA
120	Common sandpiper	*Actitis hypoleucos*	Observation	1	5743765	556829	LSA
105	Common sandpiper	*Actitis hypoleucos*	Observation	2	5737432	556753	LSA
95	Common yellowthroat	*Geothlypis trichas*	Observation	1	5730167	561347	Proposed ASR
97	Common yellowthroat	*Geothlypis trichas*	Observation	1	5710417	556251	Proposed ASR
85	Common yellowthroat	*Geothlypis trichas*	Vocalization	1	5723591	553834	Proposed ASR
102	Common yellowthroat	*Geothlypis trichas*	Vocalization	1	5691758	559058	Proposed ASR
97	Common yellowthroat	*Geothlypis trichas*	Vocalization	1	5711007	554412	Proposed ASR
Incidental	Common yellowthroat	*Geothlypis trichas*	Vocalization	1	5687060	549112	Proposed ASR
92	Common yellowthroat	*Geothlypis trichas*	Observation	1	5736946	561827	Proposed ASR
86	Common yellowthroat	*Geothlypis trichas*	Observation	1	5739779	556772	LSA
Incidental	Downy woodpecker	*Picoides pubescens*	Observation	1	5694669	559679	Proposed ASR
Incidental	Eastern meadowlark	*Sturnella magna*	Observation	1	5714267	553269	Proposed ASR
97	Eastern phoebe	*Sayornis phoebe*	Observation	1	5710402	556378	Proposed ASR
100	Eastern phoebe	*Sayornis phoebe*	Observation	1	5687182	557455	Proposed ASR
88	Eastern phoebe	*Sayornis phoebe*	Vocal	1	5751080	572931	LSA
Incidental	Franklin's gull	*Leucophaeus pipixcan*	Observation	1	5708145	559233	Proposed ASR
Incidental	Great blue heron	*Ardea herodias*	Observation	1	5687058	549219	Proposed ASR
97	Great blue heron	*Ardea herodias*	Observation	1	5710268	555098	Proposed ASR
97	Greater yellowleg	*Tringa melanoleuca*	Observation	3	5710998	554416	Proposed ASR
Incidental	Greater yellowleg	*Tringa melanoleuca*	Observation	1	5694669	559679	Proposed ASR
100	Greater yellowleg	*Tringa melanoleuca*	Vocalization	1	5687199	558338	Proposed ASR
97	Greater yellowleg	*Tringa melanoleuca*	Vocalization	1	5710417	556251	Proposed ASR

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
92	Greater yellowleg	*Tringa melanoleuca*	Observation	2	5736946	561827	Proposed ASR
97	Hawk	*Unkown Species*	Vocalization	1	5711007	554412	Proposed ASR
120	Hawk	*Unkown Species*	Observation	1	5743765	556829	LSA
111	Hawk	*Unkown Species*	Vocal	1	5749470	557059	LSA
108	House sparrow	*Passer domesticus*	Observation	1	5747403	565418	LSA
88	Immature bald eagle	*Haliaeetus leucocephalus*	Observation	2	5751080	572931	LSA
86	Immature bald eagle	*Haliaeetus leucocephalus*	Observation	1	5739779	556772	LSA
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5725598	550141	Proposed ASR
Incidental	Killdeer	*Charadrius vociferus*	Observation	1	5726847	551157	Proposed ASR
102	Killdeer	*Charadrius vociferus*	Observation	1	5740553	554367	LSA
106	Killdeer	*Charadrius vociferus*	Observation	1	5736017	555521	LSA
119	Killdeer	*Charadrius vociferus*	Observation	1	5742115	555545	LSA
90	Killdeer	*Charadrius vociferus*	Observation	1	5745560	557625	LSA
92	Least flycatcher	*Empidonax minimus*	Observation	1	5736946	561827	Proposed ASR
Incidental	Lesser scaup	*Aythya affinis*	Observation	1	5694669	559679	Proposed ASR
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*	Observation	1	5726847	551157	Proposed ASR
97	Marsh wren	*Cistothorus palustris*	Observation	1	5710305	555930	Proposed ASR
Incidental	Marsh wren	*Cistothorus palustris*	Observation	1	5701527	559259	Proposed ASR
127	Marsh wren	*Cistothorus palustris*	Observation	1	5751870	569013	LSA
Incidental	Mourning Dove	*Zenaida macroura*	Vocalization	1	5687060	549112	Proposed ASR
Incidental	Northern flicker	*Colaptes auratus*	Observation	1	5714267	553269	Proposed ASR
Incidental	Northern flicker	*Colaptes auratus*	Observation	1	5687058	549219	Proposed ASR
Incidental	Northern flicker	*Colaptes auratus*	Observation	1	5721413	553579	Proposed ASR
93	Ovenbird	*Seiurus*	Observation	1	5733379	560604	Proposed ASR

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
92	Ovenbird	*Seiurus*	Observation	1	5736946	561827	Proposed ASR
89	Ovenbird	*Seiurus*	Observation	1	5741405	564254	Proposed ASR
Incidental	Ovenbird	*Seiurus*	Vocalization	1	5715996	550609	Proposed ASR
Incidental	Ovenbird	*Seiurus*	Vocalization	1	5687100	553225	Proposed ASR
90	Ovenbird	*Seiurus*	Observation	1	5745560	557625	LSA
86	Ovenbird	*Seiurus*	Observation	1	5739779	556772	LSA
91	Ovenbird	*Seiurus*	Observation	1	5737271	558257	LSA
87	Ovenbird	*Seiurus*	Vocal	1	5753270	570518	LSA
127	Ovenbird	*Seiurus*	Vocal	1	5751870	569013	LSA
Incidental	Pileated woodpecker	*Hylatomus pileatus*	Observation	1	5687077	550817	Proposed ASR
93	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5733379	560604	Proposed ASR
92	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5736946	561827	Proposed ASR
Incidental	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5715996	550609	Proposed ASR
Incidental	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5714267	553269	Proposed ASR
Incidental	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5725598	550141	Proposed ASR
Incidental	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5716295	550939	Proposed ASR
85	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5723591	553834	Proposed ASR
97	Red-eyed vireo	*Vireo olivaceus*	Vocalization	1	5710417	556251	Proposed ASR
86	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5739779	556772	LSA
91	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5737271	558257	LSA
120	Red-eyed vireo	*Vireo olivaceus*	Observation	1	5743765	556829	LSA
108	Red-eyed vireo	*Vireo olivaceus*	Vocal	1	5747403	565418	LSA
109	Red-eyed vireo	*Vireo olivaceus*	Vocal	1	5747605	564752	LSA
110	Red-eyed vireo	*Vireo olivaceus*	Vocal	1	5747151	560447	LSA
110	Red-eyed vireo	*Vireo olivaceus*	Vocal	1	5747151	560447	LSA
95	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5730167	561347	Proposed ASR

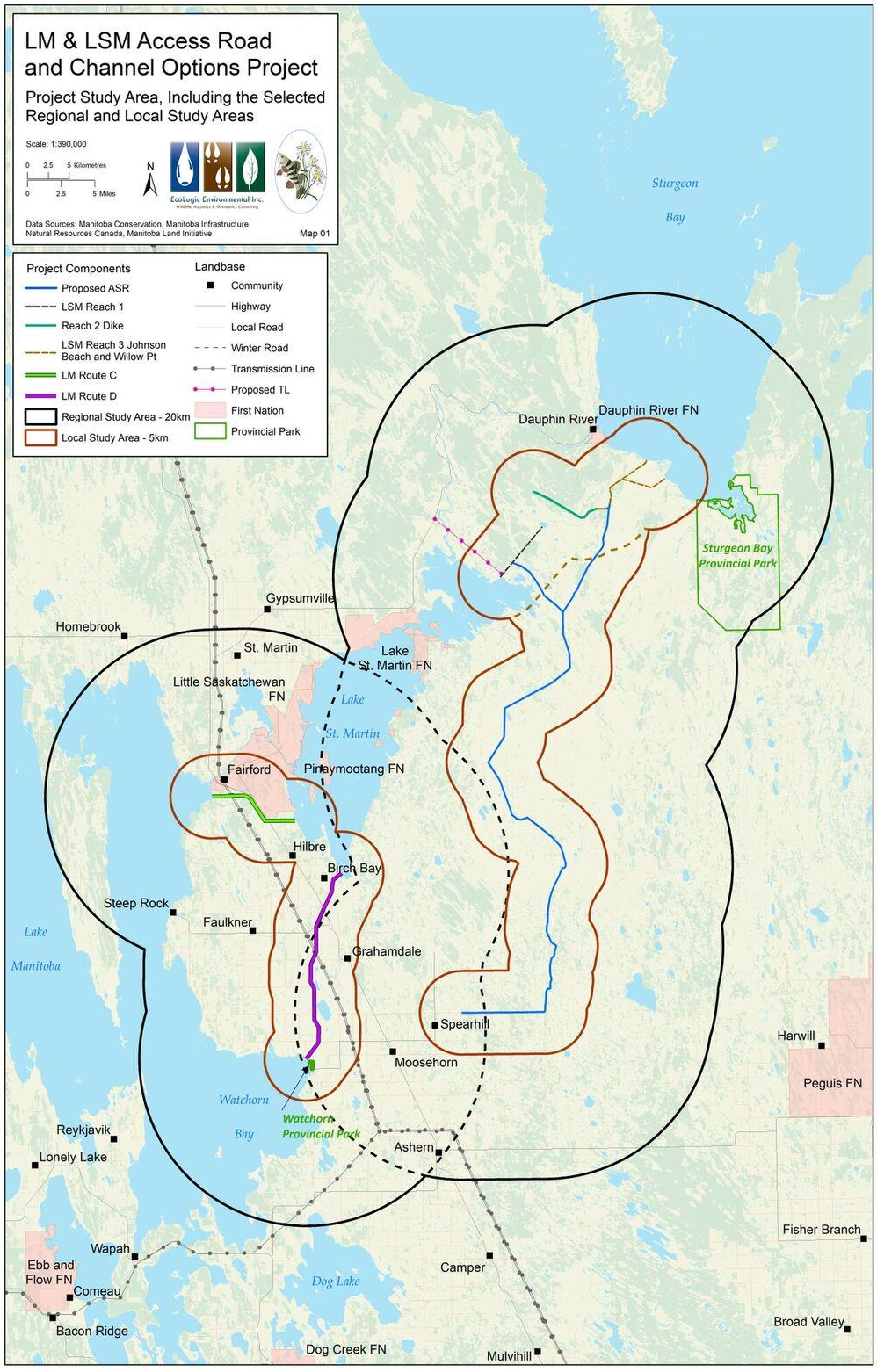
Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
89	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5741405	564254	Proposed ASR
100	Red-winged blackbird	*Agelaius phoeniceus*	Observation	10	5687199	558338	Proposed ASR
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	10	5695093	559807	Proposed ASR
97	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5710268	555098	Proposed ASR
97	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5710325	555019	Proposed ASR
97	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5710305	555930	Proposed ASR
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5687060	549112	Proposed ASR
85	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5723591	553834	Proposed ASR
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5687100	553225	Proposed ASR
102	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5691758	559058	Proposed ASR
Incidental	Red-winged blackbird	*Agelaius phoeniceus*	Vocalization	1	5721413	553579	Proposed ASR
87	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5753270	570518	LSA
87	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5753270	570518	LSA
87	Red-winged blackbird	*Agelaius phoeniceus*	Vocal	1	5753270	570518	LSA
108	Red-winged blackbird	*Agelaius phoeniceus*	Vocal	1	5747403	565418	LSA
127	Red-winged blackbird	*Agelaius phoeniceus*	Observation	3	5751870	569013	LSA
103	Red-winged blackbird	*Agelaius phoeniceus*	Observation	7	5739910	550476	LSA
105	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5737432	556753	LSA
106	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5736017	555521	LSA
107	Red-winged blackbird	*Agelaius phoeniceus*	Observation	2	5736537	552973	LSA
119	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5742115	555545	LSA
120	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5743765	556829	LSA
90	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5745560	557625	LSA
86	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5739779	556772	LSA

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
91	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5737271	558257	LSA
114	Red-winged blackbird	*Agelaius phoeniceus*	Observation	1	5738235	556249	LSA
127	Red-winged blackbird	*Agelaius phoeniceus*	Vocal	1	5751870	569013	LSA
120	Rough legged hawk	*Buteo lagopus*	Observation	1	5743765	556829	LSA
120	Rough legged hawk	*Buteo lagopus*	Vocal	1	5743765	556829	LSA
Incidental	Ruffed grouse scat	*Bonasa umbellus*	Observation	1	5715357	549560	Proposed ASR
Incidental	Ruffed grouse scat	*Bonasa umbellus*	Observation	1	5720101	551127	Proposed ASR
97	Sandhill crane	*Grus canadensis*	Tracks	1	5710998	554416	Proposed ASR
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
97	Sedge wren	*Cistothorus platensis*	Vocalization	1	5711007	554412	Proposed ASR
97	Shore bird	*Unknown Species*	Tracks	1	5710998	554416	Proposed ASR
95	Sora	*Porzana carolina*	Observation	1	5730167	561347	Proposed ASR
100	Sora	*Porzana carolina*	Vocalization	2	5687199	558338	Proposed ASR
97	Sora	*Porzana carolina*	Vocalization	1	5710417	556251	Proposed ASR
127	Sora	*Porzana carolina*	Vocal	1	5751870	569013	LSA
86	Swainson's hawk	*Buteo swainsoni*	Observation	1	5739779	556772	LSA
103	Swamp sparrow	*Melospiza georgiana*	Observation	1	5739910	550476	LSA
105	Swamp sparrow	*Melospiza georgiana*	Observation	1	5737432	556753	LSA
107	Swamp sparrow	*Melospiza georgiana*	Observation	1	5736537	552973	LSA
127	Swamp sparrow	*Melospiza georgiana*	Vocal	1	5751870	569013	LSA
108	Swamp sparrow	*Melospiza georgiana*	Vocal	1	5747403	565418	LSA
109	Swamp sparrow	*Melospiza georgiana*	Vocal	1	5747605	564752	LSA
114	Swamp sparrow	*Melospiza georgiana*	Vocal	1	5738182	557002	LSA

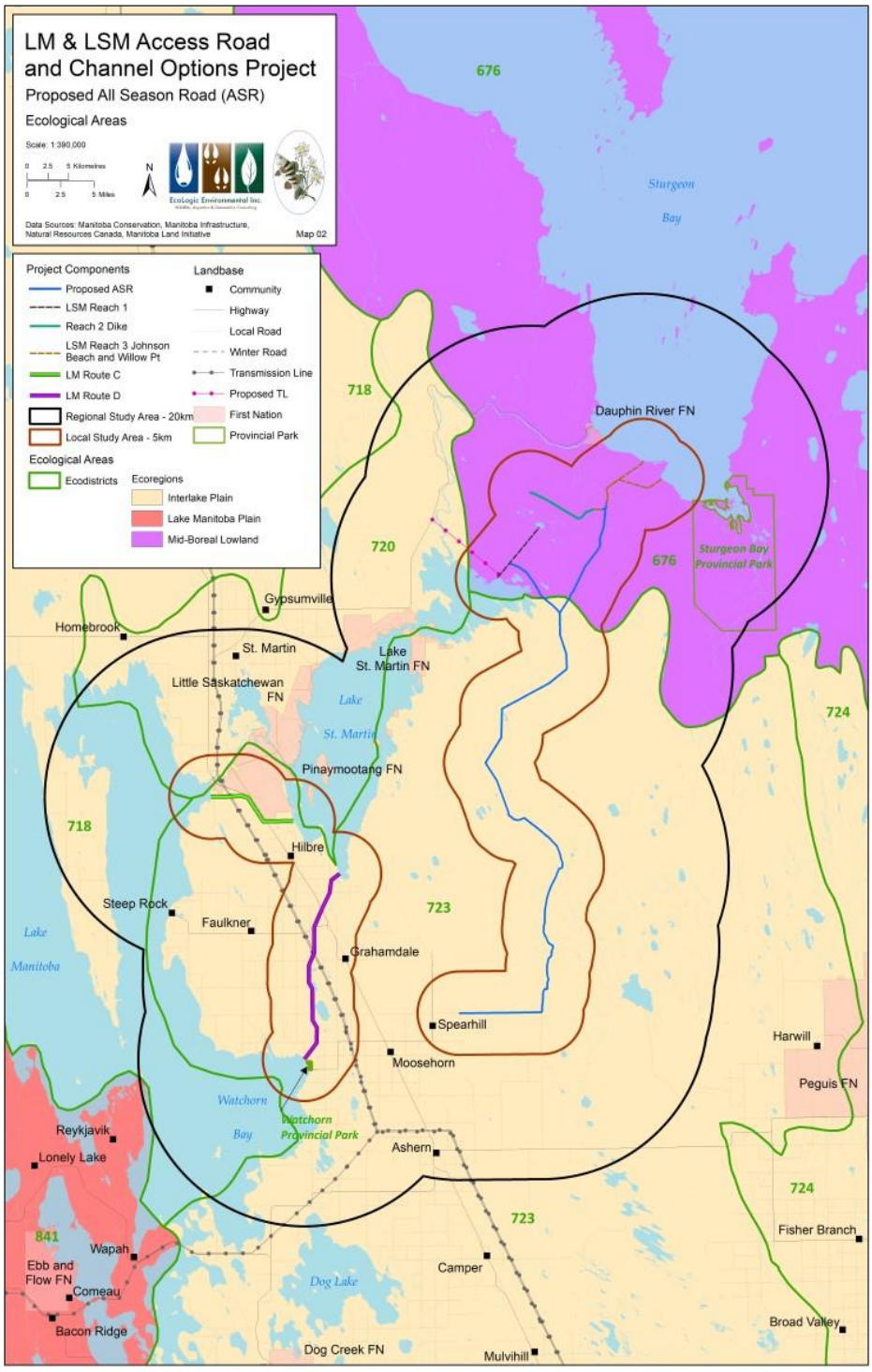
Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
97	Swamp sparrow	*Melospiza georgiana*	Vocalization	1	5711007	554412	Proposed ASR
97	Tree swallow	*Tachycineta bicolor*	Observation	1	5710325	555019	Proposed ASR
120	Tree swallow	*Tachycineta bicolor*	Observation	2	5743765	556829	Proposed ASR
Incidental	Trumpeter swan	*Cygnus buccinator*	Observation	1	5725200	556781	Proposed ASR
Incidental	Trumpeter swan	*Cygnus buccinator*	Observation	2	5721413	553579	Proposed ASR
91	Veery	*Catharus fuscescens*	Observation	1	5737271	558257	LSA
93	Vesper sparrow	*Pooecetes gramineus*	Observation	1	5733379	560604	Proposed ASR
95	Vesper sparrow	*Pooecetes gramineus*	Observation	1	5730167	561347	Proposed ASR
Incidental	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5725598	550141	Proposed ASR
Incidental	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5725598	550141	Proposed ASR
Incidental	Vesper sparrow	*Pooecetes gramineus*	Vocalization	1	5716295	550939	Proposed ASR
87	Vesper Sparrow	*Pooecetes gramineus*	Vocal	1	5753270	570518	LSA
Incidental	Warbling vireo	*Pooecetes gramineus*	Vocalization	1	5715996	550609	Proposed ASR
Incidental	Warbling vireo	*Pooecetes gramineus*	Vocalization	1	5687060	549112	Proposed ASR
Incidental	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5725598	550141	Proposed ASR
Incidental	White throated sparrow	*Zonotrichia albicollis*	Observation	1	5725598	550141	Proposed ASR
93	White throated sparrow	*Zonotrichia albicollis*	Observation	1	5733379	560604	Proposed ASR
95	White throated sparrow	*Zonotrichia albicollis*	Observation	1	5730167	561347	Proposed ASR
Incidental	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5727434	560283	Proposed ASR
97	White throated sparrow	*Zonotrichia albicollis*	Vocalization	1	5710998	554416	Proposed ASR
127	White throated sparrow	*Zonotrichia albicollis*	Vocal	1	5751870	569013	LSA

Point Count Location	Common Name	Scientific Name	Point Type	Total Count	UTM_Y	UTM_X	Area
109	White throated sparrow	*Zonotrichia albicollis*	Vocal	1	5747605	564752	LSA
110	White throated sparrow	*Zonotrichia albicollis*	Vocal	1	5747151	560447	LSA
97	Willet	*Zonotrichia albicollis*	Observation	1	5711007	554412	Proposed ASR
89	Wilson's snipe	*Gallinago delicata*	Observation	1	5741405	564254	Proposed ASR
Incidental	Wilson's snipe	*Gallinago delicata*	Observation	3	5687060	549112	Proposed ASR
Incidental	Wilson's snipe	*Gallinago delicata*	Vocalization	1	5687060	549112	Proposed ASR
105	Yellow headed blackbird	*Xanthocephalus xanthocephalus*	Observation	1	5737432	556753	LSA

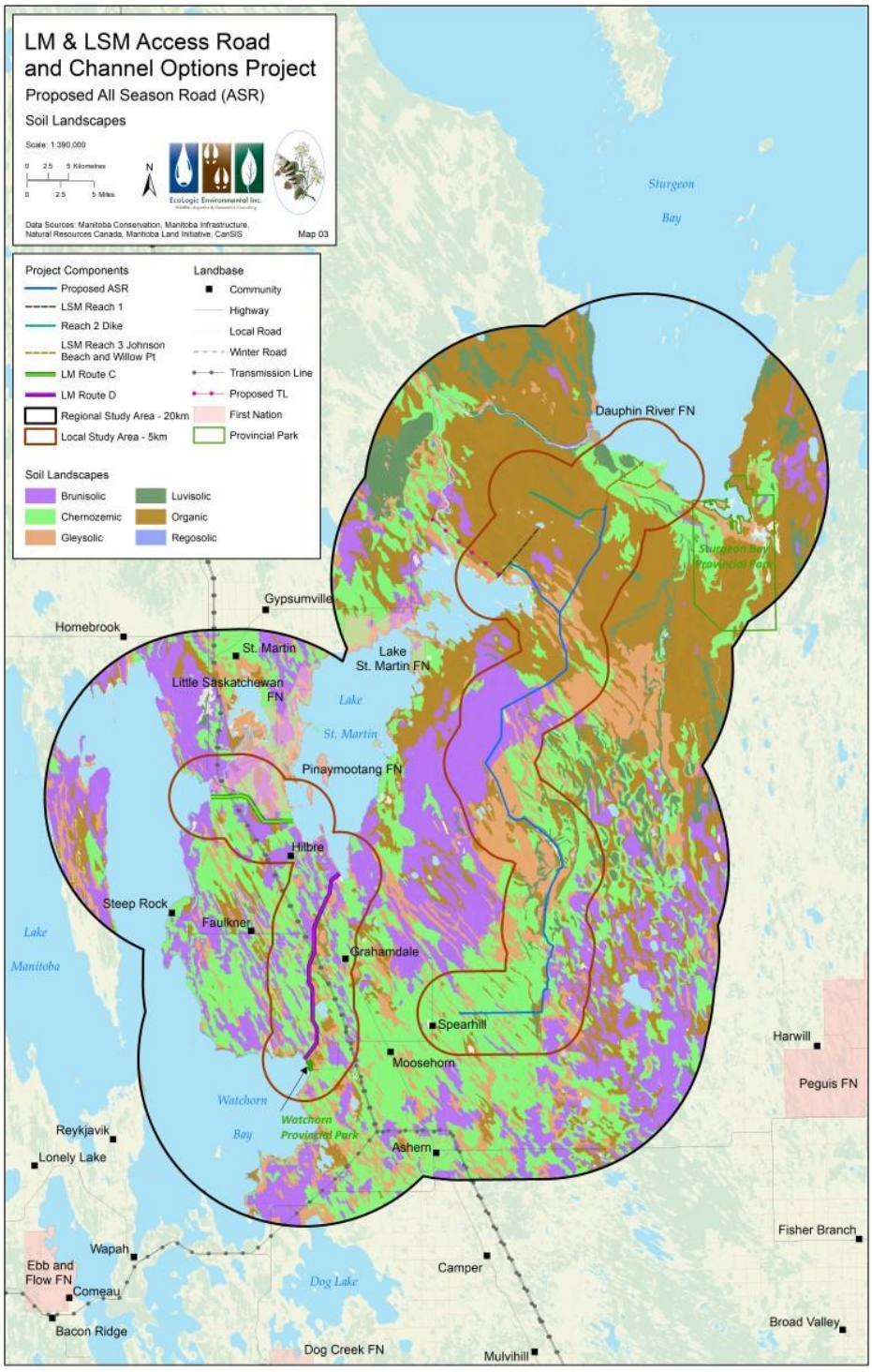
Appendix F: Report Mapping



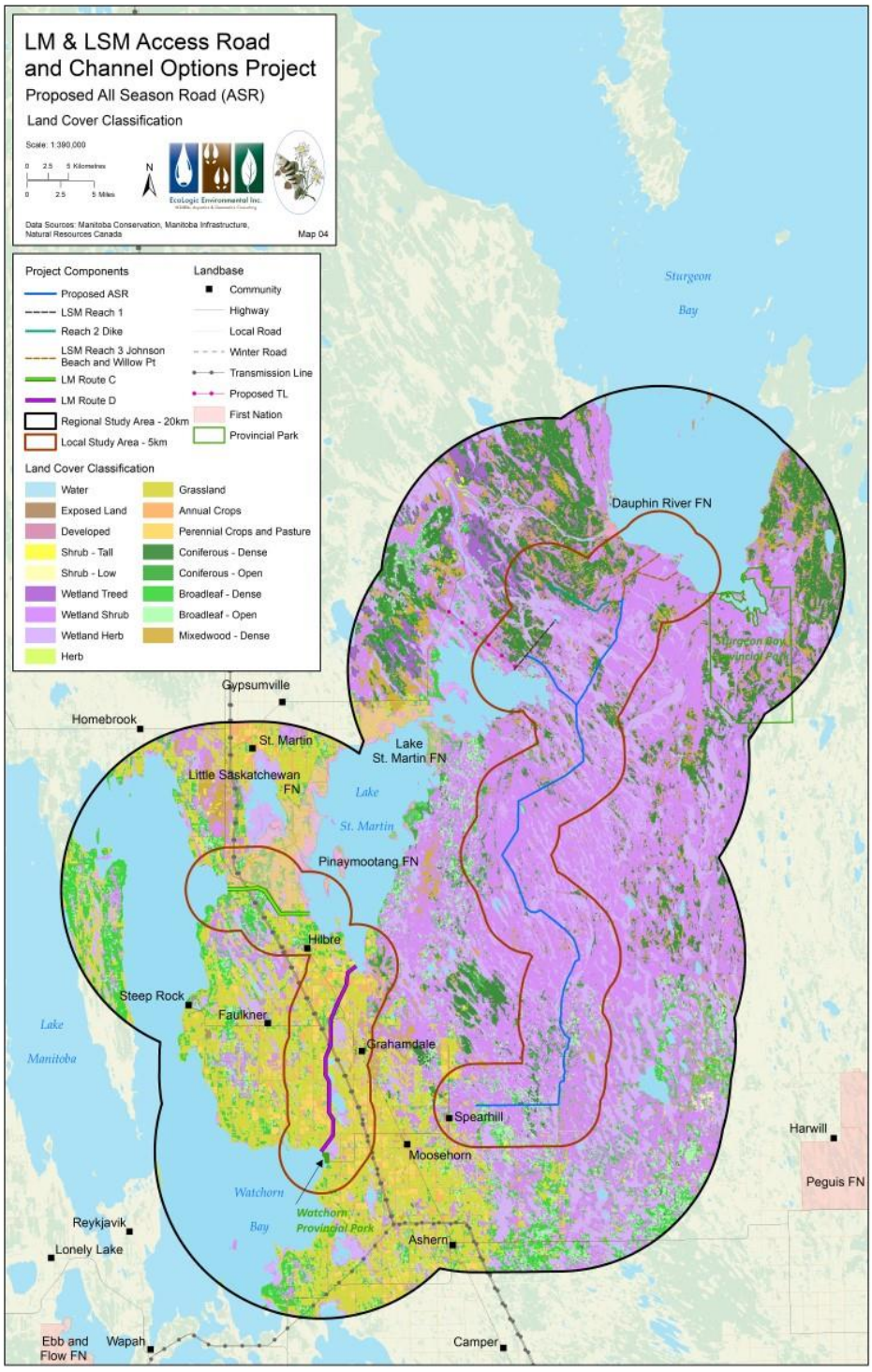
Map 1: Project Components



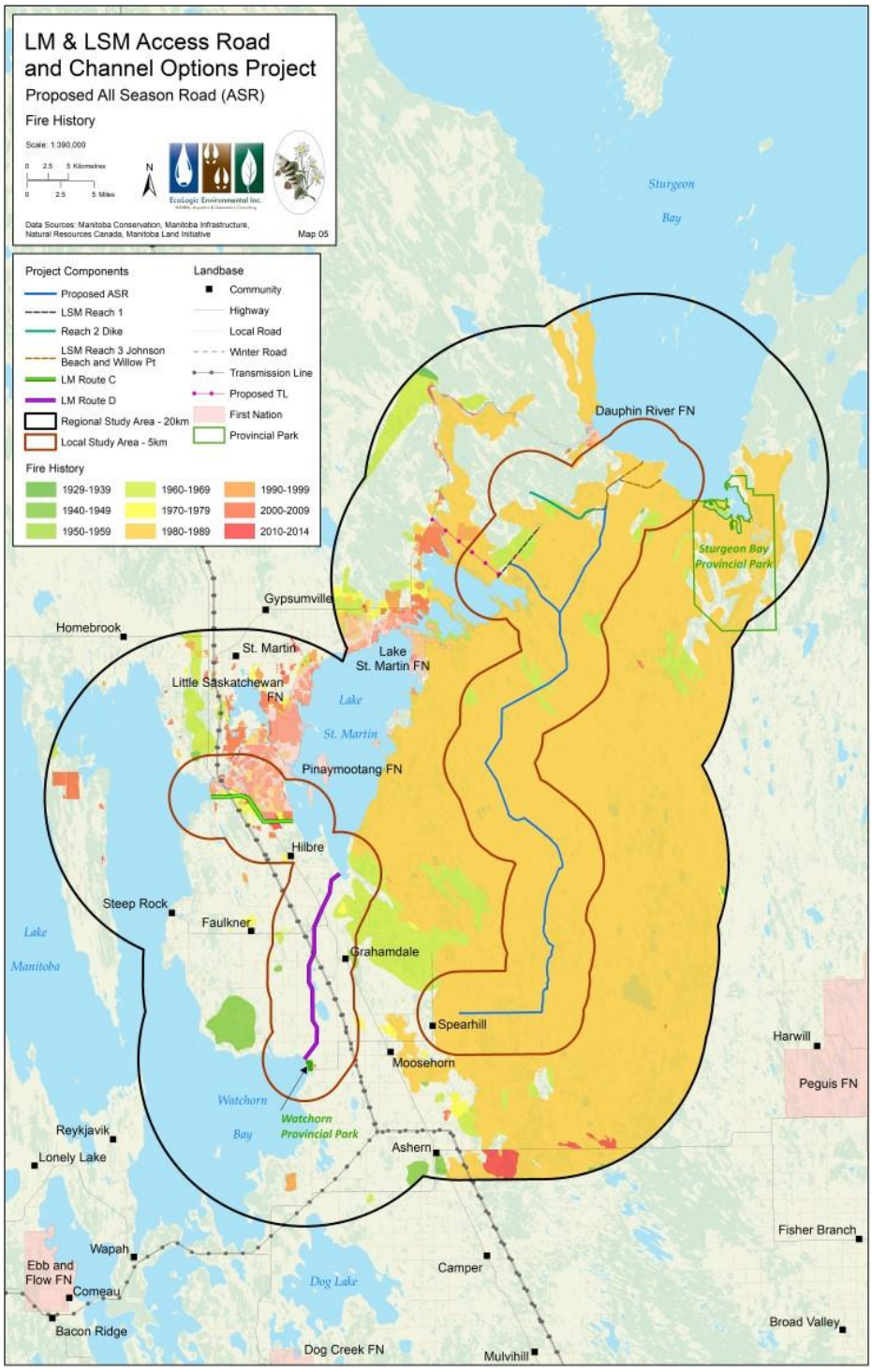
Map 2: Ecoregions within the LSA and RSA



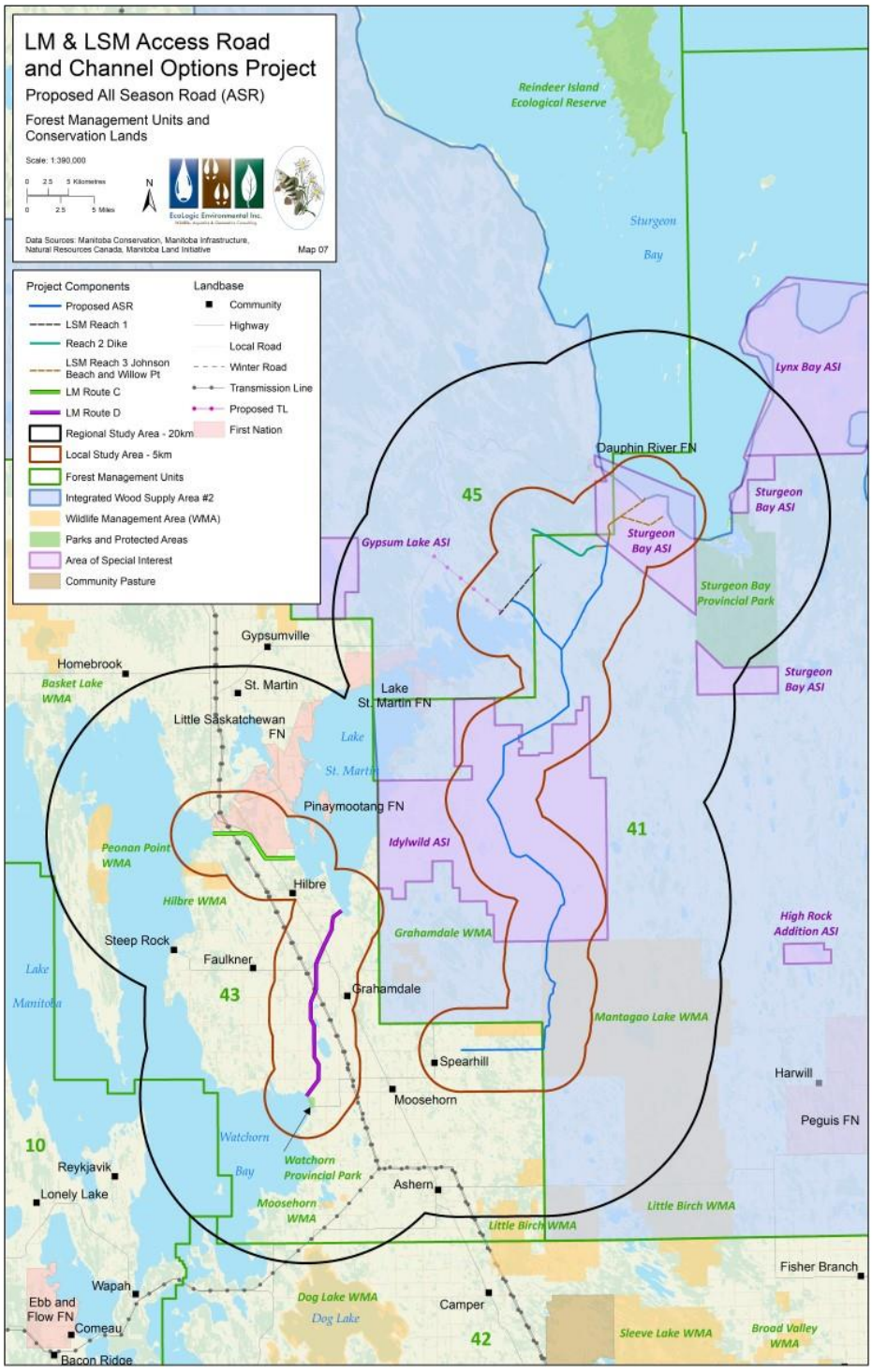
Map 3: Soil Classification within the LSA and RSA



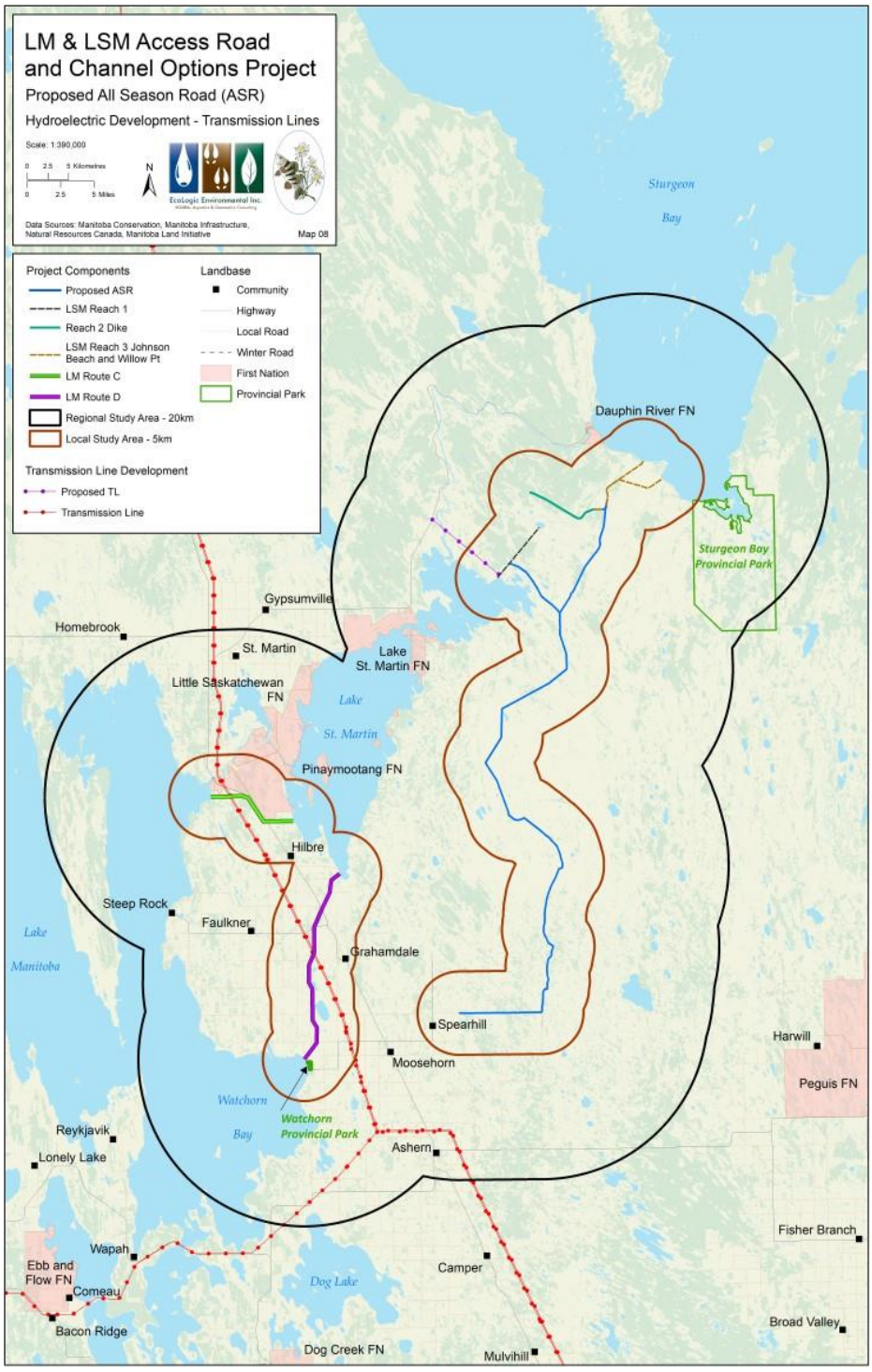
Map 4: Land Cover Classification (LCC) within the LSA and RSA



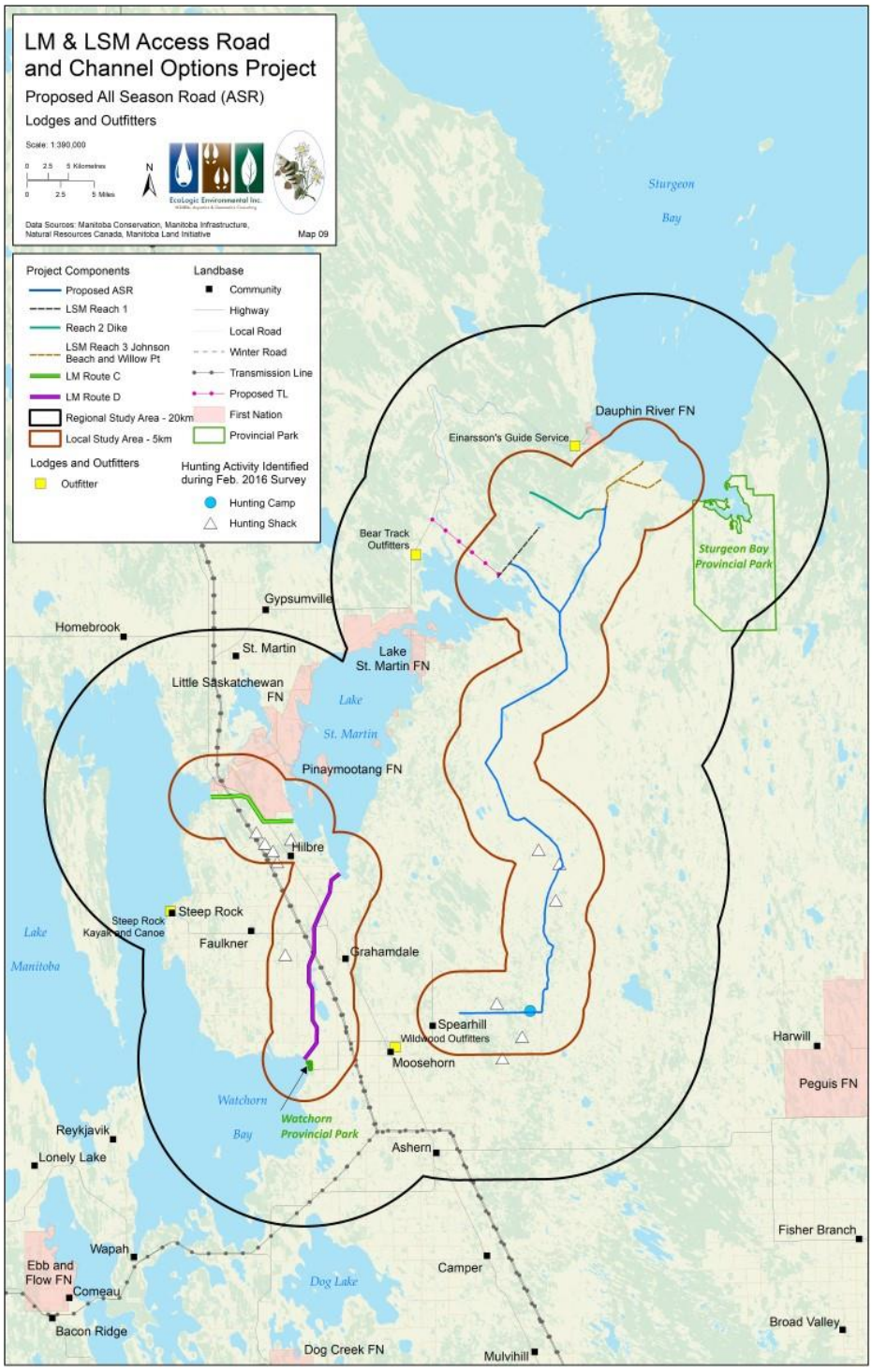
Map 5: Fire History within the LSA and RSA



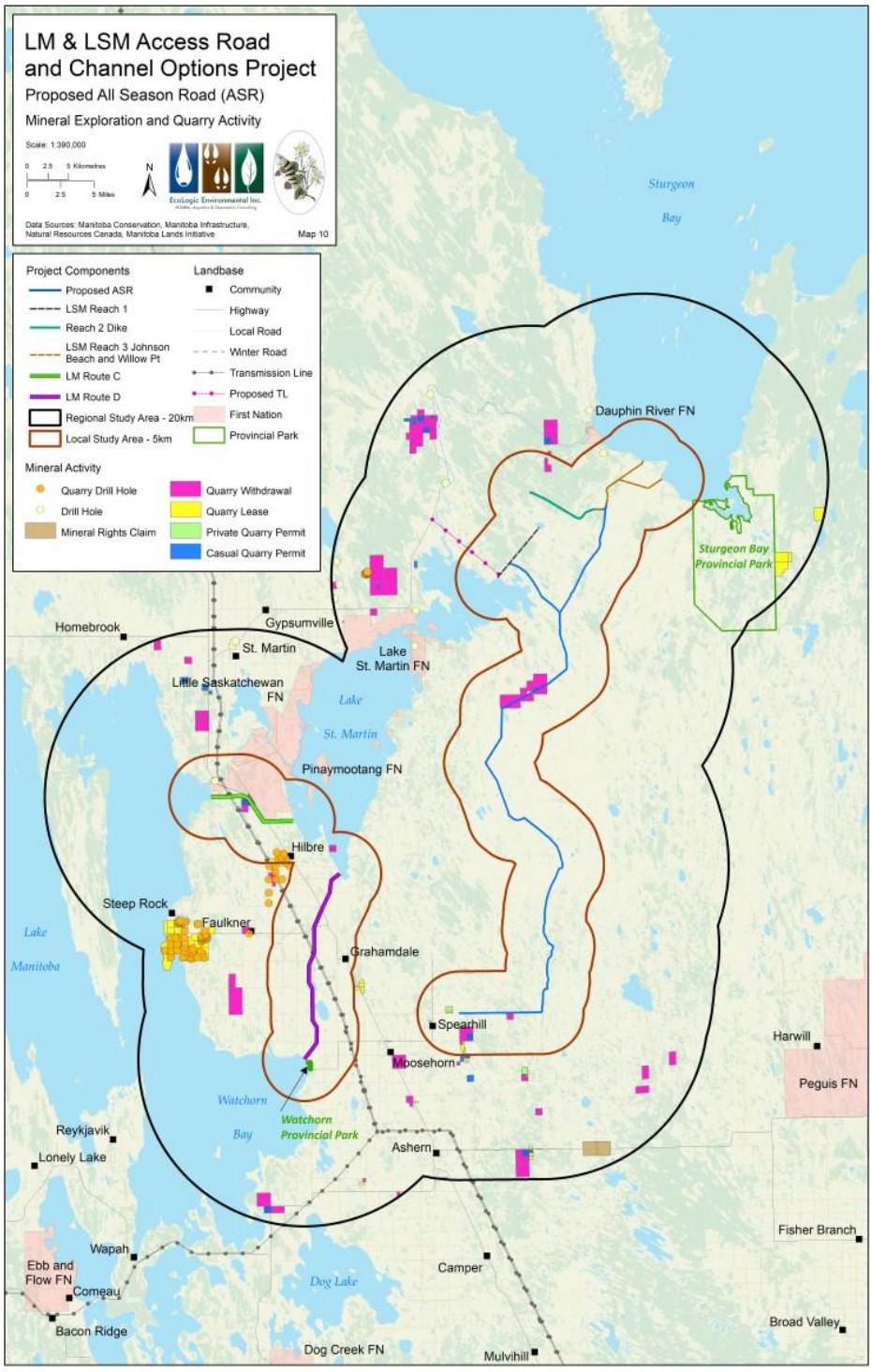
Map 7: Forest Management Units (FMUs) and Conservation Lands within the LSA and RSA



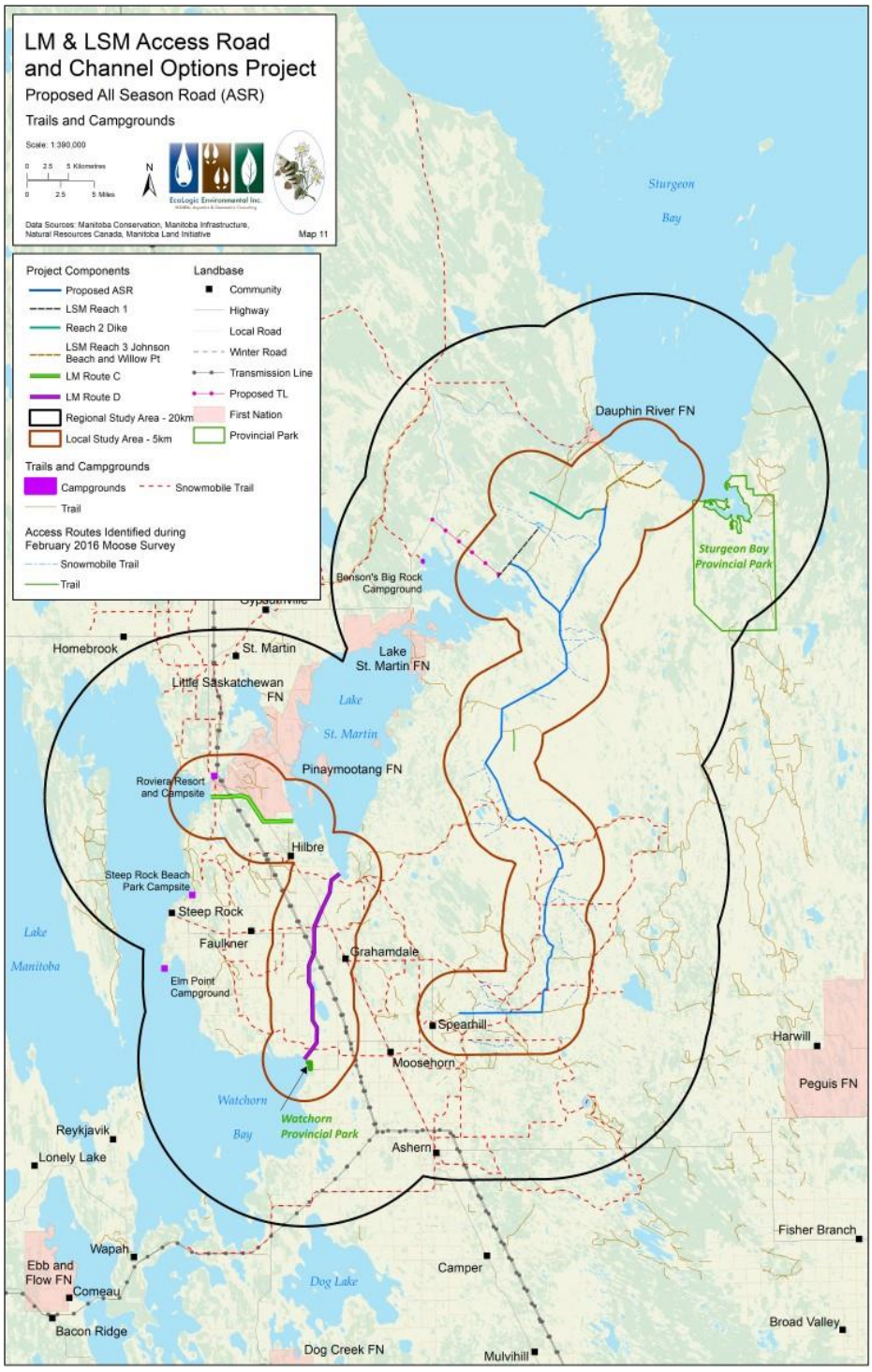
Map 8: Hydroelectric Development – Transmission Lines within the LSA and RSA



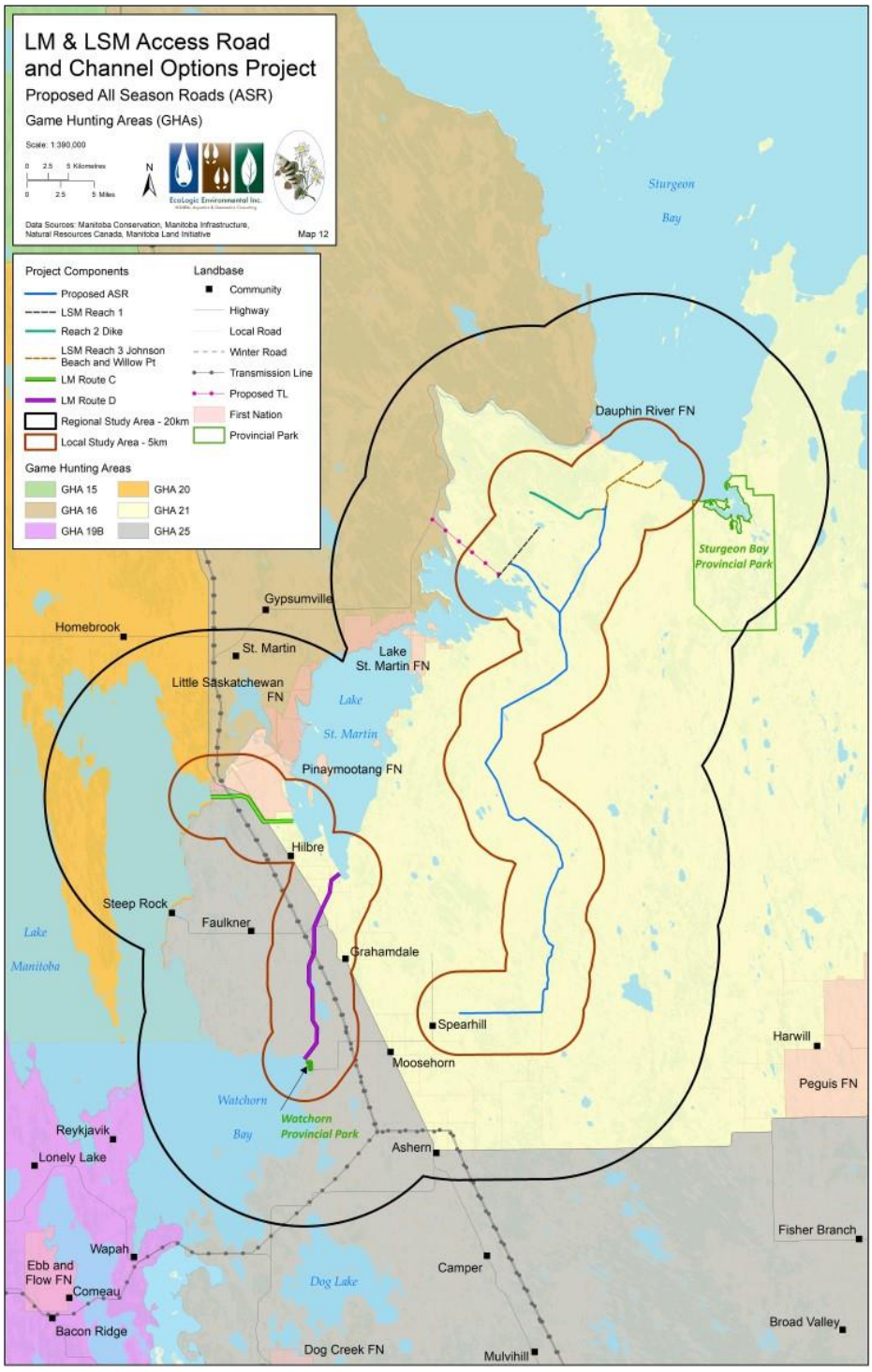
Map 9: Lodges and Outfitters within the LSA and RSA



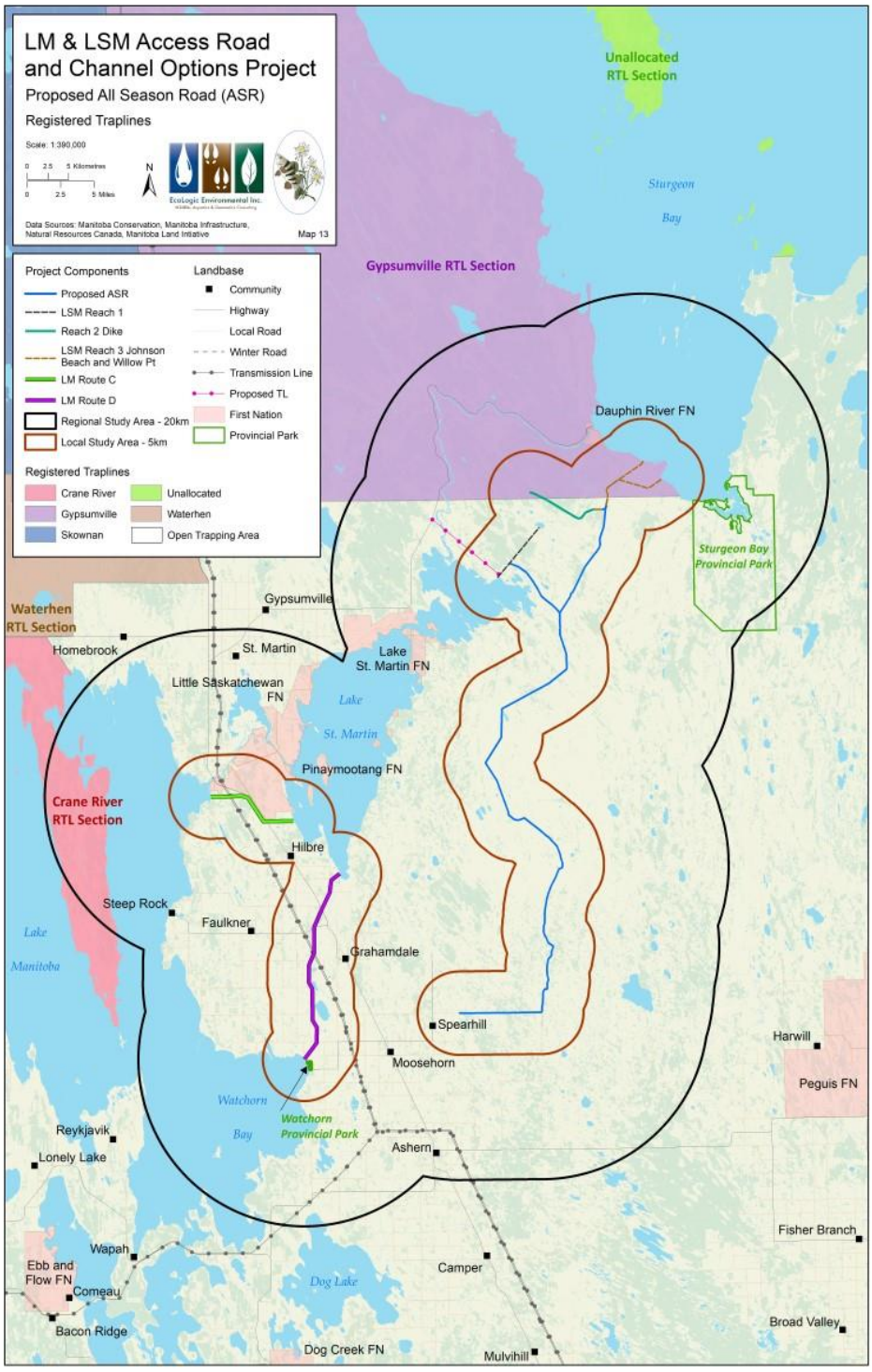
Map 10: Mineral Exploration and Quarry Activity within the LSA and RSA



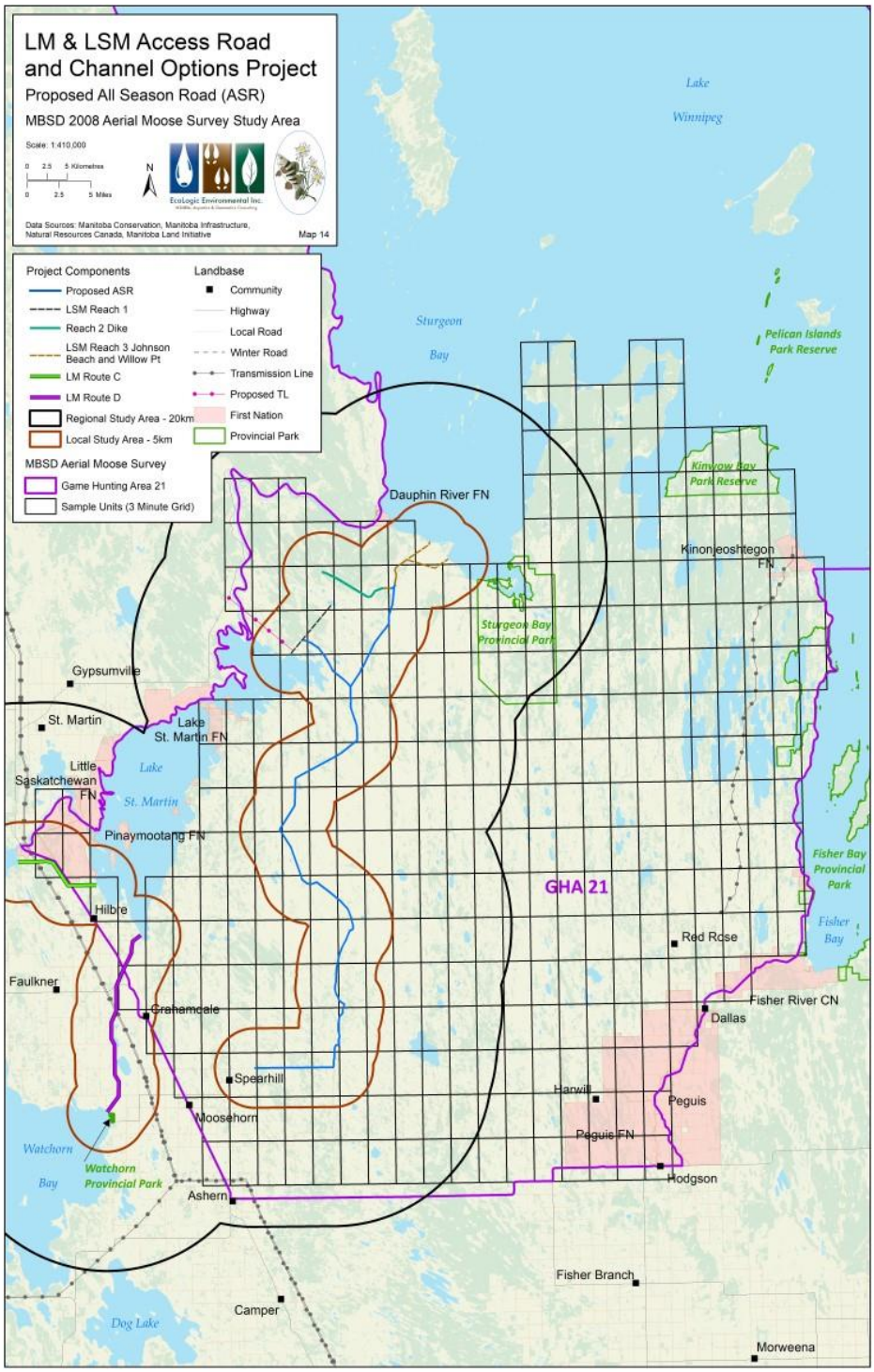
Map 11: Trails and Campgrounds within the LSA and RSA



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

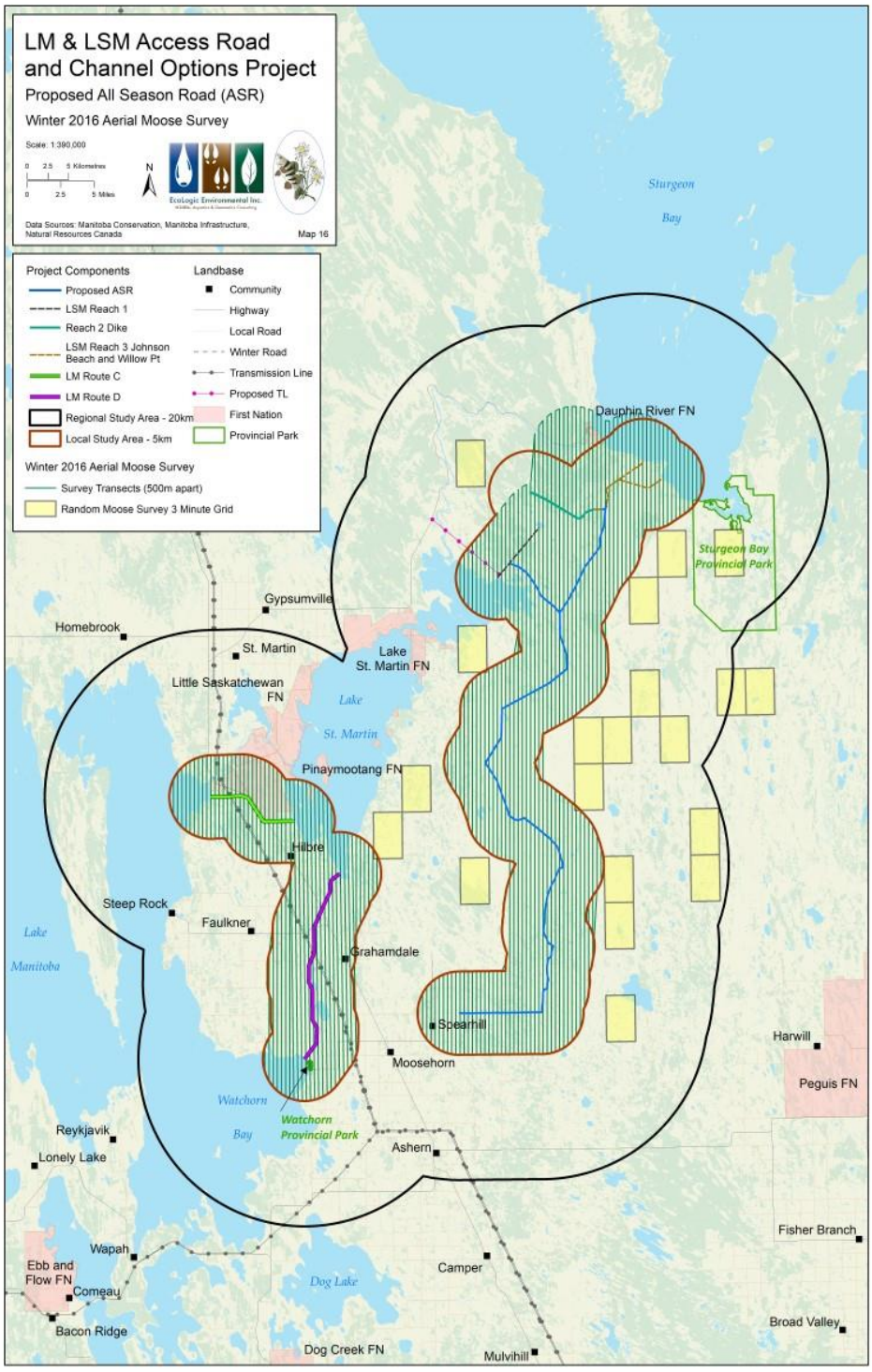


Map 13: Registered Traplines (RTLs) within the LSA and RSA

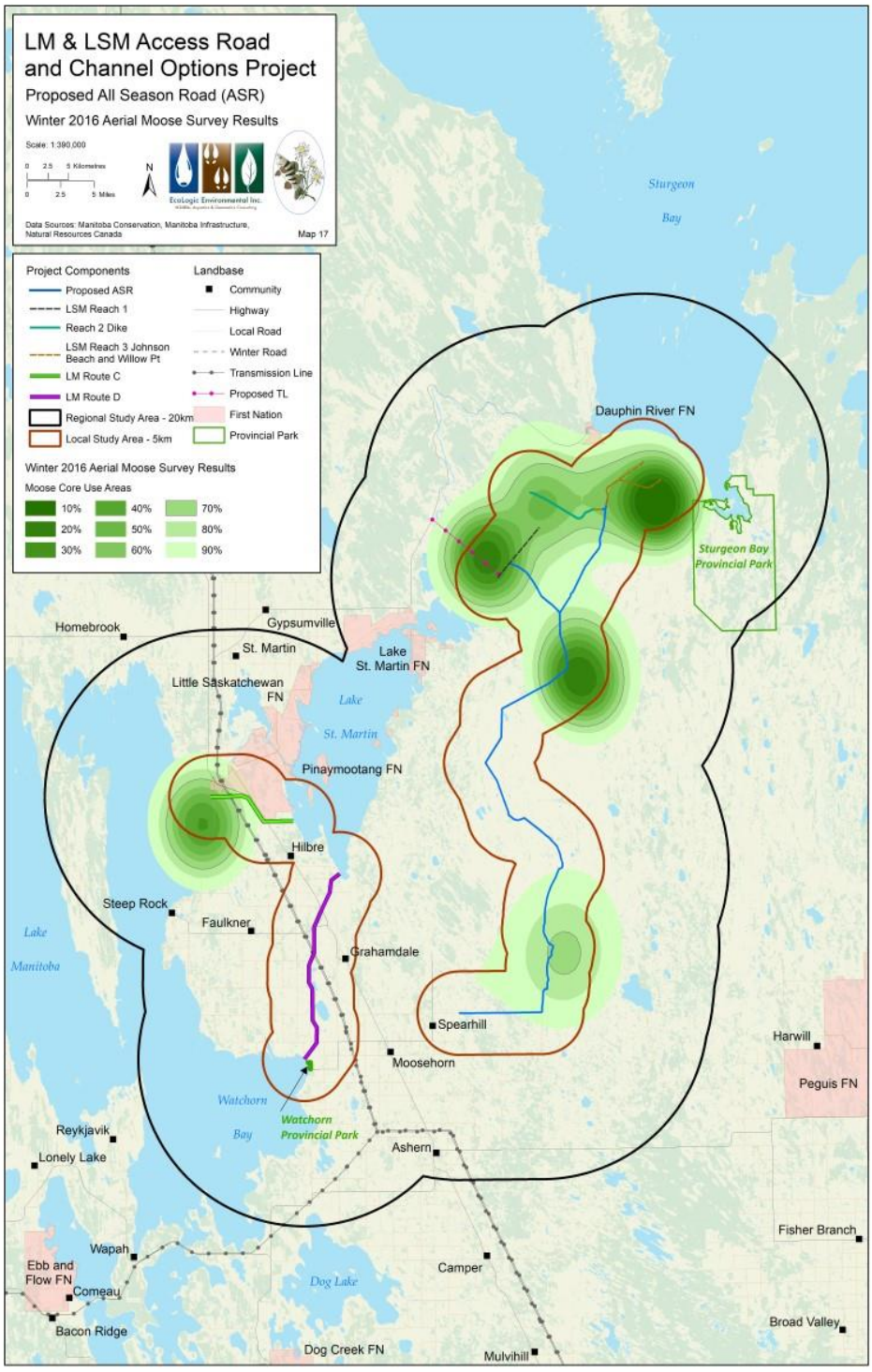


Map 14: Manitoba Sustainable Development (MBSD) 2008 Aerial Moose Survey Area

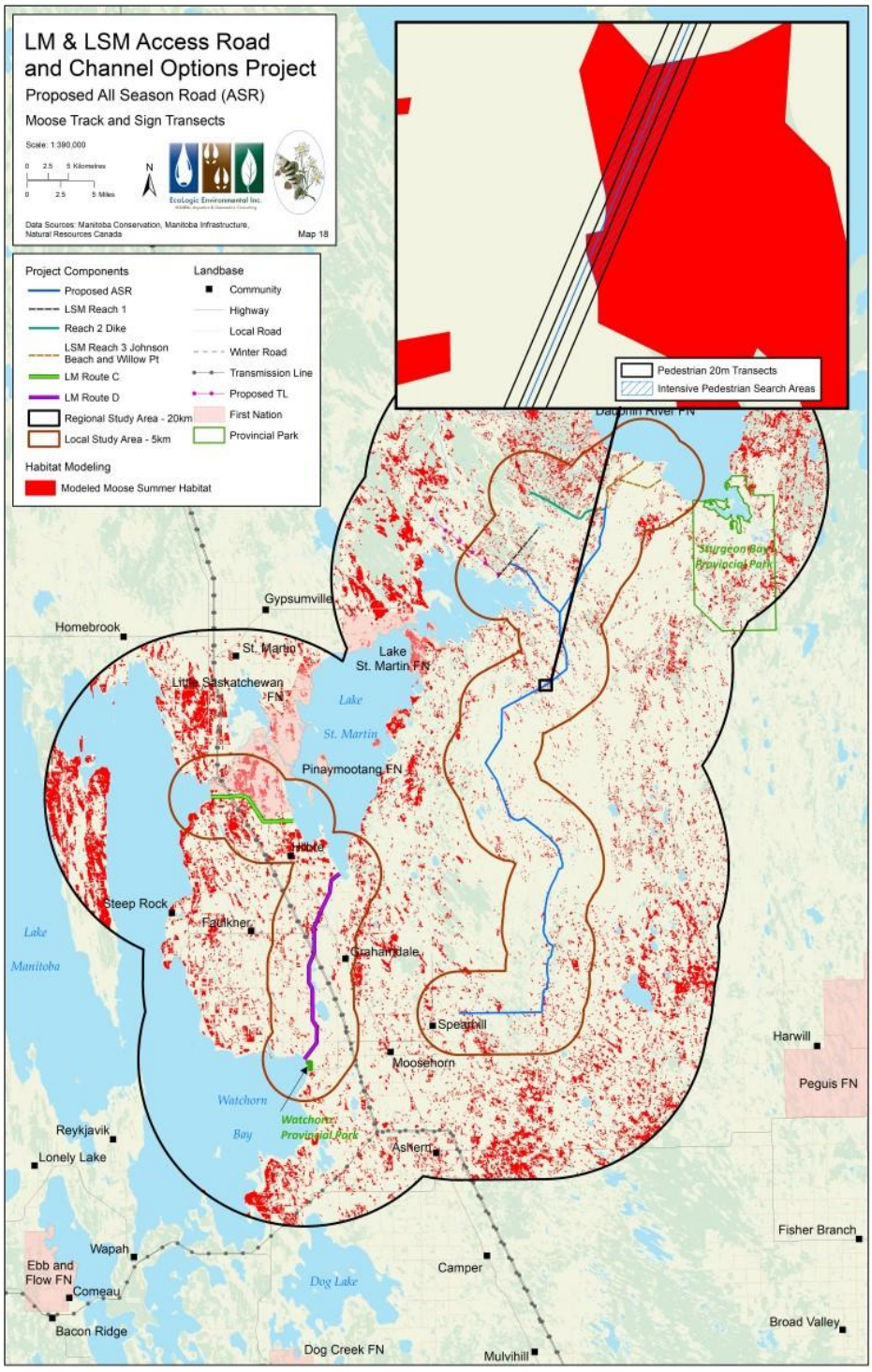
Map 15: Manitoba Sustainable Development (MBSD) 2008 Aerial Moose Survey Results



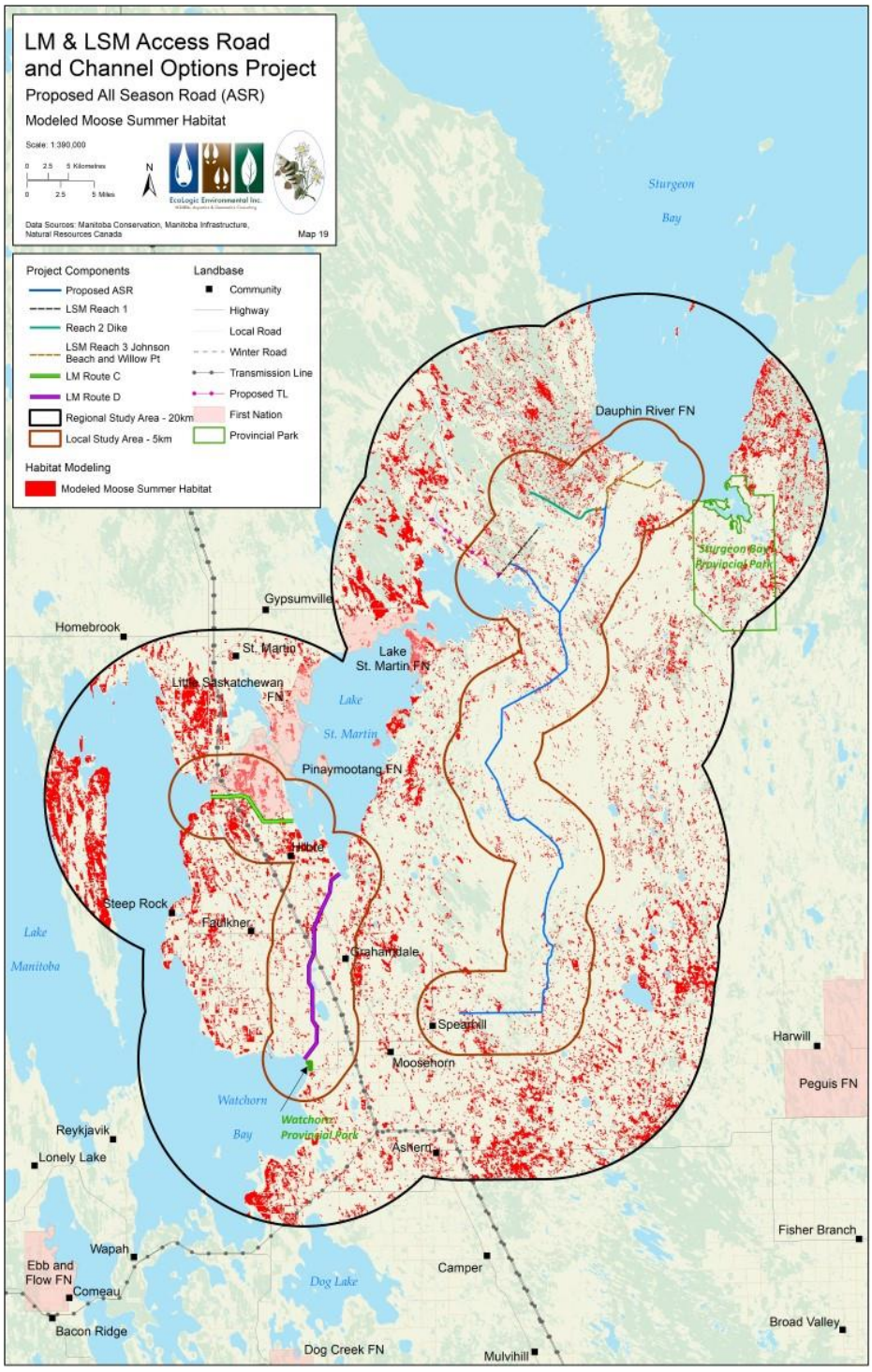
Map 16: Winter 2016 Aerial Moose Survey Area



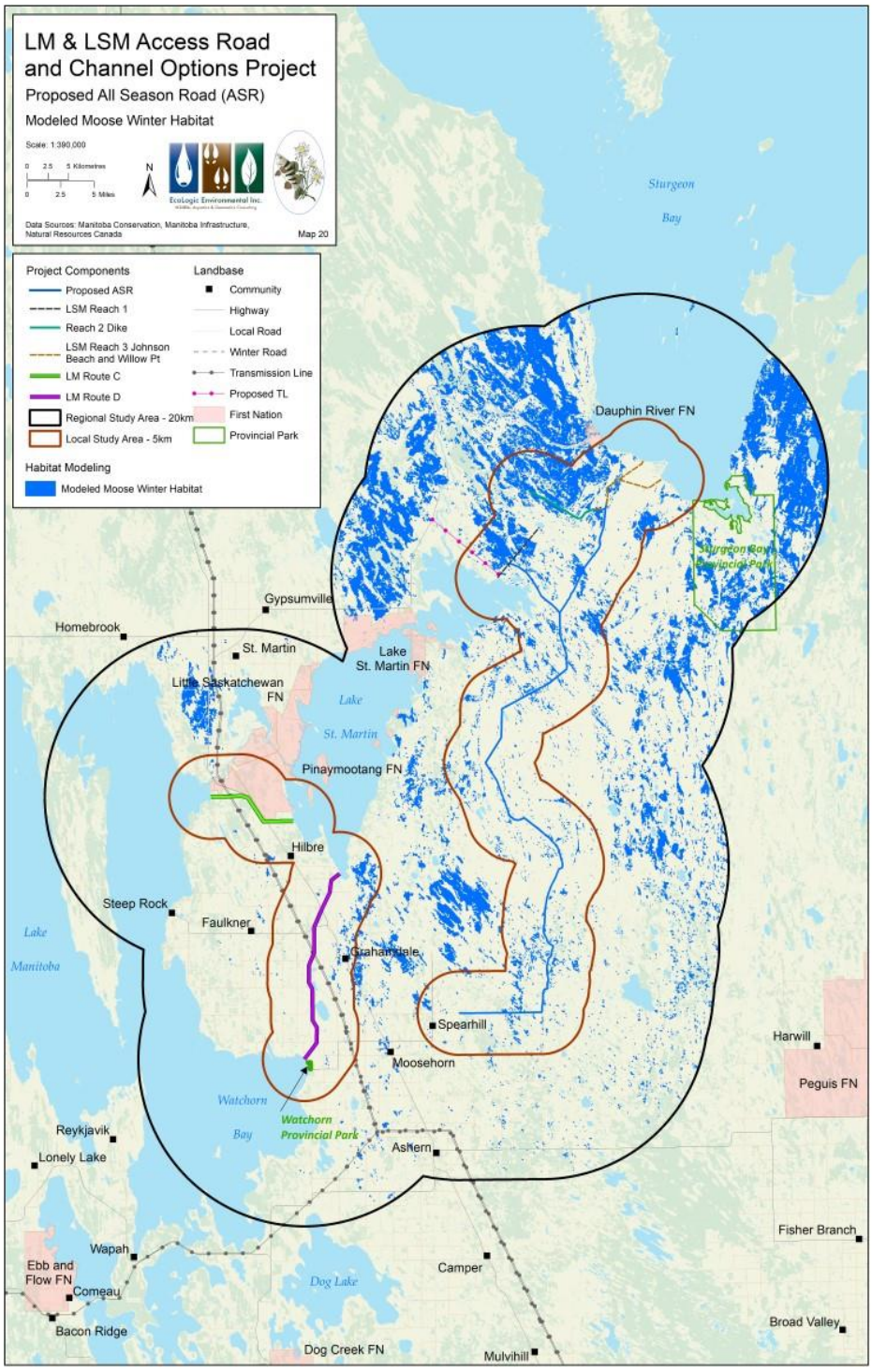
Map 17: Winter 2016 Aerial Moose Survey Results



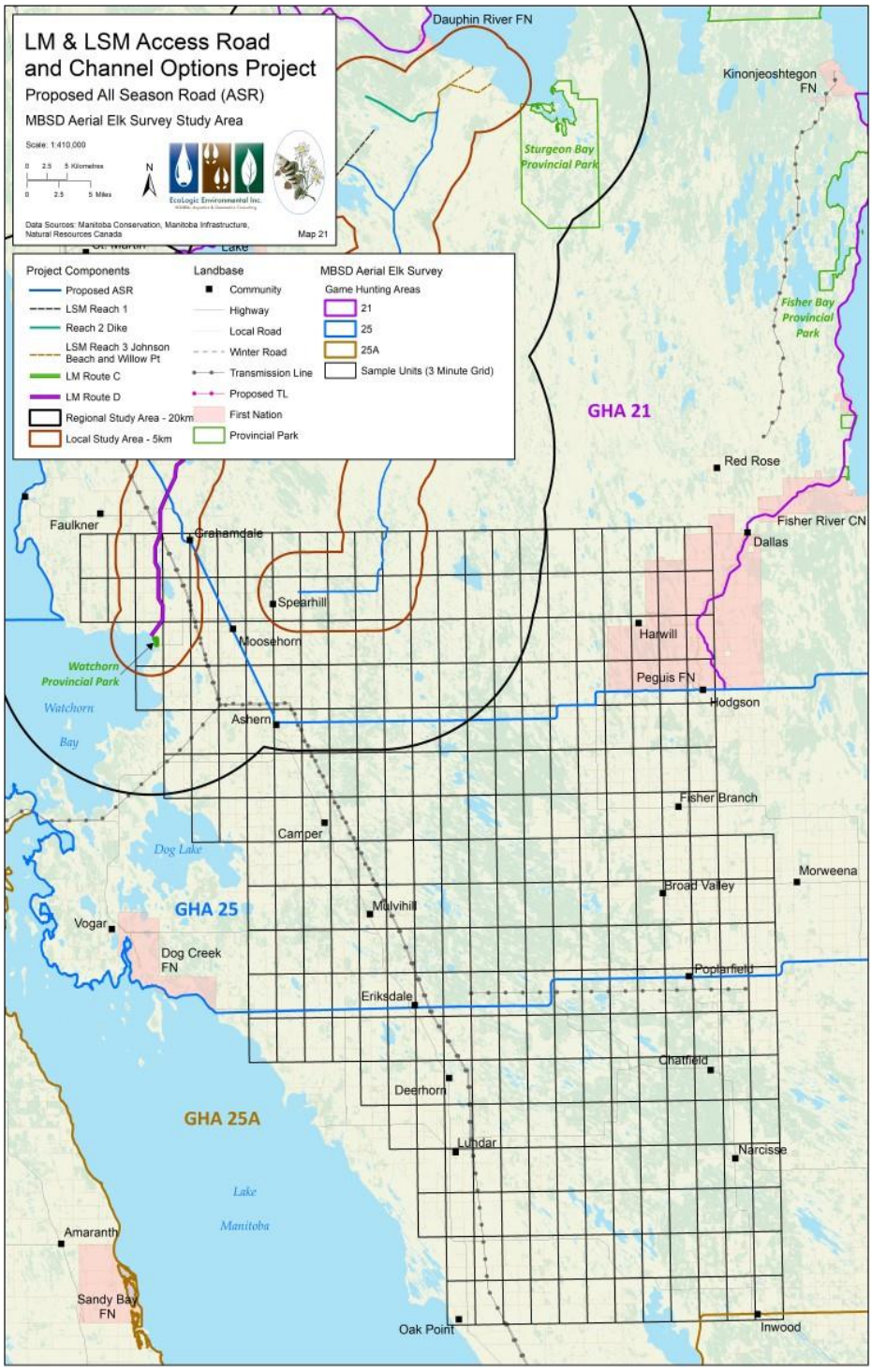
Map18: Moose Track and Sign Survey Transects



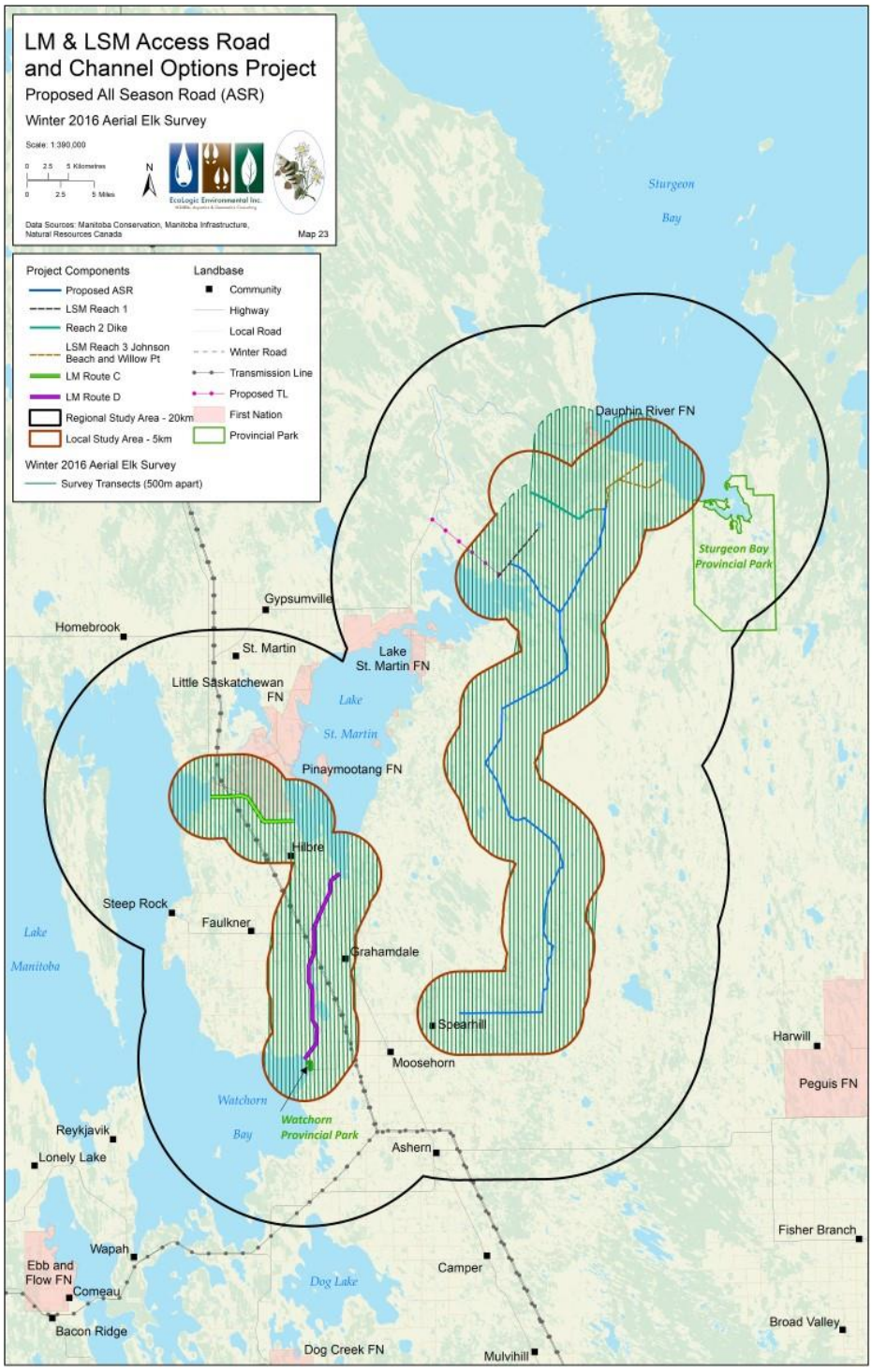
Map 19: Modeled Moose Summer Habitat



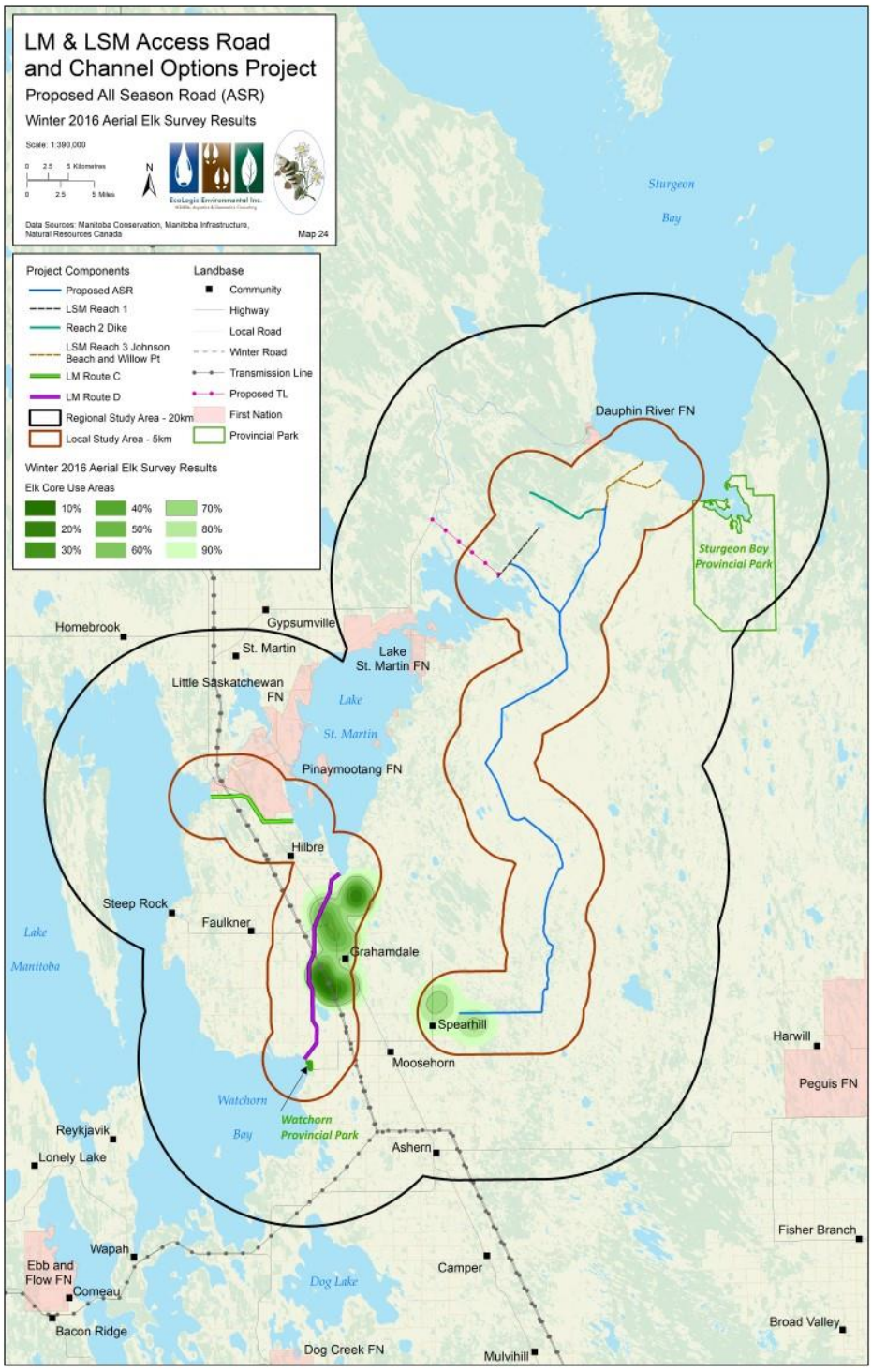
Map 20: Modeled Moose Winter Habitat



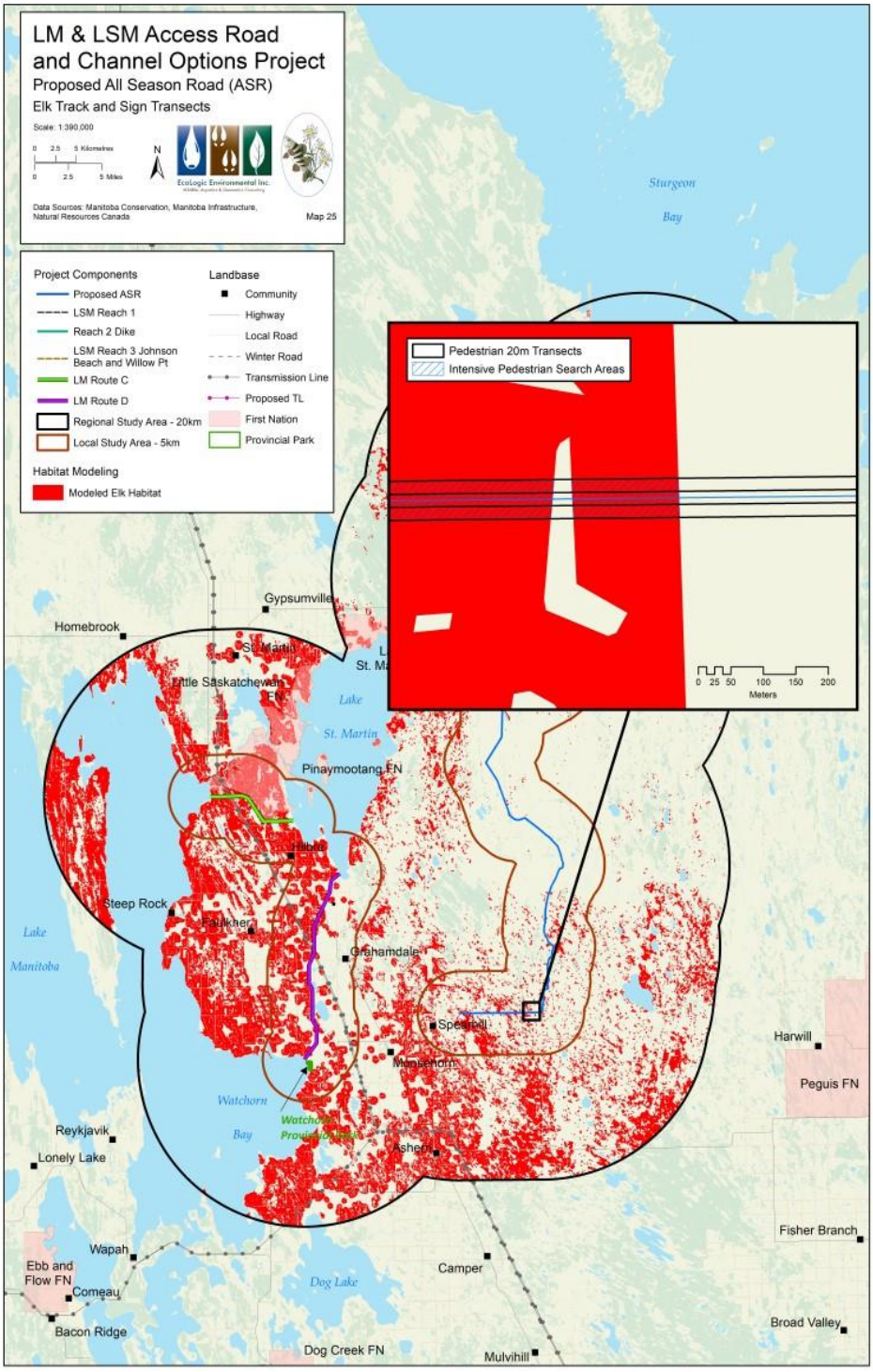
Map 21: Manitoba Sustainable Development (MBSD) Aerial Elk Survey Area



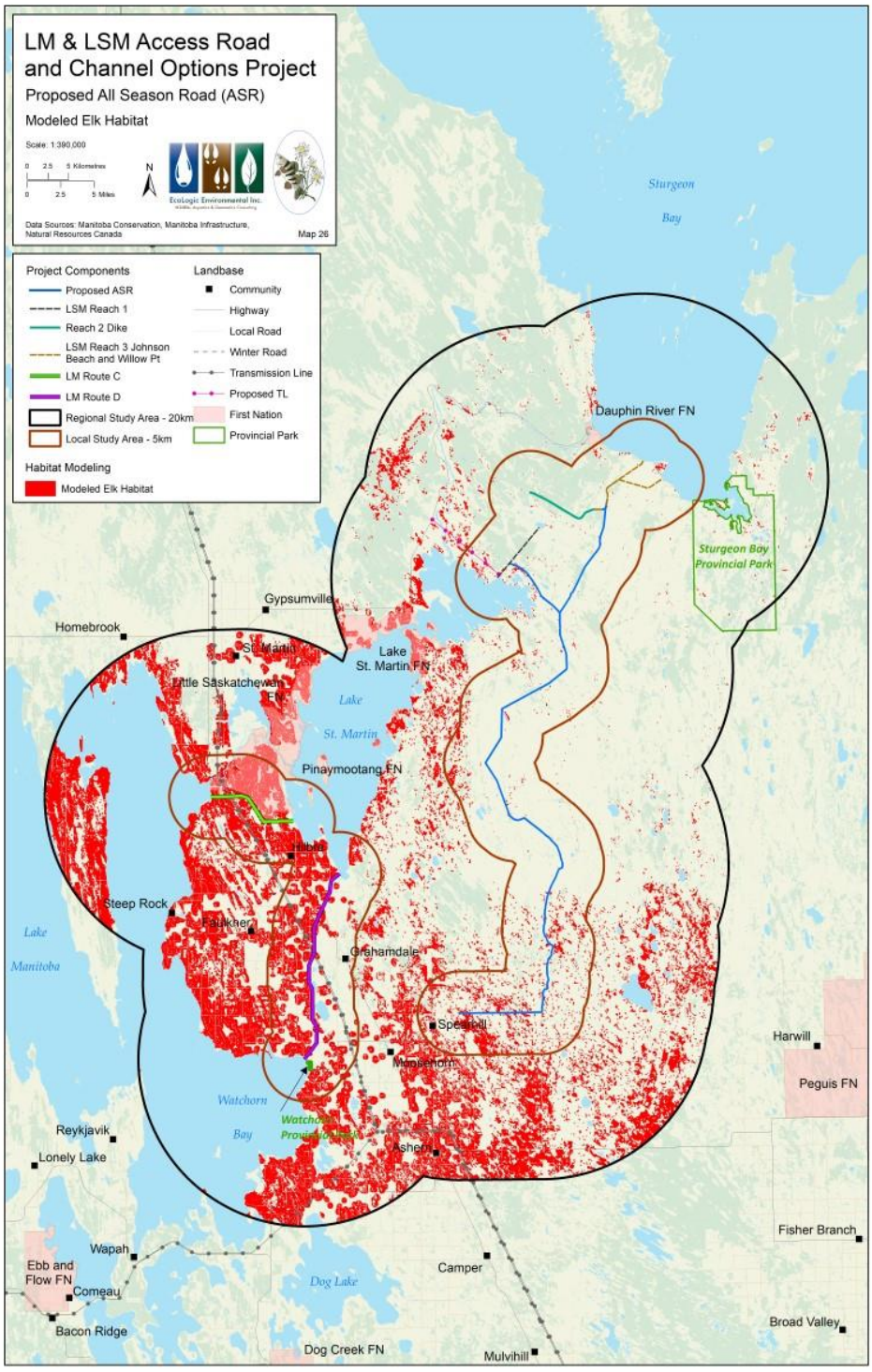
Map 23: Winter 2016 Aerial Elk Survey Area



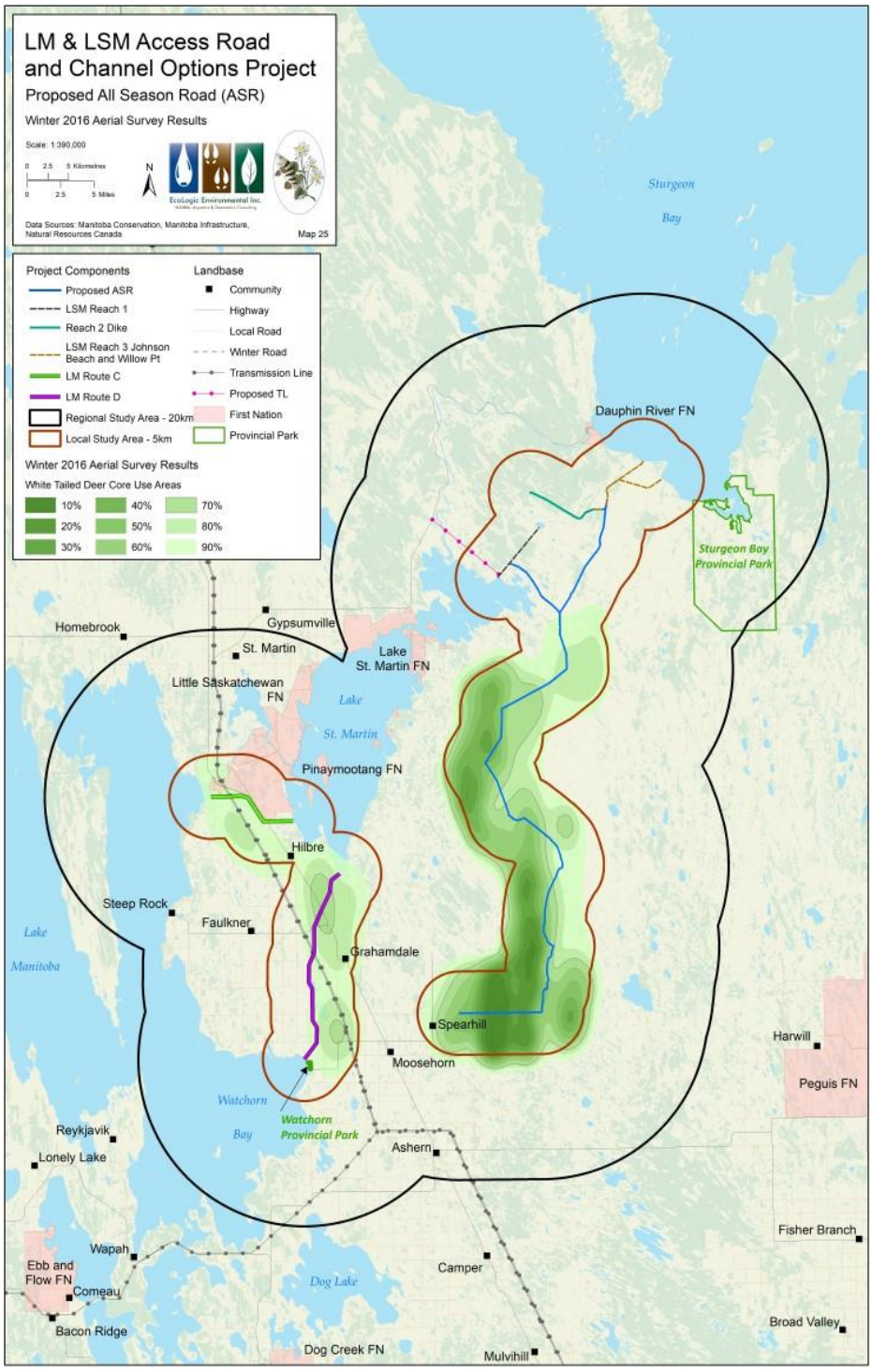
Map 24: Winter2016 Aerial Elk Survey Results



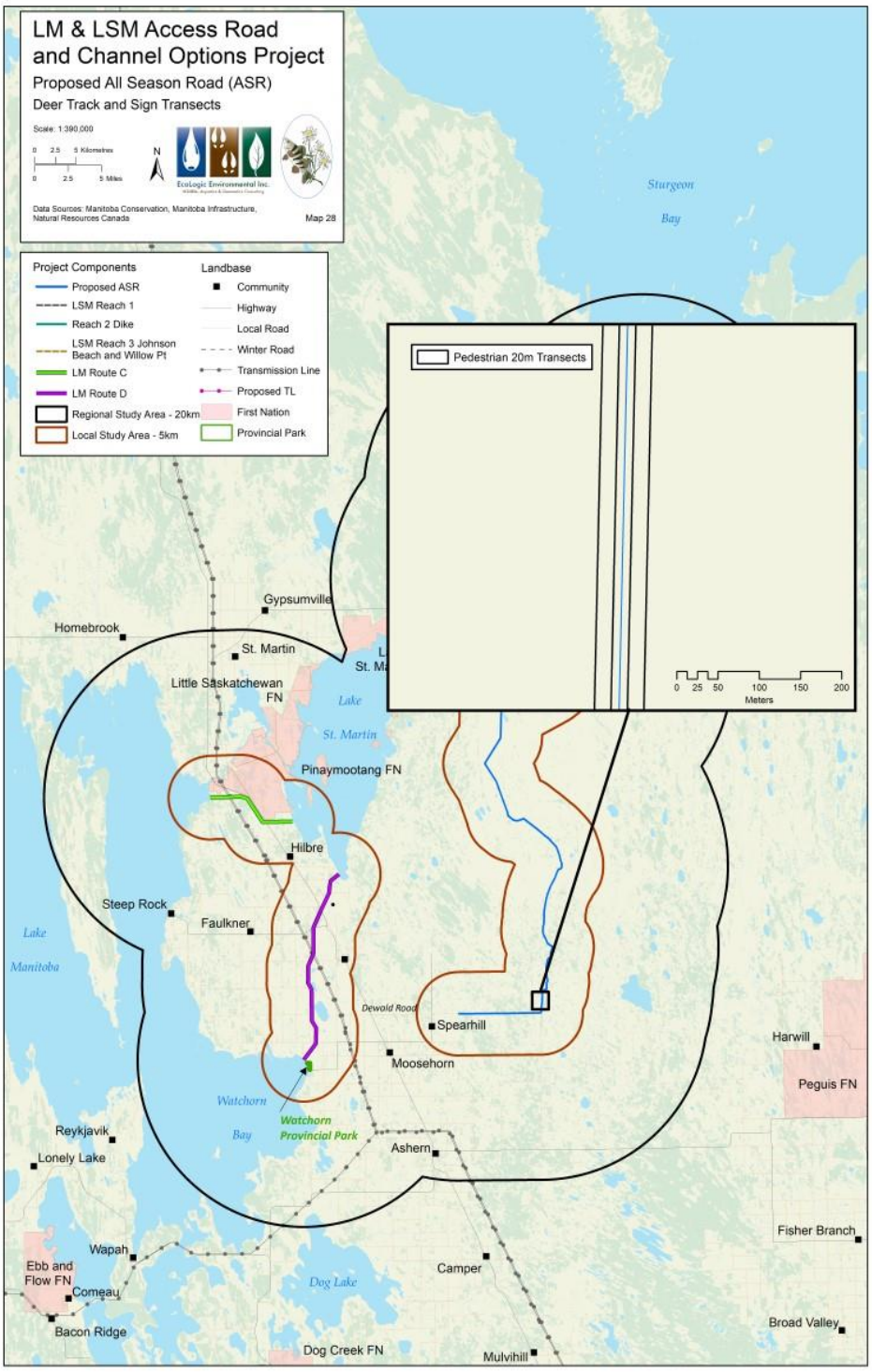
Map 25: Elk Track and Sign Survey Transects



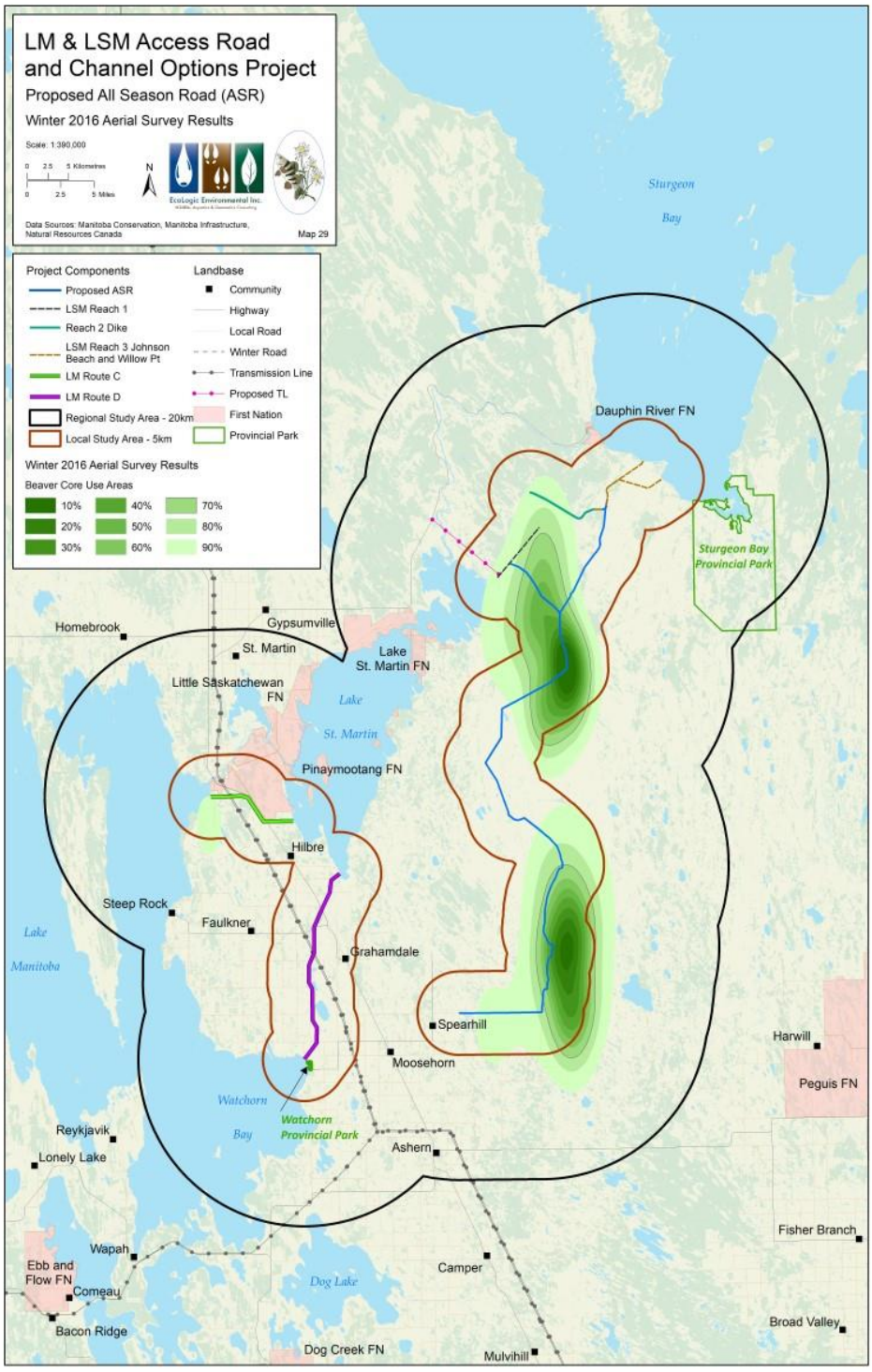
Map 26: Modeled Elk Habitat



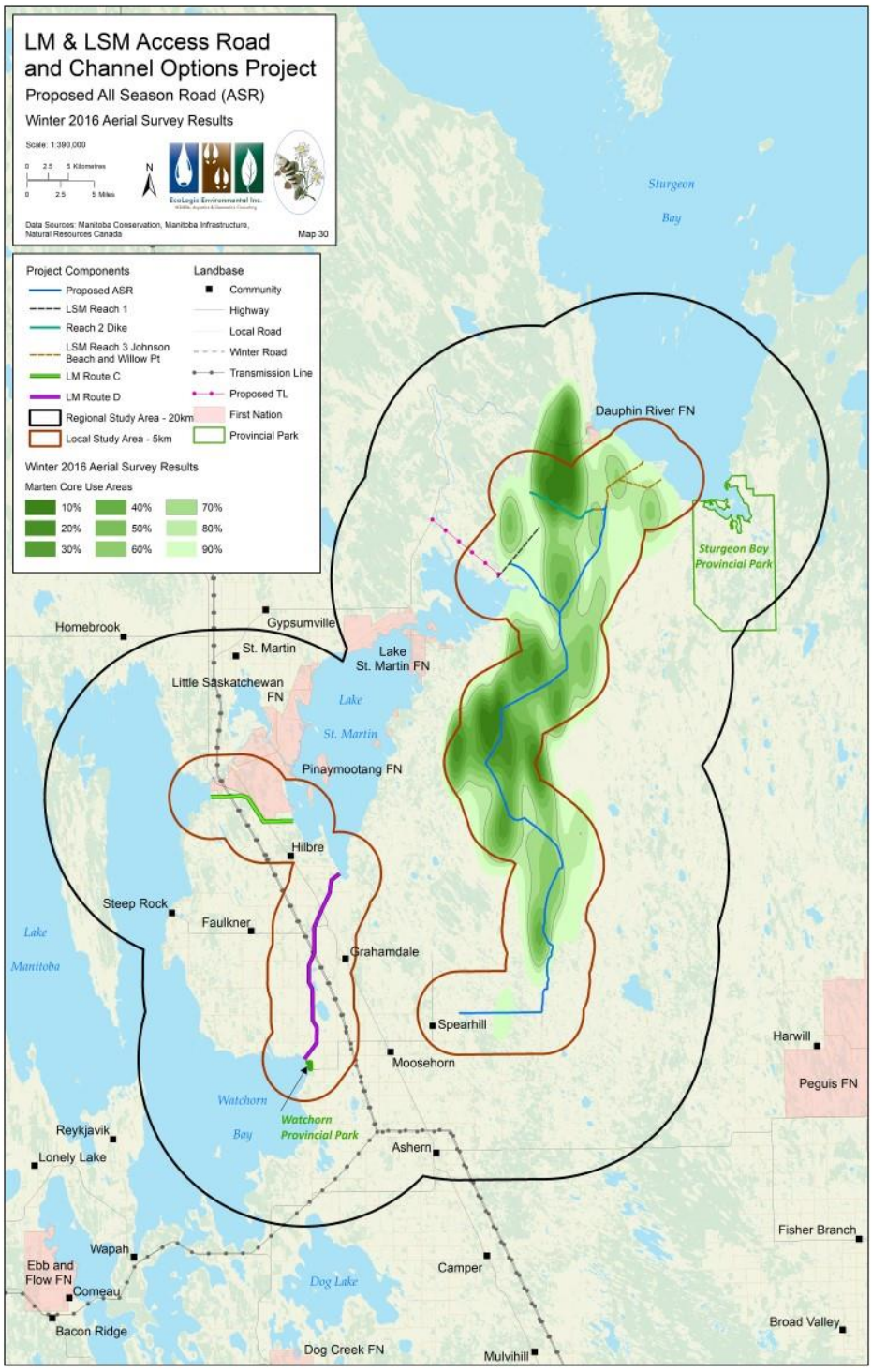
Map 27: White-tailed Deer Survey Results



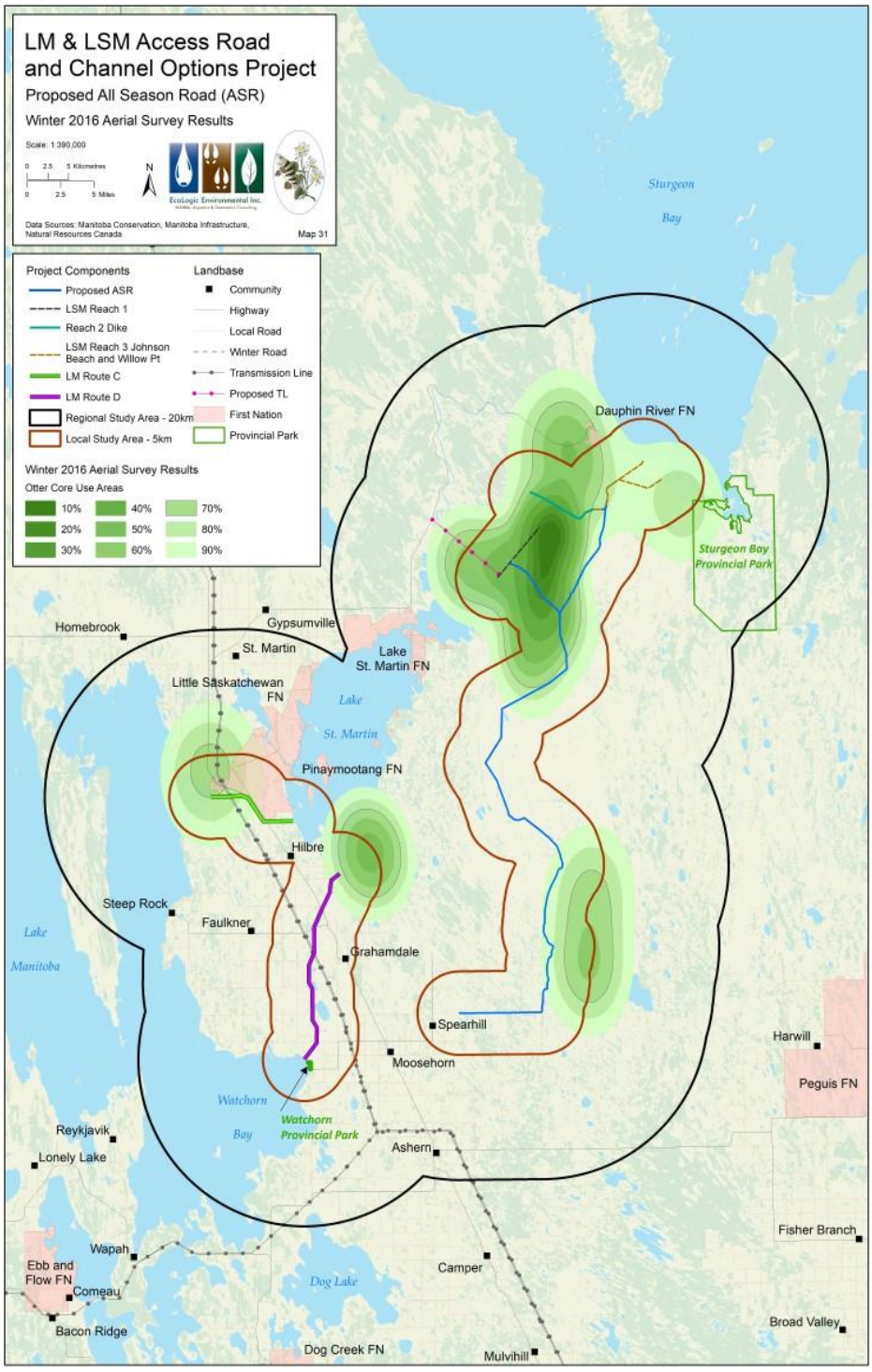
Map 28: White-tailed Deer Track and Sign Transects



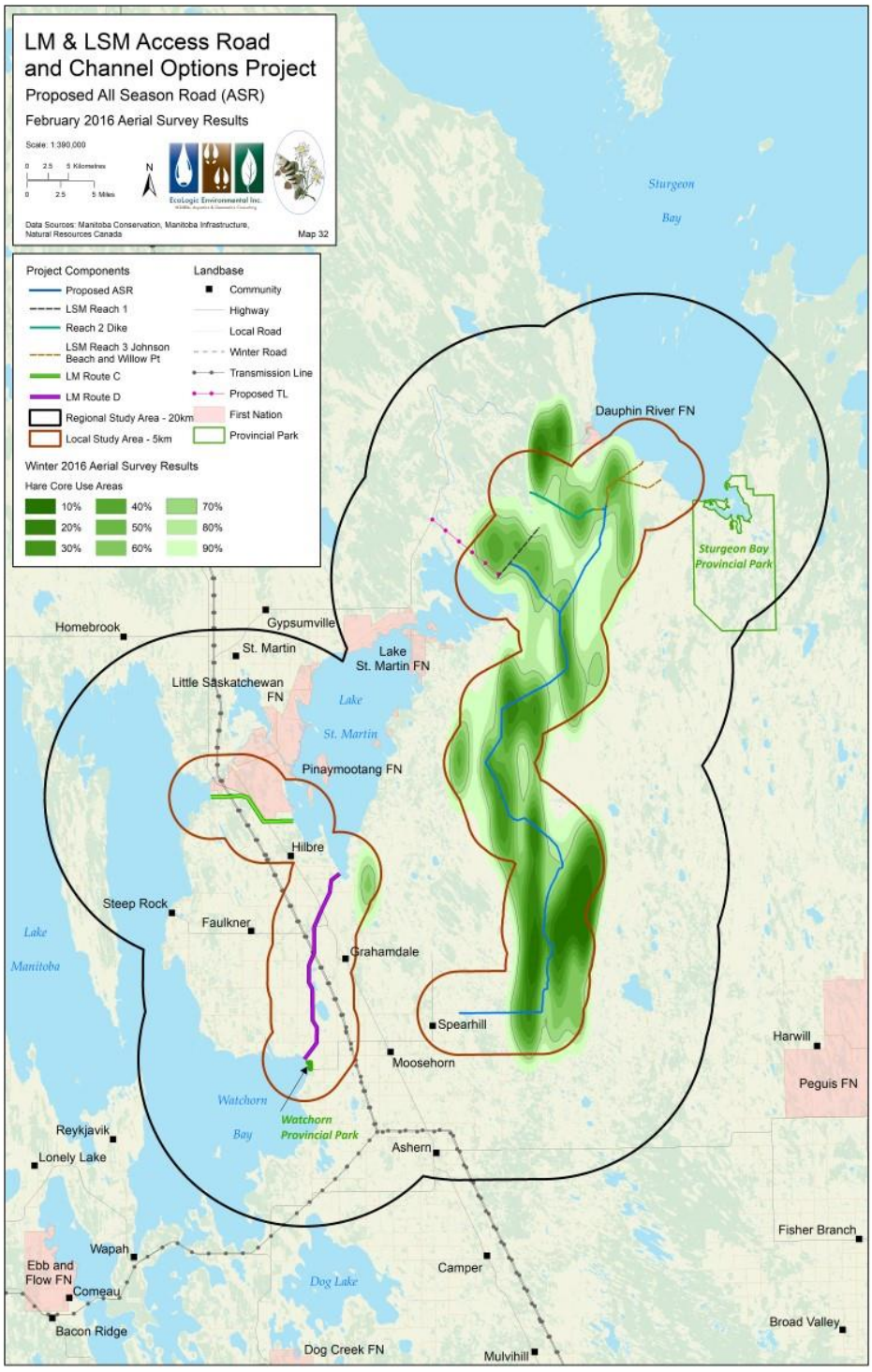
Map 29: Beaver Aerial Survey Results



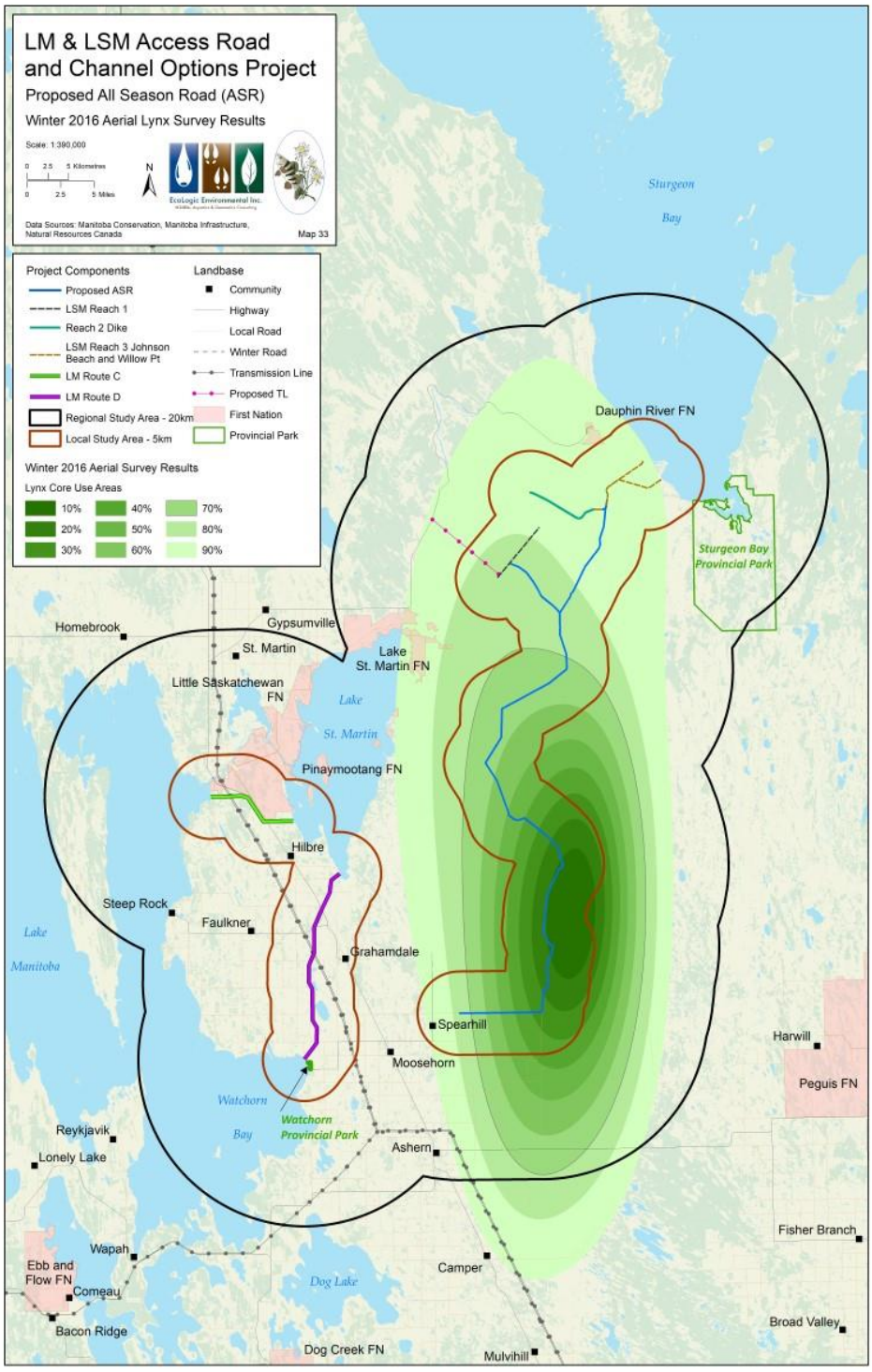
Map 30: Marten Aerial Survey Results



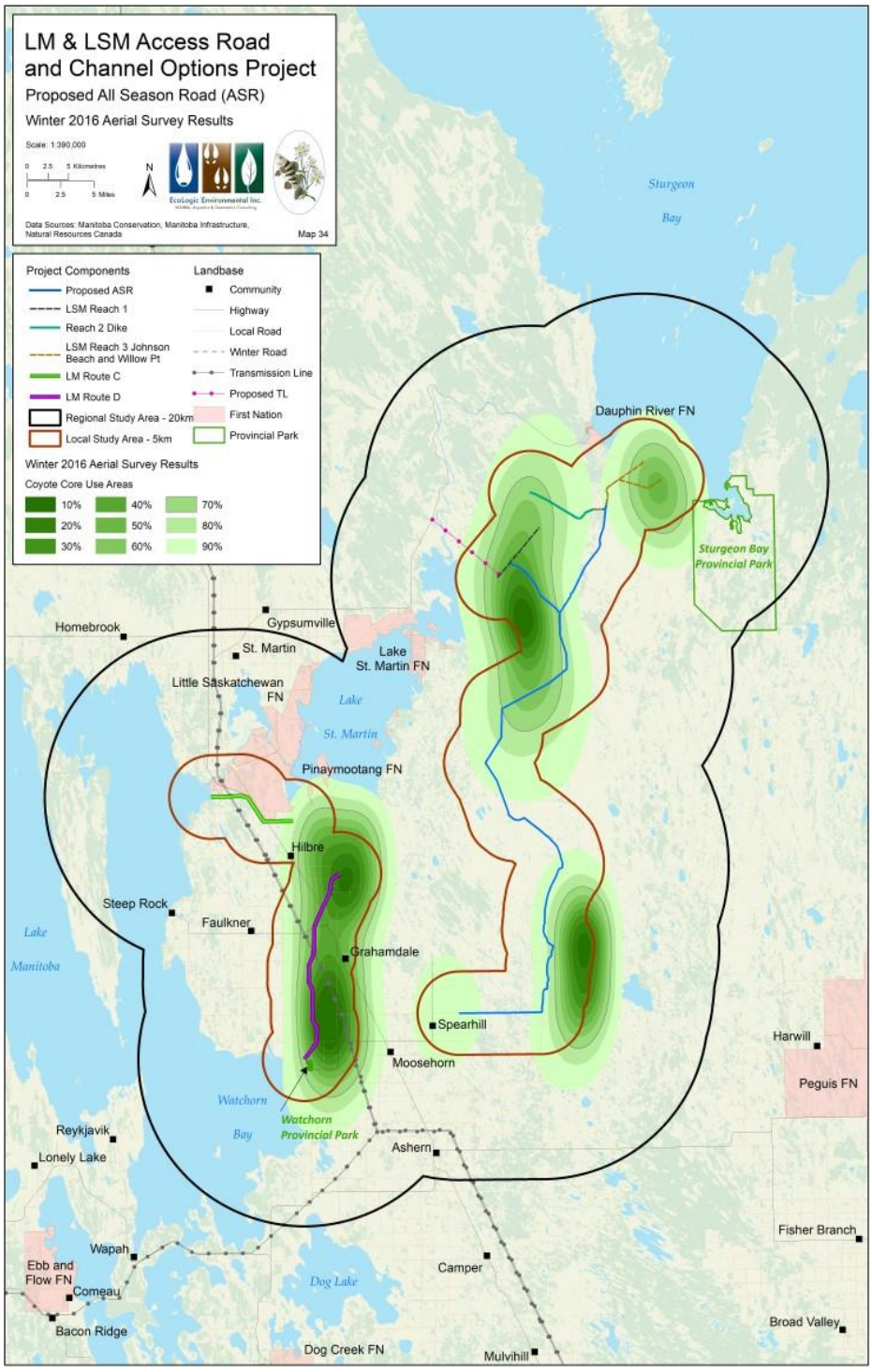
Map 31: Otter Aerial Survey Results



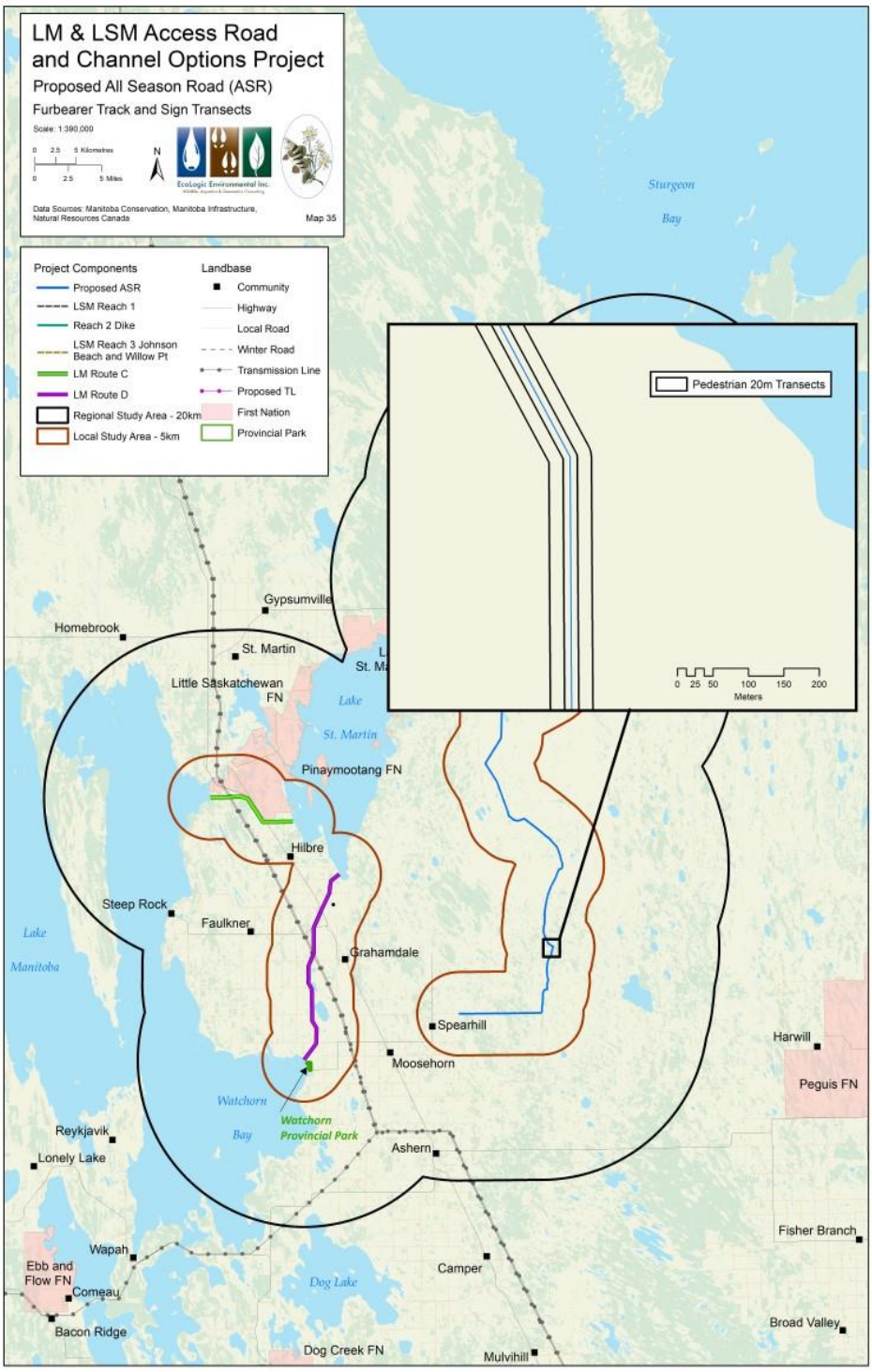
Map 32: Hare Aerial Survey Results



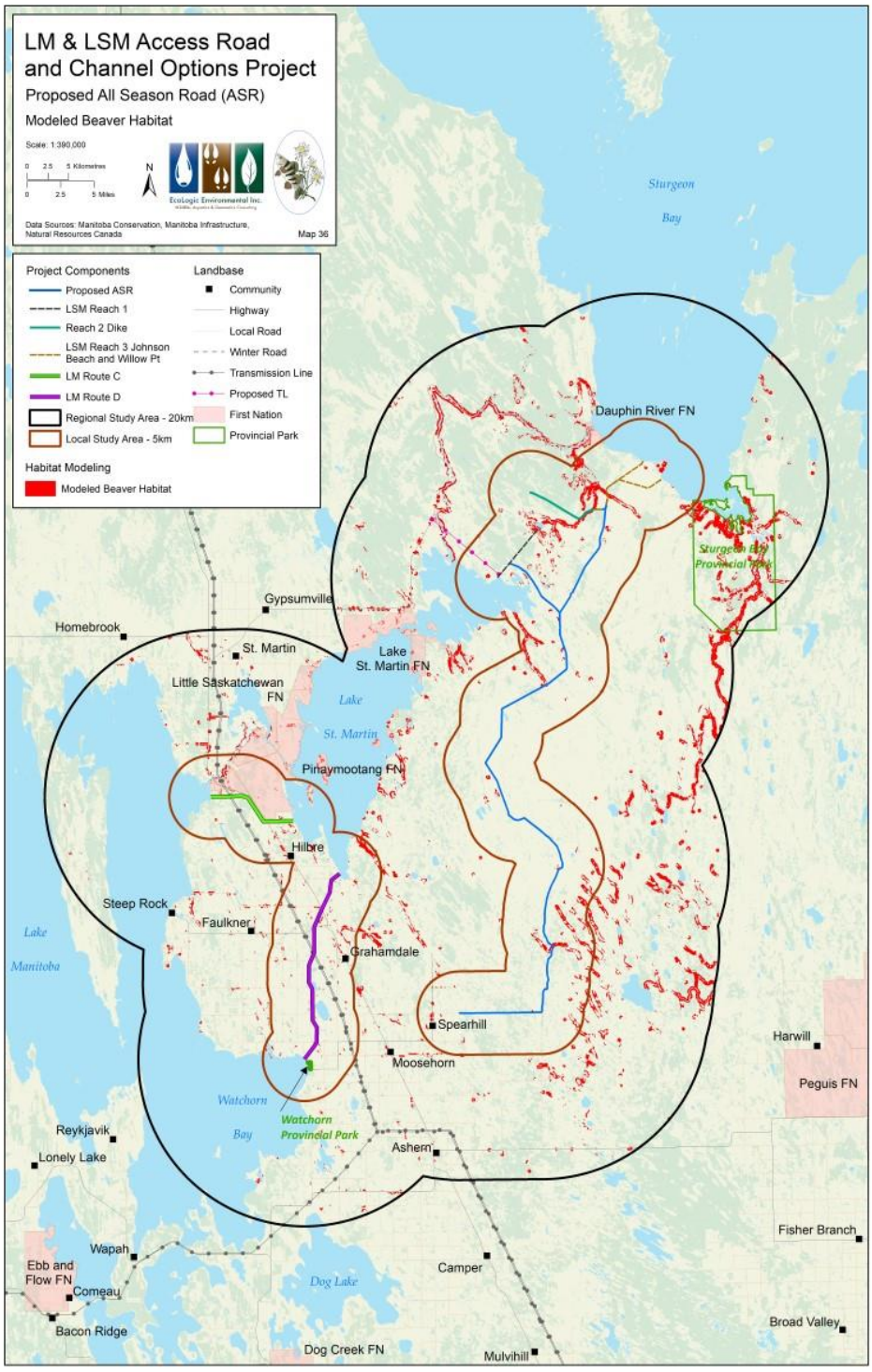
Map 33: Lynx Aerial Survey Results



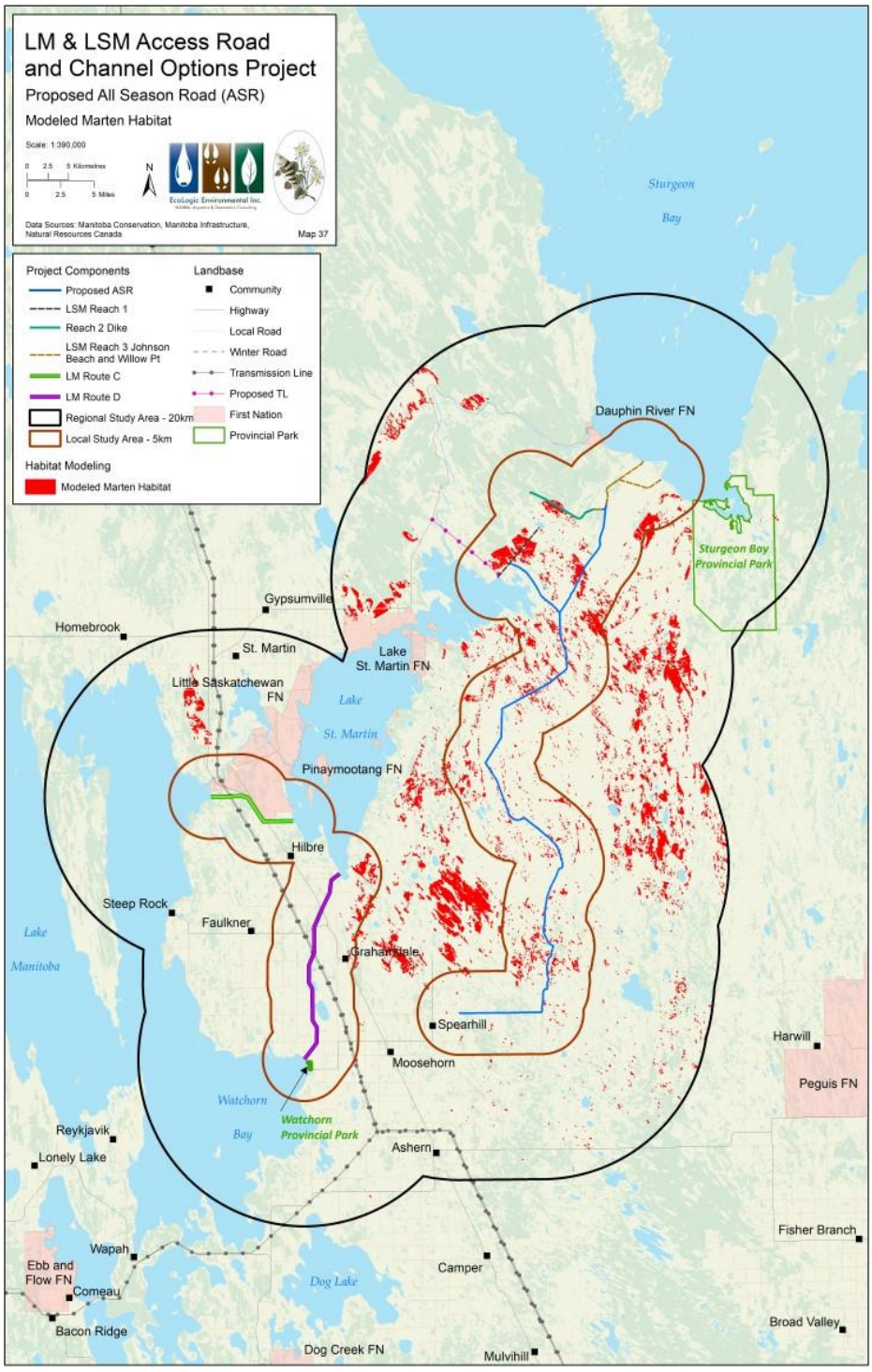
Map 34: Coyote Aerial Survey Results



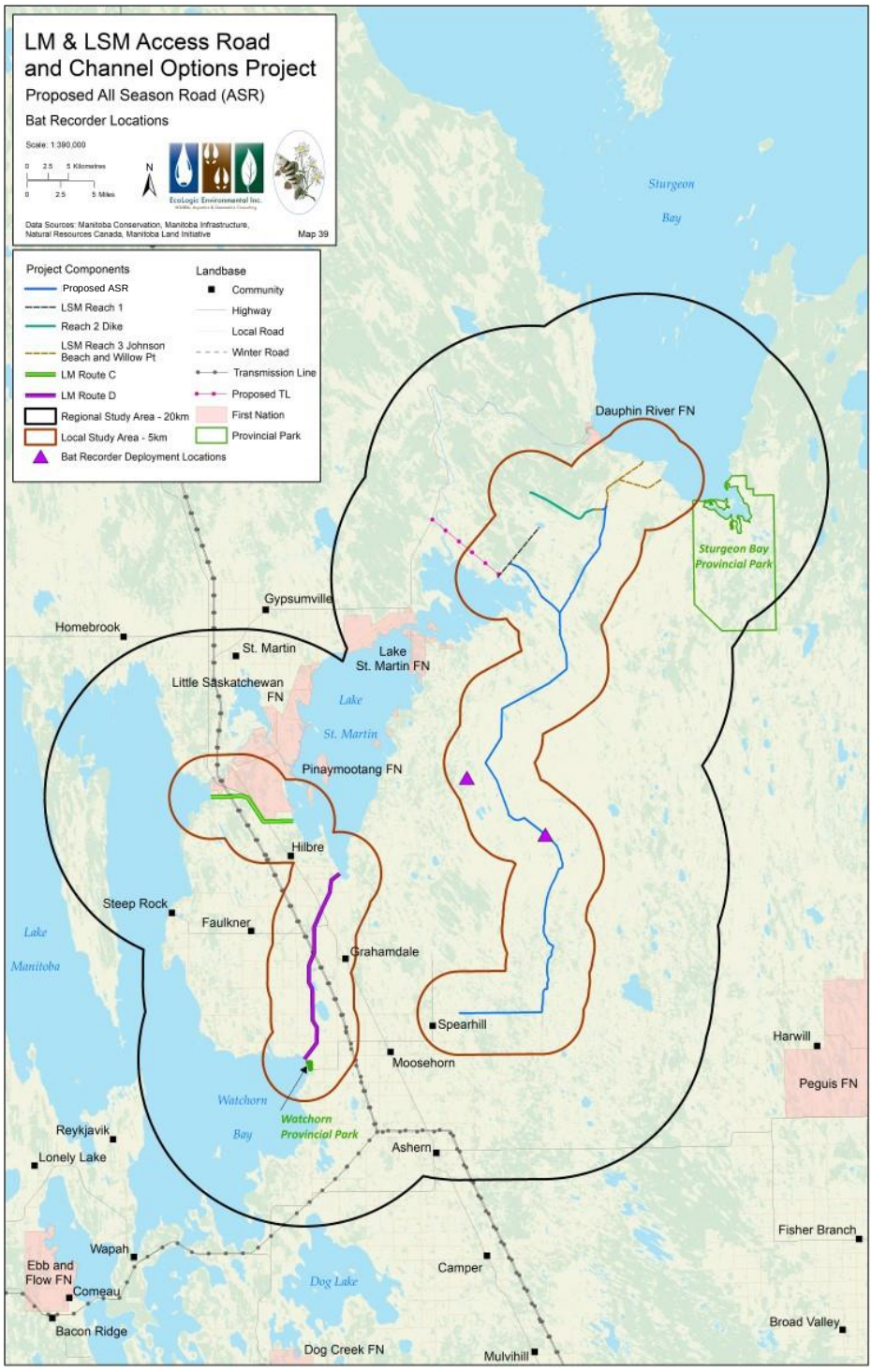
Map 35: Furbearer Track and Sign Survey Transects



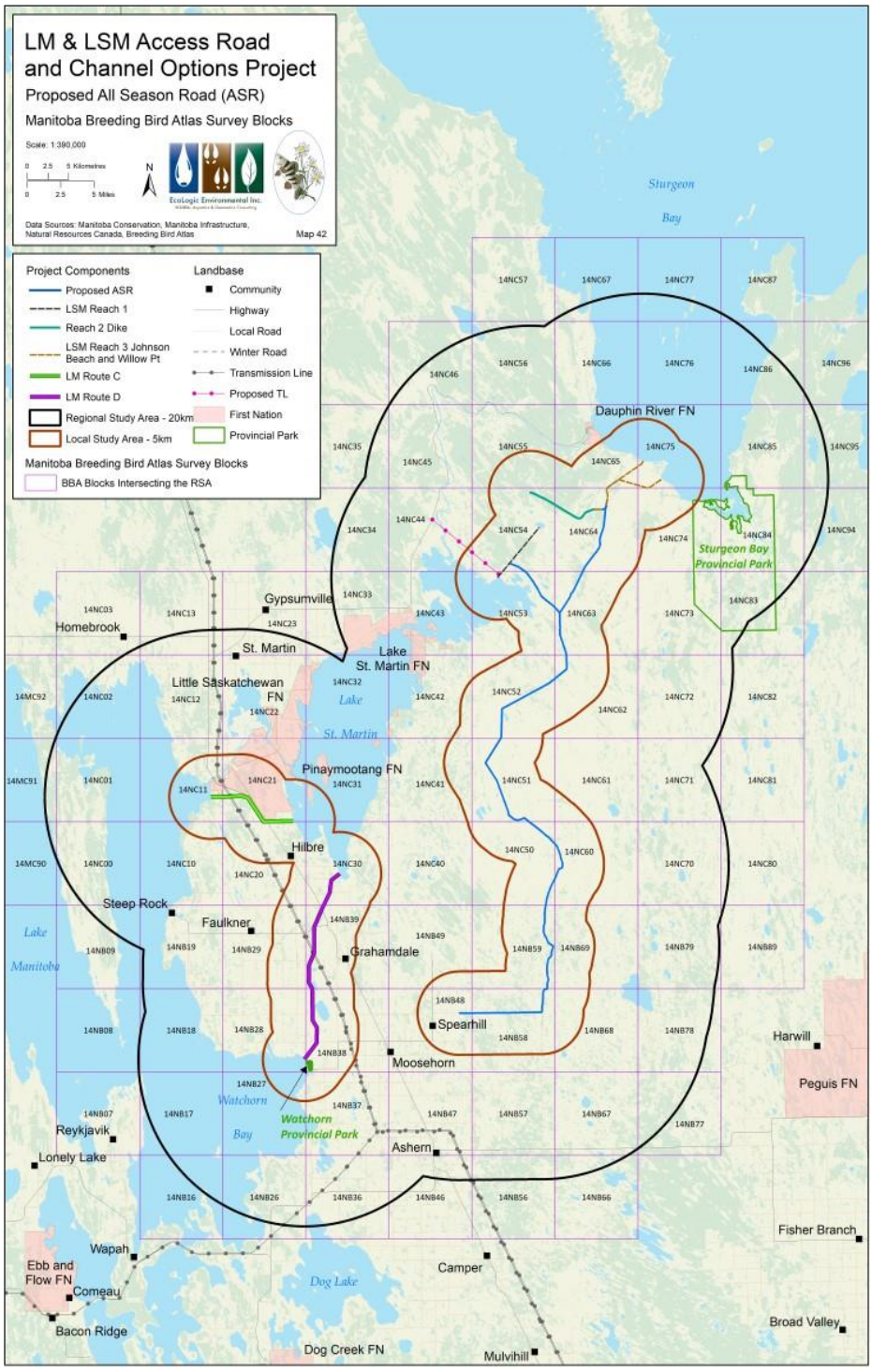
Map 36: Modeled Beaver Habitat



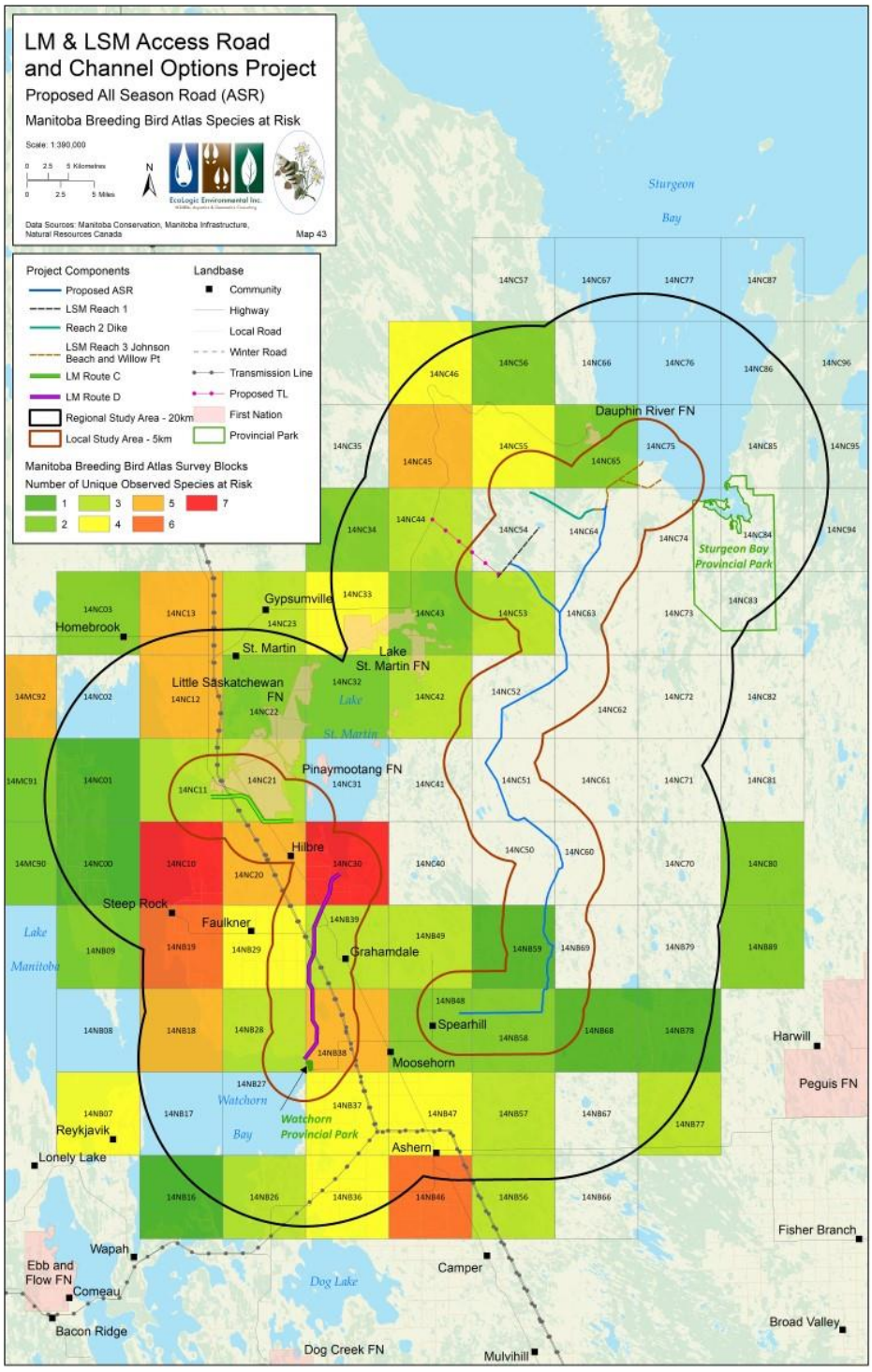
Map 37: Modeled Marten Habitat



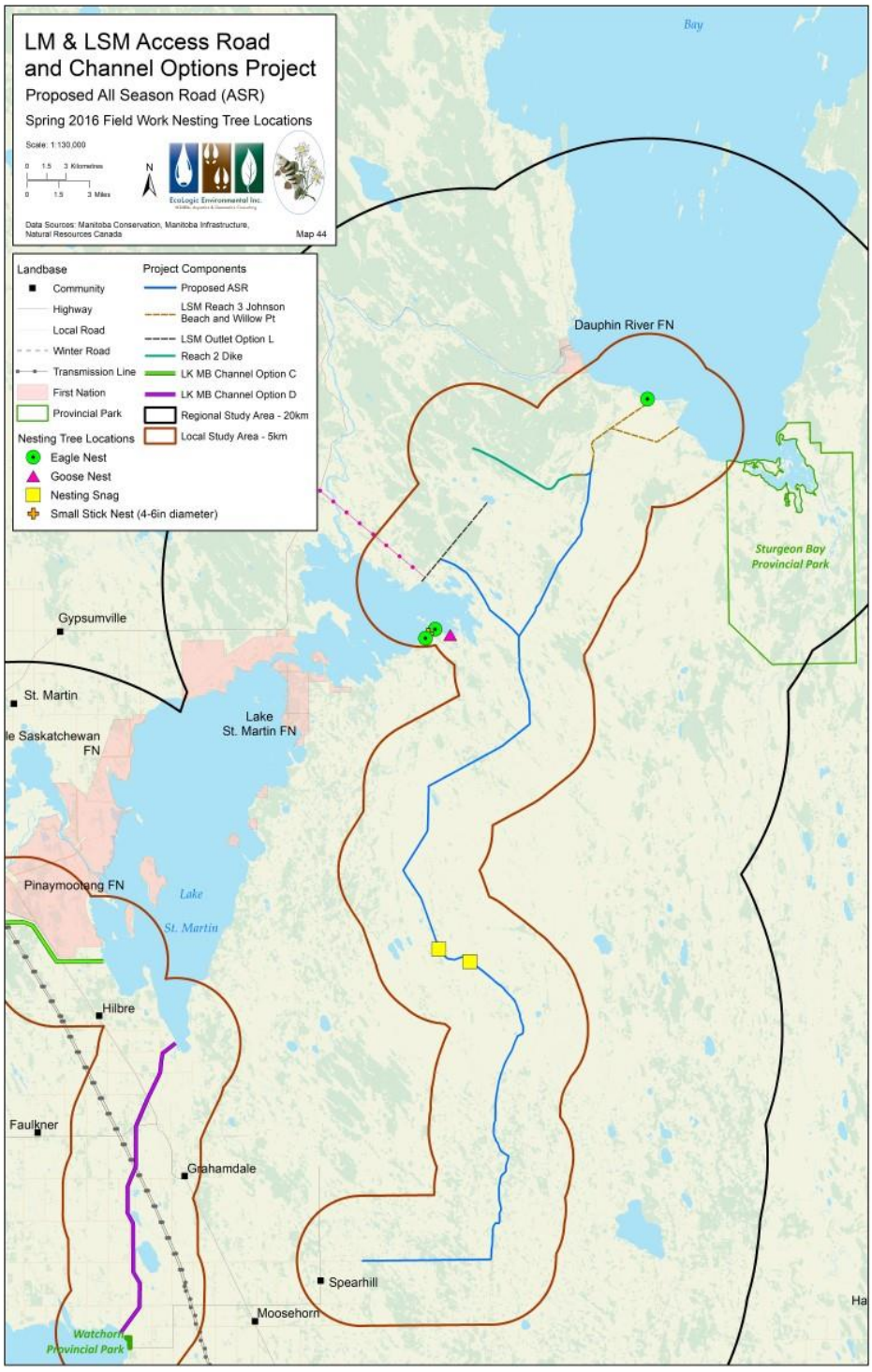
Map 39: Bat Recorder Deployment Locations along the Proposed ASRs



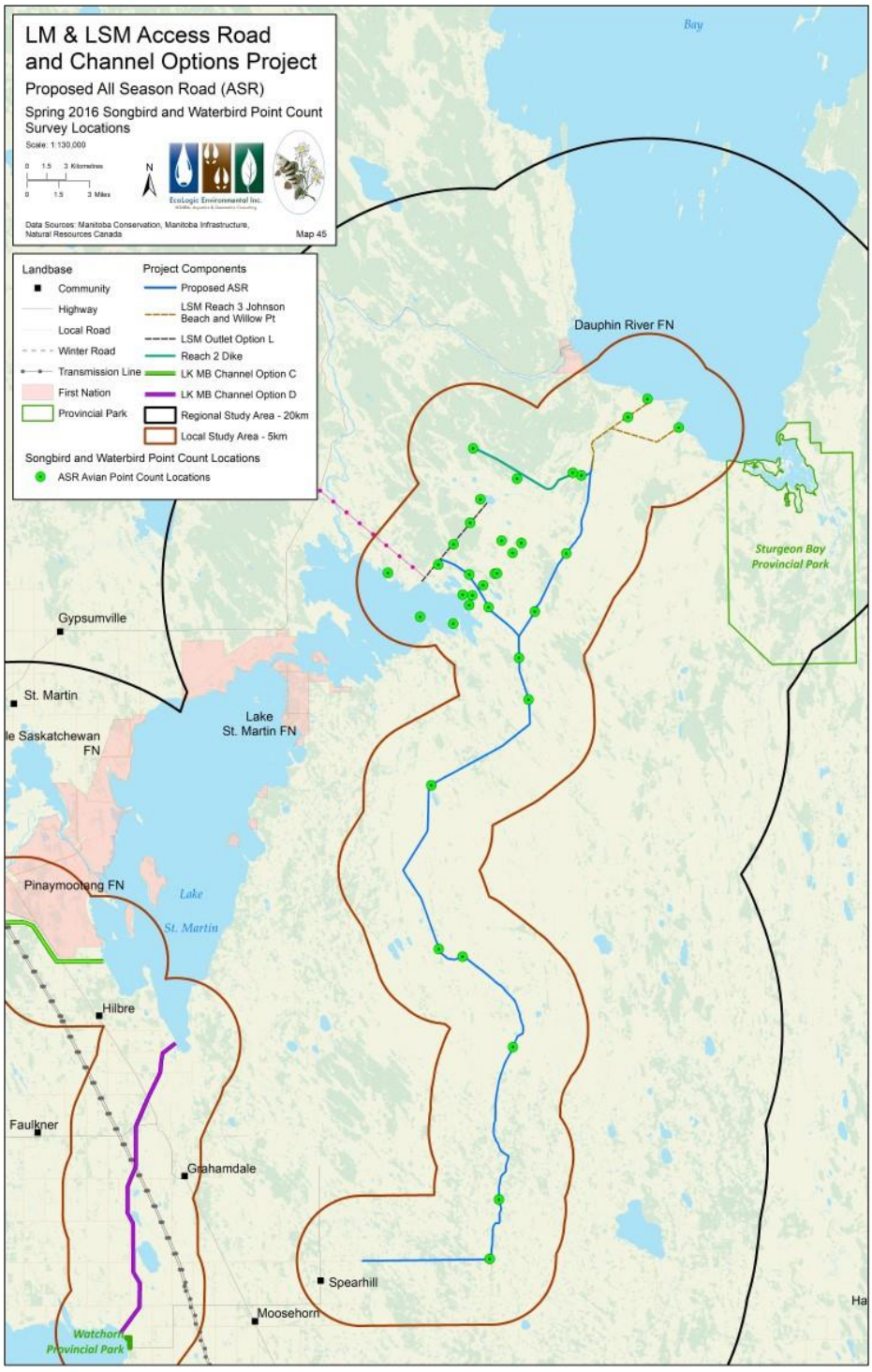
Map 42: Manitoba Breeding Bird Atlas (MBBA) Survey Grid



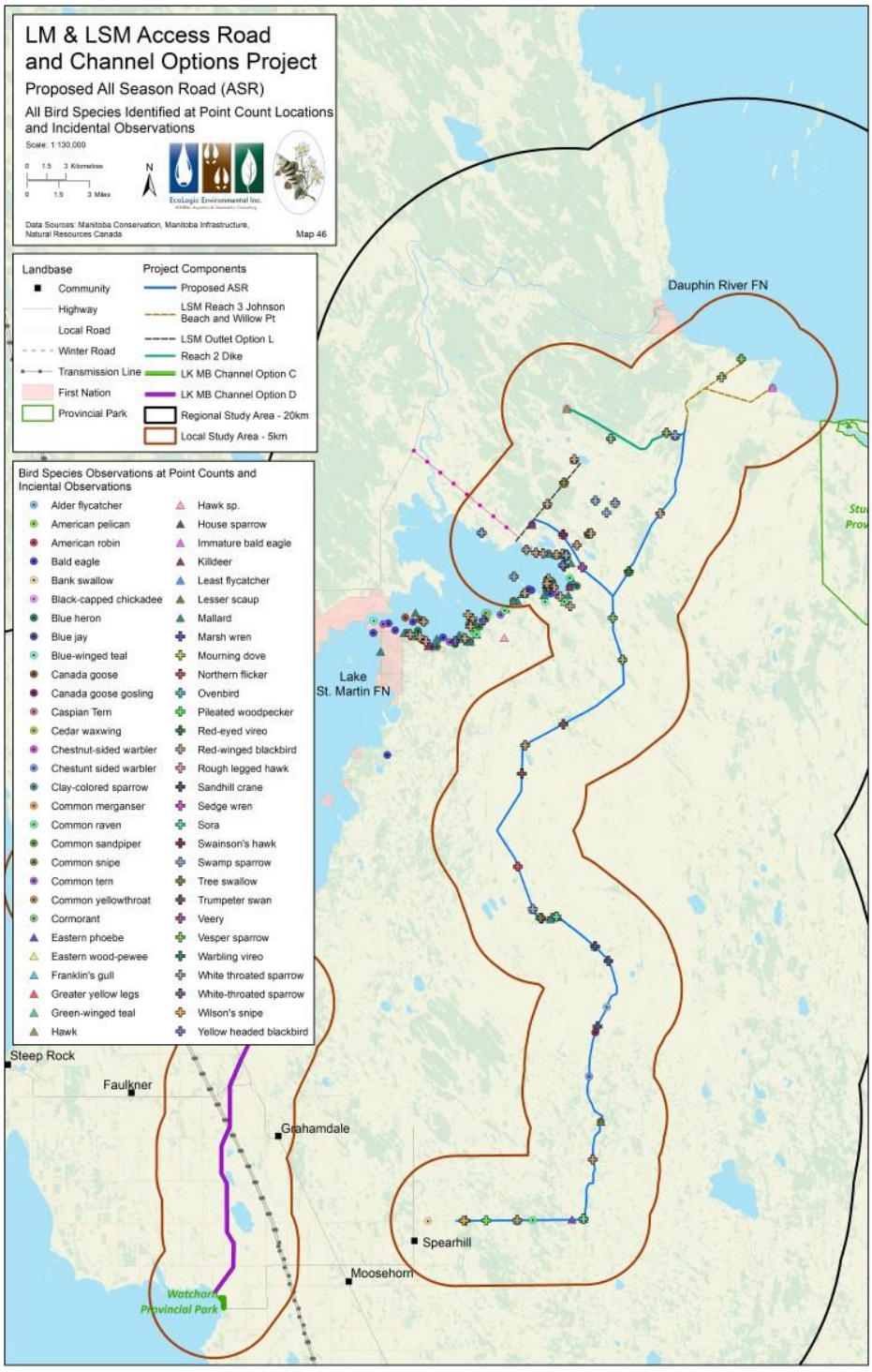
Map 43: Manitoba Breeding Bird Atlas (MBBA) Survey Results



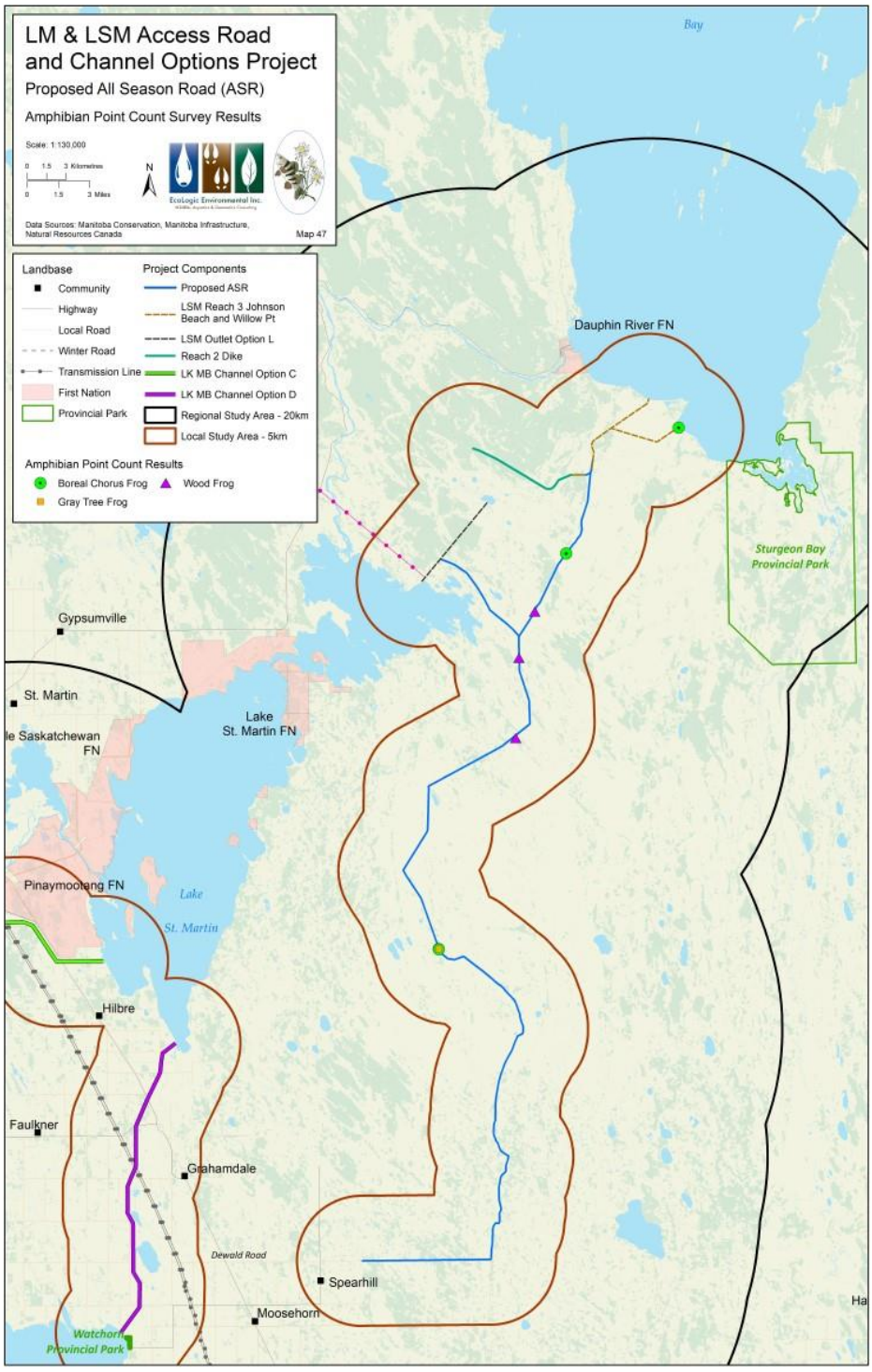
Map 44: Nesting Tree Locations Identified within the LSA



Map 45: Avian Point Count Locations within the LSA



Map 46: Point Count and Incidental Bird Observations within the LSA



Map 47: Point Count and Incidental Amphibian Observations within the LSA