PROJECT 6: EXISTING ENVIRONMENT WILDLIFE REPORT

FINAL

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EXECUTIVE SUMMARY

Manitoba Infrastructure (MI) has undertaken a wildlife monitoring program to support all season road (ASR) development across the Large Area Transportation Network (LATN) on the east side of Lake Winnipeg since 2011. The wildlife monitoring program included desktop and literature reviews as well as specific field studies to collect baseline wildlife and habitat data for use in project planning and environmental impact assessments.

Project 6 (P6) is a proposed ASR within the LATN that will connect Bunibonibee Cree Nation, Manto Sipi Cree Nation and God's Lake First Nation (Map 1), and is the focus of this report. Field studies were conducted to document distribution and relative abundance of mammals, birds, and herptiles (i.e. reptiles and amphibians) in the Regional Assessment Area (RAA) (Map 2). This report provides a characterization of wildlife in the RAA and provides baseline data on species presence, distribution, and relative abundance for the purpose of describing the existing environment of the Project 6 area.

Monitoring and wildlife data collection methods include aerial multi-species winter track surveys to determine the distribution of moose, caribou and furbearers as well as aerial winter moose survey. Global Positioning System (GPS) collar data from woodland caribou occupying the Norway House Range (forest-dwelling ecotype), and the Pen Islands caribou (forest-tundra ecotype) are presented. Trail cameras were deployed in strategic areas to detect the distribution of moose, caribou, predators, and furbearers. In addition to these specific monitoring activities, a local trapper participation program was undertaken to provide data on furbearer occurrence in the RAA through documentation of track observations and animals harvested on traplines.

Monitoring activities for birds and amphibians included the use of autonomous recording units (ARUs) during the breeding season to determine their occupancy and diversity. Data from surveys conducted by the Manitoba Breeding Bird Atlas provided additional information on breeding bird diversity and occupancy within the RAA. Aerial surveys carried out during spring and fall in proximity to water bodies near the P6 alignment were undertaken to detect potential seasonal staging areas for waterfowl. Raptor stick nests were documented during these surveys, as well as during other winter aerial surveys.

The wildlife monitoring program for Project 6 included the gathering of local and traditional wildlife knowledge (TK) through community resource user workshops. The results of workshops and other interviews conducted in the three First Nation communities provided supplemental information verifying species presence and the identification of important wildlife areas. Local community members also participated in many of the wildlife surveys in addition to the trapper program.

Results of winter aerial surveys illustrated consistency in moose observations between two separate surveys. Confidential caribou telemetry data[1] demonstrated that seasonal occupation and migration of the Pen Islands caribou occurs through the RAA during winter. Local and traditional knowledge, trail camera

[1] Telemetry data and locational mapping for species of conservation concern and hunted species is considered sensitive and has been removed from this document, as disclosing the information may cause substantial harm to the species.

observations, and GPS collar data verified that a few forest-dwelling or forest-tundra caribou were found year-round within the RAA. The eastern extent of forest-dwelling caribou (Norway House Boreal Caribou Range) intersects a small area of the western portion of the RAA.

Four bird species of conservation concern were documented in the RAA. Species of conservation concern include those listed under; Species at Risk Act (SARA), Manitoba Endangered Species and Ecosystems Act (MESEA), Committee on the Status of Endangered Wildlife in Canada (COSEWIC), and Manitoba Conservation Data Center (MBCDC) as S1 (very rare) or S2 (rare). Species of concern to communities such as bald eagle (*Haliaeetus leucocephalus*) and waterfowl were observed and mapped. Amphibians were also observed during surveys and included spring peeper (*Pseudacris crucifer*) and leopard frog (*Lithobates pipiens)*.

Assessment of the potential wildlife effects that may result from Project 6 construction and operation are provided in the Wildlife Characterization and Effects Report for P6 issued under separate cover. This second report provides criteria for the selection of Valued Wildlife Components (VC's) and discusses the assessment of potential effects, proposed mitigation, and residual effect related to construction and operation of the project.

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GLOSSARY OF TERMS

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

Colluvial* – A mass of sediments deposited by colluvial processes, most commonly loose rock debris.

Drumlinoid Ridges - A rock drumlin or drift deposit whose form approaches but does not fully attain that of a classic drumlin, even though it seemingly results from similar processes of moving ice.

Depressional – an area of low ground surrounded by higher ground in all directions, or a sinkhole; the depression may or may not be filled with water.

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

Eutric Brunisols – Part of the Brunisolic soils, they lack a well-developed mineral-organic surface horizon and have a high pH.

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

Glaciofluvial* – Pertaining to the channelized flow of glacier meltwater and deposits and landforms formed by meltwater streams.

Glaciolacustrine* – Pertaining to glacial lakes.

Gleysols – Soil developed under wet conditions and periods of reduction, which may have 40 cm of mixed peat or 60 cm of fibric moss peat on the surface and occurs under a range of climatic conditions.

Kettled fluvioglacial deposits* – Shallow, sediment-filled bodies of water formed by retreating glaciers.

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.

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

Moraines* – A landform that consists of un-stratified glacial drift that is usually till or, less commonly, of other drift.

Organic Cryosols – 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.

Regosols – Weakly developed soils that lack recognizable primary horizons and commonly associated with unstable land surfaces.

Serotiny – Is an ecological adaptation exhibited by some seed plants, in which seed release occurs in

response to an environmental trigger, rather than spontaneously at seed maturation. The most common and best studied trigger is fire.

Stochasticity – The quality defined by a process which is random, uncertain, or unpredictable; i.e involving a random variable.

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).

LIST OF ACRONYMS

All Season Road - ASR

Autonomous Recording Units – ARU

Bunibonibee Cree Nation – BCN

Committee on the Status of Endangered Wildlife in Canada - COSEWIC

Environmental Impact Assessment – EIA

First Nation – FN

Forest Resource Inventory - FRI

Forest Management Unit - FMU

Game Hunting Area - GHA

Geographic Information Systems - GIS

Global Positioning System – GPS

God's Lake First Nation – GLFN

Hour - Hr

Kilometre - km

Land Cover Classification - LCC

Land Cover Classification of Canada, East Side - LCCES

Little Grand Rapids First Nation - LGRFN

Local Area Transportation Network - LATN

Local Assessment Area - LAA

Management Unit - MU

Manitoba Boreal Woodland Caribou Management Committee - MBWCMC

Manitoba Conservation Data Centre - MBCDC

Manitoba Endangered Species and Ecosystems Act - MESEA

Manitoba Infrastructure - MI

Manitoba Sustainable Development - MSD

Manto Sipi Cree Nation – MSCN

Metre - m

Ontario Ministry of Natural Resources - OMNR

Project 1 - P1

Project 6 - P6

Project Footprint - PF

Provincial Road - PR

Regional Assessment Area - RAA

Registered Traplines - RTL

Right of Way - ROW

Species at Risk Act - SARA

Traditional Knowledge - TK

Very High Frequency - VHF

Winter Road – WR

1.0 INTRODUCTION

Manitoba Infrastructure (MI) is developing an all-season road (ASR) road network to provide safer and more reliable transportation services to the remote First Nation (FN) and Northern Affairs communities on the east side of Lake Winnipeg. The ASR development detailed in this report is part of a Large Area Transportation Network (LATN; Map 1) and includes a road connecting Manto Sipi Cree Nation, Bunibonibee Cree Nation, God's Lake FN, and the community of God's Lake Narrows, collectively known as Project 6 (P6; Map 1).

Project 6 is proposed to be a two-lane gravel road located on Provincial Crown Land, approximately 138 kilometres (km) long and has a 60 metre (m) wide right-of-way (ROW; Map 2). A Manitoba Environment Act Licence (Class II) and federal approval from the Canadian Environmental Assessment Agency is required, and the P6 Project requires an Environmental Impact Assessment (EIA) to undergo both provincial and federal review.

This Existing Environment Report provides a characterization of wildlife in the Regional Assessment Area (RAA) in support of a separate Wildlife Characterization and Effects Report for P6. The data presented in this report provides baseline data on species presence, distribution, and relative abundance for the purpose of describing the existing environment. Assessment of the P6 wildlife effects are found in the Wildlife Characterization, and Effects Report for P6. The Wildlife Characterization and Assessment Report provides further detail including criteria for the selection of Valued Wildlife Components (VC's) and the assessment of potential effects related to construction and operation of the project.

The Existing Environment Report includes baseline wildlife data collected since 2011 to document the distribution and relative abundance of mammals, birds and herptiles (i.e. reptiles and amphibians) in the P6 Regional Assessment Area (RAA; Map 2). Mammal studies have included: aerial multispecies winter track surveys, aerial winter minimum count moose surveys, GPS collar data from woodland caribou occupying the Norway House (forest-dwelling ecotype) and the Pen Islands (forest-tundra ecotype) populations and trail camera studies. A local trapper participation program was undertaken to acquire local knowledge on furbearer occurrence and relative abundance.

Bird and amphibian monitoring included data collected from autonomous recording units, Manitoba Breeding Bird Atlas point count surveys, and aerial spring and fall waterfowl surveys. Local and traditional wildlife knowledge gathered from community wildlife workshops held in the three FN communities provided valuable information from community members, including hunters and trappers, to supplement wildlife monitoring results. In addition, community members participated in many of the wildlife surveys.

2.0 STUDY AREA

This report describes the environmental setting and baseline data gathered on wildlife as it relates to the P6 RAA (Figure 1; Map 2). The boundaries of the RAA, encompassing an area of 9,005 km^2 (20-km buffer) were determined by KGS and MI, with input from technical specialists including Joro, using a multi-disciplinary approach incorporating both biophysical and social factors. Species of importance to FNs were determined through workshops, open houses and community discussions and included (but not limited to), large mammals (moose and caribou), furbearers, and migratory waterfowl. The extent of the RAA boundary was selected to ensure home ranges of large ranging species such as moose were considered. Areas of traditional use in proximity to P6 were also considered, resulting in the area extending approximately 20 km beyond the alignment being identified as important.

The Pen Islands woodland caribou population are known to have a very large range, extending to the Hudson Bay coast and north of the Nelson River. The RAA includes a small portion of the Pen Islands caribou range and the Norway House woodland caribou range. Baseline data on caribou have been gathered across these ranges and are included in this report. The RAA also encompasses habitat for other species with smaller, multi-generational home ranges that are expected to exist throughout P6 (e.g., furbearers and small mammals), as well as areas important as breeding and/or staging habitat for waterfowl and other migratory birds, and areas of known or potential local resource and traditional use.

The Local Assessment Area (LAA) for P6 is defined as a 5-km buffer on either side of the proposed P6 ASR route, encompassing an area of 1,327 km^2 (Figure 1; Map 2). The Project Footprint (PF) for P6 is defined as the 100-m ASR ROW, encompassing an area <14 km^2. Administrative boundaries which intersect with the RAA are the Manitoba Sustainable Development (MSD), Wildlife and Fisheries Branch, Game Hunting Area (GHA) 3A (MSD, 2016a) or the MSD, Forestry Branch, Forest Management Unit (FMU) 76, 90, 93, 94, 95, 96, 97, 98, and 99 (MSD, 2013) (Map 3).

FN communities located within the RAA include Bunibonibee, Manto Sipi, and God's Lake, and the Northern Affairs community of God's Lake Narrows. These communities utilize sections within the RAA as traditional hunting and trapping areas for wildlife species. In addition, winter roads, hydro transmission lines, recreational trails, quarries, and traplines occur throughout the RAA. There are also several lodges and outposts which provide various services focused mainly on angling and hunting.

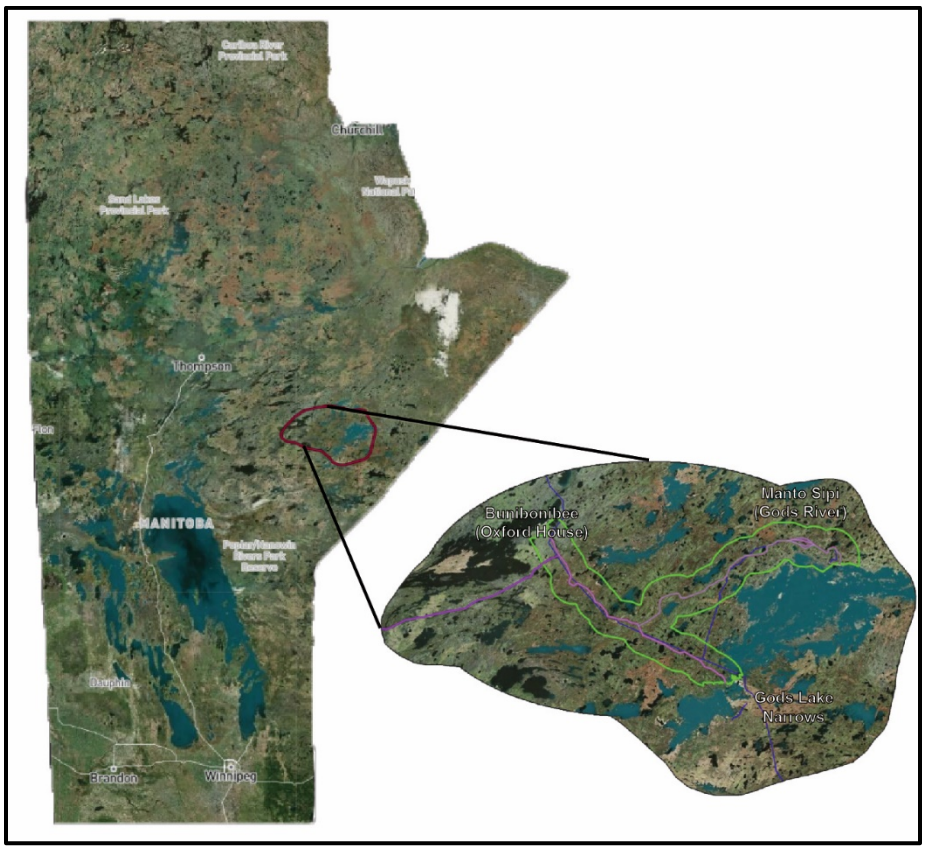

Figure 1: Location of the P6 RAA and the LAA within northeastern Manitoba

2.1 Environmental Setting

This section provides a summary of the existing environment for the P6 RAA. Further detail on the P6 environmental setting is summarized in the Wildlife Characterization and Effects Assessment of the Proposed All-Season Road Project 6 Report (Joro, 2017a).

The RAA is located within the Boreal Shield Ecozone, which is the largest ecozone in Canada. In Manitoba, it extends north from the southeast corner of the province, encompassing the area between Lake Winnipeg and the Ontario border and proceeds across the northern extent of the Lake as a broad band from the Ontario to Saskatchewan borders (Smith *et al.,* 1998). The ecozone is dominated by both lowlands and broadly rolling uplands.

The **surficial geology** [2] is composed of Precambrian granite bedrock outcrops, **moraines**, **glaciofluvial**, and **colluvial** deposits. The continental climate is typically characterized by short warm summers and cold, snowy winters. Soils are dominated by **luvisols** in the south and **brunisols** in the north (Zoladeski *et al.*, 1995). **Brunisolic** soils comprise one of three forest soil orders and can be viewed as part of a

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

prolonged evolutionary sequence that begins with an unweathered parent material (**Regosols**) and ends with development of a “mature” forested soil of the **Podzolic** or **Luvisolic** orders; the **Brunisolic** “stage” may last for several thousands of years.

The entire RAA falls within the Hayes River Upland (89) Ecoregion (Figure 2), which extends from the Grass River Basin in east-central Manitoba to the Manitoba-Ontario border. The Hayes River that flows northeast and eventually drains into Hudson Bay is the major drainage channel in the region; both Knee Lake and Oxford Lake are widened expanses of the Hayes River. The area is characterized by numerous small streams connecting a network of small lakes and wetlands between **drumlinoid ridges**, most of which have exposed bedrock. Most of the area is a mix of till blankets and till veneers over bedrock. Well to moderately-well drained till and **glaciolacustrine** parent materials are generally associated with **eluviated eutric brunisol** soils, while imperfect to poorly drained deposits are frequently overlain by **regosolic gleysols** and a mix of **cryosols** and **mesisols** (Trommelen, 2012).

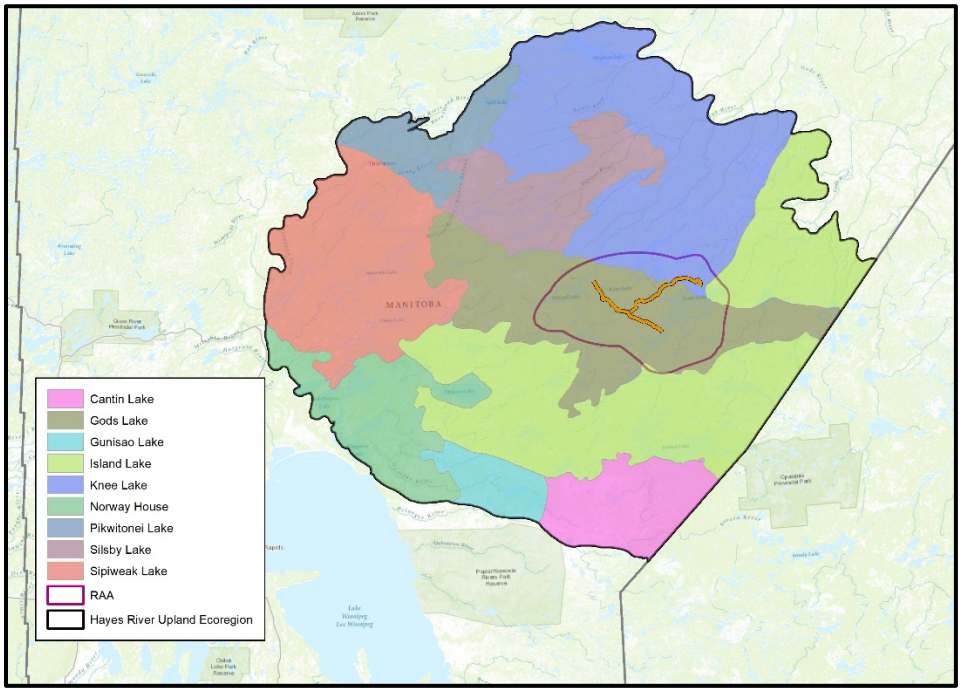

Figure 2: Location of the P6 RAA and ecodistricts within the Hayes River Upland in northeastern Manitoba (Source: Agriculture and Agri-Food Canada, 2006)

2.2 Ecodistricts

The RAA is intersected by parts of three ecodistricts, Island Lake (364), God’s Lake (365), and Knee Lake (360) (Figure 2). The God’s Lake Ecodistrict accounts for more than 85% of the total area within the RAA (Figure 3).

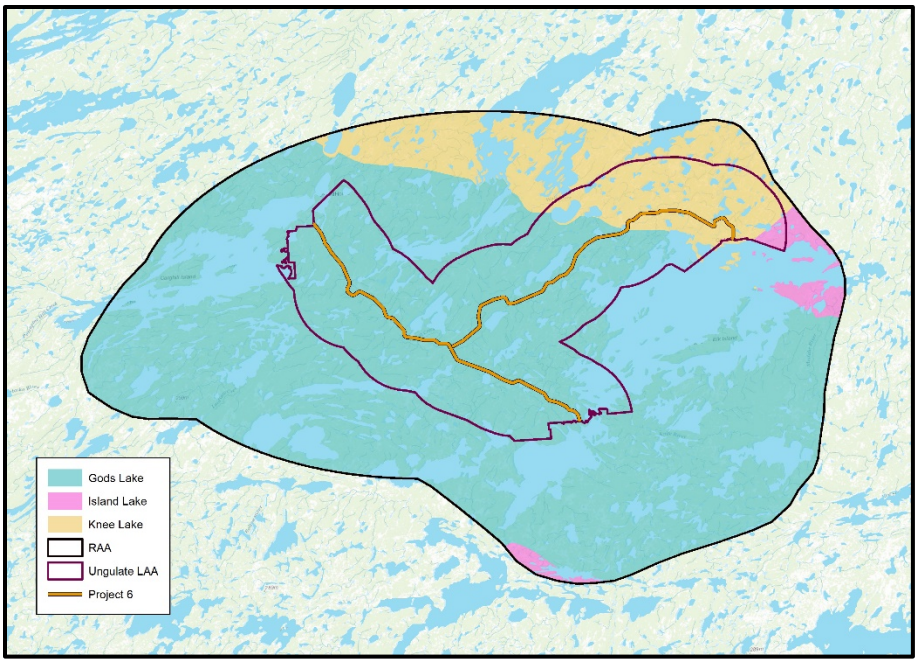

Figure 3: Location of ecodistricts that intersect the P6 RAA in northeastern Manitoba (Source: Agriculture and Agri-Food Canada, 2006)

The surficial geology, and soil to a large extent, determine the organic productivity of the landbase, including the vegetation communities and the wildlife it supports (Figure 4 and Figure 5). The glacial tills are a product of the scraping and plucking of bedrock by glacial ice resulting in variably sized rock fragments that were transported, crushed and mixed into a thin sediment layer. Till veneers and till blankets underlie most of the area accounting for almost 75% of the area in the RAA.

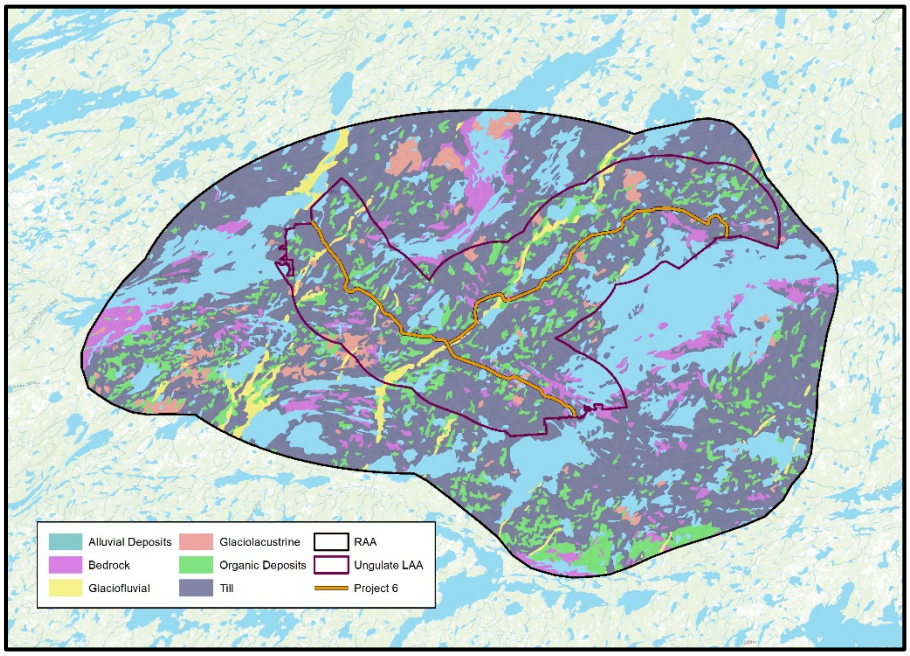

Figure 4: Surficial geology within the P6 Regional Assessment Area (Source: Natural Resources Canada, 1995)

Eutric brunisols (>71%) and **cryosols** (25%) dominate the soil profile within the RAA (Figure 5).

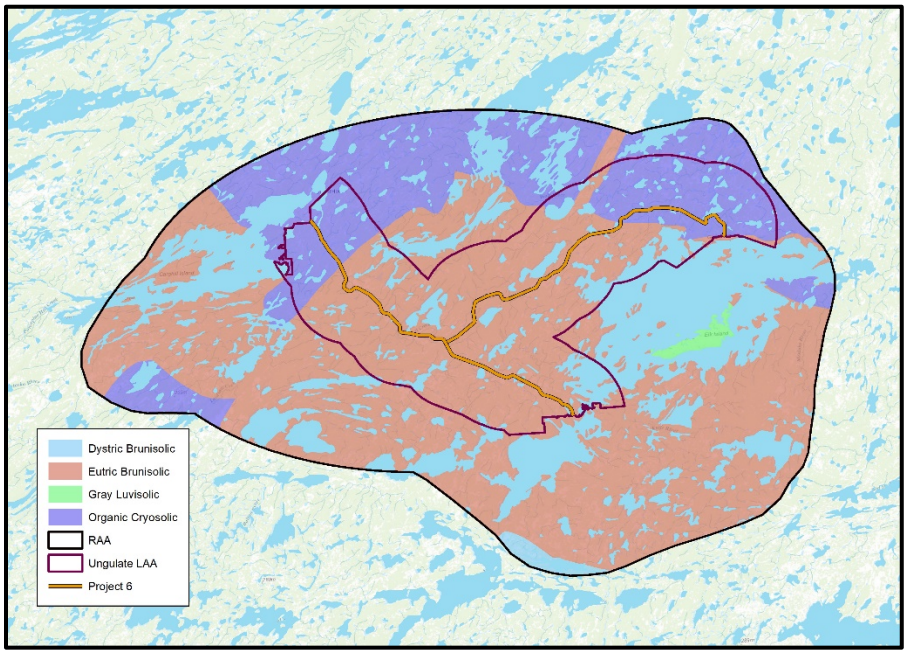

Figure 5: Distribution of major soil types within the P6 RAA (Source: Agriculture and Agri-Food Canada, 1996)

2.2.1 The God's Lake (365) Ecodistrict

This is the predominant ecodistrict in the RAA; it begins at Landing Lake and lies entirely within Manitoba except for its most eastern tip which falls in Ontario. This ecodistrict is located in the central part of the Hayes River Ecoregion and is bordered on both north and south by the Island Lake (364) Ecodistrict and also by the Knee Lake (360) Ecodistrict to the north (Smith *et al.*, 1998). The mean annual temperature is -1.5°C with an average growing season of 155 days. The mean annual precipitation is approximately 560 mm, of which less than one-third falls as snow (Smith *et al.*, 1998).

The **physiography** of the region consists of undulating to hummocky morainal plain of calcareous, sandy to loamy till deposits with clayey **glaciolacustrine** veneers and blankets all over the region, especially on lower slopes and depressions. Northern plateau bog, peat plateau bog, flat bog, patterned and horizontal fens (deep peat deposits), and veneer bog (shallow peat materials) frequently cover the fine textured glaciolacustrine sediments. There are also areas where prominent **kettled fluvioglacial deposits** occur (Smith *et al.*, 1998). Oxford Lake and God's Lake are the largest of the wide range of lakes within the ecodistrict that contribute to the region's northward flowing water (Smith *et al.*, 1998).

The God's Lake Ecodistrict has well to imperfectly drained mineral soils comprised of eluviated **eutric brunisols** and **gray luvisols** which can be found on upland clayey glaciolacustrine deposits. Peat-filled areas cover a large area on this region and are comprised of poorly drained bogs and very poorly drained fens. The soil is composed of a range of peat types including **fibrisols** (slightly decomposed sphagnum and feather moss peat), **mesisols** (moderately decomposed moss and forest peat), and **organic**

cryosols (areas with permafrost) (Smith *et al*., 1998). The deeper layers of peat are generally more decomposed than those close to the surface as is the case in peat fens.

In areas with gentle slopes, shallow peat soils with slight to moderately decomposed sphagnum, feather moss is more likely and may be associated with organic cryosols (Smith *et al.*, 1998). Black spruce (*Picea mariana*) is the dominant tree species in the God's Lake Ecodistrict; however, the upland portions are frequently replaced by jack pine (*Pinus banksiana*) followed by trembling aspen (*Populus tremuloides*) due to fire activity. Tamarack (*Larix laricina*) is common in fens and can be found mixed with black spruce in transitional bog peatlands. Successful mixed stands of white spruce (*Picea glauca*), balsam fir (*Abies balsamea*), trembling aspen, and balsam poplar (*Populus balsamifera*) can be seen along rivers and lakes (Smith *et al.*, 1998).

2.2.2 The Knee Lake (360) Ecodistrict

The Knee Lake (360) Ecodistrict is restricted to a portion of the northern edge of the RAA Figure 3, although the whole of the Knee Lake Ecodistrict forms a horseshoe-shaped area extending from Knee Lake in the south to Stevenson Lake in the north (Smith *et al.*, 1998). Mean temperatures range from a low of -25.7°C in January to a high of 15.3°C in July with an average growing season of 131 days. The mean annual precipitation is approximately 500 mm, of which more than one-third falls as snow (Smith *et al.*, 1998).

The physiography changes from undulating to ridged, (drumlins) loamy morainal plain where the drumlins have been eroded by water and may have veneer bogs on the lower slopes. Veneer bogs also appear on gently sloping glaciolacustrine blanket and veneers; whereas peat plateau bogs and patterned fens tend to be found in **depressional** terrain with clayey glaciolacustrine sediments underneath. The ecodistrict also contains sites of conspicuous eskers and esker aprons (kettled fluvioglacial deposits) which can be up to 30 m above the nearby terrain and can have eroded channels creating local relief (Smith *et al.*, 1998).

The drainage system for the northwest is the Nelson River and the south-western and eastern sections belong to the Hayes River. Lakes in this region vary from small to very large and many have shores developed in unconsolidated materials, with the smaller lakes appearing between drumlin ridges (Smith *et al.*, 1998). Much of the ecodistrict occurs on permafrost peatlands and as such the soils are organic coming from woody, forest peat, and sedge peat materials and include organic cryosols in veneer bogs and peat plateau bogs. Veneer bogs are also found in non-frozen areas and are made up of fibrisols, whereas the flat bogs and patterned fens are made up of mesisols.Knee Lake Ecodistrict has imperfectly drained mineral soils comprised of eluviated eutric brunisols on loamy to sandy calcareous till and sandy to gravelly fluvioglacial deposits and well to imperfectly drained clayey deposits in gray luvisols (Smith *et al.*, 1998).

Black spruce is the predominant tree species, but well drained upland areas are dominated by jack pine well adapted to frequent fires that characterize these dry habitats. In wetter areas, such as around lakes and rivers, white spruce appears and in bog peatlands there is black spruce, **ericaceous** shrubs, and various mosses, including sphagnum. Fens have different vegetation mostly consisting of stunted tamarack, shrubs, brown mosses, and sedges (Smith *et al.*, 1998).

2.2.3 The Island Lake (364) Ecodistrict

The Island Lake (364) Ecodistrict is separated into two sections, north and south; a very small portion of the RAA lies within the northeastern and southern sections of the ecodistrict (Figure 3). The ecodistrict is bordered by five other ecodistricts within the Hayes River Ecoregion. God's Lake Ecodistrict (365) to the north is the largest and represents the division of the two Island Lake Ecodistrict sections (Smith *et al.,* 1998). Mean temperatures range from a low of -22.8°C in January to a high of 17.6°C in July with an average growing season of 154 days. The mean annual precipitation is roughly 560 mm, with about one-third falling as snow (Smith *et al*., 1998).

The physiography of the southern section varies from an undulating to hummocky till plain where the uplands consist of granitoid rock outcrops, discontinuous blankets and veneers of acid to weakly calcareous, sandy, stony glacial till. Around Island Lake calcareous, clayey glaciolacustrine blankets and veneers are also common. In the remainder of the district, shallow to deep peat covers glaciolacustrine clayey sediments on level, gently sloping sites and in depressions (Smith *et al*., 1998). Permafrost in the northern section of the ecodistrict is widespread in deep peat bogs and discontinuous in veneer bogs and in the southern section it is confined to peat plateaus and veneer bogs and is often a relic (Smith *et al*. 1998).

Soils range from well to excessively drained and consist of dystric brunisols and stony, acid sandy till to gray luvisols, which are not as well drained. Significant areas of very poorly drained Typic (deep) and Terric (shallow) fibrisolic and mesisolic organic soils overlying loamy to clayey glaciolacustrine sediments occur in the peatlands, which are increasingly more widespread towards the west (Smith *et al*., 1998).

Most of the Island Lake Ecodistrict falls within the Hayes River watershed, with only a small western portion lying in the Nelson River watershed. The lakes range from small to very large (Island Lake) and these lakes and associated rivers and streams are the main source of water for the ecodistrict (Smith *et al*., 1998).

Jack pine and, to a lesser extent, trembling aspen are common on upland sites, due to extensive, repeated fires; however, black spruce is the dominant tree species and is especially widespread on imperfectly drained uplands and peatlands. In river valleys and around lakes where drainage is good, white spruce, balsam fir and trembling aspen form mixed stands. Stunted black spruce, sphagnum, and other mosses and ericaceous shrubs are found in bog peatlands and sedges, brown mosses, shrubs and stunted tamarack are found in fens (Smith *et al*., 1998).

2.3 Forest Cover and Vegetation

The Boreal forest within which the RAA is located forms a continuous belt from Newfoundland to the Rocky Mountains and comprises the greater part of the forested areas of Canada (Rowe, 1972). The Boreal forest is primarily coniferous with white and black spruce as characteristic species, although balsam fir and jack pine are prominent in the eastern and central portions; tamarack is only absent in the far north (LGRFN and OMNR, 2011). There is also an admixture of broadleaf trees such as white birch (*Betula papyrifera*), trembling aspen, and balsam poplar (LGRFN and OMNR, 2011).

Within the P6 RAA, the forest is further classified into the Northern Coniferous section (B.22a) (Rowe, 1972). These coniferous stands tend to have a feather moss groundcover. Bedrock outcrops have patchy tree growth with an understory of low shrubs and a groundcover of low ericaceous shrubs, mosses, and lichens. Poorly to very poorly drained fens have sedge and brown moss vegetation and may have a shrub layer or may support a tamarack-dominated tree cover with varying components of shrubs, herbs, and sedges. Poorly drained bogs generally support open to closed stands of stunted to medium tall black spruce, with an understory of dwarf birch, ericaceous shrubs, and a moss ground cover.

Peatlands that are transitional in development from fen to bog are common and the vegetation reflects the transitional aspects in its community composition (Smith *et al.*, 1998). The *Forest Ecosystem Classification for Manitoba, Field Guide* (Zoladeski *et al.*, 1995) provides a detailed species relationship, for productive forest types, in terms of their commercial tree species compositions and common relationships for understory shrubs, herbs, and mosses. Figure 6 illustrates the forest cover habitat in the RAA.

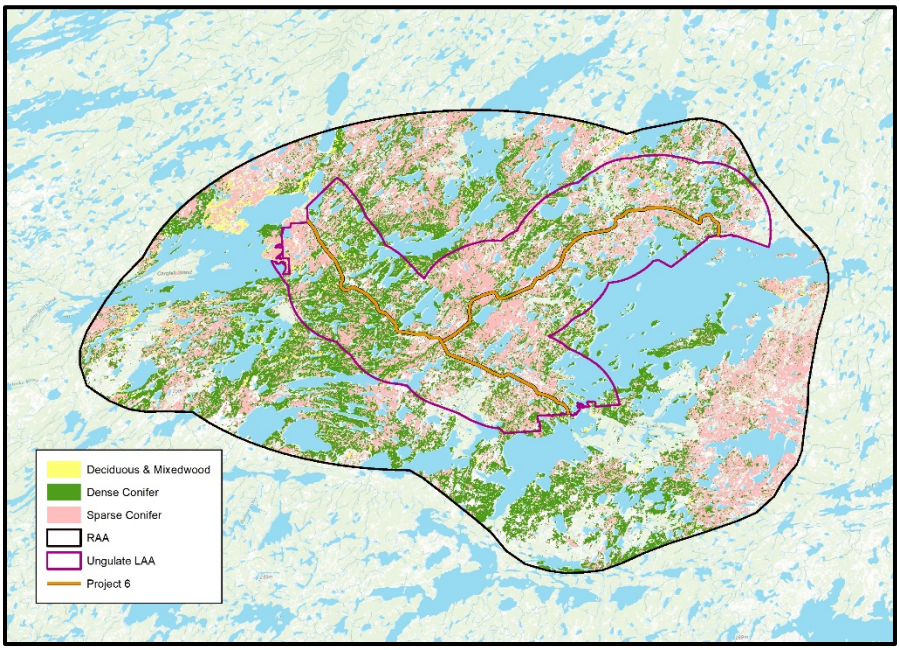

Figure 6: Distribution of deciduous and mixedwoods, sparse conifer and dense conifer within the P6 RAA (Source: Natural Resources Canada, 2003)

2.4 Habitat

The RAA vegetation community typically represents species mixes shaped by disturbance events, post-disturbance renewal and stand succession processes. The ability to adapt and occupy forest habitats at various stages of succession essentially dictates the species of wildlife that inhabit this area at any point in time, as described in Section 2.5. The area is comprised of a mosaic of different aged forest stands, plant communities and floral species that reflect the climate, topography, soils, drainage, disturbance history and forest succession of the region. Forests provide the habitats within which wildlife live and the degree and complexity of this structure determines the diversity of species and their respective abundance (Keenan *et al.*, 2009).

2.4.1 Fire History

The record of the fire history for the P6 RAA going back 100 years was mapped from the Canadian National Fire Database compiled by Natural Resources Canada (NRC, 2015). A lower rate of fire frequency is visible within the RAA than in areas to the west and south (Figure 7).

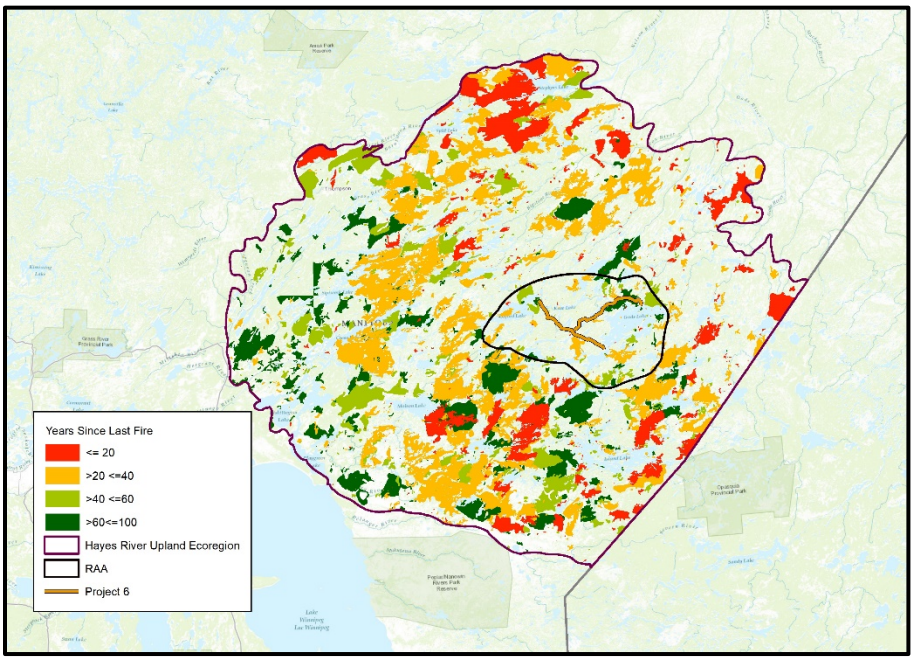

Figure 7: History of reported fires within the Hayes River Upland Ecoregion (Source: Natural Resources Canada, 2015, Agriculture and Agri-Food Canada)

Most fires within the ecoregion over the last century are <40 years of age (Figure 8), thereby favouring those wildlife species that may benefit from younger regenerating forest structures. However, within the RAA itself, a lower burn rate has resulted in a somewhat more mature forest (Figure 6).

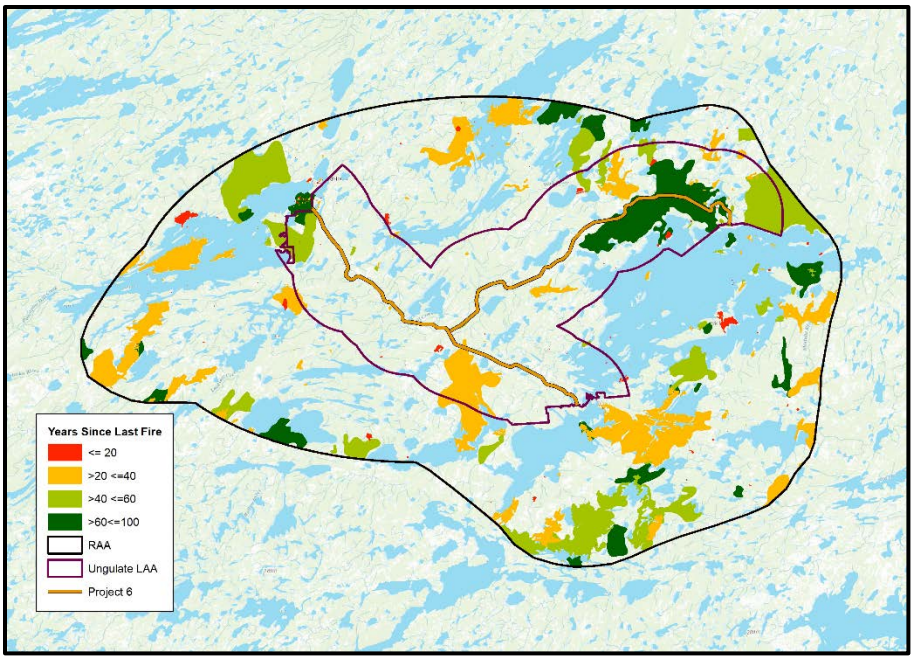

Figure 8: History of reported fires within the P6 RAA (Source: Natural Resources Canada, 2015)

Fire is the major disturbance factor shaping the patterns and distribution of forest age classes and communities within the Boreal Shield Ecozone. The forest landscape within the RAA does not present a highly complex forest covertype structure, but rather a classical Boreal shield forest defined by a mix of treed and open wetlands surrounded by higher elevation black spruce and jack pine forest communities in a range of age classes shaped by the patterns created by frequent natural fires.

Fire is the primary source of disturbance and the Boreal Shield Ecozone that extends across the region is generally characterized by fire events that periodically burn the landscape with varying degrees of intensity. In the case of black spruce, fuel loads to carry fire can include the trees, coarse woody debris and organic materials that comprise the forest floor; the most intense fires essentially leave no woody debris on the forest floor (Dyrness and Norum, 1983).

Burton *et al.* (2008) categorized the hierarchy of scales of diversity associated with large fires in the boreal forest: (1) within the entire boreal forest of North America as a function of climatic and topographic effects on both the rates of burning leading to inter-regional and/or inter-landscape differences; (2) differences within a landscape caused by specific landscape environmental attributes and **stochasticity**; and (3) a diversity within a fire that can be described in terms of burn severity, the latter of which essentially defines the structure of the post-fire forest. Black spruce and jack pine are both fire-adapted species given their **serotiny** in which fire triggers seed release and dispersal. In the case of severe fires that also burn the forest floor, there is a rapid and dense regeneration to the dominant forest type.

Hall *et al.* (2008) viewed a broad application of burn severity maps, particularly in the assessment of the consequences for varying severity regimes for wildlife suggesting, for example, that a level of burn severity that may preclude the post-fire use of the landscape by caribou may be quite different than the level of severity that would render the area unusable by other species, e.g., marten, migratory birds, or predatory birds.

The sequences of ecological processes within the RAA are a product of the repetitive burn patterns, the severity of which is linked to the combination of fuel loads combined with a host of meteorological variables. At the ecozone level, wildlife has evolved and adapted to the broad patterns of vegetative communities that provide a constant supply of habitat types that meet the life history needs for resident species and the seasonal requirements of many transient species. The ebb and flow of how species fare at the level of discrete populations is linked to the constantly shifting spatial distributions of habitats upon which species depend. Within small evaluation areas, utilization by wildlife is a direct product of the recent fire history (< 60 yrs.) that defines the complexity of mix of stand types that define the study area forest.

2.5 Wildlife in the RAA

The following sections provide an overview of important species common to the RAA. A listing of all mammals, birds, and herptiles, including species of conservation concern and species of importance to First Nations people, that may occur in the RAA is also presented in Appendices A-C, respectively.

2.5.1 Mammals

Ungulates, furbearers, and small mammals comprise the 39 species that may occur within the RAA. See Appendix A for a comprehensive list of mammals that may occur and their conservation status.

2.5.1.1 Woodland Caribou

The Pen Islands (Eastern Migratory) and Norway House (Boreal Caribou) caribou ranges/populations overlap with the P6 RAA. The animals occupying both ranges are woodland caribou (*Rangifer tarandus caribou*), but due to differences in several important life characteristics they are recognized as belonging to different ecotypes. Pen Islands caribou are categorized as the migratory ecotype, also referred to as “forest-tundra” ecotype, whereas Norway House caribou are classified as the sedentary ecotype, also referred to as “forest-dwelling” or “boreal forest” ecotype (Committee on the Status of Endangered Wildlife in Canada or COSEWIC, 2011; Manitoba Boreal Woodland Caribou Management Committee or MBWCMC, 2015).

The forest-tundra ecotype is differentiated from the forest-dwelling ecotype by their migratory and calving behaviour. Forest-tundra (Pen Islands) caribou traditionally migrate and assemble in large groups near the Hudson Bay coast to calve. This is in contrast to forest-dwelling caribou that disperse and separate over large areas during calving. Forest-tundra caribou more closely resemble migration characteristics of barren-ground caribou (*Rangifer tarandus groenlandicus*), moving large distances between winter range and spring calving areas (COSEWIC, 2011; Berglund *et al*., 2014; Pond *et al.*, 2016). FN communities in the RAA have supported the understanding of a diverse caribou population within the RAA and have described two types of caribou as identified by the behavioural characteristics described.

Pen Islands Caribou Range/Population (Forest-tundra)

COSEWIC (2011) currently identifies the Pen Islands caribou range as part of Designatable Unit 4 (DU4): Eastern Migratory Caribou. COSEWIC has assessed all subpopulations of the Eastern Migratory Caribou,

including the Southern Hudson Bay subpopulation (i.e. the Pen Islands range), as “Endangered” (COSEWIC, 2017). MBCDC (2016a) lists the population as S4. See Appendix A for further detail/definitions on conservation status listing.

The Pen Islands caribou population has a range extending from northeastern Manitoba to northwestern Ontario within the Hudson Bay and Boreal Shield Ecozones (Magoun *et al.*, 2005; Gunn *et al.*, 2011; Abraham *et al.*, 2012; Berglund *et al*., 2014). In recent years, caribou from the Pen Islands caribou population have been observed in the same geographical area as the proposed P6 road alignment, and to the area north and east within the P6 RAA on occasion. However, the actual numbers and frequency of Pen Islands caribou occupying and/or migrating through the P6 RAA has likely varied considerably over time.

Due to the migratory nature of the Pen Islands population, the use of this area by animals has been primarily on a seasonal basis (the winter months from November through to late April), though a very small number of female caribou may have remained in the RAA during the summer months. The P6 RAA would be on the southern limit of the population’s normal range. Within the RAA the animals would primarily be found in forested areas, but most commonly mature coniferous forests where quantities of lichen are available.

Norway House Caribou Range/Population (Forest-dwelling)

COSEWIC (2011) currently identifies the Norway House caribou range as part of Designatable Unit 6 (DU6): Boreal Caribou and are assessed as “Threatened”, similarly they are listed as “Threatened” under SARA. Boreal caribou are also listed as “Threatened” under MESEA and a process for developing an Action Plan for the Management Unit (MU) is provided in Manitoba’s Boreal Woodland Caribou Recovery Strategy (MBWCMC, 2015). MBCDC (2016a) lists the population as S2S3. See Appendix A for further detail/definitions on conservation status listing.

The Norway House population range overlaps slightly with the RAA and is restricted to the extreme western portion of the RAA. Historical information on the forest-dwelling ecotype within the P6 RAA is sporadic and limited. Current range data have been gathered since 2011 as part of baseline wildlife monitoring. Both government reports and traditional ecological knowledge indicate the presence of caribou within the general geographical area but detailed information on historic distribution and numbers is lacking. As a result, the range delineation of this boreal caribou population has gone through several changes since the early 1990’s (Johnson, 1993; Rebizant et al., 2000; Manitoba Conservation, 2006; MBWCMC, 2015). Currently MSD, the provincial department responsible for boreal woodland caribou management, shows the western portion of the P6 RAA as being in the Molson Lake MU and a small part of the Norway House caribou range overlapping it (MBWCMC, 2015). The Norway House range lies entirely within the Boreal Shield Ecozone.

2.5.1.2 Moose

Moose (*Alces alces*) are distributed across much of forested Canada (Banfield, 1974) and are common within the boreal forest across Manitoba including the RAA. Moose are most commonly found in association with wetlands and lakes in summer feeding on both herbaceous plants and emergent aquatic

vegetation rooted in mineral soils, and in winter seek woody browse provided by a variety of shrubs and young deciduous trees (Renecker and Schwartz; 1998, Gillingham and Parker, 2008). Moose tend to benefit from large stand renewal events, most of which are caused by wildfires in the Boreal Shield Ecozone. Within the RAA, moose are highly valued primarily for rights-based subsistence hunting and, as the largest prey species, are an integral component of the food chain (MSD, 2016a). FN communities in the RAA indicated moose to be an important source of food for local community members, with hunters sharing the moose harvested with family and community members. Moose populations in the RAA are not considered a conservation concern.

2.5.1.3 Furbearers and Small Mammals

Grey wolves (*Canis lupus*) inhabit forested areas with sufficient prey species such as moose, beaver, and snowshoe hare to sustain packs. Given the low biological productivity of the Boreal Shield ecozone, wolf home ranges tend to be large and are found throughout the RAA. Wolf populations are monitored by MI to study their movement patterns and prey selection, particularly in relation to boreal woodland caribou due to it being a threatened species listed under the federal Species at Risk legislation. Most wolf kill sites investigated within the boreal shield on the east side of Manitoba have been of moose. Wolf populations in the RAA are not considered a conservation concern.

American black bears (*Ursus americanus*) are found across most wooded habitats in North America and are relatively common through the boreal forest (Latham 2009, Tigner *et al.* 2014, DeMars 2015), including the RAA. Population densities tend to be highest in diverse forests at relatively early stages of succession and lowest where soils are thinner and plant growth generally poorer (Kolenosky and Strathearn, 1987). Bears are well known significant predators of neonate ungulates in northern temperate ecosystems and may be a factor in low recruitment rates of moose and caribou (Stewart *et al.* 1985, Bastille-Rousseau *et al.* 2011, Latham *et al.* 2011). Black bear populations in the RAA are not considered a conservation concern.

Large and small furbearers of importance to trappers in the RAA include American beaver (*Castor canadensis*), American marten (*Martes americana*), American mink (*Neovison vison*), Canada lynx (*Lynx Canadensis*), ermine (*Mustela erminea*), fisher (*Martes pennanti*), muskrat (*Ondatra zibethicus*), Northern river otter (*Lontra Canadensis*), red fox (*Vulpes vulpes*), red squirrel (*Tamiasciurus hudsonicus*), snowshoe hare (*Lepus americanus*), and wolverine (*Gulo gulo*). Marten and beaver, in particular, are valued species to trappers. Marten can be found in most of Manitoba's boreal forest and generally inhabit mature coniferous or mixedwood forests. They feed on small mammals such as hares, some birds, fruit, nuts, carrion, rodents, shrews, and insects (Reid, 2006). Beaver can also be found throughout Manitoba's boreal forest close to water, and feed on bark and twigs of softwood trees, along with aquatic plants and grasses (Caras, 1967). There are no furbearer species of conservation concern in the RAA.

Commercial trapping of furbearers is administered by MSD through the Registered Trapline (RTL) system (MSD, 2016b). There are 51 RTLs that fall (fully or partially) within the P6 RAA and 10 RTLs specifically intersect the P6 alignment. Further detail on trapping in the P6 RAA can be found in section 3.7.2.

There are several other species of small furbearers or mammals that may be residents, migrants, or incidental occasional visitors to the RAA. These include, but are not limited to, least chipmunk (*Eutamias*

minimus), least weasel (*Mustela nivalis*), masked shrew (*Sorex cinereus*), meadow jumping mouse (*Zapus hudsonius*), Northern bog lemming (*Synaptomys borealis*), porcupine (*Erethizon dorsatum*), pygmy shrew (*Sorex hoyi*), raccoon (*Procyon lotor*), short-tailed shrew (*Blarina brevicauda*), silver-haired bat (*Lasionycteris noctivagans*), southern red-backed vole (*Clethrionomys gapperi*), striped skunk (*Mephitis mephitis*), and woodchuck (*Marmota monax*).

2.5.2 **Birds**

Waterbirds and forest birds comprise most of the species that are migratory in the RAA; while some non-migratory forest birds (grey jays) and upland game birds (grouse) also may occur. See Appendix B for a comprehensive list of birds that may occur in the RAA and their conservation status.

2.5.2.1 Migratory Forest Birds

A number of migratory songbird species may be located in various forest habitats within the RAA (Bezener and De Smet, 2000; Peterson and Peterson, 2002; Manitoba Avian Research Committee, 2003; Cornell Lab of Ornithology, 2015); a selection of those that commonly frequent the area include Alder flycatcher (*Empidonax alnorum*), American robin (*Turdus migratorius*), blue-headed vireo (*Vireo solitaries*), cedar waxwing (*Bombycilla cedrorum*), chipping sparrow (*Spizella passerine)*, common raven (*Corvus corax*), Connecticut warbler (*Oporornis agilis*), dark-eyed junco (*Junco hyemalis*), downy woodpecker (*Picoides pubescens*), fox sparrow (*Passerella iliaca*), gray jay (*Perisoreus canadensis*), hermit thrush (*Catharus guttatus*), least flycatcher (*Empiodnax minimus*), Lincoln's sparrow (*Melospiza lincolnii*), magnolia warbler (*Setophaga magnolia*), Nashville warbler (*Oreothlypis ruficapilla*), Northern waterthrush (*Parkesia noveboracensis*), olive-sided flycatcher (*Contopus cooperi*), orange-crowned warbler (*Oreothlypis celata*), ovenbird (*Seiurus aurocapilla*), palm warbler (*Setophaga palmarum*), ruby-crowned kinglet (*Regulus calendula*), rusty blackbird (*Euphagus carolinus*), swamp sparrow (*Melospiza georgiana*), Tennessee warbler (*Oreothlypis peregrine*), white-throated sparrow (*Calidris fuscicollis*), white-winged crossbill (*Loxia leucoptera*), Wilson's snipe (*Gallingo delicate*), Wilson's warbler (*Cardellina pusilla*), winter wren (*Troglodytes hiemalis*), yellow-bellied flycatcher (*Empidonax flaviventris*), yellow-bellied sapsucker (*Sphyrapicus varius*), and yellow-rumped warbler (*Setophaga coronate*).

2.5.2.2 Non-Migratory Forest Birds

Non-migratory forest birds that also occur in forest habitats in the RAA include: American three-toed woodpecker (*Picoides dorsalis*), black-backed woodpecker (*Picoides arcticus*), blue jay (*Cyanocitta* cristata), common raven (*Corvus corax*), downy woodpecker (*Picoides pubescens*), European starling (*Sturnus vulgaris*), evening grosbeak (*Coccothraustes vespertinus*), gray jay (*Perisoreus canadensis*), hairy woodpecker (*Picoides villosus*), pileated woodpecker (*Dryocopus pileatus*), pine grosbreak (*Pinicola enucleator*), and pine siskin (*Spinus pinu*s).

2.5.2.3 Migratory Waterbirds and Waterfowl

Many species of migratory waterbirds occur in wetlands, or along shorelines and riparian areas within the

RAA. Some common examples are American bittern (*Botaurus lentiginosus*), American wigeon (*Anas americana),* Bonaparte's gull (*Chroicocephalus philadelphia*), bufflehead (*Bucephala albeola*), Canada goose (*Branta canadensis*), common loon (*Gavia immer*), Forester's tern (*Sterna forsteri*), greater yellowlegs (*Tringa melanoleuca*), green-winged teal (*Anas crecca*), herring gull (*Larus argentatus*), least sandpiper (*Calidris minutilla*), mallard (*Anas platyrhynchos*), red-breasted merganser (*Mergus serrator*), ring-billed gull (*Larus delawarensis*), ring-necked duck (*Aythya collaris*), sandhill crane (*Grus canadensis*), solitary sandpiper (*Tringa solitaria*), sora (*Porzana Carolina*), and yellow rail (*Coturnicops noveboracensis)*.

2.5.2.3 Raptors

American kestrel (*Falco sparverius*), bald eagle (*Haliaeetus leucocephalus*), barred owl (*Strix varia*), boreal owl (*Aegolius funereus*), broad-winged hawk (*Buteo platypterus*), great gray owl (*Strix nebulosi*), long-eared owl (*Asio otus*), Northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipter striatus*), and osprey (*Pandion haliaetus*) are some of the common non-migratory raptors that may be found in the RAA.

2.5.2.4 Non-Migratory Upland Game Birds

Birds of Prey (Raptors)

American kestrel (*Falco sparverius*), bald eagle (*Haliaeetus leucocephalus*), barred owl (*Strix varia*), boreal owl (*Aegolius funereus*), broad-winged hawk (*Buteo platypterus*), great gray owl (*Strix nebulosi*), long-eared owl (*Asio otus*), Northern harrier (*Circus cyaneus*), red-tailed hawk (*Buteo jamaicensis*), sharp-shinned hawk (*Accipter striatus*), and osprey (*Pandion haliaetus*) are some of the common raptors that may be found in the RAA.

2.5.3 **Reptiles and Amphibians**

Several species of frogs and toads may occur within the RAA and they include: American toad (Bufo americanus), boreal chorus frog (Pseudacris triseriata maculata), green frog (Lithobates clamitans), northern spring peeper (*Hyla crucifer crucifer*), northern leopard frog (*Lithobates pipiens*), and wood frog (*Lithobates sylvaticus*) (Conant and Collins, 1991). These species generally require shallow ponds and puddles for breeding and moist environments in shrubby and wooded areas for the rest of the year. No amphibian species of conservation concern occur in the RAA.

The only reptile known to occur in the RAA is the red-sided garter snake (*Thamnophis sirtalis parietalis*) and it is commonly found in moist woodlands and the edges of wetlands. None of these species are of conservation concern in the RAA. See Appendix C for further detail/definitions on their conservation status listing.

2.5.4 Species of Conservation Concern

Fourteen species of conservation concern, 11 birds and three mammals may occur within the RAA. These include:

Species	SARA Listing	COSEWIC Assessment	MESEA Listing	MBCDC Rank*
Canada warbler (***Cardellina canadensis***)	Threatened	Threatened	Threatened	S3B
Common nighthawk (***Chordeiles minor***)	Threatened	Threatened	Threatened	S3B
Olive-sided flycatcher (Contopus cooperi)	Threatened	Threatened	Threatened	S3B
Short-eared owl (***Asio flammeus***)	Special Concern	Special Concern	Threatened	S2S3B
Rusty blackbird (***Euphagus carolinus***)	Special Concern	Special Concern	Not listed	S4B
Peregrine falcon (***Falco peregrinus***)	Special Concern	Special Concern	Endangered	S1B
Yellow rail (***Coturnicops noveboracensis***)	Special Concern	Special Concern	Not listed	S3B
Bank swallow (***Riparia riparia***)	Threatened, Schedule 1	Threatened	Not listed	S5B
Barn swallow (***Hirundo rustica***)	Threatened, Schedule 1	Threatened	Not listed	S4B
Horned grebe (***Podiceps auritus***)	No Schedule, No Status	Special Concern	Not listed	S4B
Eastern wood-pewee (***Contopus virens***)	Special Concern, Schedule 1	Special Concern	Not listed	S4B
Boreal woodland caribou* (***Rangifer tarandus caribou***)	Threatened, Schedule 1	Threatened	Threatened	S2S3
Eastern migratory caribou* (***Rangifer tarandus caribou***)	No Schedule, No Status	Endangered	Not listed	S4
Little brown bat (***Myotis lucifugus***)	Endangered	Endangered	Endangered	S2N, S5B
Wolverine (***Gulo gulo***)	No Status	Special Concern	Not listed	S3S4

- Both ecotypes, migratory and non-migratory woodland caribou are addressed as a single species
- Ranges of several of the listed species overlap with the RAA

- Short-eared owl inhabits open areas including grasslands, marshes, muskeg, and tundra (Bezener and De Smet, 2000)
- Olive-sided flycatcher inhabits semi-open mixed and coniferous forests near water and/or burned areas and boggy sites with standing dead conifers (Bezener and De Smet, 2000)
- Common nighthawk and barn swallow are found throughout Manitoba with exception of the extreme north. Both species select open and semi-open habitats such as fields, forest edges, meadows, lakeshores, and wetlands (Cornell Lab of Ornithology, 2015)
- Bank swallow can also be found throughout Manitoba and inhabit low areas along riverbanks with vertical cliffs or banks for nesting (Cornell Lab of Ornithology, 2015)
- Canada warbler inhabits a variety of forest types, but typically prefer wet, mixedwood forests with a well-developed shrub layer (Cornell Lab of Ornithology, 2015)
- Rusty blackbird is found throughout Manitoba and prefer swamps, marshes and pond edges (Cornell Lab of Ornithology, 2015)
- Horned grebe and yellow rail both inhabit shallow ponds and marshes or wet meadows (Cornell Lab of Ornithology, 2015) and
- Little brown bat overwinters in hibernacula (caves/mines) and females inhabit maternity colonies such as buildings or large trees in summer; foraging occurs over water along waterways and forest edges, avoiding large open fields (COSEWIC, 2013).

Peregrine falcon, however, is considered a potential migrant within the RAA. It is typically found in urban areas of southern Manitoba, perching or nesting on skyscrapers, water towers, cliffs, power poles, and other tall structures (Cornell Lab of Ornithology, 2015). The range of the Eastern wood-pewee also does not overlap with the RAA and occurs typically in the far southern portion of Manitoba, but has been recorded on a species listing for the Hayes River Upland Ecoregion (MBCDC, 2016b). It inhabits forested habitat, primarily deciduous forest and woodland, and smaller open woodlots (Cornell Lab of Ornithology, 2015). No observations of Eastern wood-peewee were recorded during surveys undertaken for this project.

3.0 METHODS AND RESULTS

The following section describes methods for habitat evaluation and wildlife studies for selected mammals, birds, reptiles, and amphibians within the P6 RAA, and the results of those investigations.

3.1 Habitat

The evaluation of habitat utilized the national Land Cover Classification of Canada (LCC) spatial database that has been harmonized across the major federal departments including Agriculture and Agri-Food Canada, the Canadian Forest Service, and the Canadian Centre for Remote Sensing (NRC, 2003). The LCC dataset provides vegetated and non-vegetated land cover classes that identify the primary ecological and vegetation or habitat conditions of an area. Analysis of information for the P6 RAA, LAA, and PF evaluation areas was also undertaken using ALCES (A Land and Cumulative Effects Simulator) that incorporates the LCC. The data library used in ALCES contains indicator datasets including: water and wetlands, and forest cover types (Table 1). The following section provides an overview of landscape characteristics within the RAA.

3.1.1 LCC Evaluation Methods

Summary statistics were generated using the LCC in ALCES. A summary of major LCC covertypes and their proportional abundance within the RAA, LAA and PF were calculated. These general habitat categories were also utilized in the planning of field activities and monitoring for birds (ARU placement, waterfowl surveys), trail camera deployments, and the trapper program.

3.1.2 LCC Evaluation Results

Coniferous forest and water together accounted for approximately 80% of the surface cover areas within the RAA, LAA, and PF compared to approximately 1% broadleaf (deciduous) and mixedwood forest combined. Wetland classes (shrub, herbaceous, and tree) were associated with approximately 17% of the LAA, 14% of the RAA, and 12% of the PF surface area. Shrub lands comprised approximately 6.5% of the RAA, 1.6% of the LAA, and 0.0% of the PF (Table 1).

The homogeneity of the landscape favours wildlife species that benefit from associations with large and small lakes, large and small rivers, and bogs and fens as represented by the wetland classification. Species that depend on more complex vegetation structures (e.g. moose) are largely restricted to wetland edges that may provide woody browse and emergent aquatic vegetation and to younger regenerating post-fire forest areas. The major cover types as defined by the LCC database are provided in Table 1 and Figure 9. These data were used in the modelling of habitat within the PF, LAA, and RAA in the assessment of effects on important wildlife species (Joro, 2017b).

Table 1: LCC covertypes and area of coverage within the RAA, LAA, and PF

Cover Type	RAA Area (km^2)	% Total RAA	LAA Area (km^2)	% Total LAA	PF Area (km^2)	% Total PF
Broadleaf Dense	88.01	0.98	7.87	0.59	0.18	1.28
Broadleaf Open	0.26	0.00	0.00	0.00	0.00	0.00
Coniferous Open or Sparse	2,160.99	24.03	465.65	35.09	6.10	43.52
Coniferous Dense	2,049.20	22.79	371.76	28.02	5.59	39.93
Barren Land	23.68	0.26	10.99	0.83	0.35	2.52
Mixedwood Dense	45.52	0.50	3.89	0.29	0.01	0.10
Shrub Tall	581.25	6.46	21.80	1.64	0.00	0.00
Water	2,778.42	30.90	220.03	16.58	0.06	0.41
Wetland Herb	71.70	0.90	12.06	0.91	0.07	0.53
Wetland Shrub	1,037.14	11.53	187.66	14.14	1.47	10.50
Wetland Treed	154.51	1.72	24.80	1.87	0.17	1.20
Other	0.71	0.01	0.36	0.03	0.05	0.30
Total*	**8,991.40**	**100.0**	**1,326.9**	**100.0**	**14.1**	**100.0**

* Estimates of gross areas using the ALCES land classification software system.

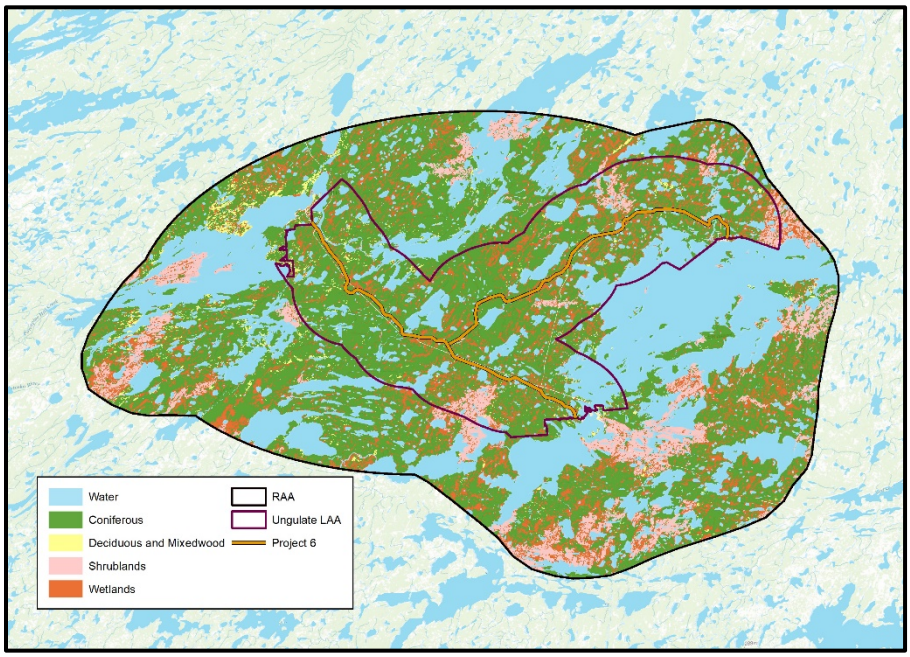

Figure 9: Distribution of major cover types in the RAA as defined by the LCC database (Source: Natural Resources Canada)

3.2 General Wildlife Field Studies

3.2.1 Trail Camera Methods

As part of a suite of baseline monitoring methods to map wildlife distribution within the RAA, trail camera studies were designed to detect ungulate, predator, and furbearer occupancy. Beginning in 2016, trail camera site selection has been based on a hexagonal sampling grid overlain the RAA. Trail cameras were located across the RAA (Map 4). A typical deployment of a trail camera within the RAA is presented in Appendix E: Photograph 1.

Hexagon sampling units facilitate spatial analysis of habitat attributes that are useful in determining wildlife occupancy (Rempel *et al.*, 2012). Sampling grids are used extensively to determine wildlife occupancy through aerial and ground surveys in boreal forest settings (e.g. Gardner *et al.*, 2010; Whittington and Heuer, 2012; Hornseth and Rempel, 2016). The application of trail camera trap event (photo) data were used to support other wildlife distribution data collected from aerial multispecies surveys, total minimum count aerial moose surveys, and trapper programs.

Trail camera placements were based on a hexagon grid of approximately 21 km^2. Sample unit size was based on maximizing the detection and occupancy of mammals with large home ranges. Trail cameras were placed within individual hexagon cells with the objective of maintaining a minimum separation of 2.5 km between camera locations. Camera trap locations were also distributed across various representative habitat types based on habitat mapping using the Land Cover Classification of Canada, East Side (LCCES), an enhanced version of the LCC layer that includes the addition of the historical fire history since 1920. Camera trap sites were placed near the proposed alignment and along existing natural and anthropogenic linear features, and game trails to provide optimum opportunity to document target species that tend to use these features for travel. The presence of a suitable helicopter landing area was also a consideration to ensure effective maintenance and retrieval of cameras.

Wildlife occurrence by hexagons was summarized by species and the total number of camera trap events. The number of camera trap events often reflects multiple animals of the same species being captured in a single photograph, however, distinguishing individuals through pelage (fur patterns), size, and/or other markings was not considered feasible due to the one-year duration of camera placement, given that animals shed hair and antlers. Also, bear tampering often results in cameras being tipped, resulting in only partial photographs of individuals. For camera coding and occupancy determination, multiple photos of the same animal were only counted once. Multiple animals in a single photograph were counted (for example, if a group of 2 moose were caught on camera in 5 separate new events, the number of camera trap events is 10) (Lyra-Jorge *et al.*, 2008; Rosatte, 2011).

Caribou, moose, wolves, and black bears were analyzed by season to identify seasonal occupancy of the RAA by each species. Differences in gradient scale and shading illustrated on maps is reflective of species observation rates as some species (such as caribou) are more commonly observed (including larger groups) than others (i.e. wolf). Seasonal mapping dates were based on general terrestrial and avian wildlife distribution for spring, summer, autumn, and winter. Trail camera data collected by seasons, similar to telemetry data for caribou and wolves, are mapped based on the dates provided below:

- Spring: March 20th – June 19th;
- Summer: June 20th – September 19th;
- Autumn: September 20th – December 19th; and
- Winter: December 20th – March 19th

3.2.2 Trail Camera Results

Results of trail camera data analysis for ungulates and furbearers are presented in Table 2 to Table 4. Caribou and moose were the most common species observed from separate camera trap events in 98 hexagons within the P6 RAA (Table 2 and Table 3; Maps 5-8). Snowshoe hare was the most common furbearer species in the P6 RAA (Table 4). The trap events are not of independent observations, as observations may include multiple sightings of the same individual. No bird species were observed on any of the trail camera data collected. A selection of species images captured by trail cameras is presented in Appendix E (Photos 2-6).

Table 2: Trail Camera data for caribou, moose, wolf, and bear in the P6 RAA, March 1, 2016 to August 15, 2017

	Number of Camera Trap Events by Season				
Species	**Spring**	**Summer**	**Autumn**	**Winter**	**Total**
Caribou	207 (87%)	17 (7%)	0 (0%)	14 (6%)	**238**
Moose	14 (21%)	43 (64%)	4 (6%)	6 (9%)	**67**
Grey Wolf	9 (41%)	9 (41%)	3 (14%)	1 (5%)	**22**
Black Bear	11 (55%)	7 (35%)	1 (5%)	1 (5%)	**20**
Total	**241 (69%)**	**76 (22%)**	**8 (2%)**	**22 (6%)**	**347**

Table 3: Trail Camera data collected on trail cameras for caribou, moose, wolf, and bear in the P6 RAA, March 1, 2016 to March 31, 2017

Species	Hexes with cameras in the RAA	Number of Hexes with Trap Events by Season				
		Spring	Summer	Autumn	Winter	Total
Caribou	98	10 (45.5%)	2 (9.1%)	0 (0%)	10 (45.5%)	**22**
Moose	98	5 (21.7%)	11 (47.8%)	4 (17.4%)	3 (13.0%)	**23**
Grey Wolf	98	3 (27.3%)	5 (45.5%)	2 (18.2%)	1 (9.1%)	**11**
Black Bear	98	4 (33.3%)	5 (41.7%)	2 (16.7%)	1 (8.3%)	**12**
Total	**98**	**22 (32.4%)**	**23 (33.8%)**	**8 (11.8%)**	**15 (22.1%)**	**68**

Table 4: Furbearer data collected on trail cameras in the P6 RAA, March 1, 2016 to March 31, 2017

Camera Trap Events for Furbearers			
Species	**Hexes with cameras in the RAA**	**Camera Trap Events - All Seasons in the RAA**	**Number of Hexes with Trap Events**
Snowshoe Hare	98	10 (66.7%)	1
Lynx	98	1 (6.7%)	1
Marten	98	1 (6.7%)	1
Otter	98	1 (6.7%)	1
Wolverine	98	2 (13.3%)	2
Total	**98**	**15**	**-**

3.2.3 Aerial Multispecies Survey Methods

An aerial multispecies distribution survey was conducted within portions of the P6 RAA 2012-2016 (Map 9). A Long Ranger helicopter crewed by three Joro biologists skilled at differentiating species tracks in the snow by flying east to west transects, spaced 5 km apart at approximately 120 km/hr and at an altitude of around 120 m. Two observers on each side of the helicopter, called out track observations within a 250 m wide strip along each side of the transect line, while the 3rd member of the team maintained detailed data sheets respecting species and location (GPS positions) of each observation, and assisted with navigation along the transect line. The data was exported to a GIS software for analysis.

3.2.4 Aerial Multispecies Survey Results

Results of the aerial multispecies surveys 2012-2016 for wildlife within the P6 RAA are presented in Table 5 and Map 9.

Table 5: Aerial Multi-Species Surveys conducted in portions of the RAA, 2012 - 2016

***VC Species**

		2012			2014			2015			2016			Total		
Species	**Scientific name**	**Tracks**	**Animals**	**Total**	**Tracks**	**Animals**	**Total**	**Tracks**	**Animals**	**Total**	**Tracks**	**Animals**	**Total**	**Tracks**	**Animals**	**Tracks+ Animals**
Caribou	*Rangifer tarandus*	N/A	33	33	283	31	314	726	116	842	235	13	248	1244	193	1437
Moose	*Alces alces*	108	16	124	N/A	N/A	N/A	27	4	31	240	0	240	395	108	16
Snowshoe Hare	*Lepus americanus*	464	0	464	120	0	120	60	0	60	173	0	173	817	0	817
Marten*	*Martes americana*	353	0	353	53	0	53	61	0	61	344	0	344	811	0	811
Otter	*Lontra canadensis*	139	0	139	37	0	37	27	0	27	130	0	130	333	0	333
Beaver lodge, dams*		N/A	N/A	N/A	0	131	131	4	73	77	0	41	41	4	4	249
Wolf	*Canis lupus*	12	3	15	5	0	5	11	0	11	192	0	192	220	3	223
Lynx	*Lynx canadensis*	21	0	21	23	0	23	3	0	3	205	0	205	252	0	252
Fox	*Vulpes vulpes*	2	0	2	0	0	0	0	0	0	132	0	132	134	0	134
Fisher	*Martes pennanti*	8	0	8	1	0	1	2	0	2	51	0	51	62	0	62
Mink	*Neovison vison*	0	0	0	0	0	0	0	0	0	4	0	4	4	0	4
Wolverine	*Gulo gulo*	1	0	1	1	0	1	0	0	0	0	0	0	2	0	2

Note: Aerial multi-species surveys were conducted for several proposed ASR projects in the region which include portions of the RAA, therefore comparisons between years is not possible. However, these data provide an account of species relative abundance and distribution for characterization purposes.

3.2.5 Incidental Wildlife Observation Methods

Incidental sightings including large stick nests, caribou, moose, and furbearers were also recorded on both GPS and field notes during all aerial and ground-based wildlife surveys conducted between 2011 and 2017 in the P6 RAA. Incidental wildlife was defined as those qualitative observations that were secondarily recorded, but were not the primary focus of the individual survey; for example, while following transect lines during winter aerial moose surveys, animal and track observations for moose were recorded primarily, but additional caribou animal and track observations and raptor stick nests were also noted.

3.2.6 Incidental Wildlife Observation Results

Results of incidental wildlife observations recorded during all surveys is presented in Table 6; a total of 366 observations of various species were documented (Map 10).

Table 6: Incidental Wildlife Observations during all 2012-2017 wildlife surveys

Survey	Observation	Tracks	Grand Total
2012 Northern Baseline Multispecies Survey		5	5
Wolverine		5	5
2014 P6 Furbearer Survey	20	7	27
Grouse	13	4	17
Stick nest	6		6
Wolverine	1	3	4
2015 Multispecies Survey	8		8
Stick nest	8		8
2016 Multispecies Survey	1		1
Stick nest	1		1
2017 P6 Moose Survey	146		146
Caribou	134		134
Mergansers	5		5
Stick nest	5		5
Wolf	2		2
Moose Survey 2016	4	23	27
Caribou	4	21	25
Wolf		2	2
Northern ASR Aerial Scouting Flight	11	109	120
Grouse	1		1
Hare		1	1
Lynx		11	11

Survey	Observation	Tracks	Grand Total
Marten		8	8
Moose	3	66	69
Wolf	6	20	26
Wolverine	1	3	4
Trapper Program	1	2	3
Skunk	1		1
Wolverine		2	2
Waterfowl Survey	64		64
Bald eagle	57		57
Caribou	1		1
Golden eagle	3		3
Hawk (unknown)	1		1
Northern Harrier	1		1
Turkey Vulture	1		1
Grand Total	**255**	**146**	**401**

3.3 Caribou

3.3.1 Collaring Methods

Pen Islands Caribou Range/Population (Forest-tundra)

Eight caribou from the Pen Islands population were captured and collared by MI within the God's Lake area of the RAA using a contracted helicopter net-gun capture crew under the authority of MSD annual scientific permits and MSD direction during January 31 to February 3, 2011. Joro staff were involved with collar initialization and testing, reconnaissance flights to locate target animals and groups, field logistics, and data management. Once animal groupings were located, the capture crew targeted select animals that were netted, restrained with hobbles, and blindfolded.

Caribou were fitted with collars that began to transmit data immediately post-release. GPS fixes were acquired every three hours, and data transmitted every 1.5 days via the Iridium satellite network. Collars also had very high frequency (VHF) radio beacons for relocation by radio-telemetry tracking. No immobilizing drugs were used during any capture operations. Following physical immobilization, measurements and biological samples were taken (blood, feces, and hair), satellite collars were fastened, and the animals were then released.

Additional collaring by MI beyond 2011 was not undertaken as per the direction of MSD due to the existence of historical telemetry and collaring data (2010-2016) for the Pen Islands population. This data was subsequently provided to MI confirming Pen Islands animals ranged near the P6 area of interest (i.e. God's Lake). All collaring data collected by MI for and made available by MSD for 39 Pen Islands caribou are found in Table 7.

Norway House Caribou Range/Population (Forest-dwelling)

A total of 61 Norway House caribou, part of the Molson MU, were captured and collared between 2011 and 2016 using the same methods and approvals as described for the Pen Islands animals (Table 7).

Table 7: Total number of caribou collars annually deployed and active collars between 2010 and 2017 in the Norway House (MI data) and Pen Islands populations (MI and MSD data)

Year	Norway House Population		Pen Islands Population	
	# Collars Deployed	# Active Collars	# Collars Deployed	# Active Collars
2010	N/A	N/A	4	4
2011	N/A	N/A	9*	13
2012	20	20	8	17
2013	11	21	10	15
2014	14	30	6	20
2015	6	32	2	17
2016	10	35	0	11
2017	0	34	N/A	N/A

N/A = MI collaring began in 2012 and ended in 2016, but some collars were still active in 2017; MSD collaring began in 2010 and the data cut-off provided was November 28, 2016

*2011 data includes 8 animals collared by MI and 1 collared by MSD

3.3.2 Collaring Results

The number of recorded telemetry location points and number of animals by season by year for the Pen Islands and Norway House populations, respectively, for the entire range are presented in Table 8 and Table 9.

Pen Islands Caribou Range/Population

Pen Islands caribou reside in the RAA primarily during the winter and spring (Map 11), migrating from the Hudson Bay shoreline in northeast Manitoba and northwest Ontario during the winter (Map 12). Pen Islands caribou migrate inland (closer to the RAA) during the winter and spring and return towards the coastline in summer and autumn. Only one animal calved in the RAA from 2010-2017.

Table 8: Number of recorded telemetry location points and number of animals by season by year for the Pen Islands population (MI and MSD data)

Year	Spring (Mar 20 – June 19)		Summer (June 20 – Sep 19)		Fall (Sep 20 – Dec 19)		Winter (Dec 29 – Mar 19)	
	Point Locations	Caribou Count	Point Locations	Caribou Count	Point Locations	Caribou Count	Point Locations	Caribou Count
2010	2894	4	2867	4	2828	4	1618	4
2011	8061	12	7433	11	6064	10	4632	13
2012	9308	17	6177	11	4186	8	9001	17
2013	11035	15	11021	15	10639	15	8374	15
2014	13928	19	12721	19	10726	16	11088	20
2015	10743	15	9767	14	8774	13	10345	17
2016	3243	6	2324	4	1727	4	5304	11

Norway House Caribou Range/Population

Norway House caribou reside in the RAA in spring, north of Bunibonibee (Oxford House FN) and Manto Sipi (Map 13). Very few telemetry points are located within the RAA, with most of the Norway House caribou residing to the southwest of the RAA, near Norway House FN in proximity to Lake Winnipeg, and to the west of the RAA, north of Cross Lake FN (Map 14). No calving of Norway House animals was documented in the RAA during 2012-2016.

Table 9: Number of recorded telemetry location points and number of animals by season by year for the Norway House population (MI data)

Year	Spring (Mar 21 – June 20)		Summer (June 21 – Sep 20)		Fall (Sep 21 – Dec 20)		Winter (Dec 21 – Mar 20)	
	Point Locations	Caribou Count	Point Locations	Caribou Count	Point Locations	Caribou Count	Point Locations	Caribou Count
2012	13582	19	10849	19	9335	15	8585	20
2013	13553	20	11777	18	10778	16	10943	21
2014	19906	28	18808	27	16008	25	13499	30
2015	20976	32	18893	28	16677	26	18690	32
2016	21224	30	40135	30	26604	28	17974	35

3.4 Moose

3.4.1 Minimum Count Aerial Survey Methods

Total minimum count aerial moose surveys were conducted in the winter of 2016 and 2017 to acquire

baseline information on areas of high moose concentration and provide an estimate of the moose population count (Map 15). Moose surveys were conducted on February 18-19, 2016 and February 6-9, 2017 within a 2,430 km^2 survey area. Kernel density methodology was used to identify high use areas near the ASR alignments.

Surveys were based on MSD's standard three-minute grid used for aerial moose surveys; grid blocks measured 3.5 x 5.0 km and extended 10 km on each side of the proposed P6 ASR alignment. Each survey was flown at 100 percent coverage in a north/south direction using a Bell Long Ranger, along transects spaced 1 km apart, at an altitude of approximately 120 m above ground level. The average air speed for the surveys was 100 km/hr. The survey team was comprised of three biologists (i.e. two observers and one recorder). When fresh moose tracks were encountered, a reasonable effort was made to find the animal(s). The number of individuals, age classification, and gender were recorded for all animals.

3.4.2 Minimum Count Aerial Survey Results

Results of the February 18-19, 2016 and February 6-9, 2017 aerial moose surveys are presented in Table 10 (Map 16 and 17).

Table 10: Results from the February 2016 and February 2017 aerial moose surveys in the P6 RAA

Year	Cows	Bulls	Calves	Total Count	Calf-Cow Ratio (CCR)	CCR Standard Error	Calves Per Adults (CPA)	CPA Standard Error	Density Per Km^2
2016	30	23	10	63	0.33	0.09	0.19	0.05	0.02
2017	33	11	24	68	0.73	0.08	0.55	0.08	0.04

3.5 Songbirds and Amphibians

3.5.1 Autonomous Recording Unit Methods

Autonomous recording units (ARUs) are an effective tool used to detect vocalizations from bird and amphibian sources to supplement on-site surveys. ARUs offer the capability of determining presence of bird and amphibian species in survey areas over longer time periods, without human interaction. By using ARUs within the RAA, Joro acquired a far more comprehensive assessment of birds and amphibians within the area, species that may only call during certain times of the day and that may be otherwise missed during on-site field surveys.

ARUs were deployed in 2016 within the different habitat types present in the P6 RAA representing the preferred habitat of a variety of different bird and amphibian species (Map 18; Appendix D: Table D-1 to Table D-3). Each ARU (model SM2+, supplied by Wildlife Acoustics Inc.) was encased in a weather-proof enclosure with four D-cell batteries, up to four 16-gigabyte memory cards, and two external microphones.

The recording units were scheduled for specific start and shut off times to capture peak bird and amphibian call times. ARUs were also programmed to record low frequency sounds down to 3 Hz (at a

gain of 48 dB) to capture all vocalizations of target species. The units were scheduled to record daily at different times of day based on the species being sampled: 1) from March to May, in the evening and night when owls and amphibians are potentially calling; and 2) from May to September, during the morning, evening and night when various songbirds and other species are calling (Appendix D: Table D-2).

Sounds files were later interpreted on the computer using Song Scope™ software (Wildlife Acoustics Inc.) to identify recorded birds and amphibians to species. Song Scope presents recorded calls on a spectrogram and allows annotation of specific vocalizations to be saved within the audio file, facilitating the process of locating and discerning species type and presence. The spectrogram plot displays a graphical representation of the audio signal in what is known as the “frequency domain”, meaning that it shows the relative power levels of the different frequency components of the sound wave over time.

3.5.2 Autonomous Recording Units Results

The sampling locations, periods, and bird and amphibian observation results for the P6 RAA are found in Appendix D: Table D-3 to D-5. The ARUs recorded over 66 species of birds in 2016 and results indicate that Sandhill crane (*Grus canadensis*), Canada goose (*Branta canadensis*), and Wilson’s snipe (*Gallinago delicate*) species were among the most commonly species recorded (Appendix D: Table D-4).

Four species of amphibians were recorded in 2016; wood frog (*Lithobates sylvaticus*) were the most common (Appendix D: Table D-5).

3.5.3 Manitoba Breeding Bird Atlas Methods

The Manitoba Breeding Bird Atlas (MBBA) completed a series of bird surveys in the summer of 2014 and recorded bird observations within survey grid blocks contained within 100 m x 100 m survey squares (MBBA, 2010). These survey blocks encompassed the P6 RAA as described in the *Manitoba Breeding Bird Atlas: Report to ESRA 2014 Surveys* (MBBA, 2014a; Map 19). Species abundance was determined through point-count surveys to provide a rough measure of how many birds were in each survey block (i.e., where they are breeding). Each point count involved standing in a pre-determined location (usually along the ROW, but a small number of off-road sites in different habitat types were also completed), waiting a 1-minute calming period prior to the survey, and recording all birds heard or seen in an exact 5-minute period (MBBA, 2010). All point count raw data for P6 was submitted to ESRA (MBBA, 2014b).

3.5.4 Manitoba Breeding Bird Atlas Results

The MBBA point count surveys recorded 2138 observations for 74 species of birds in the P6 RAA (Appendix D: Table D-6). Three of the 74 recorded were species of conservation concern: common nighthawk, rusty blackbird, and olive-sided flycatcher. The most common species observed were white-throated sparrow, Tennessee warbler, ruby-crowned kinglet, hermit thrush, chipping sparrow, and dark-eyed junco. Forty-two of the 74 species observed were also recorded by the ARU program reported in Section 3.5.2. Bird point count observations recorded in the P6 RAA are listed in Appendix D: Table D-6.

3.6 Waterfowl

3.6.1 Waterfowl Survey Methods

An aerial waterfowl survey was conducted within the P6 RAA during the period of waterfowl breeding, June 16-17, 2016 and brooding, July 20-21, 2016. Flight transects, using a Long Ranger helicopter, were located along and within 5 km on either side of the alignment (Map 20). The helicopter travelled at 30-40 m above the ground, with a ground speed of approximately 80-100 km/hr. Three biologists scanned the areas surveyed for wildlife as well as large stick nests; one of the biologists recorded the information collected onto data sheets. Survey data collection sites were recorded using hand-held GPS devices and imported to GIS software for mapping and analysis. While survey design followed Canadian Wildlife Service protocol for surveying waterfowl, other species of birds and wildlife were observed.

A second survey was conducted within the P6 RAA on October 12-14, 2016, during the period of fall waterfowl migration (Map 21). The objective of this survey was to document general areas of migratory waterfowl staging. The area of survey was similar to the June and July survey, where flight transects along major waterbodies were surveyed within the RAA. Staging waterfowl (typically rafts of diving species) were documented and mapped, providing additional qualitative data pertaining to potential waterfowl staging areas near the P6 alignment.

3.6.2 Waterfowl Survey Results

June Survey

Over 800 birds representing more than 20 species were observed during aerial waterfowl surveys conducted in mid-June 2016 (Table 11; Appendix D: Table D-7). The most commonly observed group of species observed in the RAA were waterfowl (85.1%), half of which were ring-necked ducks (*Aythya collaris*, 37.0%) and common mergansers (*Mergus merganser*, 17.0%). The remaining species included other waterbirds, shorebirds and other birds; the latter of which was mainly raptors.

Table 11: Aerial Survey Results of Bird Species Observed June 16-17, 2016 in the P6 RAA

Species	Scientific Name	Number	%
Ring-necked duck	*Aythya collaris*	303	37.0%
Common merganser	*Mergus merganser*	139	17.0%
Mallard	*Anas platyrhynchos*	124	15.1%
Canada goose	*Branta canadensis*	66	8.1%
Sandhill crane	*Antigone canadensis*	37	4.5%
Common loon	*Gavia immer*	26	3.2%
Bald eagle	*Haliaeetus leucocephalus*	23	2.8%
Scaup	*Aythya spp.*	21	2.6%
Blue-winged teal	*Anas discors*	19	2.3%

Species	Scientific Name	Number	%
Greater yellowlegs	*Tringa melanoleuca*	21	2.0%
Northern pintail	*Anas acuta*	11	1.3%
Swan	*Cygnus spp.*	9	1.1%
Bufflehead	*Bucephala albeola*	6	0.7%
Green-winged teal	*Anas crecca*	6	0.7%
Golden eagle[1]	*Aquila chrysaetos*	3	0.4%
American wigeon	*Anas americana*	1	0.1%
Duck	unknown species	1	0.1%
Shorebird	unknown species	1	0.1%
Swainsons hawk	*Buteo swainsoni*	1	0.1%
Wilson's snipe	*Gallinago delicata*	1	0.1%
Total		**819**	**100.0%**

[1] Possible non-breeding first or second year golden eagle, or misidentified juvenile bald eagle

There were 48 young of the year amongst the 12 broods observed during the June aerial surveys; the average brood size was 4.0 (±2.5). Most of the 48 young within identified broods were Canada geese, (32), mallards (11), or swans (4) as strong evidence that they were nesting within the RAA. In addition to the broods, several adult pairs of ring-necked ducks, mallards, and Canada geese were observed.

Of the 819 birds observed during the June survey, they were almost equally distributed bogs/marshes (33%), open water or lake shorelines (32%), and ponds (35%). The detailed observation results from the June 2016 waterfowl survey are given in Appendix D: Table D-7 and Map 22.

July Survey

A total of 328 birds representing over 12 species were observed during aerial waterfowl surveys conducted in mid-July 2016 (Table 12; Appendix D: Table D-8). Waterfowl were most abundant (84%); rounded out by a small sample of waterbirds (10%), bald eagles (3%), and other birds (3%) comprised mainly shorebirds and sandhill cranes. Ring-necked ducks and mergansers comprised 37% and 17% each respectively of the total observations.

Table 12: Aerial Survey Results of Bird Species Observed July 16-17, 2016 in the P6 RAA

Species	Scientific Name	Number	%
Ring-necked duck	*Aythya collaris*	110	33.5%
Duck (*spp*.)		84	25.6%
Canada goose	*Branta canadensis*	45	13.7%
Mallard	*Anas platyrhynchos*	26	7.9%
Common loon	*Gavia immer*	15	4.6%
Bald eagle	*Haliaeetus leucocephalus*	10	3.0%
Common tern	*Sterna hirundo*	10	3.0%
Tundra swan	*Cygnus columbianus*	8	2.4%
Common merganser	*Mergus merganser*	7	2.1%
Sandhill crane	*Antigone canadensis*	6	1.8%
Green-winged teal	*Anas crecca*	4	1.2%
Greater yellowlegs	*Tringa melanoleuca*	3	0.9%
Total		328	100.0%

There were 75 young of the year amongst the 25 broods observed during the July aerial surveys; the average brood size was 4.4 (±2.2). Of the broods identified to species, 36% were Canada geese, 21% ring-necked ducks, and 11% mallards; over half of the broods not identified to species (32%) were diving ducks. The results provide substantial evidence that they are nesting within or near the RAA. In addition to the broods observed, there were several adult pairs of ring-necked ducks, mallards, and Canada geese.

Open water or shorelines of lakes accounted for 55% of the 78 bird observations, compared to 36% and 9% respectively for each of creeks and rivers. The detailed observation results from the July 2016 waterfowl survey are given in Appendix D: Table D-8 and Map 23.

October Overflight

Approximately 2,200 birds representing at least three waterfowl species were observed during reconnaissance-level aerial waterfowl surveys conducted between October 12-14, 2016 (Appendix D: Table D-9). Bufflehead (*Bucephala albeola)* and common goldeneye (*Bucephala clangula*) together accounted for >83% of all the species observed; scoters accounted for the remainder.

Most of the birds (>96%) observed during the October surveys were associated with the open water or shorelines of lakes; the remainder were associated with ponds. The detailed observation results are provided in Appendix D: Table D-9 and Map 24.

3.7 Local and Traditional Knowledge

Local information[3] respecting wildlife resources was obtained through open house workshops within the FN communities of God's Lake, Bunibonibee, and Manto Sipi. Specific information pertaining to hunting and trapping, and knowledge pertaining to wildlife including rare species within the RAA, was incorporated where appropriate to guide wildlife studies, the identification of VCs, and the assessment of effects.

3.7.1 Wildlife Workshops

Wildlife workshops were conducted with local resource users (trappers and hunters) in the community of God's Lake First Nation (GLFN) on January 6, 2016, Bunibonibee Cree Nation (BCN) on February 17, 2016 and Manto Sipi Cree Nation (MSCN) on March 24, 2016. The purpose of the wildlife workshops was to have an open dialogue with community members to gather information on wildlife movement and distribution, to establish those species that are important to community members and to better understand those habitats and other variables that may affect wildlife populations and distribution. Equally important, the workshop promoted a positive opportunity to share knowledge on wildlife issues that may arise from the P6 ASR development to the benefit of both planners and community members alike, and ultimately contribute to the development of a more comprehensive environmental impact assessment report.

Resource users from the community, including Elders and youth, were invited to attend the wildlife workshop. The workshop began with a presentation highlighting the details of the ASR purpose, process, and the Project Description and Schedule, followed by information on the rare species of concern. After the information session, an open forum was held providing participants with the opportunity to comment and ask questions. Workshop participants were asked to contribute to a group mapping exercise focused on providing a visual account of local wildlife knowledge. Wildlife information collected through the workshop was recorded, compiled, and mapped digitally using GIS.

The wildlife information provided by workshop participants ranged from site specific breeding and denning locations to movement corridors and hunting/trapping areas. Highlights of the information shared included perspectives on perceived changes in certain wildlife species populations as compared to the past. The information collected at the wildlife workshops will contribute to:

- the road alignment (route), design, and construction;
- environmental studies (wildlife research);
- assessment of project effects;
- plans for mitigating, reducing and managing potential effects; and
- key topics for further discussion.

[3] Local knowledge is confidential to those communities from which it is collected and is not part of the public record without the formal consent of the participating communities.

The following sections summarize the insights and observations of the resource users that attended the workshops in the three FN communities. While the information was generally provided in response to specific questions, some of the information was provided unsolicited.

God's Lake First Nation

Wildlife typically observed in and near the GLFN community include: mallard ducks, sandpipers, herring gulls, red-sided garter snakes, wolverine, leopard frogs, snowshoe hare, bears (brown and black), bats, flying squirrels, and chipmunks. Pelicans, cormorants and skunks are generally observed near the community. Red-sided garter snakes have not historically been observed near the community, yet their populations appear to have increased over the last 10 years and are now abundant in the region. A participant shared that historically a large snowshoe hare population typically corresponds to an abundance of owls; however, this relationship has not been observed recently.

Participants shared that several new birds have been observed recently (in the last few years) including barn swallows, common swallows, and the Canada warbler. It was suggested that the northern range is extending further north for these species. Some participants believe that colonizing species are moving northward in search of cleaner environments to avoid the pollution in the south.

Trapping or shooting wild game is not allowed within the reserve boundaries. Trapping takes place near the GLFN airstrip, along the winter road heading north towards Bunibonibee Cree Nation and in the area around Webber Lake and Torchwood Lake. Registered Trap Line (RTL) 27, which extends from the East End Lodge west to the Ontario Border, has not been trapped for the last ten years. Interest in trapping has declined in recent years given low prices of pelts. Wolverines are occasionally observed near the community and along the winter road; they are known to travel large distances and mate at specific locations. Some community members actively trap wolverines.

Species important for community foods include caribou, moose, beaver, snowshoe hare, bear, goose (in the spring), duck, and muskrat. Some participants stated that wild game meat tastes different than it did in the past; the flavour of whitefish, muskrat, moose, and caribou meat is muted and less flavourful than in past years.

Resource users that attended the workshop suggested that wildlife populations were declining notably snowshoe hare, muskrat, weasel, porcupine, frogs, butterflies, small birds (Canada warbler), and the masked shrew. The latter two species were identified while reviewing a Species of Interest handbook. In the past, the porcupine population had a noticeable decline, but now appear to be recovering. Historically, roasted porcupines were a source of community food and the quills were valued by artisans. In the past, groundhog was also eaten. Snapping turtles and moles are not observed in or near the community.

Bunibonibee Cree Nation

The BCN workshop participants shared that moose and geese are the most important species hunted by community members. The winter road provides community members additional access to resource use areas. Wildlife tracks, including moose and wolf, are often observed along the winter road. Participants shared numerous moose observations along with hunting and habitat information. Caribou are known to migrate through the region, typically moving northeast to southwest and calving on islands. Participants

noted that caribou are observed year-round northwest and southwest of the community.

Participants shared their perspectives with respect to population dynamics and habitat preferences of furbearers such as beaver, muskrat, marten, fisher, wolverine, fox, and wolf. Wolf observations, trapping locations and denning sites along the northeast shoreline of Opiminegoka Lake were mapped. Some participants indicated muskrat and fisher populations appear to be declining, while the marten and wolverine populations are increasing.

Waterfowl hunting occurs in the spring and the fall and habitat information was mapped by participants. Birds not typically consumed by community members include loons, gulls, pelicans, herons, bitterns, and swans, all of which are observed in the region. Snipe and sandpiper are also observed; however, populations have decreased over the last few years.

Ruffed and spruce grouse are abundant in the region. Although the ptarmigan population has appeared to decrease, a large number of them along with sharp-tailed grouse have been observed north of Windy Lake. Bald eagles and owls are abundant in the region. Observations and nest locations were shared by workshop participants.

Manto Sipi Cree Nation

Participants from MSCN shared that moose hunting is an extremely important food source activity for community members. Successful hunters will share the moose harvested with family and community members Community members travel large distances to preferred moose hunting areas east of Edmund Lake, south of Wapapiskwatayo Lake and north of Semmens Lake and Fish Lake. The moose population is perceived to be in decline over the past 20 years as suggested through the reduced number of track observations. While hunting moose, community members opportunistically hunt and fish for other species. Caribou are known to migrate through the region, typically moving northeast to southwest and calving on nearby islands. Participants noted that caribou are observed year-round, east of the community near Edmund Lake.

Participants shared their perspectives with respect to population dynamics and habitat preferences of furbearers including beaver, muskrat, marten, fisher, otter, snowshoe hare, wolverine, fox, lynx, and wolf. Beaver trapping, wolf and wolverine observations and bear den locations were mapped. A few participants indicated that the fisher and lynx populations appear to be declining while the beaver, muskrat, and marten populations are increasing.

Spruce and ruffed grouse are commonly hunted, but recently populations appear to be declining in the MSCN area. Ptarmigan are also observed in the MSCN area. Barn and bank swallows, along with nesting colonies, are frequently observed in the community and surrounding area. Bald eagles are abundant in the region with observations and nest locations shared by workshop participants and mapped. Peregrine falcons, osprey, and snowy owl sightings were also shared by workshop participants.

Rare and uncommon wildlife observations including lizards or salamanders, skunks, porcupine and a historical observation of deer were discussed, along with access trail locations, camps, and outposts. Changes to the land (which also includes water and the air in the participant's region) over time and perspectives on the proposed ASR routes, including concern for wildlife habitat and increased access,

were also discussed. See Table 13 for a summary of the species discussed within each community at the three wildlife workshops:

Table 13: P6 Wildlife Workshops – Species List

Species	Scientific Name	Observed by Community
Mammals		
American beaver	*Castor canadensis*	GLFN, BCN, MSCN
American black bear	*Ursus americanus*	GLFN, MSCN
American marten	*Martes americana*	GLFN, BCN, MSCN
American mink	*Neovison vison*	GLFN
Canada lynx	*Lynx canadensis*	GLFN, BCN, MSCN
Chipmunk	*Neotamias minimus*	GLFN
Coyote	*Canis latrans*	GLFN
Fisher	*Martes pennanti*	GLFN, BCN, MSCN
Gray wolf	*Canis lupus*	GLFN, BCN, MSCN
Groundhog	*Marmota monax*	GLFN
Little brown bat	*Myotis lucifugus*	GLFN, BCN, MSCN
Least weasel	*Mustela nivalis*	GLFN
Masked shrew	*Sorex cinereus*	GLFN
Moose	*Alces alces*	GLFN, BCN, MSCN
Muskrat	*Ondatra zibethicus*	GLFN, BCN, MSCN
North American porcupine	*Erethizon dorsatum*	GLFN, BCN, MSCN
Northern flying squirrel	*Glaucomys sabrinus*	GLFN, MSCN
Northern river otter	*Lontra canadensis*	GLFN, MSCN
Polar bear	*Ursus maritimus*	BCN
Raccoon	*Procyon lotor*	BCN
Red fox	*Vulpes vulpes*	GLFN, BCN, MSCN
Red squirrel	*Tamiasciurus hudsonicus*	GLFN
Snowshoe hare	*Lepus americanus*	GLFN, BCN, MSCN

Species	Scientific Name	Observed by Community
Striped skunk	*Mephitis mephitis*	GLFN, BCN, MSCN
White-tailed deer	*Odocoileus virginianus*	
Wolverine	*Gulo gulo*	GLFN, BCN, MSCN
Woodland caribou	*Rangifer tarandus caribou*	GLFN, BCN, MSCN
Birds		
American bittern	*Botaurus lentiginosus*	BCN
American crow	*Corvus brachyrhychos*	GLFN
American white pelican	*Pelecanus erythrorhynchos*	GLFN, BCN, MSCN
Bald eagle	*Haliaeetus leucocephalus*	GLFN, BCN, MSCN
Bank swallow	*Riparia riparia*	MSCN
Barn swallow	*Hirundo rustica*	GLFN, MSCN
Bonaparte's gull or Black tern	*Chroicocephalus philadelphia/ Childonias niger*	BCN
Boreal owl	*Aegolius funereus*	BCN
Canada goose	*Branta canadensis*	GLFN, BCN, MSCN
Canada warbler	*Cardellina canadensis*	GLFN
Common loon	*Gavia immer*	GLFN, BCN
Common nighthawk	*Chordeiles minor*	BCN, MSCN
Common raven	*Corvus corax*	GLFN
Double-crested cormorant	*Phalacrocorax auritus*	GLFN
Ducks	*Spp.*	GLFN, BCN, MSCN
Ducks, Long-tailed "sea ducks"	*Clangula hyemalis*?	MSCN
Golden eagle	*Aquila chrysaetos*	GLFN
Gray jay	*Perisoreus canadensis*	GLFN
Great blue heron	*Ardea herodias*	GLFN, BCN
Great horned owl	*Bubo virginianus*	GLFN

Species	Scientific Name	Observed by Community
Gull	*Laridae sp.*	GLFN, BCN, MSCN
Herring gull	*Larus argentatus*	GLFN
Mallard	*Anas platyrhynchos*	GLFN
Olive-sided flycatcher	*Contopus cooperi*	GLFN
Osprey	*Pandion haliaetus*	GLFN, BCN, MSCN
Peregrine falcon	*Falco peregrinus*	BCN, MSCN
Ruffed grouse	*Bonasa umbellus*	GLFN, BCN, MSCN
Rusty blackbird	*Euphagus carolinus*	MSCN
Sandpiper	*Scolopacidae sp.*	GLFN, BCN
Sharp-tailed grouse	*Tympanuchus phasianellus*	GLFN, BCN
Short-eared owl	*Asio flammeus*	GLFN, BCN
Snowy owl	*Bubo scandiacus*	GLFN, BCN, MSCN
Spruce grouse	*Falcipennis canadensis*	GLFN, BCN, MSCN
Swallow	*Hirundinidae sp.*	BCN
Swan /Snow Goose	*Cygnus sp./ Chen caerulescens*	BCN
Tern	*Sternidae sp.*	GLFN
Tundra swan	*Cygnus columbianus*	GLFN, BCN, MSCN
Turkey vulture	*Cathartes aura*	GLFN, MSCN
Willow ptarmigan	*Lagopus lagopus*	GLFN, BCN, MSCN
Wilson's snipe	*Gallinago delicata*	BCN
Song birds (various)		GLFN
Herptiles		
Brown-coloured frog	*Spp.*	MSCN
Common garter snake (possibly non-red variation of red-sided subspecies)	*Thamnophis sirtalis*	BCN
Lizard/salamander	*Spp.*	MSCN

Species	Scientific Name	Observed by Community
Northern leopard frog	*Lithobates pipiens*	GLFN, BCN, MSCN
Red-sided garter snake	*Thamnophis sirtalis parietalis*	GLFN, MSCN

3.7.2 Trapper Program

The P6 RAA falls mainly within portions of the God's Lake section (380) and Oxford Lake section (370) trapping areas within the Northern RTL Area 6 (Map 25). The Trapper Program (TP) was developed to study the potential effects of ASR construction in the RAA on trapline harvest and furbearer abundance and distribution. Its main goals were to initiate trapper involvement; acquire baseline data through local and regional furbearer distribution, habitat preferences and current and traditional land-uses by community members and to promote collaboration with the local trapping community. Fall/Winter 2016/2017 was the first year the TP was initiated with P6 trappers.

A local Community Coordinator (CC) was selected by Chief and Council within each P6 community to collaborate and identify active trapper participants, coordinate meetings and workshops, assist with the collection of field results, liaise between trappers and the Chief and Council and review draft reports and mapping. The CC, with the advice of the Chief and Council, selected trappers within their communities based on the geographic location of their RTL with respect to the ASR Project and the RTL recent harvest history, and willingness to participate in the program.

Compliance with humane trapping standards and use of approved humane trapping equipment was outlined as a critical component of participation in the TP. In return for their participation, trappers were paid a daily honorarium. Table 14 shows the RTLs within the RAA that were potentially used to assist with trapper selection. Of note, there are a total of 51 RTLs which occur fully or partially within the RAA (Map 25), but only a small number (i.e. 4) were sampled by participating trappers in 2016-2017 (Table 15; Map 26).

Table 14: Registered traplines within the RAA potentially used in trapper selection

District	Section Name	RTLs
Northern RTL District	Oxford House	52, 54, 55, 64
	God's Lake	2,3, 4, 5, 6, 8, 9, 10 and 12

Table 15: Registered traplines sampled in the RAA in the 2016-2017 season

District	Section Name	RTLs
Northern RTL District	Oxford House	54,64
	God's Lake	2,3

Participating trappers were asked to be involved in several activities such as trapper journal recordings, track/sign surveys and scat and hair sample collection for stable isotope analysis (SIA). At the beginning of the trapping season, trappers were provided a trapper kit, which included a digital pocket camera, SD memory card, hand-held GPS unit, extra batteries, USB cord, instruction manuals, laminated maps of their RTL (ortho or topo), labelled sample bags, trapper journal, pencils and sharpener and permanent markers within a waterproof, hard-shell case.

The trapper journal was used to record trapping catches and observations (i.e. furbearer activity, tracks, and signs including scat) along their RTLs during the trapping season. Trapper journal data collected included the date, weather description, type of traps or snares used, what species and sex were caught, what type of samples were collected, location, and/or any other wildlife observations/tracks. A comment section also detailed any other significant observations made during the visits to the traplines. Completed journals were returned to Joro at the end of the trapping season and reviewed with the trapper (or the CC) for clarification. The hand-held GPS unit, digital pocket camera, and RTL maps on ArcGIS (ESRI, 2012) were used to record locations of traps and furbearer observations.

The trapper survey was designed to gain insights into trapper perspectives and knowledge regarding furbearer abundance and distribution in the RAA. Survey materials were distributed to trappers at the beginning of the trapping season and collected once trapping activities ended in approximately in mid-February (at the end of marten season). To augment information respecting wolf/prey relationships within the RAA, trappers were requested to collect hair samples from wolves, any wolf/bear feces, as well as hair or fecal samples of other prey species (smaller furbearers) along their traplines.

Table 16 displays the result of the trapper harvest and other wildlife observations/tracks. Trapper results indicate that marten (71) are the most abundant species trapped followed by otter (18); the remaining species were harvested in totals of five (5) or less (Table 16). Trappers also recorded wildlife observations or tracks (Table 18). Marten, otter, and wolverine tracks were observed equally, with ten (10) tracks each; moose (8) and mink (7) observations closely followed. The remaining species were observed in totals of five (5) or less. A skunk was also harvested in the Oxford House section.

Appendix E: Photographs 9-10 demonstrates the process of a trapper working on their RTL line. See Appendix F for all harvest data collected by individual trappers including a GPS waypoint number, which was input into Arc-GIS for mapping.

Table 16: Species summary - Oxford House/God's Lake

Species	Scientific Name	Total Harvest	Track Observation
Marten	*Martes americana*	71	10
Otter	*Lontra canadensis*	18	10
Beaver	*Castor canadensis*	5	--
Fisher	*Martes pennanti*	3	2
Mink	*Neovison vison*	3	7
Lynx	*Lynx canadensis*	2	4

Species	Scientific Name	Total Harvest	Track Observation
Muskrat	*Ondatra zibethicus*	1	--
Hare	*Lepus americanus*	1	--
Skunk	*Mephitis mephitis*	1	--
Caribou	*Rangifer tarandus caribou*	--	1
Moose	*Alces alces*	--	8
Fox	*Vulpes vulpes*	--	5
Wolf	*Canis lupus*	--	5
Weasel	*Mustela nivalis*	--	1
Wolverine	*Gulo gulo*	--	10
Total		**105**	**63**

Many of the trapper journals returned with data stated that this past trapping season was slow for fur production. This could have some reflection on the weather patterns of the 2016-2017 season; i.e. the month of January experienced higher than normal rainfall in winter. However, no comparison can be made to previous year's trapping efforts as this was the first year of data collection. Information provided by the trappers will allow some comparison to following years' trapping seasons.

3.7.3 Other TK Data

Traditional Knowledge (TK) interviews and community workshops were conducted by HTFC Planning & Design with community members from God's Lake First Nation (GLFN) on October 6, 2015 and November 18-24, 2015, Bunibonibee Cree Nation (BCN) on February 3, 2016, March 29, 2016, and April 3, 2016, and Manto Sipi Cree Nation (MSCN) on January 13-18, 2016 and September 24, 2016. Raw GIS information collected by HTFC regarding fishing, trapping, hunting, and wildlife habitat was provided to Joro for review and interpretation. The associated P6 TK summary text is included below.

God's Lake First Nation

Moose hunting occurs throughout the God's Lake area. Moose winter habitat was identified northwest of the community extending to Oxford House. Summer moose habitat was identified west of the community. In addition, moose calving sites were identified along the northern shoreline in the southern basin of God's Lake.

Caribou and caribou sign are often observed by GLFN community members. Participants shared general caribou movement patterns with animals originating northwest of the community traveling southeast in large herds through God's Lake and continuing southeast towards Red Sucker Lake. Smaller caribou movement patterns north of the community heading northeast to Oxford House and northeast towards Manto Sipi have been observed. Large herds (i.e. tens to hundreds) are known to migrate across God's Lake in January and February. Some animals from these large herds stay behind as the larger group

migrates. These animals will stay west of the community for about a year and will leave with the larger herd the following year.

Caribou were noted to cross over the winter road near the transmission line at the junction to Manto Sipi. In the spring, caribou are known to be in Ontario and move northwest, travelling northwest towards Knee Lake. Caribou habitat, including calving locations, was identified east and northeast from the community. Community members noted caribou have been harvested both east and west of the community.

A variety of furbearers are trapped in the God's Lake area. Species noted include snowshoe hare, beaver, muskrat, mink, marten, lynx, fisher, otter, fox, wolf, and wolverine. Trapping occurs throughout sections of the RTLs.

Ducks, geese, grouse, ptarmigan, spruce grouse, merganser, black ducks (scoter), and fall ducks (ring necked ducks) are hunted by community members.

Bunibonibee Cree Nation

Community members identified moose hunting areas as spanning entire watersheds and along the winter roads. Migratory caribou are harvested by community members and participants distinguished between resident and migratory caribou in the Oxford House area. In general, resident caribou have been observed year-round west of the community and are known. Resident caribou are known to be larger animals than migratory caribou and typically observed in herds of only 6 to 8 animals with a maximum herd size of approximately 15 animals.

Migratory caribou, originating from Shamattawa typically move south in December and follow the same migration route north in March or April. They are also known to have migratory movements in a west/east direction north of the community. Herds have been observed in numbers of 50 to 100 caribou. Caribou hunting has historically occurred north of the community. Caribou migration routes often come right through the community of BCN which provides opportunistic hunting opportunities.

A variety of furbearers are trapped in the Oxford House area. Species noted include snowshoe hare, muskrat, marten, mink, fox, otter, fisher, wolf, wolverine, lynx, and beaver. Black bears have been observed along with a single sighting of a porcupine near a trapper's cabin. Trapping occurs throughout sections of RTLs within the Oxford House area.

Wolves, foxes, and wolverines are known to begin using the winter road under frozen conditions before it opens in the winter. Once the road opens these furbearers shift to using the river as a transportation corridor.

Waterfowl hunting occurs on lakes and rivers in the Oxford House area. Hunted species include ducks, geese, mallards, blue bills or scaup and ring-necked ducks. Game bird hunting occurs south of the community in the general Oxford House area and includes spruce grouse and ptarmigan. Participants shared locations for bald eagle nests and indicated that they are very sensitive to human disturbance and will abandon nests if even slightly disturbed. Additional observations include garter snakes and a historic polar bear sighting.

Manto Sipi Cree Nation

Moose hunting has been extremely important as a source of food for MSCN community members. Successful hunters will share the moose harvested with family and community members. Moose hunting primarily occurs in the fall along the shoreline of lakes and river in the area and east to the Ontario border. Large groups of moose are often observed in old burn areas with beginnings of vegetation re-growth. Moose are known to move around between the transmission line and the winter road. Participants also indicated that moose use the winter road to escape wolf predation.

Caribou are known to move into the God's River area in large herds of 100 to 500 animals. These caribou typically come from Shamattawa in the winter, originating in the east they move across God's Lake to the northwest. Caribou appear to use the same migratory routes to travel north in the spring. Caribou herds migrating are thought to be a mix of barren-ground and woodland caribou as some of the animals observed were deemed too large to be barren-ground caribou. Community members know woodland caribou to be larger and darker than barren-ground caribou which are smaller and have white spots on their chest. Caribou migration routes often come right through the community of MSCN which provides opportunistic hunting opportunities. A participant mentioned that this was the first year (2016) he had not observed caribou on God's Lake. Caribou are also observed following the winter road as they move north from God's Lake.

A variety of furbearers are abundant and trapped within the MSCN area. The community has a long history of trapping and selling furs at the Hudson Bay Company post in God's Narrow. Species noted include beaver, snowshoe hare, muskrat, mink, marten, fisher, otter, lynx, fox, silver fox, wolverine, and wolf. Trapping has primarily been a source of income for community members. Marten are the primary furbearer targeted as they are easy to trap and process and provide the best fur price for harvest effort. Beaver are abundant, and trapping occurs along rivers and creeks in the MSCN area. Beaver pelt prices have decreased over time, leading to an associated drop in trapper efforts to harvest beaver. Beaver are more difficult to trap and skin when compared to marten.

Wolverine have been observed north of the community and are not abundant; trappers report only harvesting 1 or 2 per year. Lynx is a furbearer that is often harvested not only for fur but also for food. Wolves are common throughout the God's River area yet are not targeted in the trapping season due to the difficulty to harvest. Trappers have been known to shoot at wolves to scare them off as opposed to trap for them. Wolves are observed following caribou herds throughout the MSCN area and follow the winter road hunting moose. Trapping occurs throughout sections of RTLs within the MSCN area.

Waterfowl hunting in MSCN takes place in the spring and early summer months, capitalizing on the spring migration of waterfowl throughout the area. Large migrations of Canada geese pass through the MSCN area. Spring and early summer waterfowl are preferred due to body condition of migrating birds. Grouse, or prairie chickens as they are known to community members, are hunted south of the community. Spruce grouse have also been observed travelling from island to island across God's Lake.

Additional wildlife observations include great blue heron, loons, eagles and eagle nests.

Table 17 summarizes the species identified through the community interview process.

Table 17: P6 Traditional Knowledge (TK) Community Interviews/Workshops – Species list

Species	Scientific Name
Mammals	
American beaver	*Castor canadensis*
American black bear	*Ursus americanus*
American marten	*Martes americana*
American mink	*Neovison vison*
Canada lynx	*Lynx canadensis*
Fisher	*Martes pennanti*
Gray wolf	*Canis lupus*
Moose	*Alces alces andersoni*
Muskrat	*Ondatra zibethicus*
North American porcupine	*Erethizon dorsatum*
Northern river otter	*Lontra canadensis*
Polar bear	*Ursus maritimus*
Red fox	*Vulpes vulpes*
Snowshoe hare	*Lepus americanus*
Wolverine	*Gulo gulo*
Woodland Caribou	*Rangifer tarandus caribou*
Birds	
Bald eagle	*Haliaeetus leucocephalus*
Black scoter	*Melanitta americana*
Canada goose	*Branta canadensis*
Common loon	*Gavia immer*
Common merganser	*Mergus merganser*
Ducks	*Spp.*
Great blue heron	*Ardea herodias*
Mallard	*Anas platyrhynchos*
Ruffed grouse	*Bonasa umbellus*

Species	Scientific Name
Spruce grouse	*Falcipennis canadensis*
Willow ptarmigan	*Lagopus lagopus*
Herptiles	
Red-sided garter snake	*Thamnophis sirtalis parietalis*

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APPENDIX A: LIST OF POTENTIAL MAMMALS FOR THE P6 REGIONAL ASSESSMENT AREA

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
American beaver[2,3]	*Castor canadensis*			S5	
American black bear[3]	*Ursus americanus*			S5	
American deer mouse	*Peromyscus maniculatus*			S5	
American marten[2,3]	*Martes americana*			S5	
American mink[2,3]	*Neovison vison*			S5	
American water shrew	*Sorex palustris*			S5	
Arctic shrew	*S. arcticus*			S5	
Boreal caribou* (woodland, coastal)[1,2,3]	*Rangifer tarandus caribou*	THR	THR	S2S3, S4	THR
Canada lynx[2,3]	*Lynx canadensis*			S5	
Coyote[3]	*Canis latrans*			S5	
Eastern heather vole	*Phenacomys ungava*			S5	
Ermine (short-tailed weasel)	*Mustela erminea*			S5	
Fisher[2,3]	*Martes pennanti*			S5	
Gray wolf[2,3]	*Canis lupus*			S5	
Hoary bat	*Lasiurus cinereus*			S3B	
House mouse	*Mus musculus*			SNA	
Least chipmunk[3]	*Neotamias minimus*			S5	
Least weasel[2,3]	*Mustela nivalis*			S3S4	
Little brown bat[3]	*Myotis lucifugus*	END	END	S2N,S5B	END
Masked shrew[3]	*Sorex cinereus*			S5	
Meadow jumping mouse	*Zapus hudsonius*			S5	
Meadow vole	*Microtus pennsylvanicus*			S5	
Moose[2,3]	*Alces alces*			S5	
Muskrat[2,3]	*Ondatra zibethicus*			S5	
North American porcupine[3]	*Erethizon dorsatum*			S5	
Northern bog lemming	*Synaptomys borealis*			S5	
Northern flying squirrel[3]	*Glaucomys sabrinus*			S5	
Northern river otter[2,3]	*Lontra canadensis*			S5	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Pygmy shrew	*Sorex hoyi*			S5	
Raccoon[3]	*Procyon lotor*			S5	
Red fox[2,3]	*Vulpes vulpes*			S5	
Red squirrel	*Tamiasciurus hudsonicus*			S5	
Short-tailed shrew	*Blarina brevicauda*			S5	
Snowshoe hare[2,3]	*Lepus americanus*			S5	
Southern red-backed vole	*Clethrionomys gapperi*			S5	
Star-nosed mole	*Condylura cristata*			S3	
Striped skunk[2,3]	*Mephitis mephitis*			S5	
Wolverine (western pop.)[2,3]	*Gulo gulo*	No status	Non-active	S3S4	Not listed
Woodchuck	*Marmota monax*			S5	

Sources: Banfield, 1974; Caras, 1967; Cornell Lab of Ornithology, 2015; COSEWIC, 2017; MBCDC, 2016a; MESEA, 2017, SARA, 2017; Smithsonian (n.d.)

Bolded species are Species of Conservation Concern: **THR** – Threatened, **SC** – Special Concern, **END** – Endangered; NAR – Not at Risk

*****The P6 RAA includes the woodland (forest-dwelling) and coastal (forest-tundra) populations of boreal caribou in Manitoba; woodland caribou are listed as threatened while coastal caribou are not listed.

[1]Species occurrence listed on the Manitoba Conservation Data Centre for the Hayes River Upland Ecoregion,

[2]Observation during Joro Field Programs, [3]Species of First Nation Interest

MBCDC (2017 n.d.) 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.

N Non-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.

Q Taxonomic questions or problems involved, more information needed; appended to the global rank.

T Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species.

A modifier to SX or SH; the species has been reintroduced, but the population is not yet established.

SARA (2017) Definitions for Status Listing:

Schedule 1: 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.

COSEWIC (2017) Definitions for Status Listing:

Extinct: A wildlife species that no longer exists.

Extirpated: A wildlife species that no longer exists in the wild in Canada but exists elsewhere.

Endangered: A wildlife species facing imminent extirpation or extinction.

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

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

Not At Risk: A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

MESEA (2017) Definitions for Status Listing:

Extirpated: A species formerly indigenous to Manitoba no longer exists in the wild in Manitoba but exists elsewhere.

Endangered: A species threatened with imminent extirpation or with extinction throughout all or a significant portion of its Manitoba range.

Threatened: A species indigenous to Manitoba that is either: a) likely to become endangered; or b) is, because of low or declining numbers in Manitoba, particularly at risk if the factors affecting its vulnerability do not become reversed.

Special Concern: A species indigenous to Manitoba is at risk of becoming a threatened or endangered species because of a combination of biological characteristics and identified threats to the species.

APPENDIX B: LIST OF POTENTIAL BIRDS FOR THE P6 REGIONAL ASSESSMENT AREA

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Alder flycatcher[2,3]	*Empidonax alnorum*			S5B	
American bittern[2,6]	*Botaurus lentiginosus*			S5B	
American black duck[1,6]	*Anas rubripes*			S3B	
American crow[2,3,6]	*Corvus brachyrhychos*			S5B SUN	
American golden-plover[1]	*Pluvialis dominica*			S4B SUM	
American goldfinch[2]	*Spinus tristis*			S5B	
American kestrel	*Falco sparverius*			S4B	
American pipit[1]	*Anthus rubescens*			S3B	
American redstart	*Setophaga ruticilla*			S5B	
American robin[2,3]	*Turdus migratorius*			S5B	
American three-toed woodpecker[3]	*Picoides dorsalis*			S5	
American tree sparrow[1,3]	*Spizella arborea*			S5B SUM	
American white pelican[6]	*Pelecanus erythrorhynchos*			S4B	
American wigeon[5]	*Anas americana*			S4B	
Baird's sandpiper[1]	*Calidris bairdii*			SUM	
Bald eagle[5,6]	*Haliaeetus leucocephalus*			S5B SUN	
Bank swallow[6]	*Riparia riparia*	No schedule, no status	THR	S5B	Not listed
Barn swallow[4,6]	*Hirundo rustica*	No schedule, no status	THR	S4B	Not listed
Barred owl[4]	*Strix varia*			S4	
Bay-breasted warbler	*Setophaga castanea*			S5B	
Belted kingfisher[2]	*Megaceryle alcyon*			S5B	
Black scoter[1,6]	*Melanitta americana*			S4B	
Black tern[5,6]	*Childonias niger*			S4B	
Black-and-white warbler[2]	*Mniotilta varia*			S5B	
Black-backed woodpecker[2]	*Picoides arcticus*			S5	
Black-bellied plover[1]	*Pluvialis squatarola*			SUM	
Black-capped chickadee[2,3]	*Poecile atricapillus*			S5	
Black-throated green warbler	*Setophaga virens*			S4B	
Blackburnian warbler[2]	*Setophaga fusca*			S5B	
Blackpoll warbler[2]	*Setophaga striata*			S5B SUM	
Blue jay[3]	*Cyanocitta cristata*			S5	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Blue-headed vireo[2,3]	*Vireo solitarius*			S5B	
Blue-winged teal[5]	*Anas discors*			S4B	
Bohemian waxwing	*Bombycilla garrulus*			S4B SUN	
Bonaparte's gull[2,6]	*Chroicocephalus philadelphia*			S5B	
Boreal chickadee[3]	[2]*Poecile hudsonicus*			S4	
Boreal owl[6]	*Aegolius funereus*			S4	
Broad-winged hawk	*Buteo platypterus*			S5B	
Brown creeper[2,3]	*Certhia americana*			S5B	
Bufflehead[5]	*Bucephala albeola*			S4B	
Cackling goose	*Branta hutchinsii*				
Canada goose[2,3,5,6]	*Branta canadensis*			S5B	
Canada warbler[4,6]	*Cardellina canadensis*	THR	THR	S3B	THR
Cape May warbler[2]	*Setophaga tigrina*			S5B	
Cedar waxwing[2,3]	*Bombycilla cedrorum*			S5B SUN	
Chipping sparrow[2,3]	*Spizella passerina*			S5B	
Clay-colored sparrow[2]	*Spizella pallida*			S5B	
Cliff swallow	*Petrochelidon pyrrhonota*			S4B	
Common goldeneye[5]	*Bucephala clangula*			S5B SUN	
Common grackle[2,3]	*Quiscalus quiscula*			S5B	
Common loon[2,3,5,6]	*Gavia immer*			S5B	
Common merganser[5,6]	*Mergus merganser*			S5B	
Common nighthawk[2,3,4,6]	*Chordeiles minor*	THR	THR	S3B	THR
Common raven[2,3,6]	*Corvus corax*			S5	
Common redpoll[3]	*Acanthis flammea*			S4B S5N	
Common tern[5]	*Sterna hirundo*			S5B	
Common yellowthroat[2]	*Geothlypis trichas*			S5B	
Connecticut warbler[2,3]	*Oporornis agilis*			S4B	
Dark-eyed junco[2,3]	*Junco hyemalis*			S5B SUN	
Double-crested cormorant[1,6]	*Phalacrocorax auritus*			S5B	
Downy woodpecker[2,3]	*Picoides pubescens*			S5	
Dunlin[1]	*Calidris alpina*			S3B SUM	
Eastern kingbird[2]	*Tyrannus tyrannus*			S4B	
Eastern phoebe	*Sayornis phoebe*			S5B	
Eastern wood-peewee[4]	*Contopus virens*	No schedule, no status	SC	S4B	Not listed
European starling	*Sturnus vulgaris*			SNA	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Evening grosbeak[3]	*Coccothraustes vespertinus*			S3	
Forster's Tern[2]	*Sterna forsteri*			S4B	
Fox sparrow[2]	*Passerella iliaca*			S5B S4M	
Gadwall[1]	*Anas strepera*			S5B	
Golden eagle[1,5,6]	*Aquila chrysaetos*		NAR	S1B S4N	
Golden-crowned kinglet	*Regulus satrapa*			S4B	
Gray catbird[3]	*Dumetella carolinensis*			S5B	
Gray jay[2,3,6]	*Perisoreus canadensis*			S5	
Gray-cheeked thrush	*Catharus minimus*			S5B S5M	
Great blue heron[4,6]	*Ardea herodias*			S5B	
Great gray owl[2,3]	*Strix nebulosa*			S4	
Great horned owl[6]	*Bubo virginianus*			S4	
Greater scaup[1,5,6]	*Aythya marila*			S5B SUM	
Greater white-fronted goose[1]	*Anser albifrons*			SUM	
Greater yellowlegs[2,5]	*Tringa melanoleuca*			S5B SUM	
Green-winged teal[5]	*Anas crecca*			S4B	
Gyrfalcon[1]	*Falco rusticolus*		NAR	SUN	
Hairy woodpecker[2,3]	*Picoides villosus*			S5	
Harris's sparrow[3]	*Zonotrichia querula*			S4B S5M	
Hermit thrush[2,3]	*Catharus guttatus*			S5B	
Herring gull[2,6]	*Larus argentatus*			S4B	
Hoary redpoll[3]	*Acanthis hornemanni*			S3B S5N	
Hooded merganser[1]	*Lophodytes cucullatus*			S5B	
Horned grebe[4]	*Podiceps auritus*	No schedule, no status	SC	S4B	Not listed
Horned lark[1]	*Eremophila alpestris*			S3B SUM	
House sparrow	*Passer domesticus*			SNA	
Killdeer	*Charadrius vociferus*			S5B	
Lapland longspur[1]	*Calcarius lapponicus*			S4B SUM SUN	
Le Conte's sparrow[2,3]	*Ammodramus leconteii*			S5B	
Least flycatcher[2]	*Empiodnax minimus*			S5B	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Least sandpiper[2]	*Calidris minutilla*			S4B SUM	
Lesser scaup[5,6]	*Aythya affinis*			S5B	
Lesser yellowlegs[3]	*Tringa flavipes*			S4B SUM	
Lincoln's sparrow[2,3]	*Melospiza lincolnii*			S5B	
Long-eared owl	*Asio otus*			S4B	
Long-tailed duck[1,6]	*Clangula hyemalis*			S4B	
Magnolia warbler[2]	*Setophaga magnolia*			S5B	
Mallard[2,3,5,6]	*Anas platyrhynchos*			S5B	
Merlin[2]	*Falco columbarius*		NAR	S5B SUN	
Nashville warbler[2,3,5]	*Oreothlypis ruficapilla*			S5B	
Northern flicker[2,3]	*Colaptes auratus*			S5B	
Northern goshawk	*Accipiter gentilis*			S4B S5N	
Northern harrier[2,5]	*Circus cyaneus*			S5B	
Northern hawk owl	*Surnia ulula*			S4	
Northern pintail[5]	*Anas acuta*			S5B	
Northern shoveler	*Anas clypeata*			S5B	
Northern shrike	*Lanius excubitor*			S3B S5N SUM	
Northern waterthrush[2]	*Parkesia noveboracensis*			S5B	
Olive-sided flycatcher[2,3,4,6]	*Contopus cooperi*	THR	THR	S3B	THR
Orange-crowned warbler[2,3]	*Oreothlypis celata*			S5B	
Osprey[6]	*Pandion haliaetus*			S4B	
Ovenbird[2,3]	*Seiurus aurocapilla*			S5B	
Palm warbler[2]	*Setophaga palmarum*			S5B	
Pectoral sandpiper[1]	*Calidris melanotos*			S4M	
Peregrine falcon[1,6]	*Falco peregrinus*	SC	SC	S1B	END
Philadelphia vireo	*Vireo philadelphicus*			S4B	
Pied-billed grebe[2,3]	*Podilymbus podiceps*			S5B	
Pileated woodpecker[2,3]	*Dryocopus pileatus*			S5	
Pine grosbeak[3]	*Pinicola enucleator*			S4	
Pine siskin[2]	*Spinus pinus*			S5	
Purple finch[2]	*Haemorhous purpureus*			S5B	
Red crossbill[3]	*Loxia curvirostra*			S4B SUN	
Red-breasted merganser[2]	*Mergus serrator*			S4B	
Red-breasted nuthatch[2,3]	*Sitta canadensis*			S5	
Red-eyed vireo[2]	*Vireo olivaceus*			S5B	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Red-necked phalarope[1]	*Phalaropus lobatus*			S4B SUM	
Red-tailed hawk[2]	*Buteo jamaicensis*			S5B	
Red-throated loon[1]	*Gavia stellata*			S3B, SUM	
Red-winged blackbird[2,3,6]	*Agelaius phoeniceus*			S5B	
Ring-billed gull[3]	*Larus delawarensis*			S5B	
Ring-necked duck[3,5]	*Aythya collaris*			S5B	
Rose-breasted grosbeak[3]	*Pheucticus ludovicianus*			S5B	
Ross's goose[1]	*Chen rossii*			S3S4B S4M	
Rough-legged hawk[1]	*Buteo lagopus*		NAR	S3B SUM	
Ruby-crowned kinglet[2,3]	*Regulus calendula*			S5B	
Ruddy turnstone[1]	*Arenaria interpres*			SUM	
Ruffed grouse[2,3,5,6]	*Bonasa umbellus*			S4S5	
Rusty blackbird[2,4,6]	*Euphagus carolinus*	SC	SC	S4B	Not listed
Sanderling[1]	*Calidris alba*			SUM	
Sandhill crane[2,3,5,6]	*Grus canadensis*			S5B	
Savannah sparrow[2]	*Passerculus sandwichensis*			S5B	
Semipalmated plover	*Charadrius semipalmatus*			S4B SUM	
Semipalmated sandpiper[1,6]	*Calidris pusilla*			S3B SUM	
Sharp-shinned hawk	*Accipter striatus*			S4B	
Sharp-tailed grouse[5,6]	*Tympanuchus phasianellus*			S5	
Short-billed dowitcher[1]	*Limnodromus griseus*			S4B	
Short-eared owl[1,3,6]	*Asio flammeus*	SC	SC	S2S3B	THR
Smith's longspur[1]	*Calcarius pictus*			S3B SUM	
Snow bunting[1]	*Plectrophenax nivalis*			S4N SUM	
Snow goose[1,6]	*Chen caerulescens*			S5B S5M	
Snowy owl[6]	*Bubo scandiacus*			S4N	
Solitary sandpiper[2]	*Tringa solitaria*			S4B SUM	
Song sparrow[2]	*Melospiza melodia*			S5B	
Sora[3]	*Porzana carolina*			S5B	
Spotted sandpiper	*Actitis macularius*			S5B	
Spruce grouse[3,5,6]	*Falcipennis canadensis*			S4	
Stilt sandpiper[1]	*Calidris himantopus*			S4B SUM	

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
Surf scoter[1]	*Melanitta perspicillata*			S3B	
Swainson's thrush[3,5]	*Catharus ustulatus*			S5B	
Swamp sparrow[3]	*Melospiza georgiana*			S5B	
Tennessee warbler[2,3]	*Oreothlypis peregrina*			S5B	
Tree swallow[6]	*Tachycineta bicolor*			S4B	
Tundra swan[1,5,6]	*Cygnus columbianus*			S4B SUM	
Turkey vulture[6]	*Cathartes aura*			S4B	
Vesper sparrow	*Pooecetes gramineus*			S5B	
White-crowned sparrow[1,3]	*Zonotrichia leucophrys*			S5B	
White-rumped sandpiper[1]	*Calidris fuscicollis*			SUM	
White-throated sparrow[2,3]	*Zonotrichia albicollis*			S5B	
White-winged crossbill[2,3]	*Loxia leucoptera*			S5	
White-winged scoter	*Melanitta fusca*			S4B	
Willow ptarmigan[1,6]	*Lagopus lagopus*			S4B SUN	
Wilson's snipe[2,3,5,6]	*Gallingo delicata*			S5B	
Wilson's warbler[2]	*Cardellina pusilla*			S5B SUM	
Winter wren[2,3]	*Troglodytes hiemalis*			S5B	
Woodchuck[6]	*Marmota monax*			S5	
Yellow rail[2]	*Coturnicops noveboracensis*	SC	SC	S3B	Not listed
Yellow warbler[2,3]	*Setophaga petechia*			S5B	
Yellow-bellied flycatcher[2]	*Empidonax flaviventris*			S5B	
Yellow-bellied sapsucker[2,3]	*Sphyrapicus varius*			S5B	
Yellow-rumped warbler[2,3]	*Setophaga coronata*			S5B	

Sources: Manitoba Avian Research Committee, 2003; MBBA, 2014; Cornell Lab of Ornithology, 2015; COSEWIC, 2017; Joro, 2017b; MBCDC, 2016a; MESEA, 2017, SARA, 2017.

Bolded species are Species of Conservation Concern: THR – Threatened, SC – Special Concern, END – Endangered; NAR – Not at Risk

[1]Species is a migrant or non-breeding visitor in the RAA; [2]Observation during the Manitoba Breeding Bird Atlas Surveys, [3]Observation heard on ARU recordings, [4]Species occurrence listed on the Manitoba Conservation Data Centre for the Hayes River Upland Ecoregion [5]Observation during Joro Field Programs, [6]Species of First Nation Interest

MBCDC (n.d.) 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.
N	Non-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.
Q	Taxonomic questions or problems involved, more information needed; appended to the global rank.
T	Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species.
#	A modifier to SX or SH; the species has been reintroduced, but the population is not yet established.

SARA (2017) Definitions for Status Listing:

Schedule 1: 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.

COSEWIC (2017) Definitions for Status Listing:

Extinct: A wildlife species that no longer exists.

Extirpated: A wildlife species that no longer exists in the wild in Canada but exists elsewhere.

Endangered: A wildlife species facing imminent extirpation or extinction.

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

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

Not At Risk: A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

MESEA (2017) Definitions for Status Listing:

Extirpated: A species formerly indigenous to Manitoba no longer exists in the wild in Manitoba but exists elsewhere.

Endangered: A species threatened with imminent extirpation or with extinction throughout all or a significant portion of its Manitoba range.

Threatened: A species indigenous to Manitoba that is either: a) likely to become endangered; or b) is, because of low or declining numbers in Manitoba, particularly at risk if the factors affecting its vulnerability do not become reversed.

Special Concern: A species indigenous to Manitoba is at risk of becoming a threatened or endangered species because of a combination of biological characteristics and identified threats to the species.

APPENDIX C: LIST OF POTENTIAL HERPTILES FOR THE P6 REGIONAL ASSESSMENT AREA

Common Name	Scientific Name	SARA	COSEWIC	MBCDC	MESEA
American toad	*Anaxyrus americanus*			S4S5	
Boreal chorus frog	*Pseudacris maculata*			*S5*	
Northern leopard frog*[2]	*Lithobates pipiens*		NAR	S4	
Northern spring peeper[2]	*Pseudacris crucifer*			*S5*	
Wood frog	*Lithobates sylvaticus*			*S5*	
Red-sided garter snake[1,2]	*Thamnophis sirtalis parietalis*			S4	

Sources: Preston, 1982; Canadian Herpetological Society, 2016; Nature North, 2017; COSEWIC, 2017; Joro, 2017b; MBCDC, 2016a; MESEA, 2017, SARA, 2017

*COSEWIC (2009) indicates the western population (that is Special Concern under COSEWIC and SARA) is west of the Project 6 RAA

Bolded species are Species of Conservation Concern: THR – Threatened, SC – Special Concern, END – Endangered; NAR – Not at Risk

[1]Species occurrence listed on the Manitoba Conservation Data Centre for the Hayes River Upland Ecoregion, [2] Species of First Nation Interest

MBCDC (n.d.) 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.

N Non-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.

Q Taxonomic questions or problems involved, more information needed; appended to the global rank.

T Rank for subspecific taxon (subspecies, variety, or population); appended to the global rank for the full species.

A modifier to SX or SH; the species has been reintroduced, but the population is not yet established.

SARA (2017) Definitions for Status Listing:

Schedule 1: 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.

COSEWIC (2017) Definitions for Status Listing:

Extinct: A wildlife species that no longer exists.

Extirpated: A wildlife species that no longer exists in the wild in Canada but exists elsewhere.

Endangered: A wildlife species facing imminent extirpation or extinction.

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

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

Not At Risk: A wildlife species that has been evaluated and found to be not at risk of extinction given the current circumstances.

MESEA (2017) Definitions for Status Listing:

Extirpated: A species formerly indigenous to Manitoba no longer exists in the wild in Manitoba but exists elsewhere.

Endangered: A species threatened with imminent extirpation or with extinction throughout all or a significant portion of its Manitoba range.

Threatened: A species indigenous to Manitoba that is either: a) likely to become endangered; or b) is, because of low or declining numbers in Manitoba, particularly at risk if the factors affecting its vulnerability do not become reversed.

Special Concern: A species indigenous to Manitoba is at risk of becoming a threatened or endangered species because of a combination of biological characteristics and identified threats to the species

APPENDIX D: ARU METHODS AND BIRD DATA

Scoping of Target Species

Determination of the methods to be followed prior to the first deployment of ARUs in March 2016 initially involved the scoping of target species. Information on preferred breeding habitats and mating schedules were identified after determining that the prime focus of ARU studies as being to identify presence/absence of species listed under COSEWIC, SARA, MESEA and MBCDC. See Appendix B for further detail/definitions on conservation status listing.

While the field priority was initially focused on birds of conservation concern, other birds and amphibians were expected to be recorded by ARUs within the suite of habitat types sampled. Spring peeper and northern leopard frogs were amongst the amphibian species targeted through the habitat-based placement of ARUs.

Spring peepers prefer forested habitat near ponds and other wetlands and are most commonly found east of Lake Winnipeg in southeastern Manitoba (Nature North, 2017). The northern leopard frog- eastern population, which occurs in the RAA, is ranked as S4 by the MBCDC (2016a) and courts in permanent ponds lacking large fish. COSEWIC (2009) indicates the western population (listed as “Special Concern” under COSEWIC and SARA) is west of the RAA. Some of these species generally occupy habitats that are used by other amphibians, such as boreal chorus frogs and wood frogs, which breed in various wetland types and occupy a wide range of summering habitats (Nature North, 2017).

The RAA is expected to be well north of the breeding locales of some rare species, but the designed habitat sampling protocol was developed to permit the detection of species such as the green frog (*Lithobates clamitans*, S1/S2) and mink frog (*Lithobates septentrionalis,* S3).The former is a shallow water late spring breeder has been reported as far north as Nopiming Provincial Park (Nature North, 2017) while the latter is a late spring breeder resident to bogs, large cold permanent ponds, lakes and slow moving rivers with abundant vegetation

The timing and location of ARU deployment assumed that amphibians in the region would initiate vocalizations in late April and early May following snow melt and warming temperatures. Bird vocalizations were sampled at various times and locations based on known breeding cycles of diurnal (e.g., passerines), crepuscular (e.g., common nighthawks), and nocturnal (e.g., owls) species that breed as early as March and as late as late August or September.

A list of bird and amphibian species initially targeted for sampling by ARUs in 2016 is given in Appendix D: Table D-1. While these include species of conservation concern listed under federal and/or provincial legislation, their habitats overlap those of several other species; e.g., mixedwood and coniferous forests sampled in March and April potentially support breeding populations of both great gray owls and boreal owls.

Table D-1: Target Bird Species, habitat, and timing preferences used in ARU deployment planning in the P6 RAA

Bird Species	Habitat Preference	Mating Call Period (Dates/Times)
Bank swallow (*Riparia riparia*)	Vertical sandy banks near water (rivers/streams)	Mid-May to mid-August
Barn swallow (*Hirundo rustica*)	Marshy areas with structures for nesting	Mid-May to late Sept; Sunrise-10:30
Barred owl (*Strix varia*)	Mature boreal and riparian forests; mature hardwood-dominated stands, especially in low-lying areas near marsh and rivers	First mild nights in March to June; nocturnal
Canada warbler (*Cardellina canadensis*)	Deciduous or mixed-wood, often on sloping terrain near lake in dense shrubbery	Mid-May to August (June peak); Pre-Sunrise-10:30
Common nighthawk (*Chordeiles minor*)	Forests with extensive rock outcrops, clearings or burns	Early June-mid August; crepuscular late afternoon/evening
Horned grebe (*Podiceps auritus*)	Permanent potholes with vegetation	Mid-May to Mid-June
Olive-sided flycatcher (*Contopus cooperi*)	Open coniferous forests near edge of bogs/wetlands	June-mid-July; Sunrise-10:00
Rusty blackbird (*Euphagus carolinus*)	Wet areas (e.g., treed muskeg)	Mid-May to mid-July; Sunrise-10:00
Short-eared owl (*Asio flammeus*)	Open areas such as marshes and fens with tall dense vegetation with cover, bog, muskeg, and open boreal forest	Mid-April to late June; nocturnal
Yellow rail (*Coturnicops noveboracensis*)	Wetlands – shallow, grassy marsh or sedge fen; wet sedge meadows where sedge species are selected for and water depth around the nest is 10 cm	Mid-May to August; primarily nocturnal (will call during day)
Northern leopard frog (*Lithobates pipiens*)	Grasslands or forests near lakes, ponds, or other wetlands	Late April and early May, following snow melt and warming temperatures
Spring Peeper (*Pseudacris crucifer*)	Forested habitat near ponds and other wetlands	Late April and early May, following snow melt and warming temperatures

*See Appendix B for definitions on conservation status listing. Sources: Altman and Sallabanks 2000, Avery 1995, Bookhout and Stenzel 1987, Bookhout 1995, Clark 1975, Conway 1999, Godfrey 1986, Holland and Taylor 2003a,b, Koonz and Taylor 2003, Nero and Taylor 2003, Poulin *et al.* 1996, Taylor 2003, Wilson and Watts 2008

Site Selection and Temporal Settings

Knowledge respecting species present in the RAA enhances the assessment of potential Project activities to impact specific birds and/or amphibians. Throughout the Project 6 assessment history, ARUs have been deployed within appropriate habitats to ensure the best opportunity for detection of the targeted birds and amphibians (Map 18; Appendix D: Table D-1); aerial reconnaissance surveys were undertaken to assist in the selection of the most appropriate forest covertypes prior to placement of the ARUs (Appendix E: Photographs 7-8). Key criteria governing the placement of ARUs included:

- All ARUs deployed along/adjacent to proposed road infrastructure
- Habitats were selected using existing habitat information (LCCES)
- Potential sites selected were mapped using LCCES data at a 1:10,000 scale; and
- ARUs were typically set up within or near clearings close to suitable habitat that facilitates deployment and monitoring.

ARUs were securely attached to trees on the edge of a clearing; barbed wire was wrapped around the tree underneath the ARU as a deterrent to black bear destructive curiosity. The seasonal deployment of ARU's was based on known species-specific habitat requirements during the breeding season (Appendix D: Table D-2 and Table D-3). The periodicity for operation of the recording units was based on an evaluation of the most efficient use of time resources. ARUs were programmed to record for certain peak activity periods when species were most active, e.g., dusk or night for common nighthawks. Recording units were left in place for 2-4 weeks before being moved to another location, this assured increased probability of recording a rare species and correcting for recording times when weather interfered with recordings and animal detection.

The proposed periods for which the ARUs deployed in 2016 recorded various species of birds are outlined in Appendix D: Table D-2. The ARUs were set to record half an hour before sunset, recording for 10 minutes each hour for four hours (for a total of four 10-minute recordings). For habitats potentially supporting rare species during the sampling period, a minimum of 3 ARUs, with a minimum of 4 km of separation between units, were placed in each habitat types interspersed along/near the Project infrastructure sites. Sampling dates in the P6 RAA assured adequate recording coverage of the beginning, middle, and end phases of breeding cycles.

Table D-2: Temporal Settings for ARUs Deployed in the P6 RAA

Sampling* Period	Temporal Setting	Frequency	Habitat	Focal Species
March 21 - May 27	1900h-0100h	10 min/hr	Moist mixedwood and riparian forests with dense understory; mature hardwood-dominated stands, esp. in low- lying areas near marsh and rivers	Barred owl
April 11 - June 3	1900h-0100h	10 min/hr	Open areas such as marshes and fens with tall dense vegetation with cover. Likely non-breeder (*reduce/avoid sample size*).	Short-eared owl
June 6-20	0430h-1000h	10 min/hr	Wet areas (e.g., treed muskeg); bogs, fens, riparian areas	Rusty blackbird
June 6-20	2130h-0500h	10 min/hr	Wetlands – shallow, grassy marsh or sedge fen; wet sedge meadows where sedge species are selected for and water depth around the nest is 10 cm	Yellow rail
June 6-20	0430h-1000h	10 min/hr	Deciduous or mixed-wood with dense and diverse understory, often on sloping terrain near lake	Canada warbler
June 6-20	0430h-1000h	10 min/hr	Deciduous woods, large aspen bluffs, beach ridges, riparian sites and open tall jack pine stands	Eastern Wood-peewee
June 6-20	0430h-1000h	10 min/hr	Mature mixed-wood forest, swampland interspersed with rocky outcrops	Northern parula
June 6-20	2100h-0530h	10 min/hr	Open upland deciduous and mixed-wood forest; edge of regenerating woodlands	Whip-poor-will
June 6-20	0430h-1000h	10 min/hr	Open coniferous forests near edge of bogs/wetlands and recently burned stands (standing dead trees)	Olive-sided flycatcher
June 6-20	1800h-2300h	10 min/hr	Forests with extensive rock outcrops, clearings or burns–openings such as gravel pits	Common nighthawk

*Timeframes consider the early spring in 2016 and were adjusted as daylight hours increase

To augment the information collected by ARUs, observations of birds and unique or sensitive habitat (e.g., heron rookery or eagle nest) were collected during the ARU deployment phase. This assisted in collecting information on species not readily heard on ARUs but more likely to be seen visually, e.g., waterfowl and waterbirds such as horned grebes.

ARUs were initially deployed within the P6 RAA in different months (i.e. March to June) to assure that other species (listed in Appendix D: Table D1 - Table D3) would be potentially recorded if present. Once units were retrieved, the ARU data was collected, and new data storage cards were inserted. Recording units were then relocated to new locations along the P6 routes to survey a greater area for the same species (Map 18). For example, the ARUs used to sample owls and frogs were redeployed in May to assure there was adequate sampling for rare species of migratory neotropical songbirds that potentially breed in the area. ARUs that were used to sample for owls were retained in habitats that would be sampled for other species (e.g., the barred owl breeding sites were in habitats similar to the location of many other neotropical migrants. Redeployment of the owl ARUs to habitats well suited to passerines occupation was done in late May/early June coinciding with breeding season activity.

Sampling Protocol

The intent of the analysis was to determine presence/absence of species. ARUs were set to record during the early, peak, and late phases of the breeding periods for birds and amphibians. The following are some of the key factors considered in the analyses of data generated by the ARUs:

- Prior to listening to recordings, reviewers would listen to the calls of the species in question; and
- Reviewers listened to a minimum of 3-5, 10-minute pre-selected sample units/period (morning, evening, night) to assure that analyses occurred during the:
    - onset of owl breeding (late March/early April), during the middle (late April/early May), and near the end of the recording cycle (late May).
    - onset of amphibian courtship (late April) and throughout the breeding period; and
    - onset of songbird breeding (May) and throughout the breeding cycle (until mid-August).

Table D-3: P6 ARU Sampling Locations and Periods in 2016

Project	Site	Latitude	Longitude	Date Start	Date End	Time Start	Time End	Data	Habitat Type*
P6-1	SM06	54.86742	-94.04983	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Standing water in marsh, short spruce trees
P6-2	SM06	54.89451	-94.102482	2016-04-20	2016-05-18	0500, 1730	0700, 2030	Yes	Marsh grass, ~1 km from open lake. Surrounded by willow, TM with spruce farther away
P6-3	SM06	54.89451	-94.102482	2016-05-18	2016-06-16	1950	0815	No	
P6-4	SM06	54.85342	-94.390482	2016-06-16	2016-07-07	2030	0800	No	15km west along a large pond/lake, 15m of grass from treeline to creek, edge of treeline is mixed with willow
P6-5	SM06	54.85859	-94.41464	2016-07-07	2016-07-19	2030	0800	No	50% mature spruce-40% TM-10% MW in 0.5 hectare on TM
P6-6	SM06	54.85859	-94.41464	2016-07-19	2016-08-15	1900	1100	Yes	
P6-1	SM07	54.7075	-94.97585	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Small lake with marshy area, standing dead trees, MW nearby
P6-2	SM07	54.79071	-95.142422	2016-04-20	2016-05-17	0500, 1730	0700, 2030	Yes	On road alignment: Dry upland MW, large poplar trees 30 m tall
P6-1	SM09	54.61548	-94.70279	2016-03-22	2016-04-20	0500, 1730	0700, 2030	Yes	Grassy swamp with standing dead trees, willows, TM, boggy with standing water near small lake
P6-2	SM09	54.59844	-94.677759	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	Road alignment, small marshy area with willows
P6-3	SM09	54.59844	-94.677759	2016-05-16	2016-06-16	1950	0515	No	
P6-4	SM09	54.60544	-94.690866	2016-06-16	2016-07-07	2030	0800	No	Along winter road: no grass on the road peaty hummock, TM on either side; spruce trees are spaced out.
P6-5	SM09	54.61176	-94.697552	2016-07-07	2016-07-19	2030	0800	No	1 hectare (ha) 80% mature spruce, 20% tamarack north of alignment
P6-6	SM09	54.61176	-94.697552	2016-07-19	2016-09-28	350, 1820	1200, 2230	Yes	
P6-1	SM10	54.88281	-95.22083	2016-03-21	2016-04-20	0415, 1800	0715, 2100	Yes	Marshy area near small creek. Surrounded by tall MW
P6-2	SM10	54.87019	-95.233527	2016-04-20	2016-05-16	0300, 1800	0600, 2100	Yes	Clearcut road alignment, tall spruce and poplar
P6-3	SM10	54.87019	-95.233527	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM10	54.86431	-95.22567	2016-06-16	2016-07-07	2030	0500	Yes	Opening along the proposed road, TM edge, 0.1ha opening with willows and small spruce
P6-5	SM10	54.87757	-95.258227	2016-07-07	2016-07-19	1900	0600	Yes	3 ha opening: 70% tamarack-30% mature spruce south of hydro line

Project	Site	Latitude	Longitude	Date Start	Date End	Time Start	Time End	Data	Habitat Type*
P6-6	SM10	54.87757	-95.258227	2016-07-19	2016-08-11	2000	1030	Yes	
P6-3	SM11	54.89374	-94.227372	2016-05-18	2016-06-16	1950	0815	No	3 ha opening: 70% TM-30% mature spruce south of hydro line
P6-4	SM11	54.89275	-94.202343	2016-06-19	2016-07-02	2030	0800	Yes	Spruce-TM mix along the winter road
P6-5	SM11	54.8732	-94.125998	2016-07-08	2016-07-10	2030	0800	No	Winter road north side of road on black spruce
P6-6	SM11	54.8732	-94.125998	2016-07-19	2016-10-05	1715	1230	Yes	
P6-1	SM13	54.84902	-94.48282	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Small bog, grassy surrounded by spruce
P6-2	SM13	54.81203	-94.52219	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	Two deciduous stands nearby: small bog, short spruce trees
P6-3	SM13	54.81203	-94.52219	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM13	54.82782	-94.508197	2016-06-16	2016-07-07	2030	0800	No	Winter road, small spruce intermixed with small clumps of willows
P6-5	SM13	54.83643	-94.484291	2016-07-19	2016-07-20	2030	0800	Yes	70% mature spruce-30% MW
P6-6	SM13	54.83643	-94.484291	2016-07-20	2016-08-11	1930	1100	Yes	
P6-3	SM14	54.88816	-94.164111	2016-05-18	2016-06-16	1950	0815	No	No record
P6-4	SM14	54.88306	-94.151188	2016-06-16	2016-07-07	2030	0800	No	Along winter road: taller spruce to the north with small spruce and TM to the south and willows mixed throughout
P6-5	SM14	54.88577	-94.171495	2016-07-08	2016-07-08	0200	0800	No	1 ha opening: 50% mature spruce-50% TM east side of opening
P6-6	SM14	54.88577	-94.171495	2016-08-07	2016-10-04	1730	1230	Yes	
P6-1	SM15	54.78535	-94.58913	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Short grass, dead standing spruce, next to large marsh
P6-2	SM15	54.68213	-94.850282	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	Marshy area with dead trees. Grassy next to spruce/TM forest
P6-3	SM15	54.68213	-94.850282	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM15	54.68483	-94.882681	2016-06-16	2016-07-07	2030	0800	No	On winter road: 20m opening, short grass, spruce to the west and willow on the other side of the road
P6-5	SM15	54.69168	-94.902335	2016-07-08	2016-07-19	2030	0800	No	0.25 ha on TM, cell phone tower to the south: 10% mature spruce-60% tamarack-30% MW
P6-6	SM15	54.69168	-94.902335	2016-07-19	2016-10-05	1730	1230	Yes	
P6-1	SM16	54.56897	-94.57143	2016-03-22	2016-04-20	0500, 1730	0700, 2030	Yes	Grassy marsh with willows near small lake. Beaver lodge and dam 50m

Project	Site	Latitude	Longitude	Date Start	Date End	Time Start	Time End	Data	Habitat Type*
									away
P6-2	SM16	54.55623	-94.584884	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	In swamp 70m from beaver lodge. Large upland ridges, dry with poplar
P6-3	SM16	54.55623	-94.584884	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM16	54.55184	-94.571153	2016-06-16	2016-07-07	2030	0800	No	Along winter road: short grass on road with willows all around
P6-5	SM16	54.55942	-94.567564	2016-07-07	2016-07-19	2030	0800	No	0.5 ha water hole surrounded by mature spruce
P6-1	SM18	54.84853	-95.17338	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Marshy grassy area surrounded by small dry ridges with large spruce trees, MW
P6-2	SM18	54.84067	-95.188263	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	Road crossroad: Large MW forest stand
P6-3	SM18	54.84067	-95.188263	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM18	54.83161	-95.177001	2016-06-16	2016-07-07	2030	0800	No	Further down road: mixed with TM and spruce, road is grassy
P6-5	SM18	54.81994	-95.137241	2016-07-07	2016-07-19	2030	0800	No	Mature spruce grassy opening 1.5 hectare
P6-6	SM18	54.81994	-95.137241	2016-07-19	2016-08-18	1900	1100	Yes	
P6-1	SM19	54.76307	-94.72947	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Small grassy bog near large MW upland habitat
P6-2	SM19	54.73235	-94.802118	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	On road alignment: large MW stand
P6-3	SM19	54.73235	-94.802118	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM19	54.74198	-94.801174	2016-06-16	2016-07-07	2030	0800	No	Spruce on either side: small willows along the edge with short grass on the road, with a pond/swamp to the north
P6-5	SM19	54.75288	-94.782273	2016-07-08	2016-07-19	2030	0800	No	0.5 hectare: 70% mature spruce-30% MW, grassy open area on black spruce tree north side of opening
P6-6	SM19	54.75288	-94.782273	2016-07-19	2016-08-26	1900	1100	Yes	
P6-1	SM21	54.76981	-95.07153	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	In stream bed with lots of grass by very large MW upland area
P6-2	SM21	54.76237	-95.088228	2016-04-20	2016-05-16	0500, 1730	0700, 2030	Yes	On road alignment: upland dry site near a small marsh by large upland MW
P6-3	SM21	54.76237	-95.088228	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM21	54.75157	-95.065879	2016-06-16	2016-07-07	2030	0800	No	Further down road at a Junction: .1ha opening, short grass, spruce with willow

Project	Site	Latitude	Longitude	Date Start	Date End	Time Start	Time End	Data	Habitat Type*
P6-5	SM21	54.7424	-95.047382	2016-07-07	2016-10-12	2030	0800	No	North side of winter road at 215 km marker
P6-6	SM21	54.7424	-95.047382	2016-07-19	2016-10-05	1730	1230	Yes	
P6-1	SM23	54.89395	-94.25981	2016-03-21	2016-04-20	0420, 1810	0720, 2150	Yes	Small marsh, grassy with willows
P6-2	SM23	54.88602	-94.277192	2016-04-20	2016-05-16	0300, 1900	0600, 2220	Yes	Very grassy, wet, standing dead trees in marsh, small creek
P6-3	SM23	54.88602	-94.277192	2016-05-16	2016-06-16	1950	0815	No	
P6-4	SM23	54.88178	-94.249176	2016-06-16	2016-07-07	2030	0800	No	Along edge of a 2.5 ha pond: there is 10m of grass from the edge of pond to tree line, willows along the edge with spruce and TM
P6-5	SM23	54.88869	-94.270919	2016-07-08	2016-07-19	2030	0800	No	North side of pond on TM
P6-6	SM23	54.88869	-94.270919	2016-07-19	2016-09-02	2000	1130	Yes	
P6-1	SM24	54.6574	-94.86872	2016-03-21	2016-04-20	0500, 1730	0700, 2030	Yes	Marsh surrounded by MW, willows, grass, TM

*TM= Tamarack, MW -= Mixedwood

Table D-4: ARU Bird Species Heard March 21-October 12, 2016

Species	SM06			SM07		SM09			SM10					SM11	SM13						SM14		SM15				SM16			SM18				SM19						SM21			SM23				SM24
	1	2	6	1	2	1	2	6	1	3	4	5	6	6	1	2	3	5	6	6	1	2	3	6	1	2	3	1	2	3	6	1	2	3	4	5	6	1	2	6	1	2	3	6	1
Alder flycatcher			√					√		√		√	√					√							√											√										
American Crow		√			√			√			√	√				√	√									√	√			√						√			√	√						
American robin		√					√											√												√	√			√						√						
American Three-toed Woodpecker						√																								√									√						
American tree sparrow		√																																											
Unknown blackbird		√			√																																								
Black-capped Chickadee						√																√						√										√			√				
Blue jay					√											√	√					√	√											√											
Blue-headed vireo																			√																										
Boreal chickadee							√						√	√					√				√																						
Brown creeper																																		√											
Canada goose		√		√	√		√		√	√		√				√	√					√				√			√	√			√						√			√			
Cedar waxwing																													√				√											
Chipping sparrow										√	√	√	√				√	√				√	√	√		√	√						√		√				√	√		√		√	
Common loon		√			√		√	√		√	√			√		√		√	√	√						√	√			√	√		√	√		√		√	√		√		√	
Common nighthawk														√										√										√						√						
Common raven	√	√		√					√	√		√		√	√		√				√	√	√		√	√	√				√	√		√			√		√		√				√
Common redpoll							√			√			√						√			√				√			√				√	√		√									
Common grackle		√																																												
Connecticut warbler		√			√		√						√									√		√		√			√				√						√						
Dark-eyed junco							√							√																										√	√					
Downy woodpecker																													√																
Unknown duck		√						√																																						
Evening grosbeak													√									√				√																				
Gray catbird							√			√																								√											

Species	SM06			SM07		SM09			SM10					SM11	SM13						SM14		SM15				SM16			SM18				SM19						SM21			SM23			SM24
	1	2	6	1	2	1	2	6	1	3	4	5	6	6	1	2	3	5	6	6			1	2	3	6	1	2	3	1	2	3	6	1	2	3	4	5	6	1	2	6	1	2	3	6	1
Gray jay																√			√	√																		√			√						
Great gray owl																	√										√																				
Hairy woodpecker							√										√																							√							
Harris's sparrow								√				√						√																													
Hermit thrush			√		√			√		√	√	√		√			√	√	√				√		√		√			√		√		√		√		√		√	√						
Hoary redpoll																														√																	
Le Conte's sparrow		√											√																						√	√										
Lesser yellowlegs		√			√		√						√										√	√			√			√				√											
Lincoln’s sparrow		√			√																																									
Mallard		√						√		√																										√										
Nashville warbler																								√																						
Northern flicker																														√									√			√				
Olive-sided flycatcher								√			√									√					√																			√		
Orange-crowned warbler																																													√		
Ovenbird					√					√		√					√							√				√				√				√	√			√	√					
Pied-billed grebe												√																						√												
Pileated woodpecker					√						√					√							√				√																			
Pine grosbeak						√																												√												
Red crossbill																																							√							
Red-breasted nuthatch		√																																												
Red-winged blackbird		√																																												
Ring-billed gull		√	√									√															√							√											
Ring-necked duck																																										√				
Rose-breasted grosbeak														√				√																√												
Ruby-crowned kinglet		√			√		√			√	√					√	√						√	√			√	√		√	√			√	√				√						
Ruffed grouse										√																				√	√														
Sandhill crane		√			√		√				√	√		√		√			√				√	√			√	√		√	√	√		√		√		√		√			√	√		

Species	SM06			SM07		SM09			SM10					SM11	SM13						SM14		SM15				SM16			SM18				SM19						SM21			SM23				SM24
	1	2	6	1	2	1	2	6	1	3	4	5	6	6	1	2	3	5	6	6	1	2	3	6	1	2	3	1	2	3	6	1	2	3	4	5	6	1	2	6	1	2	3	6	1
Short-eared owl											√												√																								
Sora																											√																				
Spruce grouse																√									√																√				√				
Swainson's thrush																√							√																								
Swamp sparrow		√					√	√		√																							√		√												
Tennessee warbler												√						√																														
Unknown bird		√	√		√	√	√	√	√	√	√	√	√	√	√		√	√	√	√		√	√	√	√	√	√	√		√	√	√	√		√		√	√	√	√	√	√	√		√
White-crowned sparrow										√												√				√			√				√						√							
White-throated sparrow		√								√	√		√	√					√					√											√		√			√				√		
White-winged crossbill						√																										√														
Wilson's snipe		√	√		√		√	√	√	√	√	√		√		√	√	√				√	√	√	√		√	√	√	√		√		√		√		√	√		√	√			√
Winter wren										√	√													√																						
Unknown woodpecker					√			√			√		√		√	√	√						√	√		√		√		√	√	√		√	√					√	√					
Yellow warbler																									√					√				√												
Yellow-bellied sapsucker																												√											√							
Yellow-rumped warbler																																													√		

Table D-5: ARU Amphibian Species Heard March 21-October 12, 2016

Species	ARU: Site Where Species Heard At Least Once																								
	SM6:			SM9:		SM10:				SM11:	SM13:		SM14:	SM15:			SM16:		SM18:			SM19:		SM21:		SM23:
	P6-1	P6-2	P6-6	P6-2	P6-6	P6-3	P6-4	P6-5	P6-6	P6-6	P6-2	P6-3	P6-6	P6-2	P6-6	P6-2	P6-3	P6-2	P6-6	P6-3	P6-4	P6-6	P6-2	P6-2	P6-3
Boreal chorus frog				√	√	√	√			√				√	√				√			√	√	√	
Eastern American toad						√																			
Spring peeper				√		√	√			√		√		√			√			√			√	√	√
Wood frog	√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√			√		√	√	√

Table D-6: Data Collected During the Manitoba Breeding Bird Atlas Surveys, 2014

Species/Grid Block Observed	Total Observed
Alder Flycatcher	**48**
American Crow	**1**
15UA85	1
American Goldfinch	**1**
15UA76	1
American Robin	**48**
15UA57	3
15UA58	3
15UA67	4
15UA76	9
15UA85	6
15UA86	5
15UA95	2
15UA97	3
15VA07	5
15VA18	8
Bald Eagle	**1**
15VA07	1
Belted Kingfisher	**1**
15UA58	1
Black-backed Woodpecker	**3**
15UA86	1
15UA97	2
Black-capped Chickadee	**1**
15UA58	1
Blackburnian Warbler	**2**
15UA58	1
15UA95	1
Blackpoll Warbler	**2**
15UA86	1
15UA97	1
Blue-headed Vireo	**27**
15UA57	3
15UA58	5
15UA67	3
15UA85	2
15UA86	1
15UA95	6
15UA97	3
15VA07	1
15VA18	3

Species/Grid Block Observed	Total Observed
Bonaparte's Gull	**20**
15UA67	1
15UA85	9
15UA86	7
15VA07	3
Boreal Chickadee	**7**
15UA57	2
15UA58	1
15UA85	1
15UA86	2
15UA95	1
Brown Creeper	**5**
15UA57	1
15UA86	2
15UA95	2
Canada Goose	**5**
15UA58	5
Cedar Waxwing	**10**
15UA85	2
15UA86	2
15UA95	2
15UA97	3
15VA07	1
Chipping Sparrow	**141**
15UA57	11
15UA58	12
15UA67	9
15UA76	16
15UA85	15
15UA86	20
15UA95	16
15UA97	8
15VA07	23
15VA18	11
Clay-colored Sparrow	**1**
15VA18	1
Common Grackle	**3**
15UA67	2
15VA07	1
Common Loon	**34**
15UA57	2
15UA58	2
15UA67	4
15UA76	1

Species/Grid Block Observed	Total Observed
15UA85	4
15UA95	2
15UA97	4
15VA07	9
15VA18	6
Common Nighthawk	**1**
15UA58	1
Common Raven	**13**
15UA85	1
15UA86	4
15UA97	6
15VA07	2
Common Yellowthroat	**3**
15UA67	1
15UA76	1
15VA18	1
Connecticut Warbler	**10**
15UA58	1
15UA67	1
15UA76	1
15UA85	1
15UA95	2
15VA18	4
Dark-eyed Junco	**135**
15UA57	6
15UA58	6
15UA67	8
15UA76	18
15UA85	11
15UA86	20
15UA95	17
15UA97	16
15VA07	19
15VA18	14
Eastern Kingbird	**1**
15UA58	1
Forster's Tern	**3**
15UA97	3
Fox Sparrow	**38**
15UA76	2
15UA85	4
15UA86	8
15UA97	10
15VA07	1

Species/Grid Block Observed	Total Observed
15VA18	13
Gray Jay	**88**
15UA57	8
15UA58	15
15UA67	9
15UA76	8
15UA85	7
15UA86	10
15UA95	7
15UA97	3
15VA07	10
15VA18	11
Great Gray Owl	**2**
15UA97	2
Greater Yellowlegs	**56**
15UA58	1
15UA67	2
15UA76	2
15UA85	3
15UA86	7
15UA95	8
15UA97	10
15VA07	14
15VA18	9
Hairy Woodpecker	**1**
15UA95	1
Hermit Thrush	**146**
15UA57	16
15UA58	14
15UA67	13
15UA76	15
15UA85	7
15UA86	14
15UA95	22
15UA97	18
15VA07	21
15VA18	6
Herring Gull	**3**
15UA97	2
15VA07	1
Le Conte's Sparrow	**1**
15UA67	1
Least Flycatcher	**10**
15UA57	1

Species/Grid Block Observed	Total Observed
15UA67	3
15UA85	1
15UA95	4
15VA07	1
Lincoln's Sparrow	**115**
15UA57	4
15UA58	7
15UA67	12
15UA76	11
15UA85	9
15UA95	20
15UA97	13
15VA07	20
15VA18	19
Magnolia Warbler	**24**
15UA57	2
15UA58	1
15UA67	4
15UA76	3
15UA85	3
15UA86	3
15UA95	3
15UA97	3
15VA18	2
Mallard	**1**
15UA67	1
Nashville Warbler	**11**
15UA58	2
15UA76	2
15UA85	3
15UA86	2
15UA95	1
15VA07	1
Northern Flicker	**8**
15UA58	1
15UA67	1
15UA85	2
15UA86	2
15UA95	1
15UA97	1
Northern Harrier	**1**
15UA85	1
Northern Waterthrush	**10**
15UA57	2

Species/Grid Block Observed	Total Observed
15UA95	1
15VA07	1
15VA18	6
Olive-sided Flycatcher	**27**
15UA67	3
15UA76	5
15UA85	1
15UA95	3
15UA97	2
15VA07	5
15VA18	8
Orange-crowned Warbler	**46**
15UA57	3
15UA58	1
15UA67	1
15UA76	7
15UA85	4
15UA86	14
15UA95	1
15UA97	6
15VA07	7
15VA18	2
Ovenbird	**20**
15UA57	4
15UA58	1
15UA67	7
15UA86	3
15UA95	5
Palm Warbler	**90**
15UA58	3
15UA67	3
15UA76	7
15UA85	10
15UA86	11
15UA95	12
15UA97	14
15VA07	13
15VA18	17
Pied-billed Grebe	**1**
15UA97	1
Pileated Woodpecker	**1**
15UA85	1

Species/Grid Block Observed	Total Observed
Pine Siskin	**2**
15UA57	1
15UA67	1
Purple Finch	**1**
15VA07	1
Red-breasted Nuthatch	**1**
15UA67	1
Red-eyed Vireo	**6**
15UA58	1
15UA95	4
15UA97	1
Red-tailed Hawk	**3**
15UA58	1
15UA97	1
15VA18	1
Red-winged Blackbird	**5**
15UA67	4
15UA95	1
Ruby-crowned Kinglet	**147**
15UA57	10
15UA58	21
15UA67	8
15UA76	19
15UA85	13
15UA86	18
15UA95	10
15UA97	18
15VA07	14
15VA18	16
Rusty Blackbird	**10**
15UA58	1
15UA67	4
15UA85	2
15VA18	3
Sandhill Crane	**11**
15UA58	3
15UA67	2
15UA85	3
15VA18	3
Savannah Sparrow	**2**
15UA67	2
Solitary Sandpiper	**35**
15UA57	2
15UA58	2

Species/Grid Block Observed	Total Observed
15UA67	5
15UA76	1
15UA85	3
15UA86	3
15UA95	3
15VA07	4
15VA18	12
Spruce Grouse	**7**
15UA58	6
15VA18	1
Swainson's Thrush	**29**
15UA57	7
15UA58	2
15UA67	5
15UA76	2
15UA85	1
15UA86	1
15UA95	5
15VA07	1
15VA18	5
Swamp Sparrow	**28**
15UA57	2
15UA58	4
15UA67	4
15UA76	3
15UA85	4
15UA86	1
15UA95	2
15UA97	1
15VA07	1
15VA18	6
Tennessee Warbler	**162**
15UA57	25
15UA58	23
15UA67	21
15UA76	18
15UA85	6
15UA86	24
15UA95	23
15UA97	3
15VA07	6
15VA18	13
White-throated Sparrow	**203**
15UA57	23

Species/Grid Block Observed	Total Observed
15UA58	14
15UA67	11
15UA76	28
15UA85	14
15UA86	29
15UA95	17
15UA97	23
15VA07	26
15VA18	18
White-winged Crossbill	**42**
15UA57	3
15UA58	5
15UA67	2
15UA76	2
15UA86	1
15UA95	2
15UA97	12
15VA07	14
15VA18	1
Wilson's Snipe	**48**
15UA58	6
15UA67	7
15UA85	9
15UA86	3
15UA95	1
15UA97	7
15VA07	2
15VA18	13
Wilson's Warbler	**16**
15UA57	1
15UA58	4
15UA67	1
15UA76	1
15UA85	1
15UA86	1
15UA95	1
15VA18	6
Winter Wren	**11**
15UA57	5
15UA58	1
15UA76	3
15VA07	1
15VA18	1
Yellow Warbler	**1**

Species/Grid Block Observed	Total Observed
15UA97	1
Yellow-bellied Flycatcher	**55**
15UA57	5
15UA58	1
15UA67	2
15UA76	9
15UA85	2
15UA86	16
15UA95	6
15UA97	8
15VA07	5
15VA18	1
Yellow-bellied Sapsucker	**10**
15UA57	1
15UA58	1
15UA67	6
15UA76	1
15UA86	1
Yellow-rumped Warbler	**75**
15UA57	16
15UA58	5
15UA67	9
15UA76	5
15UA85	8
15UA86	12
15UA95	5
15UA97	8
15VA07	2
15VA18	5
Least Sandpiper	**1**
15UA67	1
Grand Total	**2138**

Table D-7: Data Collected During the Aerial Waterfowl Survey of Project 6, June 15-17

Waypoint	Species	Number	Activity	Habitat	Comments
090	Sandhill crane	2	LO	pond	
091	Mallard	3	LO	lake/shore	Brood (1P 1S)
092	Common merganser	1	FL	pond	
093	Canada Goose	2	LO	pond	Brood
094	Swainson's hawk	1	LO	pond	
095	Mallard	1	FL	pond	
096	Ring necked duck	3	SW	bog/marsh	1P 1S
097	Mallard	1	SW	bog/marsh	
098	Unknown diver	1	SW	bog/marsh	
098	Common merganser	1	SW	bog/marsh	
099	Green winged teal	2	FL	bog/marsh	
099	Ring necked duck	1	FL	bog/marsh	
101	Common merganser	1	FL	lake/shore	
101	Ring necked duck	4	FL	lake/shore	
101	Common merganser	1	FL	lake/shore	
102	Wilsons snipe	1	FL	bog/marsh	
103	Mallard	1	FL	bog/marsh	
104	Sandhill crane	1	FL	pond	
105	Mallard	2	FL	lake/shore	1P
106	Mallard	1	FL	lake/shore	
107	Sandhill crane	1	LO	lake/shore	
108	Swan	6	SW	lake/shore	Unknown white; Brood (4 off spring)
109	Common merganser	2	SW	lake/shore	
110	Common merganser	2	SW	lake/shore	
111	Loon	1	NE	lake/shore	
112	Mallard	1	FL	lake/shore	
113	Bald eagle	3	FL	lake/shore	
114	Sandhill crane	2	Lo	pond	1P
115	Scaup	2	SW	pond	1P
115	Sandhill crane	2	LO	pond	1P
116	Sandhill crane	1	LO	pond	
117	Scaup	2	FL	pond	
118	Ring necked duck	1	SW	pond	
119	Bufflehead	5	SW	pond	
120	Mallard	2	FL	lake/shore	
121	Bald eagle	2	FL	lake/shore	
122	Common merganser	1	SW	lake/shore	
123	Loon	1	SW	lake/shore	
124	Sandhill crane	2	LO	pond	
125	Golden eagle	1	FL	lake/shore	
126	Mallard	1	FL	lake/shore	

Waypoint	Species	Number	Activity	Habitat	Comments
127	Ring necked duck	3	SW	lake/shore	
128	Common merganser	1	SW	lake/shore	
129	Mallard	1	FL	pond	
129	Ring necked duck	1	SW	pond	
130	Mallard	6	FL	pond	
130	Ring necked duck	1	SW	pond	
131	Mallard	1	SW	pond	
132	Sandhill crane	1	FL	bog/marsh	
133	Mallard	2	FL	bog/marsh	1P
134	Ring necked duck	1	SW	bog/marsh	
135	Mallard	1	SW	pond	
136	Scaup	3	SW	pond	
137	Common merganser	3	SW	lake/shore	
138	Mallard	5	SW	lake/shore	
138	Blue winged Teal	2	SW	lake/shore	
138	Ring necked duck	5	SW	lake/shore	
138	Canada Goose	1	FL	lake/shore	
138	Common merganser	3	SW	lake/shore	
139	Mallard	4	SW	lake/shore	
140	Ring necked duck	2	FL	lake/shore	
141	Common merganser	11	FL	pond	
141	Mallard	1	FL	pond	
141	Mallard	3	FL	pond	
142	Mallard	1	FL	lake/shore	
143	Common merganser	5	SW	lake/shore	
144	Common merganser	5	SW	lake/shore	
145	Bald eagle	1	FL	lake/shore	
146	Common merganser	2	FL	pond	
147	Mallard	1	FL	pond	
147	Blue winged Teal	3	FL	pond	
148	Mallard	1	FL	pond	
149	Ring necked duck	3	FL	pond	
149	Common merganser	3	FL	pond	
150	Common merganser	5	FL	pond	
151	Ring necked duck	4	FL	bog/marsh	
151	Mallard	1	FL	bog/marsh	
152	Blue winged Teal	2	FL	bog/marsh	1P
153	Ring necked duck	2	FL	bog/marsh	1P
154	Mallard	1	FL	bog/marsh	
154	Mallard	2	FL	bog/marsh	
155	Ring necked duck	4	FL	bog/marsh	
156	Ring necked duck	1P	FL	bog/marsh	1P
157	Mallard	4	FL	pond	

Waypoint	Species	Number	Activity	Habitat	Comments
158	Ring necked duck	8	FL	bog/marsh	
158	Ring necked duck	2	FL	pond	
158	Mallard	1	FL	pond	
158	Blue winged Teal	3	FL	pond	
159	Ring necked duck	2	FL	bog/marsh	
160	Ring necked duck	1	FL	bog/marsh	
161	Ring necked duck	4	FL	bog/marsh	
162	Swan	2	SW	lake/shore	Uknown white
162	Mallard	1	SW	lake/shore	
163	Scaup	1	SW	lake/shore	
164	Ring necked duck	8	SW	lake/shore	
165	Mallard	1	SW	pond	
165	Scaup	1	SW	pond	
166	Ring necked duck	2	SW	pond	1P
167	Sandhill crane	2	LO	pond	
168	Ring necked duck	7	SW	pond	
169	Blue winged Teal	4	SW	bog/marsh	
169	Scaup	2	SW	bog/marsh	
169	Mallard	2	SW	bog/marsh	
169	Mallard	2	FL	lake/shore	
169	Ring necked duck	3	FL	lake/shore	
169	Canada Goose	8	FL	lake/shore	Brood (3 off spring)
170	Sandhill crane	1	FL	pond	
171	Greater yellow legs	2	FL	bog/marsh	1P
172	Mallard	1	FL	lake/shore	
173	Greater yellow legs	1	SW	lake/shore	
174	Sandhill crane	2	FL	lake/shore	
174	Unknown	1	SW	lake/shore	Brood
175	Mallard	3	FL	lake/shore	1P 1S
176	Common merganser	2	FL	pond	1P
177	Common merganser	3	FL	lake/shore	
178	Wigeon	1	SW	pond	
179	Buffelhead	1	FL	lake/shore	
180	Mallard	1	FL	pond	
180	Ring necked duck	3	FL	pond	
180	Mallard	4	FL	pond	
180	Greater yellow legs	1	FL	pond	
181	Blue winged Teal	2	FL	pond	
182	End of survey				Day 1
183	Ring necked duck	5	FL	bog/marsh	
184	Canada Goose	1	FL	pond	
184	Sandhill crane	2	FL	pond	
185	Loon	2	SW	pond	

Waypoint	Species	Number	Activity	Habitat	Comments
186	Mallard	2	FL	lake/shore	
187	Ring necked duck	1	SW	bog/marsh	
188	Sandhill crane	1	FL	bog/marsh	
189	Loon	1	NE	bog/marsh	
190	Sandhill crane	1	LO	pond	
191	Loon	2	SW	lake/shore	
192	Mallard	2	SW	bog/marsh	
192	Scaup	2	SW	bog/marsh	
193	Ring necked duck	8	SW	lake/shore	
194	Loon	3	SW	bog/marsh	
195	Canada Goose	6	SW	bog/marsh	Brood (4 off spring)
196	Mallard	1	SW	pond	
196	Greater yellow legs	1	LO	pond	
197	Mallard	1	SW	pond	
198	Loon	2	SW	lake/shore	
199	Mallard	2	SW	bog/marsh	1P
199	shore bird (unknown)	1	SW	lake/shore	
199	Greater yellow legs	1	LO	lake/shore	
200	Mallard	1	FL	bog/marsh	
200	Ring necked duck	1	FL	bog/marsh	
201	Ring necked duck	2	SW	bog/marsh	1P
202	Sandhill crane	1	LO	bog/marsh	
203	Ring necked duck	15	SW	bog/marsh	
204	Mallard	2	SW	bog/marsh	1P
204	Ring necked duck	3	SW	bog/marsh	
205	Ring necked duck	5	SW	bog/marsh	
206	Ring necked duck	9	SW	bog/marsh	
206	Mallard	2	SW	bog/marsh	1P
207	Common merganser	2	SW	bog/marsh	
208	Ring necked duck	1	SW	lake/shore	
209	Ring necked duck	5	SW	bog/marsh	
209	Mallard	2	SW	bog/marsh	
210	Green winged teal	1	SW	bog/marsh	
211	Northern pintail	6	SW	pond	
212	Common merganser	2	SW	bog/marsh	
212	Ring necked duck	19	SW	bog/marsh	
213	Northern pintail	5	SW	bog/marsh	
213	Ring necked duck	7	SW	bog/marsh	
213	Green winged teal	2	SW	bog/marsh	
214	Common merganser	2	SW	bog/marsh	
215	Mallard	1	FL	pond	
216	Sandhill crane	2	LO	bog/marsh	
217	Ring necked duck	2	SW	bog/marsh	1P

Waypoint	Species	Number	Activity	Habitat	Comments
218	Ring necked duck	6	SW	pond	
219	Swan	1	SW	pond	Unknown white
220	Scaup	2	SW	pond	1P
221	Bald eagle	1	FL	bog/marsh	
222	Ring necked duck	1	FL	bog/marsh	
223	Bald eagle	1	FL	pond	
224	Ring necked duck	2	SW	pond	
225	Canada Goose	7	SW	pond	Brood (6 off spring)
226	Green winged teal	1	SW	pond	
227	Ring necked duck	5	SW	pond	
228	Bald eagle	2	FL	pond	
228	Greater yellow legs	1	FL	pond	
229	Golden eagle	2	FL	pond	
230	Loon	2	SW	bog/marsh	
231	Mallard	3	FL	bog/marsh	
232	Canada Goose	5	SW	bog/marsh	Brood (3 off spring)
233	Sandhill crane	2	LO	pond	
234	Mallard	3	FL	bog/marsh	
235	Ring necked duck	3	SW	pond	
236	Ring necked duck	1	SW	pond	
236	Mallard	2	SW	pond	1P
237	Ring necked duck	1	SW	pond	
238	Mallard	1	SW	pond	
239	Ring necked duck	1	SW	lake/shore	
240	Loon	2	SW	lake/shore	
241	Canada Goose	1	SW	bog/marsh	
242	Canada Goose	2	SW		
243	Ring necked duck	1	SW	bog/marsh	
244	Ring necked duck	5	SW	bog/marsh	
244	Sandhill crane	1	LO	bog/marsh	
245	Ring necked duck	6	FL	bog/marsh	
246	Greater yellow legs	3	LO	bog/marsh	
247	Canada Goose	9	SW	lake/shore	Brood (4 off spring)
248	Ring necked duck	2	SW	pond	
249	Canada Goose	8	SW	pond	Brood (6 off spring)
250	Canada Goose	6	SW	lake/shore	Brood (4 off spring)
251	Mallard	3	FL	lake/shore	
252	Mallard	2	FL	lake/shore	
253	Common merganser	1	SW	pond	
254	Ring necked duck	6	SW	pond	
255	Ring necked duck	5	SW	pond	
256	Ring necked duck	27	SW	pond	
257	Mallard	1	FL	pond	

Waypoint	Species	Number	Activity	Habitat	Comments
258	Sandhill crane	2	LO	pond	
258	Moose	1	Walk	pond	Bull
258	Common merganser	36	SW	pond	
259	Bald eagle	1	FL	lake/shore	
260	Loon	1	SW	pond	
261	Ring necked duck	4	SW	lake/shore	
262	Common merganser	1	SW	lake/shore	
263	Mallard	1	FL	bog/marsh	
264	Mallard	1	FL	bog/marsh	
265	Ring necked duck	3	SW	bog/marsh	
266	Ring necked duck	5	SW	bog/marsh	
267	Ring necked duck	2	SW	lake/shore	
268	Greater yellow legs	4	LO	bog/marsh	
269	Greater yellow legs	1	LO	bog/marsh	
270	Scaup	2	SW	pond	
271	Bald eagle	1	FL	pond	
272	Canada Goose	2	SW	pond	1P
273	Ring necked duck	6	SW	pond	
274	Loon	1	SW	pond	
274	Canada Goose	2	SW	pond	
275	Loon	1	SW	lake/shore	
276	Ring necked duck	6	SW	bog/marsh	
277	Mallard	1	SW	bog/marsh	
278	Ring necked duck	5	SW	bog/marsh	
279	Mallard	1	SW	bog/marsh	
279	Ring necked duck	2	SW	bog/marsh	1P
280	Common merganser	5	SW	lake/shore	
281	Mallard	2	SW	lake/shore	
281	Ring necked duck	5	SW	lake/shore	
282	Mallard	11	SW	lake/shore	Brood (10 off spring)
283	Ring necked duck	4	SW	bog/marsh	2P
284	Mallard	2	SW	bog/marsh	
285	Greater yellow legs	1	SW	bog/marsh	
285	Common merganser	1	SW	bog/marsh	
285	Ring necked duck	4	SW	bog/marsh	2P
285	Mallard	1	SW	bog/marsh	
285	Scaup	2	SW	bog/marsh	
286	Scaup	2	SW	bog/marsh	
287	Mallard	1	SW	lake/shore	
288	Greater yellow legs	2	LO	bog/marsh	
289	Blue winged Teal	3	SW	bog/marsh	
290	Sandhill crane	2	LO	lake/shore	
291	Mallard	4	FL	lake/shore	

Waypoint	Species	Number	Activity	Habitat	Comments
292	Sandhill crane	2	LO	bog/marsh	
292	Greater yellow legs	1	LO	lake/shore	
293	Ring-necked duck	4	FL	bog/marsh	2P
293	Sandhill crane	2	FL	bog/marsh	1P
294	Canada Goose	2	FL	pond	1P
295	Mallard	2	FL	pond	
295	Common merganser	6	FL	lake/shore	
296	Common merganser	26	FL	lake/shore	
297	Bald eagle	6	FL	lake/shore	
298	Sandhill crane	2	FL	pond	
299	Ring necked duck	10	FL	bog/marsh	
300	Mallard	2	FL	lake/shore	1P
301	Bald eagle	1	FL	lake/shore	
302	Bald eagle	2	FL	lake/shore	
303	Common merganser	3	FL	lake/shore	
304	Ring necked duck	2	FL	lake/shore	
305	Loon	1	SW	lake/shore	
306	Bald eagle	1	FL	lake/shore	
307	Loon	1	SW	lake/shore	
308	Loon	5	SW	lake/shore	
309	Ring necked duck	2	SW	lake/shore	1P
310	Common merganser	2	SW	lake/shore	
311	Ring necked duck	6	SW	lake/shore	
312	Greater yellow legs	1	LO	lake/shore	
312	Bald eagle	1	FL	lake/shore	
313	Greater yellow legs	1	LO	lake/shore	
314	Canada Goose	2	SW	pond	1P
315	Ring necked duck	3	SW	pond	
315	Canada Goose	2	SW	pond	1P

Note: Habitat designators - 2=marsh/bog; 4= pond; 7=lake / lakeshore; FL=Flying, LO=Loafing, ST=Stand (Loafing), SW=Swimming; WA=Walk; P=Pair

Table D-8: Data Collected During the Aerial Waterfowl Survey of Project 6, July 16, 2016

Waypoint	Species	Number	Activity	Habitat	Comments
54	Unknown duck	5	SW		1A 4J old brood
55	Sandhill cranes	2	FL		
56	Canada geese	5	SW		1pair 3J
57	Canada geese	12	SW		1Pair 10J
58	Diving ducks	4	SW		1A 3J
59	Canada geese	10	SW		1pair 8j
60	Diving ducks	3	SW		1A 2J
61	Ring-necked duck	7	SW		1A 6J
62	Ring-necked duck	4	SW		
63	Diving Ducks	4	SW		1A 3J
64	Mallard	1	FL		
65	WATER COMMENT				LOW
66	Terns	10			
67	Tundra swans	2	SW		
68	Ring-necked duck	6	SW		1A 5J OLD BROOD
69	Scratch				
70	Common merganser	1	SW		
71	Diving Ducks	6	SW		1A 5J
72	Diving Ducks	4	SW		1A 3J
73	Bald eagle	1			
74	Ring-necked duck	3	SW		
75	Bald eagle	1			
75	Ring-necked duck	7	SW		1A 6J
76	Common merganser	4	SW		
77	Greater yellowlegs	3	FL		
78	Ring-necked duck	30	SW		
79	caribou	1			bull swimming across the lake
80	Scratch				
81	Common Merganser	1	SW		
82	Mallard	3	SW		
83	Bald eagle	1	FL	river	
84	brood	5	SW	river	Brood
85	Sandhill cranes	1	FL		

Waypoint	Species	Number	Activity	Habitat	Comments
86	Bald eagle	1	FL		
87	Tundra swans	2	SW	lake	
88	Bald eagle	1	FL		FL river
89	brood	5	SW	creek	Brood
90	Ring-necked duck	2	SW	creek	
91	brood	5	SW	creek	duck brood
92	Unknown Duck	1	SW	creek	
93	brood	4	SW	creek	duck brood
94	Canada Geese	10	SW	creek	1pair 8j
95	Bald eagle	1	FL		
96	Loon	1	SW	river	
97	Mallard	4	SW	lake	
97	Ring-necked duck	30	SW	lake	
98	Sandhill cranes	1	ST	creek	
99	moose	2			calf cow
100	Mallard	3	SW	lake	
101	Tundra swans	2	SW	lake	
102	Bald eagle	1	FL	lake	
103	Common merganser	1	SW	lake	
104	Scratch				
1	scratch				
2	scratch				
3	scratch				
4	scratch				
5	Loon	1	SW		
6	Mallard	4			1A 3J
7	Unknown diver	1	SW		
8	Mallard	2			
8	Unknown diver	1	SW		
9	Mallard	3			
9	Unknown diver	4			1A 3J
10	Ring-necked duck	3			
11	Unknown diver	1	FL		
12	Bald eagle	1			
13	Canada geese	8	SW		1pair 6J

Waypoint	Species	Number	Activity	Habitat	Comments
14	Ring-necked duck	3	FL		
14	Sandhill crane	2	FL		
14	Loon	2	SW		
15	Loon	2	SW		
16	Ring-necked duck	1	SW		
16	Green-winged teal	4	FL		
17	Ring-necked duck	8	FL		
18	Loon	2	SW		
19	moose	1	ST		cow
20	Unknown diver	8	SW		
20	Unknown duck	5	SW		brood
21	Unknown duck	3	SW		brood
22	Unknown dabblers	6	FL		
23	Loon	1	SW		
24	scratch				
25	Loon	1	SW		
26	Loon	1	SW		
27	Loon	3	SW		
28	Bald eagle	1	FL		
29	Mallard	6	SW		1A 5J
30	Bald eagle	1	FL		
31	Ring-necked duck	6	SW		1A 5J
32	Loon	1	SW		
33	Tundra swan	2	SW		
34	scratch				
35	Unknown duck	5	SW		brood
36	Unknown duck	4	SW		

Note: Habitat designators - 2=marsh/bog; 4= pond; 7=lake / lakeshore; Scratch = point marked in error; FL=Flying, LO=Loafing, ST=Stand (Loafing), SW=Swimming; WA=Walk; A=Adult; J=Juvenile

Table D-9: Data Collected During the Aerial Waterfowl Survey of Project 6, October 12-14, 2016

Waypoint	Species	Number	Habitat
16	bufflehead/goldeneye	30	marsh/pond
17	bufflehead/goldeneye	350	lake
25	bufflehead/goldeneye	30-40	marsh/pond
26	bufflehead/goldeneye	10	marsh/pond
27	bufflehead/goldeneye	10	lake
28	bufflehead/goldeneye	30	lake
29	bufflehead/goldeneye	10	lake
31	bufflehead/goldeneye	30-40	lake
32	bufflehead/goldeneye	30	lake
34	bufflehead/goldeneye	70-100	lake
36	bufflehead/goldeneye	40-50	lake
42	bufflehead/goldeneye/scoters	20	lake
43	bufflehead/goldeneye	40	lake
44	bufflehead/goldeneye	400-500	lake
45	scoters	130	lake
46	bufflehead/goldeneye	130	lake
49	scoters	120	lake
51	scoters	40	lake
53	bufflehead/goldeneye/ scoters	230-250	lake
54	bufflehead/goldeneye	160-170	lake
55	bufflehead/goldeneye	130	lake
59	bufflehead/goldeneye	20	lake
62	bufflehead/goldeneye	15	lake
66	bufflehead/goldeneye	30	lake

APPENDIX E: PHOTOGRAPHS

Photo 1: Trail camera deployed within the P6 RAA

Photo 2: Woodland caribou herd captured on a trail camera in the P6 RAA

Photo 3: Single moose captured on a trail camera in the P6 RAA

Photo 4: A very large black bear (with brown features) captured on a trail camera in the P6 RAA

Photo 5: Family of black bears captured on a trail camera in the P6 RAA

Photo 6: Single wolverine captured on a trail camera in the P6 RAA

Photo 7: ARU deployed within the P6 RAA

Photo 8: Joro staff installing an ARU within the P6 RAA

Photo 9: Trapper collecting his harvest along the RTL in the Oxford House area

Photo 10: Trapper setting his line under the ice for beaver along the RTL in the Oxford House area

APPENDIX F: TRAPPER PROGRAM RESULTS

DN: Table to be reviewed/updated by Joro

RTL #	Section	Date	Lat	Long	Waypoint	Trap	Trap type	Sample number	Temp	Snow Depth	Snowing	Raining	Cloudy	Sunny	Species	Sex	Hair/scat
2	God's Lake		54.50677300	-95.16137000	003	2	120	1	-27	n/a	no	no	no	yes	marten	male	Hair
2	God's Lake		54.50840500	-95.16173200	4	3	120	12	0	n/a	no	no	yes	yes	marten	male	Hair
2	God's Lake	Jan 28,2017	54.51199200	-95.17669800	5	4	330	22	-20	n/a	no	no	yes	no	marten	male	Hair
2	God's Lake	Jan 26,2017	54.51353900	-95.18041000	6	5	120	20	-10	n/a	no	no	no	yes	marten	female	Hair
2	God's Lake		54.51023700	-95.19402500	10	9	120	19	0	n/a	no	yes	yes	no	marten	male	Hair
2	God's Lake		54.50267000	-95.20914900	13	12		2	-27	n/a	no	no	yes	yes	marten	female	Hair
2	God's Lake		54.49631100	-95.22175000	20	19		3	-19	1"	yes	no	yes	no	marten	male	Hair
2	God's Lake		54.48111100	-95.22281700	25	24	120	9	-26		no	no	no	yes	marten	n/a	Hair
2	God's Lake		54.48111100	-95.22281700	25	24	120	10	-26		no	no	no	yes	marten	n/a	Scat
2	God's Lake	Feb 19,2017	54.48111100	-95.22281700	25	24	120	25	-8		no	no	yes	no	marten	female	Hair
2	God's Lake	Jan 20 2017	54.47400800	-95.29252000	39	37	120	13	-3		no	no	yes	no	marten	male	Hair
2	God's Lake	Jan 20 2017	54.47400800	-95.29252000	39	37	120	14	-3		no	no	yes	no	marten	male	Hair
2	God's Lake		54.46927100	-95.34592400	48	46		5	-31		no	no	no	yes	marten	male	Hair
2	God's Lake		54.46911200	-95.35008100	49	47	120	15	-3		no	no	yes	yes	marten	male	Hair
2	God's Lake		54.46487500	-95.34904600	50	48	120	6	-31		no	no	yes	no	marten	male	Hair
2	God's Lake	Feb 19,2017	54.46691900	-95.36305100	52	50	120	26	-8		no	no	yes	no	marten	male	Hair
2	God's Lake		54.46678800	-95.36830900	54	52	120	7	-31		no	no	yes	no	marten	male	Hair
2	God's Lake	Jan 20,2017	54.46678800	-95.36830900	54	52	120	16	-3		no	no	yes	no	marten	male	Hair
2	God's Lake		54.45895400	-95.33681400	057	55	120	8	-31		NO	no	no	yes	marten	female	Hair
2	God's Lake	Jan 22,2017	54.45895400	-95.33681400	57	55	120	18	0		no	yes	yes	no	marten	male	Hair
2	God's Lake		54.45895400	-95.33681400	57	55	120	27	-8		no	no	yes	no	fisher	female	Hair
2	God's Lake		54.45551000	-95.33112700	58	56	120	11	-7	1''	no	no	no	yes	marten	female	Hair
2	God's Lake	Jan 20,2017	54.50870700	-95.23987100	66	60	120	17	-3		no	no	yes	no	fisher	female	Hair
2	God's Lake	Feb 6,2017	54.50870700	-95.23987100	66	60	120	23	-34		no	no	no	yes	marten	female	Hair
2	God's Lake	Feb 12,2017	54.50870700	-95.23987100	66	60	120	24	-15		no	no	yes	yes	marten	female	Hair

RTL #	Section	Date	Lat	Long	Waypoint	Trap	Trap type	Sample number	Temp	Snow Depth	Snowing	Raining	Cloudy	Sunny	Species	Sex	Hair/scat
2	God's Lake		54.50926500	-95.23756000	67	61		4	-19	1"	yes	no	yes	no	marten	male	hair
2	God's Lake	Jan 26,2017	54.30239000	-95.12474000	72	64	120	21	-10		no	no	no	yes	marten	female	Hair
54	Oxford House	Feb 1,2017	54.82159000	-95.23281300	003	trap									marten	male	Hair
54	Oxford House	Jan 7,2017	54.78958200	-95.23101200	005	trap									marten	male	Hair
54	Oxford House	Jan 21,2017	54.78958200	-95.23101200	5	trap									marten	male	Hair
54	Oxford House	Jan 2,2017	54.75826200	-95.23786700	011	trap									otter	male	Hair
54	Oxford House	Dec 31,2016	54.75826200	-95.23786700	11	trap									marten	female	Hair
54	Oxford House	Dec 31,2016	54.75826200	-95.23786700	11	trap									otter	female	Hair
54	Oxford House	Jan 16,2017	54.76426900	-95.29483400	016	trap									otter	male	Hair
54	Oxford House	Jan 3,2017	54.76480700	-95.29522000	017	trap									otter	female	Hair
54	Oxford House	Feb 17,2017	54.76325200	-95.27864900	018	trap									marten	male	Hair
54	Oxford House	Jan 2,2017	54.75767700	-95.19408200	019	trap									beaver	n/a	Hair
54	Oxford House	Feb 17,2017	54.75769100	-95.19416300	020	trap									beaver	n/a	Hair
54	Oxford House	Feb 1,2017	54.75769100	-95.19416300	20	trap									beaver	n/a	Hair
54	Oxford House	Jan 21,2017	54.71152200	-95.20735900	021	trap									marten	male	Hair
54	Oxford House	Jan 25,2017	54.71152200	-95.20735900	21	trap									marten	male	Hair
54	Oxford House	Feb 17,2017	54.70131100	-95.20409600	024	trap									otter	female	Hair
54	Oxford House	Feb 7,2017	54.70131100	-95.20409600	24	trap									otter	male	Hair
54	Oxford House	Feb 17,2017	54.70018800	-95.20832500	026	trap									marten	male	Hair
54	Oxford House	Jan 11,2017	54.70018800	-95.20832500	26	trap									otter	male	Hair
54	Oxford House	Jan 21,2017	54.69189400	-95.21967800	029	trap									marten	male	Hair
54	Oxford House	Feb 17,2017	54.68498700	-95.22608200	031	trap									marten	male	Hair
54	Oxford House	Jan 21,2017	54.68498700	-95.22608200	31	trap									marten	male	Hair
54	Oxford House	Jan 25,2017	54.67765400	-95.22747900	032	trap									marten	male	Hair
54	Oxford House	Jan 16,2017	54.67608100	-95.21280400	035	trap									marten	male	Hair
54	Oxford House	Dec 31,2016	54.80524200	-95.25970100	036	trap									marten	female	Hair
54	Oxford House	Jan 25,2017	54.80524200	-95.25970100	36	trap									marten	male	Hair
54	Oxford House	Dec 28,2016	54.81663000	-95.28891200	037	trap									otter	male	Hair
54	Oxford House	Feb 17,2017	54.67638200	-95.30523200	078	trap									mink	female	hair

RTL #	Section	Date	Lat	Long	Waypoint	Trap	Trap type	Sample number	Temp	Snow Depth	Snowing	Raining	Cloudy	Sunny	Species	Sex	Hair/scat
54	Oxford House	Feb 17,2017	54.72948900	-95.20890400	080	trap									beaver	n/a	Hair
54	Oxford House	Feb 17,2017	54.72948900	-95.20890400	80	trap									beaver	n/a	Hair
54	Oxford House	Feb 1,2017	54.67377800	-95.28020900	047	trap									marten	female	Hair
54	Oxford House	Jan 16,2017	54.66870800	-95.27397600	050	trap									marten	male	Hair
54	Oxford House	Feb 17,2017	54.76668800	-95.22617900	051	trap									marten	male	Hair
54	Oxford House	Jan 25,2017	54.76668800	-95.22617900	51	trap									Skunk	N/a	Hair
54	Oxford House	Jan 21,2017	54.76668800	-95.22617900	51	trap									marten	male	Hair
54	Oxford House	Jan 21,2017	54.73706300	-95.20377700	052	trap									marten	male	Hair
54	Oxford House	Jan 21,2017	54.68143000	-95.29182500	053	trap									marten	female	Hair
54	Oxford House	Feb 17,2017	54.67563800	-95.31308000	055	trap									muskrat	female	Hair
54	Oxford House	Jan 25,2017	54.67563800	-95.31308000	55	trap									otter	male	Hair
64	Oxford House	Feb 4,2017	54.71003600	-95.75263500	251	trap									marten	n/a	Hair
64	Oxford House	Feb 4,2017	54.68386000	-95.84599600	253	trap									otter	n/a	Hair
64	Oxford House	Jan 29,2017	54.75816800	-95.68880200	123	trap									marten	n/a	Hair
64	Oxford House	Jan 06,2017	54.75816500	-95.68880300	124	trap									marten	n/a	Hair
64	Oxford House	Jan 11,2017	54.77905700	-95.78123900	165	trap									marten	n/a	Hair
64	Oxford House	Jan 20,2017	54.76570000	-95.71509700	200	trap									marten	n/a	Hair
64	Oxford House	Jan 19,2017	54.76570000	-95.71509700	200	trap									otter	male	Hair
64	Oxford House	Jan 20,2017	54.70335600	-95.84593500	211	trap									marten	n/a	Hait
64	Oxford House	Jan 20,2017	54.66676000	-95.85442000	213	trap									marten	n/a	Hair
64	Oxford House	Jan 21,2017	54.73940500	-95.65813700	221	trap									marten	n/a	Hair
64	Oxford House	Jan 15,2017	54.78002500	-95.66113200	230	trap									otter	n/a	Hair
64	Oxford House	Jan 28,2017	54.76148100	-95.76964700	235	trap									otter	n/a	Hair
64	Oxford House	Jan 19,2017	54.70642300	-95.77114800	243	trap									otter	n/a	Hair
64	Oxford House	Jan 28,2017	54.70642300	-95.77114800	243	trap									marten	n/a	Hair
64	Oxford House	Dec 29,2017	54.74454400	-95.80129000	019	trap	snare	4	-26	10''	no	no	no	yes	Lynx	male	hair/meat
64	Oxford House	Dec 29,2017	54.73249200	-95.82322700	020	trap	120	10	-26	10''	no	no	no	yes	Fisher	male	hair/meat
64	Oxford House	Jan 19,2017	54.71199300	-95.82233500	022	trap									marten	n/a	hair
64	Oxford House	Dec 29,2016	54.71733700	-95.72349100	036	trap	120	16	-26	10''	no	no	no	yes	marten	male	hair/meat

RTL #	Section	Date	Lat	Long	Waypoint	Trap	Trap type	Sample number	Temp	Snow Depth	Snowing	Raining	Cloudy	Sunny	Species	Sex	Hair/scat
64	Oxford House	Dec 29,2017	54.72485400	-95.68611900	041	trap	280	1	-24	10''	yes	no	yes	yes/am	otter	female	Hair
64	Oxford House		54.72485400	-95.68611900	41	trap	280	13	-24	10''	yes	no	yes	yes/am	otter	female	Hair
64	Oxford House	Dec 29,2016	54.72802500	-95.67172700	043	trap	120	43	-26	10''	no	no	no	yes	marten	male	hair/meat
64	Oxford House	Feb 5,2017	54.75023400	-95.76028800	047	trap									marten	n/a	Hair
64	Oxford House	Feb 12,2017	54.75023400	-95.76028800	47	trap									lynx	n/a	Hair
64	Oxford House	Feb 12,2017	54.75023400	-95.76028800	47	trap									otter	n/a	Hair
64	Oxford House	Jan 29,2017	54.76598100	-95.69355100	247	trap									otter	n/a	Hair
64	Oxford House	Dec 30,2016	54.76820100	-95.78233800	049	trap	280	5	-24	10''	yes	no	yes	yes/am	marten	male	Hair
64	Oxford House	Jan 4,2017	54.76820100	-95.78233800	49	trap									mink	n/a	Hair
64	Oxford House	Jan 15,2017	54.78725300	-95.67345900	058	trap									marten	male	Hair
64	Oxford House	Jan 8,2017	54.78725300	-95.67345900	58	trap									marten	n/a	Hair
64	Oxford House	Jan 6,2017	54.77884500	-95.65997300	059	trap									marten	n/a	Hair
54	Oxford House	Feb 12,2017	54.56095000	-95.18545000	255	trap									marten	n/a	Hair
3	God's Lake	Dec 27,2016	54.46047400	-95.01723400	015	trap		1	-23	5''	no	no	yes	no	marten	male	n/a
3	God's Lake	Dec 27,2016	54.49323900	-95.06866900	010	trap		2	-23	5''	no	no	yes	no	marten	male	n/a
3	God's Lake	Dec 30,2016				trap		n/a	-20	5''	no	no	yes	no	marten	male	n/a
3	God's Lake	Jan 15,2017				trap			n/a	8''	yes	no	yes	yes	marten	n/a	n/a
3	God's Lake	Jan 25 ,2017				trap			-12	1''	no	no	no	yes	marten	n/a	n/a
3	God's Lake	Jan 29,2017				trap			-19	1''	no	no	yes	no	marten	n/a	n/a
3	God's Lake	Jan 29,2017				trap			-19	1''	no	no	yes	no	mink	n/a	n/a
3	God's Lake	Jan 29,2017				trap			-19	1''	no	no	yes	no	rabbit	n/a	n/a
3	God's Lake	Feb 05,2017				trap			-24	1''	no	no	yes	yes	marten	n/a	n/a