



October 2013

**ANNEX IV TERRESTRIAL ENVIRONMENT
BASELINE REPORT**

Tazi Twé Hydroelectric Project

Submitted to:
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REPORT

Report Number: 10-1365-0004/DCN-072



List of Acronyms

Term	Definition
ACIMS	Alberta Conservation Information Management System
ALS	Australian Laboratory Services
ALUPIAP	Athabasca Land Use Planning Interim Advisory Panel
ANOVA	analysis of variance
BAM	Boreal Avian Modelling Project
BBS	upland breeding bird surveys
BLFN	Black Lake First Nation
BNA	Birds of North America Online
CaCl ₂	calcium chloride
CCME	Canadian Council of Ministers of the Environment
CEC	cation exchange capacity
CI	confidence interval
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DBH	diameter at breast height
DDT	dichlorodiphenyltrichloroethane
DVI	detailed vegetation inventory
ELC	ecological landscape classification
GPS	global positioning system
HSD	honestly significant difference
LSA	local study area
max	maximum
min	minimum
MOE	Saskatchewan Ministry of Environment
n	sample size
N/A	not applicable
NDVI	normalized difference vegetation index
NDWI	normalized difference wetland index
P	probability
Project	Tazi Twé Hydroelectric Project
RSA	regional study area
SARA	<i>Species at Risk Act</i>
SCWG	Soil Classification Working Group
SE	standard error
SKCDC	Saskatchewan Conservation Data Centre

List of Acronyms (continued)

Term	Definition
syn	synonym
TAC	Transportation Association of Canada
TKD	adjusted track density
WMZ	wildlife management zone
WTC	winter track count

List of Units

Term	Definition
~	approximately
%	percent
±	plus or minus
<	less than
≤	less than or equal to
>	greater than
°C	degrees Celsius
cm	centimetres
ha	hectares
km	kilometre
km ²	square kilometre
km/h	kilometres per hour
M	molar
m	metre
meq/100 g	milliequivalents of ammonium cation (NH ₄ ⁺) adsorbed by 100 grams of dry soil
m ³ /s	cubic metres per second
MW	megawatt

Table of Contents

1.0 INTRODUCTION.....	1
1.1 Project Proponent.....	1
1.2 Project Overview.....	1
1.3 Objective of the Baseline Report	1
2.0 STUDY AREAS	3
2.1 Regional Study Area.....	3
2.2 Local Study Area	5
3.0 TERRAIN AND SOILS.....	5
3.1 Introduction.....	5
3.1.1 Regional Terrain and Soils.....	5
3.2 Methods.....	6
3.2.1 Field Program	6
3.2.2 Soil Classification and Mapping	7
3.2.3 Soil Sensitivities in the Local Study Area	8
3.2.3.1 Erosion Sensitivities.....	8
3.2.3.2 Sensitivity to Acidification	10
3.2.3.3 Permafrost Potential	11
3.2.3.4 Sensitivity to Compaction	12
3.2.3.5 Soil Chemistry.....	13
3.3 Results.....	13
3.3.1 Field Program	13
3.3.2 Soil Classification and Mapping	13
3.3.2.1 Soil Classification.....	13
3.3.2.2 Soil Mapping.....	15
3.3.3 Soil Sensitivities in the Local Study Area	20
3.3.3.1 Erosion Sensitivities.....	20
3.3.3.2 Sensitivity to Acidification	24
3.3.3.3 Permafrost Potential	26
3.3.3.4 Sensitivity to Compaction	27

Table of Contents (continued)

3.3.3.5	Soil Chemistry.....	28
3.4	Summary	28
3.4.1	General Setting	28
3.4.2	Terrain and Soil Conditions in the Regional and Local Study Areas	29
3.4.2.1	Methods.....	29
3.4.2.2	Results.....	29
3.4.3	Soil Sensitivities in the Local Study Area	30
3.4.3.1	Methods.....	30
3.4.3.2	Results.....	31
4.0	VEGETATION.....	32
4.1	Introduction.....	32
4.1.1	Regional Vegetation.....	33
4.2	Methods.....	34
4.2.1	Data Collection.....	34
4.2.1.1	Sampling Intensity and Distribution.....	35
4.2.2	Ecological Landscape Classification	35
4.2.3	Detailed Vegetation Inventory Surveys	37
4.2.4	Biodiversity.....	37
4.2.5	Listed Plant Species and Listed Plant Habitat Potential.....	38
4.2.5.1	Listed Plant Species Occurrences	38
4.2.5.2	Listed Plant Habitat Potential.....	39
4.2.6	Traditional Use Plants and Habitat Potential.....	39
4.2.6.1	Traditional Use Plants.....	39
4.2.6.2	Traditional Use Plant Habitat Potential	39
4.3	Results.....	39
4.3.1	Ecological Landscape Classification	39
4.3.1.1	Regional Study Area.....	39
4.3.1.2	Local Study Area	42
4.3.1.3	Ecological Landscape Classification Map Unit Descriptions.....	44

Table of Contents (continued)

4.3.2	Biodiversity.....	52
4.3.2.1	Species Richness by Ecological Landscape Classification Map Unit	53
4.3.2.2	Total Number of Listed Species.....	53
4.3.2.3	Total Number of Unique Species.....	56
4.3.2.4	Species Richness by Sample Plot	56
4.3.3	Listed Plant Species and Listed Plant Habitat Potential.....	59
4.3.3.1	Listed Plant Species Occurrences	59
4.3.3.2	Listed Plant Habitat Potential.....	65
4.3.4	Traditional Use Plants.....	69
4.3.4.1	Traditional Use Plant Habitat Potential	71
4.4	Summary	74
4.4.1	General Setting	74
4.4.2	Ecological Land Classification in the Regional and Local Study Areas	74
4.4.2.1	Methods.....	74
4.4.2.2	Results.....	74
4.4.3	Biodiversity.....	75
4.4.3.1	Methods.....	75
4.4.3.2	Results.....	75
4.4.4	Listed Plant Species and Listed Plant Species Habitat Potential	76
4.4.4.1	Methods.....	76
4.4.4.2	Results.....	76
4.4.5	Traditional Use Plant and Traditional Use Plant Habitat Potential	77
4.4.5.1	Methods.....	77
4.4.5.2	Results.....	77
5.0	WILDLIFE	78
5.1	Introduction.....	78
5.2	Methods.....	78
5.2.1	Wildlife Habitat	78
5.2.2	Provincial and Federal Listed Species	79

Table of Contents (continued)

5.2.3	Traditional and Non-Traditional Use.....	79
5.2.4	Amphibians	79
5.2.5	Semi-aquatic Mammals.....	81
5.2.6	Carnivores and Terrestrial Furbearers	81
5.2.7	Ungulates.....	83
5.2.8	Upland Breeding Birds	85
5.2.9	Waterbirds.....	87
5.2.10	Raptors	89
5.3	Results.....	89
5.3.1	Wildlife Habitat	89
5.3.2	Provincial and Federal Listed Species	90
5.3.3	Traditional and Non-traditional Use.....	93
5.3.4	Amphibians	93
5.3.4.1	Boreal Chorus Frog	94
5.3.4.2	Wood Frog.....	94
5.3.5	Semi-aquatic Mammals.....	95
5.3.5.1	Muskrat.....	95
5.3.5.2	Beaver	96
5.3.5.3	River Otter	98
5.3.5.4	American Mink.....	98
5.3.6	Carnivores and Terrestrial Furbearers	99
5.3.6.1	Black Bear	99
5.3.6.2	Wolf	100
5.3.6.3	Red Fox.....	101
5.3.6.4	Lynx.....	102
5.3.6.5	Wolverine.....	103
5.3.6.6	Fisher and American Marten	104
5.3.6.7	Weasel Species.....	106
5.3.6.8	Snowshoe Hare	108

Table of Contents (continued)

5.3.6.9	American Red Squirrel.....	108
5.3.7	Ungulates.....	110
5.3.7.1	Moose.....	110
5.3.7.2	Barren-ground Caribou.....	112
5.3.7.3	Woodland Caribou.....	113
5.3.8	Upland Breeding Birds.....	114
5.3.8.1	Population Status and Distribution.....	114
5.3.8.2	Species Level Results.....	116
5.3.8.3	Community Level Results.....	120
5.3.8.4	Habitat Selection and Foraging.....	123
5.3.9	Waterbirds.....	123
5.3.9.1	Population Status and Distribution.....	123
5.3.9.2	Habitat Selection and Foraging.....	126
5.3.10	Raptors.....	126
5.3.10.1	Population Status and Distribution.....	126
5.3.10.2	Habitat Selection and Foraging.....	129
5.4	Summary.....	130
5.4.1	General Setting.....	130
5.4.2	Wildlife Habitat.....	131
5.4.3	Provincial and Federal Listed Species.....	131
5.4.3.1	Methods.....	131
5.4.3.2	Results.....	131
5.4.4	Traditional and Non-traditional Use.....	132
5.4.4.1	Methods.....	132
5.4.4.2	Results.....	132
5.4.5	Amphibians.....	132
5.4.5.1	Methods.....	132
5.4.5.2	Results.....	132
5.4.6	Semi-aquatic Mammals.....	132

Table of Contents (continued)

5.4.6.1	Methods.....	132
5.4.6.2	Results.....	133
5.4.7	Carnivores and Terrestrial Furbearers	134
5.4.7.1	Methods.....	134
5.4.7.2	Results.....	134
5.4.8	Ungulates.....	137
5.4.8.1	Methods.....	137
5.4.8.2	Results.....	137
5.4.9	Upland Breeding Birds	138
5.4.9.1	Methods.....	138
5.4.9.2	Results.....	139
5.4.10	Waterbirds.....	141
5.4.10.1	Methods.....	141
5.4.10.2	Results.....	141
5.4.11	Raptors	142
5.4.11.1	Methods.....	142
5.4.11.2	Results.....	142
6.0	GLOSSARY.....	143
7.0	REFERENCES.....	148

TABLES

Table 3.2-1:	Criteria for Determining Water Erosion Rating.....	9
Table 3.2-2:	Criteria for Determining Water Erosion Potential	9
Table 3.2-3:	Criteria for Determining Wind Erosion Rating	10
Table 3.2-4:	Criteria for Rating the Sensitivity of Mineral Soils to Acidic Inputs	10
Table 3.2-5:	Cation Exchange Capacity Relationship to Soil Texture	11
Table 3.2-6:	Criteria for Rating the Sensitivity of Wetland Soils to Acidic Inputs.....	11
Table 3.2-7:	Criteria for Determining Compaction Ratings of Soils	13
Table 3.3-1:	Distribution of Soil Map Units Within the Terrestrial Local Study Area.....	15
Table 3.3-2:	Water Erosion Potential for Soil Map Units within the Local Study Area.....	21

Table of Contents (continued)

Table 3.3-3:	Wind Erosion Ratings for Soil Map Units within the Local Study Area	23
Table 3.3-4:	Acidification Ratings for Soil Map Units within the Local Study Area	25
Table 3.3-5:	Permafrost Potential for Soil Map Units within the Local Study Area	26
Table 3.3-6:	Compaction Ratings for Soil Map Units within the Local Study Area	27
Table 4.3-1:	Absolute and Relative Area of Ecological Landscape Classification Map Units within the Regional Study Area	40
Table 4.3-2:	Absolute and Relative Area of Ecological Landscape Classification Map Units within the Local Study Area	42
Table 4.3-3:	Number of Detailed Vegetation Inventory and Listed Plant Survey Plots per Ecological Landscape Classification Map Unit in the Regional and Local Study Areas	52
Table 4.3-4:	Biodiversity Measures by Ecological Landscape Classification Map Unit within the Regional Study Area	54
Table 4.3-5:	Species Richness by Detailed Vegetation Sample Plots in the Regional Study Area	57
Table 4.3-6:	Listed Vascular Plant Species Confirmed to Occur Within the Regional and Local Study Areas	61
Table 4.3-7:	Listed Ground-dwelling and Epiphytic Lichen Species Confirmed to Occur Within the Local and Regional Study Areas	64
Table 4.3-8:	Potential of Ecological Landscape Classification Map Units in the Regional and Local Study Areas to Support Listed Plant Species	66
Table 4.3-9:	Distribution of Listed Plant Species Habitat Potential within the Regional and Local Study Areas	67
Table 4.3-10:	Traditional Use Plants of the Northern Boreal Forest	70
Table 4.3-11:	Potential of Ecological Landscape Classification Map Units in the Regional and Local Study Areas to Support Traditional Use Plants	71
Table 4.3-12:	Distribution of Traditional Use Plant Species Habitat Potential within the Regional and Local Study Areas	72
Table 5.3-1:	Provincial and Federal Listed Species Having Potential to Occur in the Regional Study Area, 2012	91
Table 5.3-2:	Trapping Season Dates for Furbearing Species that are Expected to Occur in the Regional Study Area for the 2012 to 2013 Season	93
Table 5.3-3:	Wetland and Weather Conditions during the Amphibian Calling Surveys, 2012	94
Table 5.3-4:	American Mink Snow Track Density among Habitats within the Regional Study Area, 2012	99
Table 5.3-5:	American Red Fox Snow Track Density among Habitats within the Regional Study Area, 2012	102
Table 5.3-6:	Fisher and American Marten Snow Track Density among Habitats within the Regional Study Area, 2012	105
Table 5.3-7:	Weasel Species Snow Track Density among Habitats within the Regional Study Area, 2012	107
Table 5.3-8:	Snowshoe Hare Snow Track Density among Habitats within the Regional Study Area, 2012	108
Table 5.3-9:	American Red Squirrel Snow Track Density among Habitats within the Regional Study Area, 2012	109
Table 5.3-10:	Moose Snow Track Density among Habitats within the Regional Study Area, 2012	111

Table of Contents (continued)

Table 5.3-11:	Mean (\pm 1SE) Density (individuals per hectare) of Upland Breeding Bird Species among Habitats in the Regional Study Area, 2012.....	117
Table 5.3-12:	Grouse Snow Track Density among Habitats within the Regional Study Area, 2012.....	120
Table 5.3-13:	Ptarmigan Snow Track Density among Habitats within the Regional Study Area, 2012.....	120
Table 5.3-14:	Density (birds/hectare) and Observed Species Richness of Upland Birds for Habitats in the Regional Study Area, 2012.....	121
Table 5.3-15:	Adult Density (birds/hectare) (\pm 1SE) during Waterbird Breeding Surveys within the Regional Study Area, 2012.....	124
Table 5.3-16:	Adult Density (birds/hectare) (\pm 1SE) during Waterbird Productivity Surveys within the Regional Study Area, 2012.....	125
Table 5.3-17:	Juvenile Density (birds/ha) (\pm 1SE) during Waterbird Productivity Surveys within the Regional Study Area, 2012.....	126
 FIGURES		
Figure 1.2-1:	General Project Location.....	2
Figure 2.1-1:	Location of the Terrestrial Regional and Local Study Areas.....	4
Figure 3.3-1:	Terrain and Soil Survey Locations Within the Regional and Local Study Areas.....	14
Figure 3.3-2:	Soil Map Units in the Terrestrial Local Study Area.....	17
Figure 4.2-1:	Vegetation Survey Locations within the Regional and Local Study Areas.....	36
Figure 4.3-1:	Ecological Landscape Classification for the Regional Study Area.....	41
Figure 4.3-2:	Ecological Landscape Classification for the Local Study Area.....	43
Figure 4.3-3:	Locations of Listed Plant Species Observations in the Regional Study Area.....	60
Figure 4.3-4:	Locations of Listed Lichen Observations in the Regional Study Area.....	63
Figure 4.3-5:	Listed Plant Habitat Potential within the Regional Study Area.....	68
Figure 4.3-6:	Traditional Use Plant Habitat Potential within the Regional Study Area.....	73
Figure 5.2-5:	Locations of Waterbird Breeding and Productivity Aerial Survey.....	88
Figure 5.3-1:	Locations of Beaver Dam and Lodge Observations in the Regional Study Area, 2012.....	97
Figure 5.3-2:	Mean (\pm 95% CI) Relative Abundance (birds per hectare) of Upland Breeding Birds among Habitat Types.....	122
Figure 5.3-3:	Species Richness Curve (95% Confidence Intervals) for Upland Breeding Birds within the Regional Study Area, 2012.....	122
Figure 5.3-4:	Incidental Observations of Raptor Species in the Regional Study Area, 2012.....	127

Table of Contents (continued)

APPENDICES

APPENDIX IV'1

Soil Data

APPENDIX IV'2

Vegetation Data

APPENDIX IV'3

Wildlife Data

1.0 INTRODUCTION

1.1 Project Proponent

In response to an increasing demand for energy in northern Saskatchewan, Black Lake First Nation (BLFN) together with Saskatchewan Power Corporation (SaskPower) are the Proponents of the Tazi Twé Hydroelectric Project (Project). Black Lake First Nation's interest in the Project is held through the Elizabeth Falls Hydro Limited Partnership (EFHLP).

1.2 Project Overview

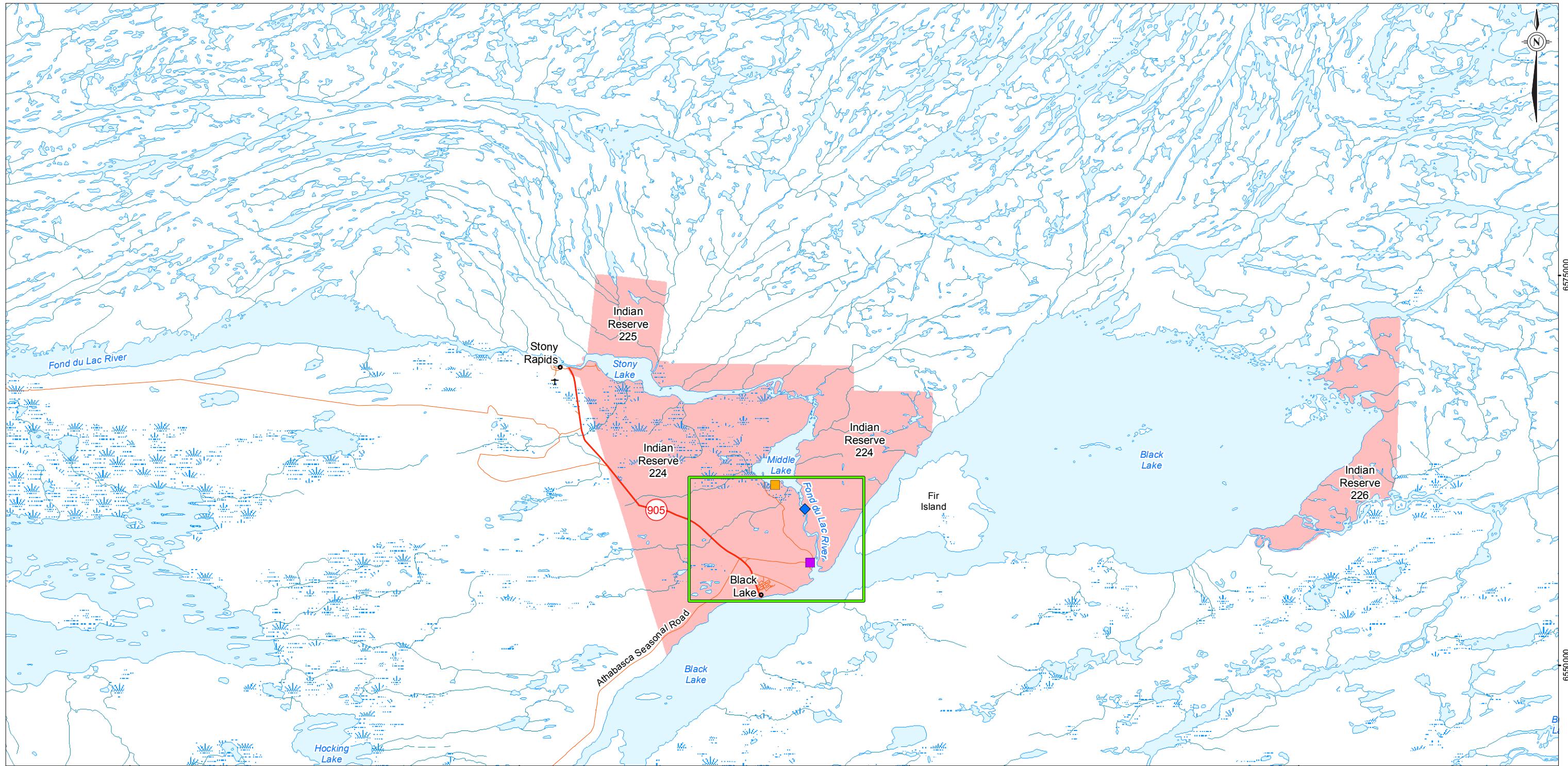
The proposed Project will be a 50 megawatt (MW) water diversion type electrical generating station. The Project is located on the Chicken Indian Reserve 224, approximately 7 kilometres (km) from the community of Black Lake adjacent to the Fond du Lac River between Black Lake and Middle Lake (Figure 1.2-1). Black Lake has an approximate area of 418 square kilometres (km²) and discharges an average flow of 305 cubic metres per second (m³/s) into the Fond du Lac River. The Fond du Lac River traverses Elizabeth Falls on its way to Middle Lake. Water from Black Lake will be diverted through an intake and power tunnel to the powerhouse before being released through a tailrace channel into the Fond du Lac River, which ultimately discharges into Middle Lake.

The principal components of the Project consist of the following:

- gravel, all-season access road to the Project site from the all-season road between the communities of Stony Rapids and Black Lake;
- bridge over the Fond du Lac River;
- powerhouse and associated infrastructure;
- water intake and power tunnel to convey flow from Black Lake to the powerhouse;
- tailrace channel from the powerhouse to the Fond du Lac River just upstream of Middle Lake;
- submerged weir located in the Fond du Lac River at the outlet of Black Lake at Grayling Island;
- transmission lines and switching stations to connect to the northern Saskatchewan electrical grid; and
- all related physical works and physical activities required to carry out these works, including the associated coffer dams, access roads, laydown areas, construction camp, borrow areas, waste rock piles, concrete batch plant, fuel storage facility and fueling areas, explosives storage, construction camp, and sewage treatment and potable water facilities.

1.3 Objective of the Baseline Report

The objective of this baseline report is to provide information on the current environmental conditions related to the terrestrial environment. This information will be used to support assessment of the effects of the proposed Project on biophysical and socio-economic environments in the area.



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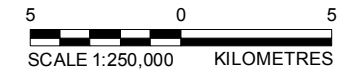
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LEGEND

- VILLAGE
- ✚ RUNWAY
- HIGHWAY
- ROAD
- RIVER
- WETLAND
- WATERBODY
- INDIAN RESERVE
- ◆ ELIZABETH FALLS
- CAMP GRAYLING
- PERMANENT RESIDENT'S CABIN
- GENERAL PROJECT LOCATION

REFERENCE

DMT1 HIGHWAYS AND ROADS
 NTS MAPSHEET 74I, 74J, 74O, 74P
 DATUM: NAD 83 PROJECTION: UTM ZONE 13



PROJECT		TAZI TWÉ HYDROELECTRIC PROJECT	
TITLE		GENERAL PROJECT LOCATION	
PROJECT		10-1365-0004	FILE No.
DESIGN	SM	12/07/13	SCALE AS SHOWN
GIS	SM	12/07/13	REV. 1
CHECK	BC	12/07/13	FIGURE: 1.2-1
REVIEW	BC	25/07/13	



2.0 STUDY AREAS

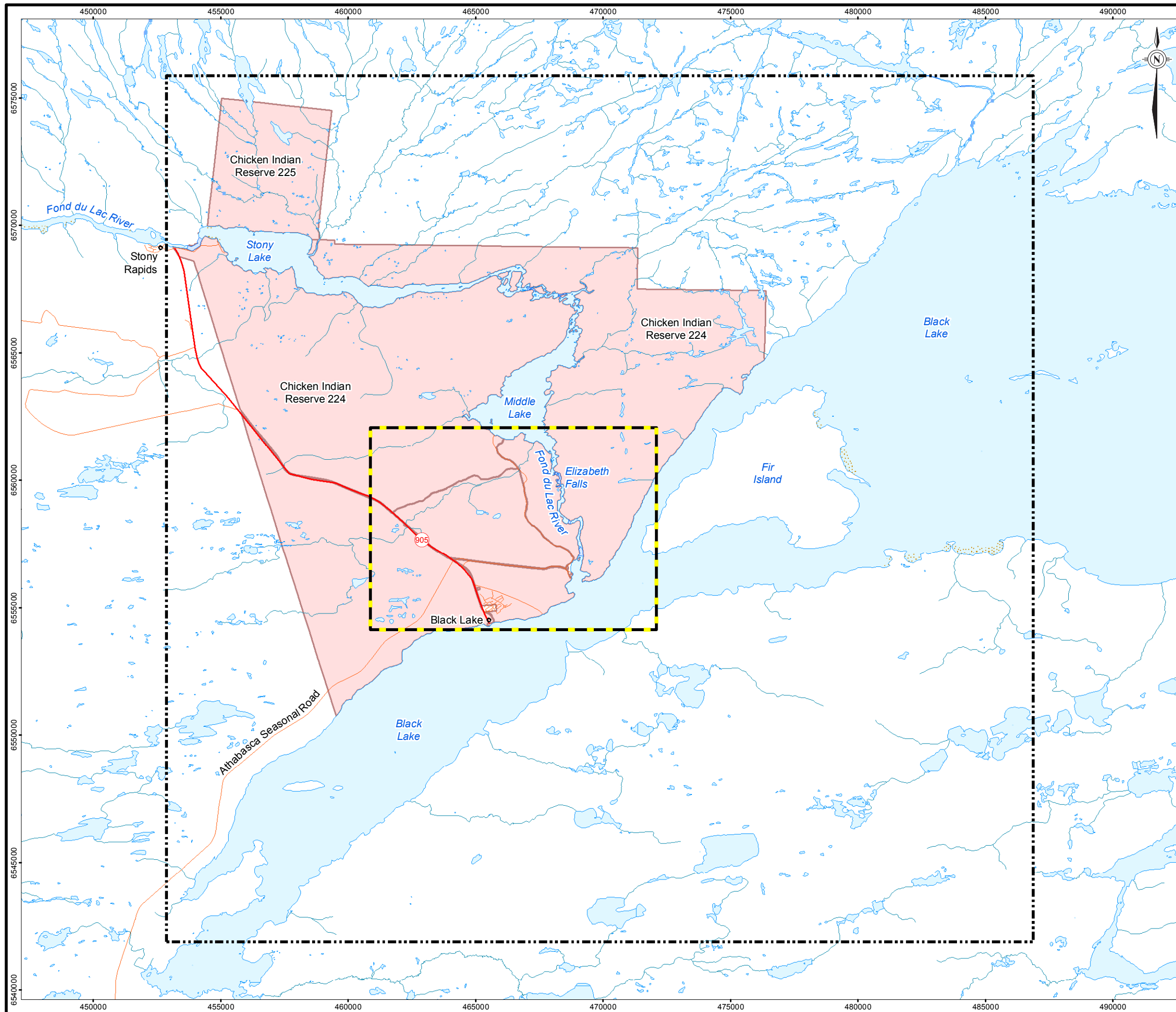
To quantify baseline conditions and assess Project-related effects on the terrestrial environment, a regional study area (RSA) and a local study area (LSA) were defined for all terrestrial components (soil and terrain, vegetation, and wildlife). Survey intensity varied within each spatial boundary depending on the baseline study objectives for each physical condition, species, and habitat.

2.1 Regional Study Area

The Project is located in an area with a relatively low level of human-related disturbance. The area north of the main body of Black Lake and the Fond du Lac River currently has no human-related disturbances, except for isolated fishing camps and cabins. The community of Black Lake is located approximately 7 km southwest of the Project and Stony Rapids is located approximately 25 km northwest. Camp Grayling is a fishing camp located approximately 2.5 km south of the Project. Other human-related disturbances in the vicinity of the Project include small developments (<8 hectares [ha]), including old gravel and borrow pits, cabins, the Black Lake sewage lagoon, and linear features such as all-terrain vehicle and snowmobile trails. Highway 905, an all-season road, connects the communities of Black Lake and Stony Rapids.

The RSA selected for terrain and soils, vegetation, and wildlife consisted of a 1,156 square kilometre (km²) (115,600 ha) area centred on the Project (Figure 2.1-1). Because terrain and soils, and vegetation in the Project area are also present across the RSA, the RSA was selected based on the predicted spatial extent of the combined direct and indirect effects on wildlife from the Project. Direct effects from the Project include mortality to individuals from physical hazards (e.g., infrastructure, vehicle collisions), and physical changes to terrain and soils, vegetation, and surface water (i.e., wildlife habitat) from the Project footprint, which occur mostly at the local scale. Indirect effects from the Project may extend beyond the immediate Project footprint (i.e., sensory disturbances such as noise, lights, and smells, and other factors that can indirectly effect the environment at a distance). Most wildlife species are highly mobile and can interact with other human activities near the Project. Effects from human-related sensory disturbance on bird and mammal populations can extend over 1 km and 5 km, respectively (Benitez-Lopez et al. 2010). The RSA boundary is at least 8 km from the Project and so should encompass unaffected (i.e., reference) areas and areas influenced by the Project and other human activities.

The RSA is expected to be large enough to contain the local populations of all plant and most wildlife species and communities that are present in the RSA. A population is a group of individuals of the same species that is primarily affected by natural and human-related factors that change survival and reproduction of individuals; emigration and immigration do not greatly affect the population size (Berryman 2002). Developments outside of the RSA were expected to have little to no influence on plant populations and wildlife species with small to medium-sized home ranges. Moose (*Alces alces*), black bear (*Ursus americanus*), and wolf (*Canis lupus*) are large mammals that have moderate to high potentials of occurring in the RSA. These three species have large home ranges and so the RSA may not contain the entire population that is in the vicinity of the Project. However, moose, wolf, and black bear densities in the RSA are low and sensory effects from the Project are not expected to influence individuals that are further than 5 km from the Project (Benitez-Lopez et al. 2010). Therefore, the number of individuals that are expected to be influenced by the Project is small, and effects to individuals are not likely to be measurable at the population level.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- INDIAN RESERVE
- TERRESTRIAL REGIONAL STUDY AREA
- TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
LOCATION OF THE TERRESTRIAL REGIONAL AND LOCAL STUDY AREAS			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM/LMR	12/07/13
	CHECK	ME	24/07/13
	REVIEW	BC	24/07/13
SCALE AS SHOWN		REV.	0
			FIGURE: 2.1-1

2.2 Local Study Area

The LSA is approximately 89 km² (8,881 ha), and includes preferred and alternative locations for Project infrastructure and the main access road (Figure 2.1-1). The LSA was based on the predicted direct and small-scale indirect effects from the Project on terrain and soil, vegetation, and wildlife. Direct effects include removal of soil, vegetation, and wildlife habitat from the Project footprint. Small-scale indirect effects include changes to soil and vegetation from dust deposition, air emissions, and surface water levels and flows. For species with small home ranges, such as upland breeding birds, the LSA could contain habitat that is capable of supporting all requirements necessary for the survival and reproduction of individuals, including forage, cover, and breeding habitat.

3.0 TERRAIN AND SOILS

3.1 Introduction

Terrain and soils are important components for a functioning ecosystem and are linked to one another because terrain influences soil development and distribution across the landscape. Soil is a complex heterogeneous medium consisting of variable amounts of minerals, organic matter, water and air, and supports organisms, including bacteria, fungi, invertebrates, plants, and other animal life. The diverse fauna of macro- and micro-organisms are critical for healthy ecosystems. Soil macro- and micro-organisms are responsible for organic matter decomposition, nutrient cycling, and organic waste decomposition, which in turn influence the health of an ecosystem.

The terrain and soils baseline describes key characteristics and existing conditions of terrain and soils in the RSA, with a particular focus on the LSA. Baseline information will be used for the assessment of Project effects on the terrestrial environment and will help to identify mitigation and protective actions that could be implemented to avoid or reduce potential adverse effects to the existing environment. The following sections include data and information collected during the 2012 baseline survey and a review of current literature.

The objectives of the terrain and soils baseline is:

- to describe terrain and soils in the RSA, with a focus on soil in the LSA;
- to describe existing soil properties, soil quality, and soil quantity in the RSA, with a focus on soil in the LSA;
- to evaluate soil sensitivity to erosion, acidification, and compaction in the RSA, with a focus on soil in the LSA; and
- to evaluate the potential for the occurrence of permafrost in the RSA and LSA.

To meet these objectives, the terrain and soils baseline has been organized into the following sections.

Section 3.2 describes approaches for characterizing the terrain and soils that occur in the study areas and includes the methods and rationale for producing a description of terrain and soils.

Section 3.3 provides quantitative information on the distribution of terrain and soils within the LSA.

3.1.1 Regional Terrain and Soils

The RSA and LSA are situated on a transitional area between the boundaries of the Taiga Shield and Boreal Shield Ecozones in Saskatchewan (Acton et al. 1998). The north portion of the RSA is in the Uranium City

Upland Landscape Area within the Tazin Lake Upland Ecoregion of the Taiga Shield Ecozone. The south and southeastern portion of the RSA is situated in the Lower Cree River Plain and Fond du Lac Lowland Landscape areas of the Athabasca Plains Ecoregion of the Boreal Shield Ecozone. This area is characterized by a subarctic climate with long, very cold winters and short, cool summers. Permafrost is uncommon but may occur in localized areas of deep organic terrain.

The Uranium City Upland Landscape Area is a large area lying to the north of Lake Athabasca, Fond du Lac, and Black Lake. Rugged crystalline basement rocks in this landscape area are sparsely covered with glacial drift. The terrain is very rugged, with elevations ranging from less than 300 m along the southern margin to approximately 500 m in the northern part. Steep bedrock ridges occur throughout the area. Brunisolic soils form in the thin veneer of sandy and bouldery glacial till and occur between the bedrock outcrops. Organic soils occur in low-lying and poorly drained areas. Cryosolic soils, if present, also occur in these depressional areas.

The Lower Cree River Plain Landscape Area is predominantly a drumlinoid moraine that is extensively, but not completely, covered with undulating glaciofluvial deposits. Brunisolic soils dominate well-drained areas in the landscape, with Gleysols and Organics occurring in the poorly drained depressional areas. Local Cryosols, if present, also occur in these depressional areas.

The Fond du Lac Lowland Landscape Area is a small area extending along the south shore of Fond du Lac from Lake Athabasca to Black Lake. The southern part of the landscape area is dominated by a blanket of sandy glacial till with prominent drumlins and local outwash deposits. A sandy glaciolacustrine plain occurs at the area bordering the Fond du Lac River and Black Lake. Brunisolic soils dominate the well-drained landscape positions. Gleysols and Organics and local Cryosols occur in poorly drained areas.

3.2 Methods

The terrain and soil baseline report presents a review and interpretation of qualitative and quantitative information from data collected during the 2012 field program and from reviewed literature. Additional sources of information and data used to complete the terrain and soil baseline report included Ecological Land Classification (ELC) map units derived from the 2012 vegetation surveys completed by Golder ([Section 4.0](#)).

3.2.1 Field Program

A baseline field program was completed from June 1, 2012 through June 12, 2012. The field program was designed as a level four survey intensity level (broad reconnaissance survey) that identified common soil subgroups used to delineate map units as described in [Section 3.2.2](#) (Agriculture Canada 1987). A total of 56 sites were surveyed within the RSA, with 35 locations occurring in the LSA. At each site, soil profiles were characterized to a maximum depth of 120 centimetres (cm). Terrain and soil data collected during the field program were used for soil classification and mapping descriptions.

Terrain and soil data collected at each site included landform, slope position, slope class, slope length, land use, drainage, horizonation, colour, texture, structure, consistence, root presence, coarse fragment content, presence of carbonates, moisture regime, and vegetation cover as per The Canadian Soil Information System Manual for Describing Soils in the Field (Agriculture Canada 1982).

3.2.2 Soil Classification and Mapping

Based on information obtained during the 2012 field program, soils were classified to the subgroup level according to the Canadian System of Soil Classification (Soil Classification Working Group [SCWG] 1998). In particular, Brunisolic soils were classified to the great group level based on soil pH of the B horizon; Podzolic soils were classified based on soil chemistry properties of the B horizon; Folisols were classified based on the presence of upland organic material layers greater than 10 cm in thickness overlying bedrock; and peaty phase Gleysolic soil profiles classified as such based on an organic layer of greater than 15 cm and less than 60 cm overlying mineral soil (SCWG 1998).

Brunisolic and Podzolic soils were classified to the great group based on soil chemistry criteria outlined in the Canadian System of Soil Classification (SCWG 1998). Samples were submitted to ALS Environmental Laboratory in Saskatoon for analysis. Basic chemistry required for determining the Brunisolic great group is pH determined by using 0.01 molar (M) calcium chloride (CaCl_2). Basic chemistry for determining the Podzolic great group includes pH, total organic carbon content, and extractable iron and aluminum.

Soil mapping was completed following guidelines outlined in A Soil Mapping System for Canada: Revised (Agriculture Canada 1981). Soils were generally grouped into four landscape (terrain) areas including upland landscape positions for well drained soils; depressional (wetland) landscape positions for very poorly drained soils; transition landscape positions (between upland and wetland positions) for poorly to imperfectly drained soils (possibly exhibiting peaty phase characteristics); and bedrock landscape positions for bedrock sites void of soil development.

Soil mapping involved the correlation of field observations and soil classification to topographic maps and mapped ELC vegetation units. Landsat satellite imagery (30 m by 30 m resolution, June 24, 2010) was used to classify vegetation units for the ELC map for the LSA (Section 4.2.2). Topographic maps (1:50,000 National Topographic System maps) were used to identify general relief and changes in terrain. Vegetation map units were used to derive correlations between topographic features and the ELC vegetation types. Soil inspection information was applied considering principles of geomorphology and surficial geology, in combination with ground-truthed soil and vegetation patterns. The primary characteristics used to group soil types into map units included dominant soil texture and parent material, soil moisture regime, soil subgroup, and terrain (slope and surface expression). Map units (soil polygons) were created for the LSA after considering relationships between map resources, ELC vegetation units, satellite imagery, and field data. As there are no published soil surveys for the LSA, soil map unit names were assigned based on the dominant parent material (mineral, organic, or bedrock) within the map unit area.

Due to the coarse resolution of the ELC data, many soil map units include both mineral and organic soil subgroups. Soil subgroups (or groups of multiple soil subgroups) within map units are defined as dominant, co-dominant, sub-dominant, or inclusions based on the proportion of each soil subgroup present in the map unit. Dominant soil subgroups represent the most common soil subgroup within the map unit and typically occupied between 60 percent (%) to 100% of the map unit. Co-dominant soil subgroups are defined as soil subgroups that occur in near equal proportion (approximately 40% to 60% of the map unit), and sub-dominant soil subgroups represent a minor proportion of the map unit (typically 20% to 40%). Inclusions represent soil subgroups that occupy a minor amount (approximately 15% to 20%) of the map unit area and are generally found sporadically and infrequently. Soil subgroups that represented less than 15% of the map unit were not

mapped. Although bedrock is not a soil subgroup, it was listed as dominant, co-dominant, sub-dominant, or inclusion where applicable.

Existing Disturbance map units encompass areas of existing disturbance that is a result of areas modified by human activity, such as roads, the community of Black Lake, the Black Lake sewage lagoon, Camp Grayling, and borrow/gravel pits. These were mapped based on visual identification of roads from satellite imagery and the ELC map. Not all Existing Disturbance map unit areas identified on the vegetation ELC map were applied to the soil map because disturbance contributing to changes in vegetation (e.g., cut lines) does not necessarily result in disturbance to soil.

3.2.3 Soil Sensitivities in the Local Study Area

Soil sensitivities that have the potential to affect soil quality include erosion, acidification, permafrost, compaction and soil chemistry. Changes to soil quality may influence the ability of soil to support vegetation; therefore these sensitivities are outlined in the following sections.

3.2.3.1 Erosion Sensitivities

The risk of soil erosion from water and/or wind is influenced by many factors including soil particle size, organic matter content, water content, permeability, topography, slope gradient, vegetation cover, natural events (e.g., freeze-thaw), as well as human activities that cause soil disturbance (Cruse et al. 2001; Campbell et al. 2002; Transportation Association of Canada [TAC] 2005). Erosion from water and wind differ by the processes that move detached soil particles, and each process of erosion affects soil differently. The outcome of soil erosion is important because of potential off-site effects, including the sedimentation of adjacent waterbodies and the release of chemicals from the soil into surface water, which may alter water quality (Kuhn and Bryan 2004).

Soil erosion risk is one of the primary concerns for disturbed soils because the removal of vegetation cover exposes soil materials to wind and water. Depending on terrain and soil characteristics, with continuous exposure of soil to wind or rain, soil materials may be eroded, washed, or blown away and may result in the loss of topsoil and a reduction in soil quality.

Erosion potentials describe the potential for soil to move, and do not necessarily describe the ecological, project, and legal consequence of soil erosion. Ecological consequences are related to the receiving environment sensitivity. Ecologically sensitive areas can include waterbodies, riparian and terrestrial areas. Soil erosion can also affect soil quality. Project consequences can include schedules and costs, whereas legal consequences can include those related to provincial or federal legislation. The higher the consequence of soil erosion, the more mitigation may be required to control erosion. Soil sensitivity to water and wind erosion were assigned to soil map units within the LSA and are described in more detail in the following subsections.

3.2.3.1.1 Water Erosion Sensitivity

The potential for soil erosion by water is affected by soil texture, organic matter content, water content, permeability, topography, slope gradient, and vegetation cover. Finer textured clayey soils tend to be less prone to erosion by water than silty soils (TAC 2005), especially when the soil structure has been disturbed by freeze-thaw or human activity (Cruse et al. 2001). The higher permeability of sandy textured soils contributes to a lower potential for over-land flow of water, thus decreasing the potential for soil erosion. In areas where slope gradient and slope length increases, so does the potential for soil erosion regardless of soil texture.

Determining soil erosion potential by water is based on methods described by TAC (2005). Water erosion ratings and potentials were assigned to soil map units within the LSA based on characteristics of soils and terrain (i.e., topsoil texture, slope length, and gradient) recorded during the field programs. The uppermost mineral soil horizon textures of soil subgroups were used to determine the water erosion rating (Table 3.2-1) as the first step in determining water erosion potential. Water erosion potential was then determined based on the water erosion rating, dominant slope class, and dominant slope length (Table 3.2-2). Water erosion potentials were then assigned to map units within the LSA. In areas where slope gradient increases, so does the potential for soil erosion regardless of soil texture. Water erosion potentials are based on bare, unprotected soils.

Table 3.2-1: Criteria for Determining Water Erosion Rating

Soil Texture	Water Erosion Rating
Silt, Silt Loam, Loam	High
Sandy Loam, Silty Clay Loam, Sandy Clay Loam, Silty Clay, Clay Loam	Medium
Sandy Clay, Clay, Heavy Clay, Loamy Sand, Sand	Low

Source: TAC (2005).

Table 3.2-2: Criteria for Determining Water Erosion Potential

Slope Gradient	Water Erosion Rating ^(a)	Slope Length	
		<70 m	>70 m
0% to 10%	Low	Low	Low
	Medium	Low	Moderate
	High	Moderate	High
10% to 20%	Low	Low	Moderate
	Medium	Moderate	High
	High	High	High
>20%	Low	Moderate	Moderate
	Medium	High	High
	High	High	High

Source: TAC (2005).

^(a) determined from Table 3.2-1

m = metres; % = percent; <= less than; >= greater than

3.2.3.1.2 Wind Erosion Sensitivity

The potential for soil erosion by wind is affected by vegetation cover, wind velocity, soil water content, and soil texture. In general, coarse (sandy) textured soils are more prone to wind erosion than finer (clay) textured soils (Coote and Pettapiece 1989). Sandy textured soils typically do not have a well-developed soil structure. The lack of soil structure is due to limited soil aggregation or adhesion of the soil particles, which does not allow for the formation of larger and more stable soil aggregates that are less likely to be moved by wind. Organic soils are typically less prone to wind erosion, unless they have dried out, or are disturbed (Campbell et al. 2002). Wind erosion of organic soils is a function of the degree of peat decomposition, thus the more highly decomposed (humic) the organic soil is the greater the risk for wind erosion.

Wind erosion ratings were assigned to the soil map units within the LSA. Mineral soil sensitivity was based on the uppermost mineral soil horizon texture and a dimensionless index described by Coote and Pettapiece (1989) (Table 3.2-3). Wind erosion ratings for Organic soils were assigned based on degree of peat decomposition based on Campbell et al. (2002) (Table 3.2-3). Wind erosion ratings are based on disturbed, bare soils for mineral soils and based on dry, disturbed conditions for Organic soils.

Table 3.2-3: Criteria for Determining Wind Erosion Rating

Soil Texture	Wind Erosion Rating
Very Fine Sand, Sand, Coarse Sand, Loamy Sand, Gravelly Sand, Humic	High
Sandy Loam, Loam, Silty Loam, Sandy Clay Loam, Sandy Clay, Mesic	Medium
Silt, Silty Clay Loam, Clay Loam, Silty Clay, Clay, Heavy Clay, Fibric	Low

Adapted from Coote and Pettapiece (1989) and Campbell et al. (2002).

3.2.3.2 Sensitivity to Acidification

The sensitivity of a soil to acidification is a measure of the decrease in soil pH that a soil would likely experience to a given addition of acid. Soils are categorized as having High, Medium, or Low sensitivity ratings. The ratings are based on the sensitivity to loss of basic cations (primarily calcium, magnesium, and potassium), sensitivity to acidification, and sensitivity to solubilization of aluminum. Soil map units in the LSA were rated for sensitivity to acidification based on the following criteria.

The sensitivity of mineral soils to acid deposition was evaluated using the chemical criteria published by Holowaychuk and Fessenden (1987) (Table 3.2-4). In general, neutral to alkaline soils (pH values greater than 6.5) have a lower sensitivity to acidification, because of an increased buffering capacity (Holowaychuk and Fessenden 1987). As cation exchange capacity (CEC) increases, the associated soil pH can be less, and remain less sensitive to acidic inputs. Soils that are high in clay and organic matter content are characterized as having a higher CEC, and therefore a Low sensitivity to acidification.

Table 3.2-4: Criteria for Rating the Sensitivity of Mineral Soils to Acidic Inputs

Cation Exchange Capacity (meq/100 g)	pH	Overall Sensitivity
<6	<4.6 to 6.5	High
	>6.5	Low
6 to 15	<4.6	High
	4.6 to 6.0	Medium
	>6.0	Low
>15	<4.6	High
	4.6 to 5.5	Medium
	>5.6	Low

Modified from Holowaychuk and Fessenden (1987).

meq/100 g = milliequivalents of ammonium cation (NH₄⁺) adsorbed by 100 grams of dry soil; < = less than; > = greater than

Because soils were not analysed for CEC, an estimation of the range of CEC related to soil texture was compiled (Table 3.2-5). Soil textures were then used to estimate the sensitivities of soils to acidification. For soils where pH was obtained, the pHs were considered in the determination of acidification sensitivity.

Table 3.2-5: Cation Exchange Capacity Relationship to Soil Texture

Texture	Typical Range of Cation Exchange Capacities (meq/100 g)
Sand and Loamy Sand	<6
Sandy Loam	6 to 15
Loam and Silt Loam	12 to 22
Clay Loam and Silty Clay Loam	20 to 30
Clay	25 to 45

Derived from soil data presented in Holowaychuk and Fessenden (1987).

meq/100 g = milliequivalents of ammonium cation (NH₄⁺) adsorbed by 100 grams of dry soil; < = less than; > = more than

The sensitivity rating for Organic soil is based on the type of wetland (i.e., bog, poor fen, moderate rich fen, and extreme rich fen) (Turchenek et al. 1998). These criteria are based on the pH, CEC, and percent base saturation of the surface layer of organic soil in each wetland type, as well as the pH and base cation content of the associated pore water.

In general, moderate rich and extreme rich fens (moderate to high nutrient status and neutral pH or higher [greater than pH 6]) tend to be least susceptible to acidification (Table 3.2-6). In moderate and rich fens, water supply is from surface water or groundwater, which is typically mineral-rich and neutral in pH. Fens are not hydrologically isolated, and therefore receive mineral-rich surface or groundwater which influences their pH and nutrient content. Due to the incoming water, the acid buffering capacity is replenished and water is eventually discharged from the wetland through lateral flow. Organic soils that occur in moderate and rich fens are least susceptible to acidification and therefore have a Low sensitivity rating (Table 3.2-6).

Table 3.2-6: Criteria for Rating the Sensitivity of Wetland Soils to Acidic Inputs

Wetland Type	Sensitivity to:		Overall Sensitivity Rating
	Base Loss	Acidification	
Extreme Rich Fen	Low	Low	Low
Moderate Rich Fen	Low to Medium	Low	Low
Bog and Poor Fen	Medium to High	Medium	Medium

Source: Turchenek et al. (1998)

Bogs are hydrologically isolated, and therefore these wetlands mainly get their water from precipitation and are very low in nutrients and more acidic. In addition, a larger volume of organic (peat) material is present at the surface of bogs that can react with incoming acidity. Poor fens, although slightly higher in nutrient status and pH than bogs, represent an intermediate between bogs and rich fens. Peat accumulation in poor fens is ongoing, and influence of underlying mineral material is reduced as compared to richer fen types. In poor fens there is less material present to react with incoming acidity and buffering capacity may not be replenished as quickly through water inputs. Organic soils that occur in bogs and in poor fens are most susceptible to acidification and therefore have a Medium sensitivity rating (Table 3.2-6).

3.2.3.3 Permafrost Potential

Permafrost is defined as permanently frozen soil or rock and incorporated ice and organic material that remains at or below 0 degrees Celsius (°C) for a minimum of two years due to natural climatic factors (van Everdingen 1998). The distribution and thickness of permafrost is influenced by various factors including climate, topography, peat thickness, winter snow accumulation, hydrology, and subsurface geology. Peat thickness, vegetation cover, micro-topography (i.e., presence of hummocks), and moisture content are important variables in predicting the presence of permafrost (Williams and Burn 1996).

Permafrost soils are sensitive to ground disturbances as changes to surface materials can alter the soil thermal regime and result in warming of the soil to a greater depth, and cause persistent ice to melt (Hayhoe and Tarnocai 1993). This can result in differential thaw settling, slumping, and increase wind and water erosion potential (Burgess and Harry 1990; Hayhoe and Tarnocai 1993). The potential effects of disturbance on permafrost soils depends on soil ice content, soil type, drainage, and vegetative cover. Organic soils in wetlands are particularly sensitive to disturbance and melting of ice because of their low bulk densities and potentially high ice content (Magnusson and Stewart 1987). However, depressional topography, high moisture content, dense vegetation cover, thickness of snow cover, and thickness of surface organic matter can have an insulating effect on permafrost (i.e., keep it frozen) (Judge 1973; Tarnocai 1984; Zoltai 1995; Williams and Burn 1996).

Permafrost potential was assigned to the soil map units within the LSA. Permafrost potential ratings for each soil subgroup were assigned based on soil type, drainage, soil texture, and topography observed during the field program. Location of the Project, with respect to the permafrost zone in which it occurs, was also considered. Poor to imperfectly drained soils were rated as having a Low to Moderate permafrost potential, whereas moderate to rapidly drained soils were rated as having a Very Low potential for permafrost. If present, Cryosolic soils were rated as having a High potential for permafrost.

3.2.3.4 Sensitivity to Compaction

Soil capability to support vegetation can be reduced if soil becomes compacted. Soil compaction can also influence reclamation success by altering plant establishment and subsequent plant growth. Compaction of topsoil and subsoil can lead to a decrease in long-term productivity because of an increase in soil bulk density and soil strength, reductions in soil aeration (i.e., soil oxygen), reduced water infiltration and available soil water, restricted root growth, reductions in soil microbiological activity, and lowered nutrient uptake by vegetation. (Heuer et al. 2008; Blouin et al. 2008).

Generally, well-drained, coarse and medium textured soils (loams, sandy loam, loamy sand, loam) are less prone to compaction than fine-textured soils (silty clay loam, silty clay, clay loam, and clay). However, sensitivity to compaction can change based on soil moisture conditions (Lewis et al. 1989). For example, loamy-textured soils under wet conditions are more prone to compaction than the same soil texture under dry conditions. In finer-textured soil (i.e., clayey), saturated conditions may exist due to poor drainage (i.e., the smaller soil pore sizes related to these textures can reduce water movement through the soil) and as soil moisture increases, so does soil sensitivity to compaction.

Compaction ratings for map units in the LSA were determined using the criteria outlined in [Table 3.2-7](#), under moist conditions. Gleysolic soils and their peaty phases were assigned compaction ratings based on soil texture under wet (saturated) soil conditions. Organic soils were not assigned compaction ratings but should be treated with special management practices (e.g., rig matting) or avoided during construction. Bedrock was not assigned a compaction rating.

Table 3.2-7: Criteria for Determining Compaction Ratings of Soils

Soil Texture ^(a)	Compaction Rating ^(b)		
	Dry	Moist	Wet
Sandy (S, LS)	Low	Low	Moderate
Loamy (SL, L)	Low	Moderate	High
Silty (Si, SiL)	Moderate	High	Very High
Clayey (SC, SiCL, SCL, CL, SiC, C)	High	Very High	Very High

Source: Modified from Lewis et al. (1989).

^(a) S = sand; LS = loamy sand; SL = sandy loam; L = loam; Si = silt; SiL = silty loam; SC = sandy clay; SiCL = silty clay loam; SCL = sandy clay loam; CL = clay loam; SiC = silty clay; C = clay

^(b) Based on a coarse fragment content of less than 35% (if coarse fragment content is between 35% and 70% loamy and silty are grouped together and compaction rating is moderate, and clayey is high)

3.2.3.5 Soil Chemistry

Chemical constituents of underlying bedrock and associated rock leachate have the potential to be present in the upper soil strata because of soil formation from bedrock parent material, as well as upward leaching of metals from rock (Turk et al. 2012). Geochemistry results may give some indication of the presence of metals, metalloids, and radionuclides in underlying materials (Golder 2012). If these constituents are present in underlying materials, they have potential to be present in the overlying soil, and therefore identify potential soil chemistry sensitivities that may be associated with the presence of those metals, metalloids, and radionuclides.

3.3 Results

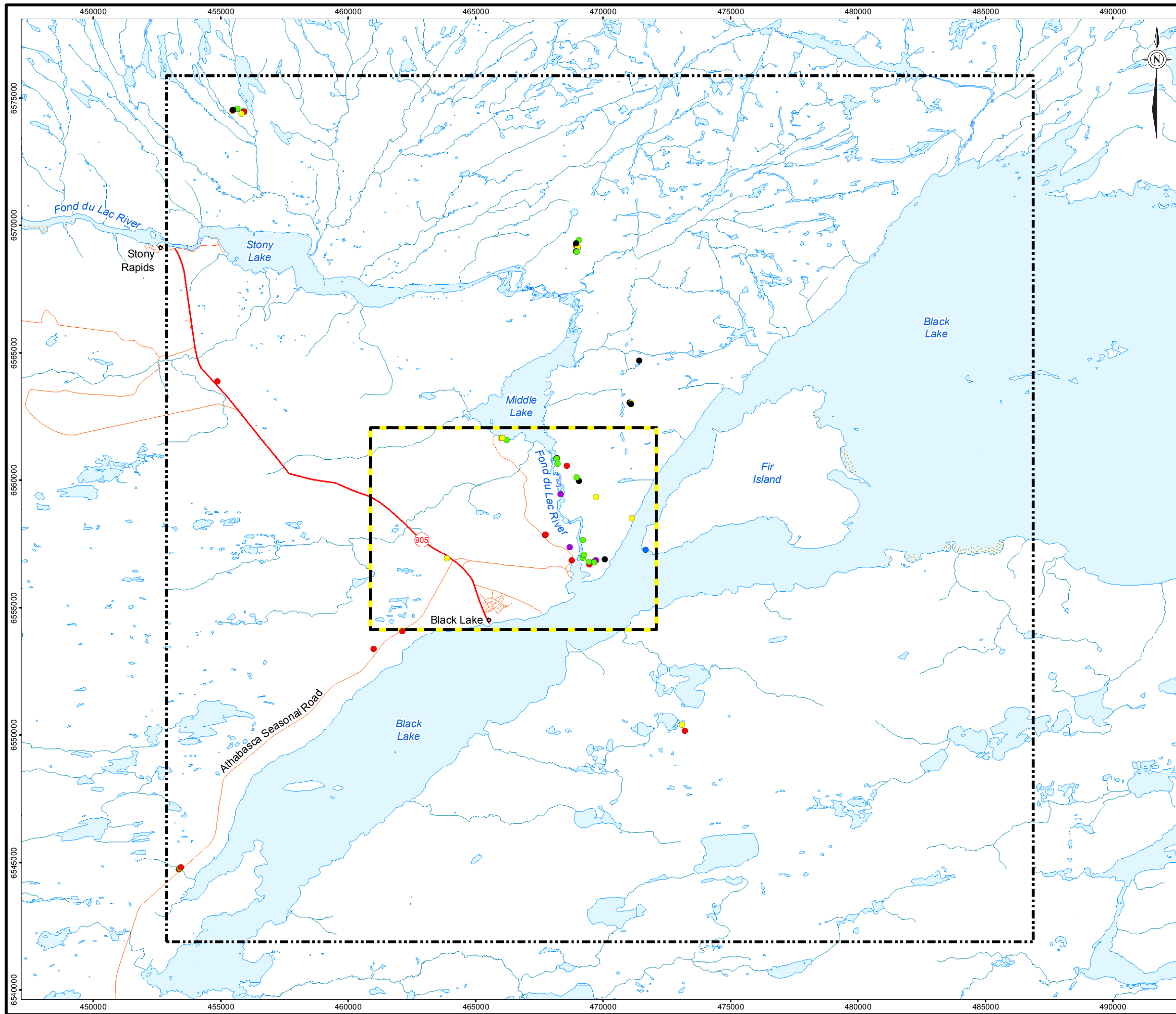
3.3.1 Field Program

During the baseline field program 56 sites were surveyed within the RSA, with 35 locations occurring with the LSA. Of the 56 sites surveyed, 30 were mineral soils, 15 were organic soils, and 11 were bedrock outcrop sites (Figure 3.3-1). Terrain and soils information for each survey site are available in Appendix IV.1 (Table IV.1-1 and Table IV.1-2).

3.3.2 Soil Classification and Mapping

3.3.2.1 Soil Classification

Mineral soils identified during the baseline field program included Brunisolic (15 total), Gleysolic (11 total, 3 of which were peaty phase), Regosolic (3 total), and Podzolic (1 total) soils. Soil pH, as determined by 0.01 M CaCl₂, of sampled B horizons from surveyed Brunisolic soils is available in Table IV.1-3 in Appendix IV.1. Podzolic soil profile chemistry is available in Table IV.1-4 in Appendix IV.1. Soils at 11 locations were classified as Organic, and included subgroups within the Fibrisol, Mesisol, and Folisol great groups. Eleven of the sites surveyed were identified as Bedrock (classified as a non-soil).



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY

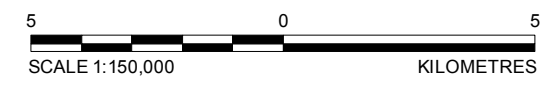
SOIL SURVEY LOCATION


- BEDROCK
- BRUNISOLIC
- GLEYSOLIC
- ORGANIC
- PODZOLIC
- REGOSOLIC

■ TERRESTRIAL REGIONAL STUDY AREA

■ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT		TAZI TWÉ HYDROELECTRIC PROJECT	
TITLE		TERRAIN AND SOIL SURVEY LOCATIONS WITHIN THE REGIONAL AND LOCAL STUDY AREAS	
 Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	LMR/SM	12/07/13
	CHECK	DD	24/07/13
	REVIEW	BC	24/07/13
			FIGURE: 3.3-1

Soils classified within the Brunisolic Order include Eluviated Eutric Brunisol, Eluviated Dystric Brunisol, Gleyed Eluviated Brunisol, and Orthic Dystric Brunisol. Confirmation of the great group classification (i.e., Eutric and Dystric) was confirmed using the B-horizon pH. One Orthic Humo-Ferric Podzol was identified. Regosolic soils include Orthic Regosol and Cumulic Regosol. Gleysolic soils included Rego Gleysol, Orthic Gleysol, peaty phase Rego Gleysol, and peaty phase Orthic Gleysol. Organic soils identified included Terric Mesisol, Typic Fibrisol, Terric Fibrisol, Hydric Fibrisol, and Hemic Folisol.

Brunisolic and other mineral soils (excluding Gleysols) were generally found at upland landscape positions. Gleysolic soils were generally found in transition areas between upland landscape positions and depressional landscape positions (i.e., wetlands). Organic soils were found in depressional areas.

3.3.2.2 Soil Mapping

The LSA covers an area of approximately 8,881 ha. Within the LSA, seven soil map units, an Existing Disturbance (DIS) map unit, and an Open Water (ZW) map unit have been delineated based on correlations with ELC vegetation classes, soil characteristics, and terrain features. The seven soil map units include four mineral map units (Mineral-1 [M1], Mineral-2 [M2], Mineral-3 [M3], and Mineral-4 [M4]), two organic map units (Organic-1 [O1], Organic-2 [O2]), and one bedrock map unit (Bedrock-1 [R1]), all of which capture the range of variability in soil subgroups present in the LSA.

The distribution and area (ha and %) of each map unit within the LSA is shown in [Table 3.3-1](#) and [Figure 3.3-2](#). The majority of the LSA is comprised of mineral soil map units, with the Mineral-1 (M1) map unit encompassing the largest proportion of the LSA (approximately 2,462 ha or 27.7% of the LSA). The Organic-2 (O2) map unit cover the smallest area of the LSA (approximately 46 ha or 0.5% of the LSA). Detailed descriptions of each map unit are provided below [Table 3.3-1](#).

Table 3.3-1: Distribution of Soil Map Units Within the Terrestrial Local Study Area

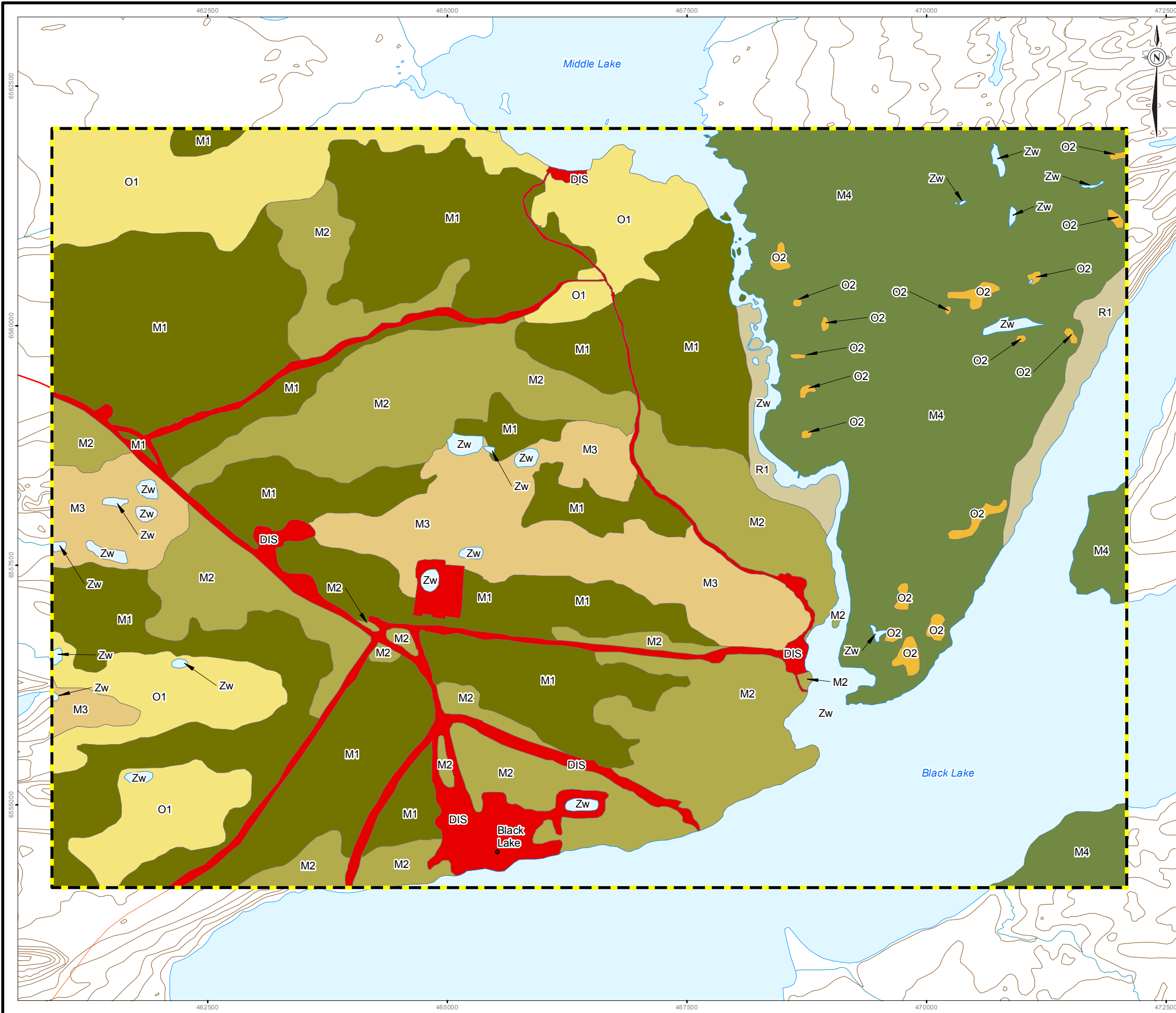
Map Unit Name	Map Unit Symbol	Proportion of LSA		Soil Subgroups in Map Unit ^(a)
		Area (ha)	Percent (%)	
Mineral-1	M1	2,462	27.7	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols
				Inclusions of Rego Gleysols and Terric Fibrisols
Mineral-2	M2	1,397	15.7	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols
				Sub-dominantly Rego Gleysols and Terric Fibrisols
Mineral-3	M3	604	6.8	Co-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols
				Co-dominantly Rego Gleysols and Terric Fibrisols
Mineral-4	M4	1,639	18.5	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols
				Inclusions of Hemic Folisols, Terric Fibrisols, and bedrock outcrop and fragmental material
Organic-1	O1	800	9.0	Dominantly Terric Fibrisols
				Sub-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols

Table 3.3-1: Distribution of Soil Map Units Within the Terrestrial Local Study Area (continued)

Map Unit Name	Map Unit Symbol	Proportion of LSA		Soil Subgroups in Map Unit ^(a)
		Area (ha)	Percent (%)	
Organic-2	O2	46	0.5	Dominantly Typic Fibrisols and Terric Fibrisols
				Inclusions of Gleysols
Bedrock-1	R1	127	1.4	Dominantly bedrock outcrop and fragmental material
				Inclusions of Terric Fibrisols and Gleysols
Existing Disturbance	DIS	377	4.2	N/A
Open Water	ZW	1,428	16.1	N/A
Total	-	8,881	100	-

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = near equal proportion of map unit area covered; sub-dominant soil subgroup(s) = cover 20% to 40% of map unit area; inclusions = cover 15% to 20% of the map unit area

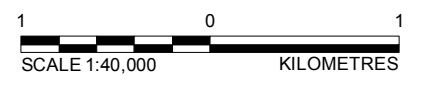
ha= hectares; % = percent; LSA = local study area; N/A = not applicable



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- CONTOUR LINE
- RIVER
- WATERBODY
- ▭ TERRESTRIAL LOCAL STUDY AREA
- MAP UNIT
- M1 (MINERAL-1)
- M2 (MINERAL-2)
- M3 (MINERAL-3)
- M4 (MINERAL-4)
- O1 (ORGANIC-1)
- O2 (ORGANIC-2)
- R1 (BEDROCK-1)
- ZW (OPEN WATER)
- DIS (EXISTING DISTURBANCE)

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEET: 74P/03, 04



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
SOIL MAP UNITS IN THE TERRESTRIAL LOCAL STUDY AREA			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	SM/LMR	25/07/13
	CHECK	DD	25/07/13
	REVIEW	BC	25/07/13
			FIGURE: 3.3-2

3.3.2.2.1 Mineral Map Units

The Mineral-1 (M1), Mineral-2 (M2), Mineral-3 (M3), and Mineral-4 (M4) soil map units combined make up approximately 6,103 ha (69.0%) of the LSA. The mineral map units differ from one another based on the distribution of dominant or co-dominant upland (mineral) soils and co-dominant, sub-dominant, and/or inclusion wetland (organic) or transition (mineral or peaty phase mineral) soils. The mineral map units also differ based on terrain and soil development.

3.3.2.2.1.1 Mineral-1 (M1)

The Mineral-1 (M1) soil map unit is the largest map unit in the LSA and covers approximately 2,462 ha (27.7%) of the LSA. This map unit dominantly consists of slightly stony to very stony, very rapid to moderately well drained Eluviated Dystric Brunisols and Eluviated Eutric Brunisols developed on nearly level to inclined and ridged relief (0 to 30%), coarse textured (sand, coarse sand, gravel and cobble) glaciofluvial materials. The unit contains inclusions of poorly drained Rego Gleysols developed on coarse textured (fine sand, sand, coarse sand) glaciofluvial material, and poorly to very poorly drained Terric Fibrisols. Gleysols are generally found in the lower slope positions, swales between undulations, hummocks or ridges, and in transitions to areas of very poor drainage. Fibrisols are generally found in depressions and low elevation areas with poor to very poor drainage. Imperfect drained Gleyed Eluviated Dystric Brunisols or Gleyed Eluviated Eutric Brunisols may occur sporadically within the unit.

3.3.2.2.1.2 Mineral-2 (M2)

The Mineral-2 (M2) soil map unit covers approximately 1,397 ha (15.7%) of the LSA. This map unit dominantly consists of slightly stony to very stony, very rapid to moderately well drained Eluviated Dystric Brunisols and Eluviated Eutric Brunisols developed on nearly level to inclined and ridged relief (0 to 30%), coarse textured (sand, coarse sand, gravel and cobble) glaciofluvial materials. The unit sub-dominantly consists of imperfectly drained Rego Gleysols developed on coarse textured (fine sand, sand, coarse sand) glaciofluvial material, and poorly to very poorly drained Terric Fibrisols. Gleysols are generally found in the lower slope positions, swales between undulations, hummocks or ridges, and in transitions to areas of very poor drainage. Fibrisols are generally found in depressions and low elevation areas with poor to very poor drainage. Imperfect drained Gleyed Eluviated Dystric Brunisols or Gleyed Eluviated Eutric Brunisols may occur sporadically within the unit.

3.3.2.2.1.3 Mineral-3 (M3)

The Mineral-3 (M3) soil map unit covers approximately 604 ha (6.8%) of the LSA. This map unit co-dominantly consists of slightly stony to very stony, very rapid to moderately well drained Eluviated Dystric Brunisols and Eluviated Eutric Brunisols developed on nearly level to inclined and ridged relief (0 to 30%), coarse textured (sand, coarse sand, gravel and cobble) glaciofluvial materials. The unit also contains co-dominant amounts of poorly drained Rego Gleysols developed on coarse textured (fine sand, sand, coarse sand) glaciofluvial material, and poorly to very poorly drained Terric Fibrisols. Gleysols are generally found in the lower slope positions, swales between undulations, hummocks or ridges, and in transitions to areas of poor drainage. Fibrisols are generally found in depressions and low elevation areas with very poor drainage. Imperfect drained Gleyed Eluviated Dystric Brunisols or Gleyed Eluviated Eutric Brunisols may occur sporadically within the unit. The Mineral-3 (M3) map unit is associated with confined and meander floodplain channels with moderately steep valley slopes; it may have standing and flowing water in the valley bottom.

3.3.2.2.1.4 Mineral-4 (M4)

The Mineral-4 (M4) soil map unit covers approximately 1,639 ha (18.5%) of the LSA. This map unit dominantly consists of slightly stony to very stony, very rapid to moderately well drained Eluviated Dystric Brunisols and Eluviated Eutric Brunisols developed on nearly level to inclined and ridged relief (0 to 30%), coarse textured (sand, coarse sand, gravel and cobble) glaciofluvial materials. The unit contains inclusions of bedrock outcrops and fragmental materials, Hemic Folisols composed of organic (folic) material overlying bedrock or fragmental material, and poorly to very poorly drained Terric Fibrisols composed of organic (peat) occur on level to nearly level areas (slopes 0 to 0.5%). Folisols are generally found on low inclined slopes with appreciable forest cover. Fibrisols are generally found in depressions, low plains and swales between undulations, hummocks or ridges of bedrock. Poorly drained Rego Gleysols may occur sporadically within the unit in transitions to areas of better drainage. Mesisols may also occur sporadically within the map unit.

3.3.2.2.2 Organic Map Units

The Organic-1 (O1) and Organic-2 (O2) soil map units combined make up approximately 846 ha (9.5%) of the LSA. The organic map units differ from each other based on the distribution of dominant wetland (organic) soils and sub-dominant or inclusion upland or transition (mineral or mineral peaty phase) soils. The organic map units also differ based on terrain and soil development.

3.3.2.2.2.1 Organic-1 (O1)

The Organic-1 (O1) soil map unit covers approximately 800 ha (9.0%). The Organic-1 (O1) soil map unit dominantly consists of poorly to very poorly drained Terric Fibrisols developed on level to nearly level (slopes 0 to 0.5%), moderately decomposed organic materials (fen peats and bog peats) overlying moderately coarse to coarse textured (loamy sand, fine sand, sand, coarse sand) glaciofluvial deposits. The unit sub-dominantly consists of well to moderately well drained Eluviated Dystric Brunisols and Eluviated Eutric Brunisols developed on coarse textured (sand, coarse sand, gravel and cobble) glaciofluvial materials. Mesic variants may also occur sporadically within the map unit. Imperfectly to poorly drained Rego Gleysols developed on coarse textured (fine sand, sand, coarse sand) glaciofluvial material, and moderately well to imperfect drained Gleyed Eluviated Dystric Brunisols or Gleyed Eluviated Eutric Brunisols may occur sporadically within the unit. Gleysols and Gleyed variants of upland mineral soils are generally found in transitions to areas of better drainage. The Organic-1 (O1) soil map unit is associated with low lying nearly level areas within proximity to a large body of standing water.

3.3.2.2.2.2 Organic-2 (O2)

The Organic-2 (O2) soil map unit is one of the smallest map units in the LSA and covers approximately 46 ha (0.5%) of the LSA. This map unit dominantly consists (of poorly to very poorly drained Typic Fibrisols and Terric Fibrisols developed on level to nearly level (slopes 0 to 0.5%), moderately decomposed organic (peat) materials. Fibrisols are generally found in depressions, low plains and swales between undulations, hummocks or ridges of bedrock. Mesisols may also occur sporadically within the map unit. Inclusions of Gleysols may be found in transitions to areas of better drainage.

3.3.2.2.3 Bedrock Map Unit

3.3.2.2.3.1 Bedrock-1 (R1)

The Bedrock-1 (R1) soil map unit covers approximately 127 ha (1.4%). The Bedrock-1 (R1) soil map unit dominantly consists of large bedrock outcrops and fragmental material. The unit contains minor amounts of

poorly to very poorly drained Hemic Folisols composed of organic (folic) material overlying bedrock or fragmental material, and poorly to very poorly drained Terric Fibrisols developed on level to nearly level (slopes 0 to 0.5%) terrain. Folisols are generally found on low inclined slopes with appreciable forest cover. Fibrisols are generally found in depressions, low plains and swales between undulations, hummocks or ridges of bedrock. Well to moderately well drained Eluviated Dystric Brunisols or Eluviated Eutric Brunisols, and poorly drained Rego Gleysols may occur sporadically within the unit. Brunisols are generally found at mid and lower slope positions, and in level areas between exposed outcrops with soil profiles extending 30 to 60 cm until bedrock contact. Gleysols are generally found in transitions to areas of better drainage. Mesisols may also occur sporadically within the map unit.

3.3.2.2.4 Other Map Units

3.3.2.2.4.1 Existing Disturbance (DIS)

The Existing Disturbance (DIS) soil map unit covers approximately 377 ha (4.0%) of the LSA and consists of areas of soil disturbance from roads, the community of Black Lake, Camp Grayling, the Black Lake sewage lagoon, and borrow/gravel pits.

3.3.2.2.4.2 Open Water (ZW)

The Open Water (ZW) soil map unit covers approximately 1,428 ha (16.1%) of the LSA and consists of standing or moving waterbody basins which may be filled or partly filled with water.

3.3.3 Soil Sensitivities in the Local Study Area

3.3.3.1 Erosion Sensitivities

3.3.3.1.1 Water Erosion Sensitivity

Water erosion potentials were assigned to the map units within the LSA. A summary of the water erosion ratings and potentials for the map units are presented in [Table 3.3-2](#). Water erosion potential for dominant soil subgroups in all map units was Low, based on the dominantly sandy texture associated with upper mineral soil horizons, low percent slope, and a dominant slope length less than 70 m. Soils with Low to Moderate water erosion potential were associated with silt and silt loam texture upper mineral soil horizons ([Table 3.3-2](#)).

Based on this, in the LSA, the sandy Brunisolic soils at upland landscape positions have a Low sensitivity to water erosion. At transition and depressional landscape positions, poorly drained Gleysolic and peaty phase Gleysolic soils have Low to Moderate sensitivity to water erosion. In areas of Organic soils that are not deep and organic surface horizons are removed and subsurface materials and exposed, the water erosion potential of the underlying material would be Low if sandy, and Moderate if silty. Within all map units, if slope percentage or slope length increases, the water erosion potential for soils will also increase.

Table 3.3-2: Water Erosion Potential for Soil Map Units within the Local Study Area

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Uppermost Soil Horizon Texture	Water Erosion Rating	Dominant Slope Class (%)	Dominant Slope Length (m)	Water Erosion Potential
Mineral-1 (M1)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Low	0 to 10	<70	Low
	Inclusions of Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt, Silt Loam, and Organic	Low to High or N/A	0 to 10	<70	Low to Moderate or N/A
Mineral-2 (M2)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Low	0 to 10	<70	Low
	Sub-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt, Silty Loam, and Organic	Low to High or N/A	0 to 10	<70	Low to Moderate or N/A
Mineral-3 (M3)	Co-dominantly Eluviated Dystric Brunisols, Eluviated Eutric Brunisols	Sand, Loamy Sand	Low	0 to 10	<70	Low
	Co-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt, Silty Loam, and Organic	Low to High or N/A	0 to 10	<70	Low to Moderate or N/A
Mineral-4 (M4)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Low	0 to 10	<70	Low
	Inclusions of Hemic Folisols, Terric Fibrisols, and bedrock outcrops and fragmental material	Organic	N/A	0 to 10	<70	N/A

Table 3.3-2: Water Erosion Potential for Soil Map Units within the Local Study Area (continued)

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Uppermost Soil Horizon Texture	Water Erosion Rating	Dominant Slope Class (%)	Dominant Slope Length (m)	Water Erosion Potential
Organic-1 (O1)	Dominantly Terric Fibrisols	Organic	N/A	0 to 10	<70	N/A
	Sub-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Low	0 to 10	<70	Low
Organic-2 (O2)	Dominantly Typic Fibrisols and Terric Fibrisols	Organic	N/A	0 to 10	<70	N/A
	Inclusions of Gleysols	Sand, Sandy Loam, Silt and Silty Loam	Low to High	0 to 10	<70	Low to Moderate
Bedrock-1 (R1)	Dominantly bedrock outcrop and fragmental material	Bedrock	N/A	N/A	N/A	N/A
	Inclusions of Terric Fibrisols and Gleysols	Organic, Sand, Sandy Loam, Silt, and Silt Loam	N/A or Low to Medium	0 to 10	<70	Low

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = cover 40% to 60% of map unit area; sub-dominant soil subgroup(s) = cover 20% to 40% of map unit area; inclusion = cover 15% to 20% of map unit area.
% = percent; m = metres; <= less than; N/A = not applicable

3.3.3.1.2 Wind Erosion Sensitivity

Wind erosion ratings were assigned to map units within the LSA and presented in [Table 3.3-3](#). Wind erosion ratings of mineral soils are based on disturbed, bare soils and wind erosion ratings of organic soils are based on degree of peat decomposition under dry and disturbed conditions.

Wind erosion ratings for dominant soil subgroups in all map units was High, based on either sandy textured mineral upper soil horizons or disturbed, dry organic (folic) upper soil horizons. Soils with Low to High wind erosion ratings potential were associated with silt and silt loam texture upper mineral soil horizons or disturbed and Fibric Organic horizons (Low rating) or sandy or disturbed and dry Folic Organic upper soil horizons (High rating) ([Table 3.3-3](#)).

Soils most sensitive to wind erosion include sandy Brunisolic soils, and Folisols ([Table 3.3-3](#)). In the event Organic surface materials are removed and underlying mineral soil horizons are exposed, the wind erosion ratings remain High because of the sandy textures. Areas containing Organic Fibrisols and peaty phase Gleysolic soils with silt or silt loam uppermost mineral horizons have a Low sensitivity to wind erosion.

Table 3.3-3: Wind Erosion Ratings for Soil Map Units within the Local Study Area

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Uppermost Soil Horizon Texture	Wind Erosion Rating
Mineral-1 (M1)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	High
	Inclusions of Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silt Loam (mineral), and Fibric (Organic)	Low
Mineral-2 (M2)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	High
	Sub-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silt Loam (mineral), and Fibric (Organic)	Low
Mineral-3 (M3)	Co-dominantly Eluviated Dystric Brunisols, Eluviated Eutric Brunisols	Sand and Loamy Sand	High
	Co-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silt Loam (mineral), and Fibric (Organic)	Low
Mineral-4 (M4)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	High
	Inclusions of Hemic Folisols, Terric Fibrisols, and bedrock outcrops and fragmental material	Organic (Folic and Fibric)	Medium to Low

Table 3.3-3: Wind Erosion Ratings for Soil Map Units within the Local Study Area (continued)

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Uppermost Soil Horizon Texture	Wind Erosion Rating
Organic-1 (O1)	Dominantly Terric Fibrisols	Fibric (Organic)	Low
	Sub-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	High
Organic-2 (O2)	Dominantly Typic Fibrisols and Terric Fibrisols	Fibric (Organic)	Low
	Inclusions of Gleysols	Sand, Sandy Loam, Silt and Silt Loam	Low to High
Bedrock-1 (R1)	Dominantly bedrock outcrop and fragmental material	Bedrock	N/A
	Inclusions of Terric Fibrisols and Gleysols	Organic, Sand, Sandy Loam, Silt, and Silt Loam	High

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = cover 40% to 60% of map unit area; sub-dominant soil subgroup(s) = cover 20% to 40% of map unit area; inclusion = cover 15% to 20% of map unit area.

N/A = not applicable

3.3.3.2 Sensitivity to Acidification

Acidification sensitivity ratings were assigned to the map units within the LSA and are listed in [Table 3.3-4](#). Brunisolic soils had a sand or loamy sand surface texture. These soil textures are generally associated with a low CEC. Brunisolic B-horizon pH ranged from 4.35 to 6.14, therefore surface horizons would also be somewhat acidic. Surface material in Brunisolic soils in the LSA was assumed to have a pH less than 6.0. Because of their low CEC and low pH, Brunisolic soils would have a High sensitivity to acidification.

Organic soils within all map units have Low to Medium sensitivity to acidification depending on the associated wetland type. Moderate, rich and extreme rich fens have a Low sensitivity to acidification. Bogs and poor fens are rated as Medium.

Gleysolic soils generally had sand, sandy loam and silty textures, which are associated with low to high CEC ([Table 3.3-4](#)). These soils occur in transitional areas adjacent to wetlands; therefore their pH would be influenced by water associated with the adjacent wetland type. Even in areas that are considered peaty phase, the overlying shallow organic layer would be influenced by underlying materials. In general, these soils would be considered to have a Medium to Low sensitivity to acidification; this rating would increase to Medium to High where they are occurring adjacent to acidic bogs or where textures are sandy.

Overall, in the LSA upland landscape positions containing well drained, sandy soils are most sensitive to acidification, whereas wetland containing Organic soils (within bogs, fens, and swamps) have a Low to Medium sensitivity to acidification. Gleysolic and peaty phase Gleysolic soils would generally have a Low to Medium sensitivity, except where they have sandy textures, they are rated as High.

Table 3.3-4: Acidification Ratings for Soil Map Units within the Local Study Area

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Uppermost Soil Horizon Texture	Expected Range of CEC (meq/100 g) Based on Soil Texture ^(b)	Acidification Sensitivity Rating
Mineral-1 (M1)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	<6	High
	Inclusions of Rego Gleysols and Terric Fibrisols	Sand Sandy Loam Silt and Silt Loam Organic	<6 6-15 >15 N/A	High Medium Low Low to Medium
Mineral-2 (M2)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	<6	High
	Sub-dominantly Rego Gleysols and Terric Fibrisols	Sand Sandy Loam Silt and Silt Loam Organic	<6 6-15 >15 N/A	High Medium Low Low to Medium
Mineral-3 (M3)	Co-dominantly Eluviated Dystric Brunisols, Eluviated Eutric Brunisols	Sand and Loamy Sand	<6	High
	Co-dominantly Rego Gleysols and Terric Fibrisols	Sand Sandy Loam Silt and Silt Loam Organic	<6 6-15 >15 N/A	High Medium Low Low to Medium
Mineral-4 (M4)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	<6	High
	Inclusions of Hemic Folisols, Terric Fibrisols, and bedrock outcrops and fragmental material	Organic	N/A	Low to Medium
Organic-1 (O1)	Dominantly Terric Fibrisols	Organic	N/A	Low to Medium
	Subdominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	<6	High
Organic-2 (O2)	Dominantly Typic Fibrisols and Terric Fibrisols	Organic	N/A	Low to Medium
	Inclusions of Gleysols	Sand Sandy Loam Silt and Silt Loam Organic	<6 6-15 >15 N/A	High Medium Low Low to Medium
Bedrock-1 (R1)	Dominantly bedrock outcrop and fragmental material	Bedrock	N/A	N/A
	Inclusions of Terric Fibrisols and Gleysols	Organic Sand, Sandy Loam Silt and Silt Loam	N/A <6 6-15 >15	Low to Medium High Medium Low

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = cover 40% to 60% of map unit area; sub-dominant soil subgroup(s) = cover 20% to 40% of map unit area; inclusion = cover 15% to 20% of map unit area.

^(b) Derived from soil data presented in Holowaychuk and Fessenden (1987).

< = less than; > = greater than; N/A = not applicable; CEC = cation exchange capacity

3.3.3.3 Permafrost Potential

The LSA is within the sporadic discontinuous permafrost zone, where permafrost may occupy approximately 10% to 50% of the area (Natural Resources Canada 1995). The distribution and occurrence of permafrost is highly variable in the sporadic discontinuous permafrost zone. The permafrost in this area is characterized by having low ice content, indicating the ground ice content in the upper 10 to 20 m of the ground has less than 10% ice content by volume of visible ice (Natural Resources Canada 1995). Though most treed bogs have a higher potential to contain permafrost, many fens are free of permafrost (Zoltai 1995). Within the LSA, permafrost, if present, likely occurs in treed bogs with poorly-drained Organic soils.

In general, imperfect to poorly drained soils have Low to Moderate permafrost potential, whereas moderately to rapidly drained soils have Very Low potential for permafrost (Table 3.3-5). Brunisolic soils in the LSA have Very Low permafrost potential. Peaty phase Gleysolic and Folisolic soils with poor drainage have Low permafrost potential. Areas of treed bogs containing Organic (peat) soils would be the most likely to contain permafrost. Overall, Fibrisolic soils have Moderate potential to contain permafrost.

Table 3.3-5: Permafrost Potential for Soil Map Units within the Local Study Area

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Soil Texture	Soil Drainage Class	Permafrost Potential
Mineral-1 (M1)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Moderately Well to Rapid	Very Low
	Inclusions of Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silt Loam (mineral) and Fibric (organic)	Imperfect to Poor	Low to Moderate
Mineral-2 (M2)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand, Loamy Sand	Moderately Well to Rapid	Very Low
	Sub-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silty Loam (mineral) and Fibric (organic)	Imperfect to Poor	Low to Moderate
Mineral-3 (M3)	Co-dominantly Eluviated Dystric Brunisols, Eluviated Eutric Brunisols	Sand, Loamy Sand	Moderately Well to Rapid	Very Low
	Co-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt and Silty Loam (mineral), and Fibric (organic)	Imperfect to Poor	Low to Moderate
Mineral-4 (M4)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Moderately Well to Rapid	Very Low
	Inclusions of Hemic Folisols, Terric Fibrisols, and bedrock outcrops and fragmental material	Organic (Folic over bedrock), Organic (Fibric) or N/A	Poor or N/A	Low to Moderate or N/A

Table 3.3-5: Permafrost Potential for Soil Map Units within the Local Study Area (continued)

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Soil Texture	Soil Drainage Class	Permafrost Potential
Organic-1 (O1)	Dominantly Terric Fbrisols	Organic (Fibric) over Sand and Sandy Loam	Poor	Low to Moderate
	Sub-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Moderately Well to Rapid	Very Low
Organic-2 (O2)	Dominantly Typic Fbrisols and Terric Fbrisols	Organic (Fibric) over Sand and Sandy Loam	Poor	Low to Moderate
	Inclusions of Gleysols	Sand, Sandy Loam, Silt, and Silt Loam	Imperfect to Poor	Low
Bedrock-1 (R1)	Dominantly bedrock outcrop and fragmental material	Bedrock	N/A	N/A
	Inclusions of Terric Fbrisols and Gleysols	Organic (Fibric), Sand, Sandy Loam, Silt, and Silt Loam	Very Rapid to Poor	Low to Moderate

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = near equal proportion of map unit area covered; sub-dominant soil subgroup(s) = cover 15% to 40% of map unit area.

N/A = not applicable

3.3.3.4 Sensitivity to Compaction

Soil compaction ratings were assigned to soil map units within the LSA and were based on soil texture under moist conditions. Gleysolic soils were assigned compaction ratings based on soil texture under wet (saturated) soil conditions. Organic soils were not assigned compaction ratings but should be treated with special management practices (e.g., rig matting) or avoided during construction. Bedrock was not assigned a compaction rating.

Compaction ratings for soil map units in the LSA are listed in [Table 3.3-6](#). Sandy and loamy sand textured Brunisols have a Low sensitivity to compaction under moist soil conditions. Gleysolic soils, including peaty phase Gleysolic soils, generally had sandy, sandy loam, silt, and silt loam textures in the upper and lower mineral soil horizons, indicating Moderate to Very High sensitivity to compaction under wet soil conditions.

Table 3.3-6: Compaction Ratings for Soil Map Units within the Local Study Area

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Mineral Soil Texture	Mineral Soil Compaction Rating
Mineral-1 (M1)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Low
	Inclusions of Rego Gleysols and Terric Fbrisols	Sand, Sandy Loam, Silt, Silt Loam, and Organic	Moderate to Very High/ N/A
Mineral-2 (M2)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Low
	Sub-dominantly Rego Gleysols and Terric Fbrisols	Sand, Sandy Loam, Silt and Silty Loam	Moderate to Very High/ N/A

Table 3.3-6: Compaction Ratings for Soil Map Units within the Local Study Area (continued)

Map Unit Name (Map Unit Symbol)	Soil Subgroups in Map Unit ^(a)	Mineral Soil Texture	Mineral Soil Compaction Rating
Mineral-3 (M3)	Co-dominantly Eluviated Dystric Brunisols, Eluviated Eutric Brunisols	Sand and Loamy Sand	Low
	Co-dominantly Rego Gleysols and Terric Fibrisols	Sand, Sandy Loam, Silt, Silty Loam, Organic	Moderate to Very High/ N/A
Mineral-4 (M4)	Dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Low
	Inclusions of Hemic Foisols, Terric Fibrisols, and bedrock outcrops and fragmental material	N/A	N/A
Organic-1 (O1)	Dominantly Terric Fibrisols	Organic	N/A
	Sub-dominantly Eluviated Dystric Brunisols and Eluviated Eutric Brunisols	Sand and Loamy Sand	Low
Organic-2 (O2)	Dominantly Typic Fibrisols and Terric Fibrisols	Organic	N/A
	Inclusions of Gleysols	Sand, Sandy Loam, Silt and Silty Loam	Moderate to Very High
Bedrock-1 (R1)	Dominantly bedrock outcrop and fragmental material	N/A	N/A
	Inclusions of Terric Fibrisols and Gleysols	Organic, Sand, Sandy Loam, Silt, and Silt Loam	N/A

^(a) Dominant soil subgroup(s) = cover 60% to 100% of map unit area; co-dominant soil subgroup(s) = near equal proportion of map unit area covered; sub-dominant soil subgroup(s) = cover 15% to 40% of map unit area.

N/A = not applicable

3.3.3.5 Soil Chemistry

Initial geochemistry results (Golder 2012) indicate metals, including aluminum, chromium, selenium, arsenic, cadmium, copper, nickel, silver, zinc, lead, and iron, have been detected in some rock leachate samples, and are at levels that exceed Canadian Council of Ministers of the Environment (CCME) Canadian Environmental Quality Guidelines for the protection of freshwater aquatic life. Although these results do not necessarily mean that these metals will be present in soil, it does indicate that they are present in bedrock parent material and therefore have the potential to be present in soil.

3.4 Summary

3.4.1 General Setting

The terrain and soils section of the environmental baseline report provides baseline information that can be used to predict and monitor direct and indirect effects of the Project on soil resources. The soils baseline report presents a review and interpretation of qualitative and quantitative information from literature and data collected during the 2012 field program. The key objective of the soil baseline report is to describe existing soil and terrain resources, and associated soil quality and sensitivities within the RSA and LSA.

The RSA was selected based on the predicted spatial extent of the combined direct and indirect effects on wildlife from the Project, because the soils and vegetation present in the Project area and LSA are also present across the RSA. The RSA consists of an approximate 115,600 ha area centred on the Project. The LSA is approximately 8,881 ha centered on the anticipated Project footprint. The LSA was based on the predicted direct and small-scale indirect effects from the Project on the terrestrial environment.

The RSA and LSA are situated on a transitional area between the boundaries of the Taiga Shield and Boreal Shield Ecozones in Saskatchewan (Acton et al. 1998). The north portion of the RSA is in the Uranium City Upland Landscape Area within the Tazin Lake Upland Ecoregion of the Taiga Shield Ecozone. The south and southeastern portion of the RSA is situated in the Lower Cree River Plain and Fond du Lac Lowland Landscape areas of the Athabasca Plains Ecoregion of the Boreal Shield Ecozone. This area is characterized by a subarctic climate with long, very cold winters and short, cool summers. Permafrost is uncommon but may occur in localized areas of deep organic terrain.

3.4.2 Terrain and Soil Conditions in the Regional and Local Study Areas

3.4.2.1 Methods

A baseline field program was completed from June 1, 2012 through June 12, 2012. The field program was designed as a level four intensity, broad reconnaissance survey that identified common soil subgroups used to delineate map units (Agriculture Canada 1987). At each site, soil profiles were characterized to a maximum depth of 120 cm. Terrain and soil data collected during the field program were used for soil classification and mapping descriptions.

The approach to classifying and mapping soils in the LSA involved a review of existing information, field surveys, soil sampling and analysis. Soil mapping involved the correlation of field observations and soil classification to topographic maps and mapped ELC vegetation units. Topographic maps were used to identify general relief and changes in terrain. Vegetation map units were used to derive correlations between terrain features and the ELC vegetation types. Soil inspection information was applied considering principles of geomorphology and surficial geology, in combination with ground-truthed soil and vegetation patterns. The primary characteristics used to group soil types into map units included dominant soil texture and parent material, soil moisture regime, soil subgroup, and terrain (slope and surface expression). Map units (soil polygons) were created for the LSA after considering relationships between map resources, ELC vegetation units, satellite imagery, and field data. As there are no published soil surveys for the LSA, soil map unit names were assigned based on the dominant parent material (mineral, organic, or bedrock) within the map unit area.

3.4.2.2 Results

In total, 56 sites were surveyed within the RSA, with 35 locations occurring within the LSA. Of the 56 sites surveyed, 30 were mineral soils, 15 were organic soils, and 11 were bedrock outcrop sites. Soils identified during the baseline field program included Brunisolic (15 total), Gleysolic (11 total, 3 of which were peaty phase), Regosolic (3 total), and Podzolic (1 total) soils.

Soils classified within the Brunisolic Order include Eluviated Eutric Brunisol, Eluviated Dystric Brunisol, Gleyed Eluviated Brunisol, and Orthic Dystric Brunisol. Confirmation of the great group classification (i.e., Eutric and Dystric) was confirmed using the B-horizon pH. One Orthic Humo-Ferric Podzol was identified. Regosolic soils include Orthic Regosol and Cumulic Regosol. Gleysolic soils included Rego Gleysol, Orthic Gleysol, peaty phase Rego Gleysol, and peaty phase Orthic Gleysol. Organic soils identified included Terric Mesisol, Typic Fibrisol, Terric Fibrisol, Hydric Fibrisol, and Hemic Folisol.

Brunisolic and other mineral soils (excluding Gleysols) were generally found at upland landscape positions. Gleysolic soils were generally found in transition areas between upland landscape positions and depressional landscape positions (i.e., wetlands). Organic soils were found in wetlands in depressional areas.

A total of seven soil map units, an Existing Disturbance (DIS) map unit, and an Open Water (ZW) map unit have been delineated. The seven soil map units include four mineral map units (Mineral-1 [M1], Mineral-2 [M2], Mineral-3 [M3], and Mineral-4 [M4]), two organic map units (Organic-1 [O1], Organic-2 [O2]), and one bedrock map unit (Bedrock-1 [R1]), all of which capture the range of variability in soil subgroups present in the LSA. The majority of the LSA is comprised of mineral soil map units, with the Mineral-1 (M1) map unit encompassing the largest proportion of the LSA (approximately 2,462 ha or 27.7% of the LSA). The Organic-2 (O2) map unit cover the smallest area of the LSA (approximately 46 ha or 0.5% of the LSA).

3.4.3 Soil Sensitivities in the Local Study Area

3.4.3.1 Methods

3.4.3.1.1 Erosion Sensitivities

Soil sensitivity to water and wind erosion were assigned to soil map units within the LSA. Water erosion ratings and potentials were assigned to soil map units within the LSA based on characteristics of soils and terrain (i.e., topsoil texture, slope length, and gradient) recorded during the field programs. The uppermost mineral soil horizon textures of soil subgroups were used to determine the water erosion sensitivity. In areas where slope gradient increases, so does the potential for soil erosion regardless of soil texture. Water erosion potentials are based on bare, unprotected soils. Wind erosion ratings were evaluated using the uppermost mineral soil horizon texture. Wind erosion ratings for Organic soils were assigned based on degree of peat decomposition. Wind erosion ratings are based on disturbed, bare soils for mineral soils and based on dry, disturbed conditions for Organic soils.

3.4.3.1.2 Sensitivity to Acidification

Soils are categorized as having High, Medium, or Low sensitivity ratings to acid deposition. The ratings are based on the sensitivity to loss of basic cations (primarily calcium, magnesium, and potassium), sensitivity to acidification, and sensitivity to solubilization of aluminum. The sensitivity of mineral soils to acid deposition was evaluated using the chemical criteria published by Holowaychuk and Fessenden (1987). Because soils were not analysed for CEC, an estimation of the range of CEC related to soil texture was compiled. Soil textures were then used to estimate the sensitivities of soils to acidification. For soils where pH was obtained, the results were considered in the determination of acidification sensitivity.

The sensitivity rating for Organic soil is based on the type of wetland (i.e., bog, poor fen, moderate rich fen, and extreme rich fen) (Turchenek et al. 1998). In general, moderate rich and extreme rich fens (moderate to high nutrient status and neutral pH or higher [greater than pH 6]) tend to be least susceptible to acidification. Organic soils that occur in moderate and rich fens are least susceptible to acidification and therefore have a Low sensitivity rating. Organic soils that occur in bogs and in poor fens are most susceptible to acidification and therefore have a Medium sensitivity rating.

3.4.3.1.3 Permafrost Potential

Permafrost potential was assigned to the soil map units within the LSA. Permafrost potential ratings for each soil subgroup were assigned based on soil type, drainage, soil texture, and topography observed during the field program. Location of the Project, with respect to the permafrost zone in which it occurs, was also considered. Poor to imperfectly drained soils were rated as having a Low to Moderate permafrost potential, whereas

moderate to rapidly drained soils were rated as having a Very Low potential for permafrost. If present, Cryosolic soils were rated as having a High potential for permafrost.

3.4.3.1.4 Sensitivity to Compaction

Compaction ratings for map units in the LSA were determined using the criteria outlined in Lewis et al. (1989), under moist conditions. Gleysolic soils and their peaty phases were assigned compaction ratings based on soil texture under wet (saturated) soil conditions. Organic soils were not assigned compaction ratings but should be treated with special management practices (e.g., rig matting) or avoided during construction. Bedrock was not assigned a compaction rating.

3.4.3.1.5 Soil Chemistry

Chemical constituents of underlying bedrock and associated rock leachate have the potential to be present in the upper soil strata because of soil formation from bedrock parent material, as well as upward leaching of metals from rock (Turk et al. 2012). Geochemistry results may give some indication of the presence of metals, metalloids, and radionuclides in underlying materials (Golder 2012). If these constituents are present in underlying materials, they have potential to be present in the overlying soil, and therefore identify potential soil chemistry sensitivities that may be associated with the presence of those metals, metalloids, and radionuclides.

3.4.3.2 Results

3.4.3.2.1 Erosion Sensitivities

Water erosion potential for dominant soil subgroups in all map units was Low, based on the dominantly sandy texture associated with upper mineral soil horizons, low percent slope, and a dominant slope length less than 70 m. Soils with Low to Moderate water erosion potential were associated with silt and silt loam texture upper mineral soil horizons. Sandy Brunisolic soils at upland landscape positions have a Low sensitivity to water erosion. At transition and depressional landscape positions, poorly drained Gleysolic and peaty phase Gleysolic soils have Low to Moderate sensitivity to water erosion. In areas of Organic soils that are not deep and areas where organic surface horizons are removed and subsurface materials exposed, the water erosion potential of the underlying material would be Low if sandy, and Moderate if silty. Within all map units, if slope percentage or slope length increases, the water erosion potential for soils will also increase. Water erosion potentials are not assessed for bedrock and Organic soils.

Wind erosion ratings for dominant soil subgroups in all map units was High, based on either sandy textured mineral upper soil horizons or disturbed, dry Organic (Folic) upper soil horizons. Soils with Low to High wind erosion ratings potential were associated with silt and silt loam texture upper mineral soil horizons and Fibric Organic horizons (Low rating) or sandy or disturbed and dry Folic Organic upper soil horizons (High rating). Soils most sensitive to wind erosion include sandy Brunisolic soils and Folisolic soils. In the event Organic soils are removed and underlying mineral soil horizons are exposed, the wind erosion ratings is High because of the sandy textures of the underlying material. Transitional and depressional landscape positions containing peaty phase Gleysolic soils with silt or silt loam uppermost mineral horizons and Fibrisolic soils have a Low sensitivity to wind erosion.

3.4.3.2.2 Sensitivity to Acidification

Brunisolic soils had a sand or loamy sand surface texture. These soil textures are generally associated with a low CEC. Brunisolic B-horizon pH ranged from 4.35 to 6.14, therefore surface horizons would also be somewhat acidic. Surface material in Brunisolic soils in the LSA was assumed to have a pH less than 6.0. Because of their low CEC and low pH, Brunisolic soils would have a High sensitivity to acidification.

Organic soils within all map units have Low to Moderate sensitivity to acidification depending on the associated wetland type. Moderate, rich and extreme rich fens have a Low sensitivity to acidification. Bogs and poor fens are rated as Medium.

Gleysolic soils generally had sand, sandy loam and silty textures, which are associated with low to high CEC. These soils occur in transitional areas adjacent to wetlands; therefore their pH would be influenced by water associated with the adjacent wetland type. Even in areas that are considered peaty phase, the overlying shallow organic layer would be influenced by underlying materials. In general, these soils would be considered to have a Medium to Low sensitivity to acidification; this rating would increase to High where they are occurring adjacent to acidic bogs or where textures are sandy.

Overall, in the LSA upland landscape positions containing well drained, sandy soils are predicted to be most sensitive to acidification, whereas wetland containing Organic soils (within bogs, fens, and swamps) have a Low to Medium sensitivity to acidification. Gleysolic and peaty phase Gleysolic soils would generally have a Low to Medium sensitivity, except where they have sandy textures they are rated as High

3.4.3.2.3 Permafrost Potential

The LSA is within the sporadic discontinuous permafrost zone, where permafrost may occupy approximately 10% to 50% of the area (Natural Resources Canada 1995). The distribution and occurrence of permafrost is highly variable in the sporadic discontinuous permafrost zone. The permafrost in this area is characterized by having low ice content, indicating the ground ice content in the upper 10 to 20 m of the ground has less than 10% ice content by volume of visible ice (Natural Resources Canada 1995). Though most treed bogs have a higher potential to contain permafrost, many fens are free of permafrost (Zoltai 1995). Within the LSA, permafrost, if present, likely occurs in treed bogs with poorly-drained Organic soils.

Brunisolic soils in the LSA have Very Low permafrost potential. Peaty phase Gleysolic and Folisolic soils with poor drainage have Low permafrost potential. Areas of treed bogs containing Organic soils would be the most likely to contain permafrost. Overall, Fibrisolic soils have Moderate potential to contain permafrost.

3.4.3.2.4 Sensitivity to Compaction

Sandy and loamy sand textured Brunisols have a Low sensitivity to compaction under moist soil conditions. Gleysolic soils, including peaty phase Gleysolic soils, generally had sandy, sandy loam, silt, and silt loam textures in the upper and lower mineral soil horizons, indicating Moderate to Very High sensitivity to compaction under wet soils conditions.

3.4.3.2.5 Soil Chemistry

Initial geochemistry results (Golder 2012) indicate metals, including aluminum, chromium, selenium, arsenic, cadmium, copper, nickel, silver, zinc, lead, and iron, have been detected in in some rock leachate samples, and are at levels that exceed CCME Canadian Environmental Quality Guidelines for the protection of freshwater aquatic life. Although these results do not necessarily mean that these metals will be present in soil, it does indicate that they are present in bedrock parent material and therefore have the potential to be present in soil.

4.0 VEGETATION

4.1 Introduction

The characteristics of plant communities are determined by the complex interactions between soil, terrain, climate, and hydrologic regime within a given area. Vegetation type and community structure are influenced by

biotic and abiotic features of the surrounding area. This includes features such as wildlife populations, human activity, climate, soils, terrain, and nutrient cycles. Conversely, vegetation characteristics will also affect soil development, nutrient availability, and wildlife habitat. The purpose of this section is to establish an understanding of the vegetation baseline conditions in the RSA (1,156 km²) and LSA (89 km²). Baseline field data were collected during the 2010 and 2012 vegetation field programs. The primary focus was on the LSA; however, in order to capture the regional variation in plant species and communities, data were also collected in the RSA. The baseline vegetation data will be used to assess potential Project-specific and cumulative effects on vegetation, which includes listed (rare) and traditional use plants.

The vegetation baseline describes the composition and distribution of plant communities within the study areas and presents data collected during the 2010 to 2012 field programs. For the purpose of this report, listed species includes all species that are designated as 'at risk', 'rare', 'endangered', 'threatened', 'special concern', or otherwise tracked by federal and provincial conservation legislation and documents.

The key objectives of the baseline vegetation report are:

- to define and map vegetation within the RSA and LSA using an ELC;
- to provide information on the characteristics of vegetation associated with the mapped vegetation types (ELC map units; habitat) for the RSA and LSA;
- to provide an inventory of the plant species present within the RSA and LSA;
- to provide an indication of the richness of plant species among the vegetation types within the RSA and LSA;
- to document the potential and observed occurrences of listed plants (provincial and federal) in the RSA and LSA and assess the suitability of habitats to support listed plant species; and
- to document the traditional use plants observed within the RSA and LSA and assess the suitability of habitats to support traditional use plant species.

To meet these objectives, the vegetation baseline has been organized into the following sections.

[Section 4.2](#) describes approaches for characterizing the vegetation community types that occur in the study areas, includes the methods and rationale for producing an inventory of listed plant species, listed plant habitat potential, traditional use plant species, and traditional plant use habitat potential within the LSA and RSA.

[Section 4.3](#) provides quantitative information on the composition and location of vegetation communities, and any listed and traditional use plants that have potential to occur within the LSA and RSA.

4.1.1 Regional Vegetation

The RSA and LSA are situated on a transitional area between the boundaries of the Taiga Shield and Boreal Shield Ecozones in Saskatchewan (Acton et al. 1998). The north portion of the RSA is in the Uranium City Upland Landscape Area within the Tazin Lake Upland Ecoregion of the Taiga Shield Ecozone. The south and southeastern portion of the RSA is situated in the Lower Cree River Plain and Fond du Lac Lowland Landscape areas of the Athabasca Plains Ecoregion of the Boreal Shield Ecozone. This area is characterized by a subarctic climate with long, very cold winters and short, cool summers. Permafrost is uncommon but may occur in localized areas of deep organic terrain.

The Uranium City Upland Landscape Area is characterized by forests of black spruce (*Picea mariana*), but because fire is a frequent occurrence in this Landscape Area, forests of jack pine (*Pinus banksiana*) are common (Acton et al. 1998). White spruce (*Picea glauca*) tends to occur along the margins of fens and marshes, and stands of trembling aspen (*Populus tremuloides*) typically occupy low, sheltered areas.

Characteristic vegetation within the Lower Cree River Plain Landscape Area is open jack pine forests which are the result of the sandy glaciofluvial sediments present in the area. Riparian areas typically contain black spruce, jack pine, and white birch (*Betula papyrifera*) as well as alders (*Alnus* species) and willow (*Salix* species). Bogs and fens are typically dominated with black spruce, with tamarack (*Larix laricina*) occurring with the black spruce in fens.

Forests occurring in the Fond du Lac Lowland Landscape Area are typically stands of mixedwood containing species such as black spruce, jack pine, and white birch. Black spruce is common in wetlands, and dwarf birch (*Betula pumila*) is frequently intermixed with the black spruce in these areas.

4.2 Methods

4.2.1 Data Collection

Field surveys were completed during the growing seasons in 2010 and 2012 to obtain a set of baseline data for the RSA and LSA. Field surveys were completed during July 21 to 24, 2010, June 2 to 11, 2012, and July 31 to August 2, 2012 to capture an inventory of both early and late flowering species. Field survey information was used to characterize and map vegetation types (ELC map units; habitats), compile a vegetation inventory of observed species in each vegetation map unit defined in the ELC map, and document any listed and traditional use species found in the study areas. All field data were used to help ground-truth, classify, and describe the ELC map units for the RSA and LSA. Field surveys were completed by qualified Golder personnel.

Those tree species recorded in the main canopy are greater than or equal to 5 m. Where a sub-canopy is present, trees are taller than 5 m, but tree heights in the main canopy and the sub-canopy differ by greater than or equal to 3 m. The tall shrub layer includes all trees and/or shrubs between 2 to 4.9 m. The low shrub layer includes shrubs that are less than 2 m. The forb layer includes all herbaceous flowering plants, ferns, fern allies, and club mosses. The graminoid layer includes grasses, sedges, and rushes. At the ground layer, bryophytes (mosses, liverworts or hornworts) and ground-dwelling lichens were recorded. Epiphytic lichens, if observed, were also recorded.

Unknown vascular plants were identified in the field using several guidebooks and plant keys including Vascular Plants of Continental Northwest Territories, Canada (Porsliid and Cody, 1980), Field Guide to the Sedges of the Pacific Northwest (Wilson et al. 2008), Catkin-Bearing Plants of British Columbia (Brayshaw 1996), and Flora of North America – Volume 22 (Brooks and Clemants 2012). Bryophytes (mosses, liverworts, and hornworts) that were collected during the 2012 field programs were classified by a bryophyte taxonomist (Eleanor Edge, Bryologist - Alberta Biodiversity Monitoring Institute). Ground-dwelling and epiphytic lichens were also collected during the 2012 field programs and were classified by a lichen taxonomist (Trevor Goward, Lichenologist - Enrichened Consulting Ltd.).

Scientific names used were obtained from the Saskatchewan Conservation Data Centre (SKCDC) Saskatchewan Vascular, Non-vascular, and Fungi Plant Species Lists (SKCDC 2012a, b, c) and the PLANTS Database (USDA NRCS 2012). All species names were cross checked so that species were not counted twice (synonyms). The details of all field survey and data collection methods are described in the following sections.

4.2.1.1 Sampling Intensity and Distribution

Locations for all survey sites are shown in [Figure 4.2-1](#) and presented in [Appendix IV.2 \(Table IV.2-1\)](#). In total, 160 locations were visited during the field programs, and include 40 detailed vegetation inventory plots, 78 listed plant survey plots, and 42 ground truth plots.

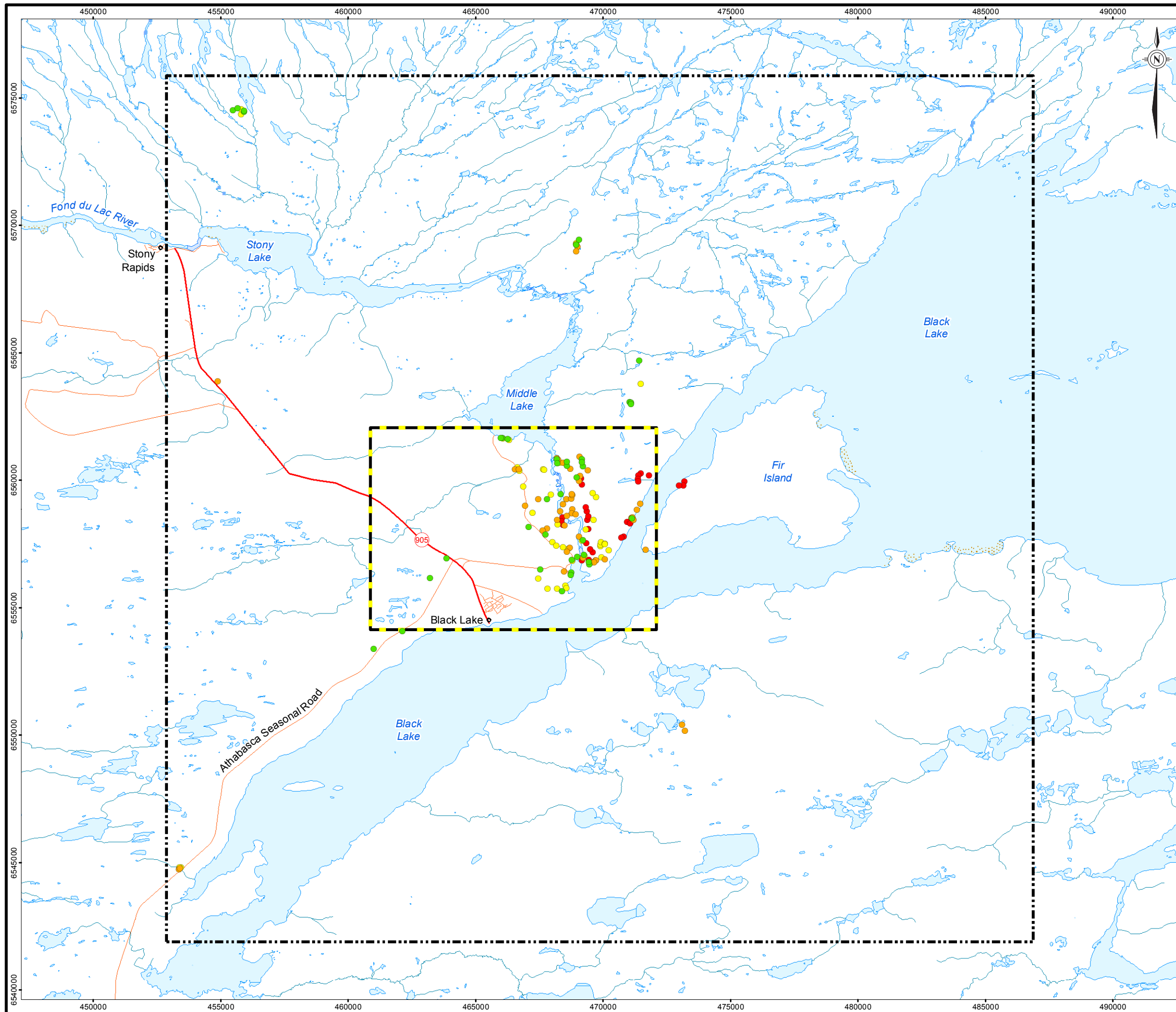
4.2.2 Ecological Landscape Classification

An ELC was developed to provide information about the abundance and distribution of vegetation types (ELC map units; habitats) within the RSA and LSA. The ELC provides a broad-level inventory of habitats in the RSA and LSA. The ELC also provides a basis for interpreting or modelling listed and traditional use plant habitat potentials and wildlife habitat suitability.

The ELC map was developed for the RSA and LSA using Landsat satellite imagery (30 m by 30 m pixel, June 24, 2010). The multispectral imagery was cloud-free and captured during the summer. Quality control measures were implemented so that the imagery was correctly calibrated and geo-referenced within the RSA. The imagery was loaded into an object-based remote sensing analysis software (eCognition 8.7) for the classification process. The first step in this classification was to segment the image into meaningful image objects.

Ecological Landscape Classification map units were then delineated using a multispectral segmentation algorithm. The parameters of this algorithm were adjusted until the image objects (polygons) were an appropriate shape and size to best approximate the features to be classified. These units were then classified based on the spectral characteristics of known vegetation types that were collected at ground-truth locations during vegetation field programs as part of the supervised classification. Based on the spectral signatures of the field-validated ground truth locations, the remote sensing software assigned a maximum likelihood classification to all objects in the image. Image objects with spectral characteristics that deviated from the ground-truth locations were classified with the use of multispectral indices developed for the Landsat sensor. Any spectral characteristics of an object that deviated from that of the ground truthed field data may be the result of a different substrate type, moisture regime, or a difference in illumination at the time the imagery was collected.

These multispectral indices include the Normalized Difference Vegetation Index (NDVI), Normalized Difference Water Index (NDWI) and the Tasseled Cap transformation which provide an indirect measure of plant vigor, moisture, and greenness or yellowness. These indices were applied using values at ground-truth locations as a guide. The final classification rules used a combination of spectral characteristics associated with known ground features in addition to thresholds determined for the multispectral indices and applied for generating the final supervised classification. In recent history, multiple fires have affected the area within the RSA. Therefore, fire history data were obtained from the Government of Saskatchewan and incorporated into the ELC after the completion of the supervised classification.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- DETAILED VEGETATION INVENTORY PLOT, 2012
- GROUND TRUTH PLOT, 2012
- LISTED PLANT PLOT, 2010
- LISTED PLANT PLOT, 2012
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
VEGETATION SURVEY LOCATIONS WITHIN THE REGIONAL AND LOCAL STUDY AREAS			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	LMR/SM	12/07/13
	CHECK	KM	24/07/13
	REVIEW	BC	24/07/13
SCALE AS SHOWN		REV.	0
			FIGURE: 4.2-1

Once the ELC classification was complete, selected survey plot locations from vegetation field programs and wildlife breeding bird surveys, other than those used as field-validated observation points, were compared against the classification for a visual accuracy assessment. The vegetation surveys provide detailed descriptions for each ELC map unit.

4.2.3 Detailed Vegetation Inventory Surveys

Detailed vegetation inventory (DVI) plots were completed to obtain site-specific, descriptive information on the nature and characteristics of the plant communities within each ELC map unit. Data on species present, percent cover, and vegetation layer were documented. In addition, site information such as terrain, moisture regime, nutrient regime, substrate, and slope were recorded to provide additional background information.

Detailed vegetation inventory plots were established at 40 locations within the RSA, 29 of these locations occurring within the LSA (Figure 4.2-1). Establishment of detailed vegetation inventory plots was focused in the LSA; however, some plots were completed in the RSA to help characterize the regional variation of species and community presence and abundance, in part because of the multiple fires occurring within the area (fire dates 1989, 1994, 1996, 2003, 2006, 2008, and 2010) and because the LSA occurs on the boundary of the Taiga Shield and Boreal Shield Ecozones (Section 4.1.1). Locations were selected as to obtain data across all vegetation types (ELC map units), as well as to obtain coverage of different serial stages present in the RSA that are primarily a result of fire in the region.

Plots were established in representative locations within each vegetation type at least 30 m from the nearest vegetation polygon boundary. A nested plot design with a 20 m by 20 m plot used to characterize the site conditions and canopy characteristics. A smaller 10 m by 10 m plot was used to assess understory vegetation layers (i.e., shrubs, forbs, graminoids, bryophytes, lichens, and epiphytes). The plots were placed so they did not straddle two or more types of plant communities. In areas such as riparian areas, where vegetation may have occurred as a narrow band along the edge of the water, the plot shape was adjusted to only count those species within a homogenous plant community (e.g., 5 m by 20 m). Lichens, epiphytes, and bryophytes were collected at detailed plot locations and some of the rare plant plot locations, separated, and placed into separate labeled bags for subsequent submission to experts for identification (Section 4.2.1).

4.2.4 Biodiversity

Biodiversity refers to the variety of life forms, especially number of species, and includes the number of ecosystem types. The term biodiversity can be described as the total number of species, the evenness of their distribution, and the differences in their functionality. Biodiversity is often used as a synonym for species richness; however, biodiversity also includes the relative abundance, composition, and presence and absence of key species (Hooper et al. 2005). Species richness is influenced by the number of sites sampled (i.e., a higher sample number may result in higher species richness), but it can nonetheless be an effective comparative measurement, allowing minimum and maximum richness between areas to be compared.

For the purposes of this report, biodiversity was assessed using the number of species within each of the ELC map units in the RSA. Species diversity was determined using DVI and listed plant survey data collected during the field surveys completed in 2010 and 2012. Biodiversity was assessed for each ELC map unit based on the total numbers of species, and the total numbers of vascular, non-vascular, and lichen species. Other biodiversity measures estimated included the number of listed plant species and the number of unique species within each ELC map unit. Minimum and maximum numbers of species by DVI sample plot are also included.

4.2.5 Listed Plant Species and Listed Plant Habitat Potential

A listed plant species is considered rare, because of biological characteristics or for some other reason and exists in low numbers or in very restricted areas (Drury 1974; Rabinowitz 1981). By definition, a rare plant has restricted spatial, ecological, and/or temporal distributions and more commonly within variable or diverse environments (Harper 1981). Plant rarity is generally determined by three factors including geographic range, habitat specificity, and local population size (Given 1994).

The occurrence and potential of listed plants within the RSA and LSA was determined through field surveys and assessing the listed plant habitat potential of ELC map units. Both approaches are described below.

4.2.5.1 Listed Plant Species Occurrences

Plant species at risk in Saskatchewan are tracked and/or protected under provincial and federal conservation legislation and documents. These include the following:

- the Saskatchewan Conservation Data Centre (SKCDC 2012d, e, f);
- the Saskatchewan *Wildlife Act* (1998).
- the Committee on the Status of Endangered Wildlife in Canada ([COSEWIC] 2012); and
- the *Species at Risk Act* ([SARA] 2012a).

Federal status documents include the Species at Risk Public Registry (*SARA* 2012b) and COSEWIC (2012). Provincial tracking lists provided by SKCDC (2012d, e, f) distribute standardized information on the ecological status of provincial species and communities. Prior to field programs, an inventory of listed species that are known to occur or have potential to occur within the RSA was compiled using federal and provincial status documents, provincial tracking lists, references/literature, and known distributions. The habitat requirements of these listed plant species were reviewed and compared to availability of that habitat type in the RSA. Listed plant species with the potential to occur within the RSA and LSA and their preferred habitats can be found in [Appendix IV.2, Table IV.2-4](#).

Sampling effort was concentrated in the LSA in habitats and microsites identified to have a greater potential to support listed plant species. However, listed species surveys were not limited to areas with highest habitat potential, as suitable microhabitats exist across all vegetation types. A meander search was determined to be the most appropriate method for locating listed plant species (Robson 1998). Meander length varied based on habitat complexity and microhabitats present at each location. Listed plant searches were carried out during all field programs to account for early and late flowering species, and were also completed within and around all DVI plots. Listed plant species found during these searches were documented by taking photographs of the site and plants, and recording GPS coordinates, ELC map unit, microhabitat, number of individuals present, and population size.

Plant species that could not be identified in the field were collected for later identification. Samples were only collected in cases where the collection removed less than 5% of the population. Species were identified using standard plant identification keys and consultation with expert botanists or taxonomists ([Section 4.2.1](#)).

4.2.5.2 Listed Plant Habitat Potential

Habitats present within ELC map units were assessed for potential to support listed plant species. Field survey results and habitat preference of listed species were used to determine the potential of each ELC map unit to support listed plant species.

4.2.6 Traditional Use Plants and Habitat Potential

A traditional use plant species is one that is used or was historically used by aboriginal peoples. Many of these plant species have medicinal, ceremonial, and spiritual uses. Locally, these species are used for food, firewood, and medicine (Athabasca Land Use Planning Interim Advisory Panel [ALUPIAP] 2003). In addition to direct use of these species, the vegetation and habitats present in the RSA support traditional use wildlife species. Interviews with resource users were completed to identify important resource use areas near the Project (Annex VI). Information on the plant species currently used in the area was also collected.

The occurrence and potential habitats of traditional use plants within the RSA and LSA was determined through field surveys and assessing the traditional use plant habitat potential of ELC map units. Both approaches are described below.

4.2.6.1 Traditional Use Plants

A general list of traditional use plants applicable to the RSA was developed based on known plant species that have been or are potentially still used in the area. In addition, those plant species identified during interviews were also included.

4.2.6.2 Traditional Use Plant Habitat Potential

Habitats present within ELC map units were assessed for potential to support traditional use plant species. Field survey results and habitat preference of traditional use plant species were used to determine the potential of each ELC map unit to support traditional use plant species.

4.3 Results

4.3.1 Ecological Landscape Classification

4.3.1.1 Regional Study Area

Nineteen ELC map units (habitat types) were classified in the RSA and include Bedrock, Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland, Riparian, Open Water, Regenerating map units, Recent Burn, Existing Disturbance, and Unclassified (Table 4.3-1). The mapped distribution of ELC map units for the RSA is presented in Figure 4.3-1. The overall accuracy of the ELC classification was 71%.

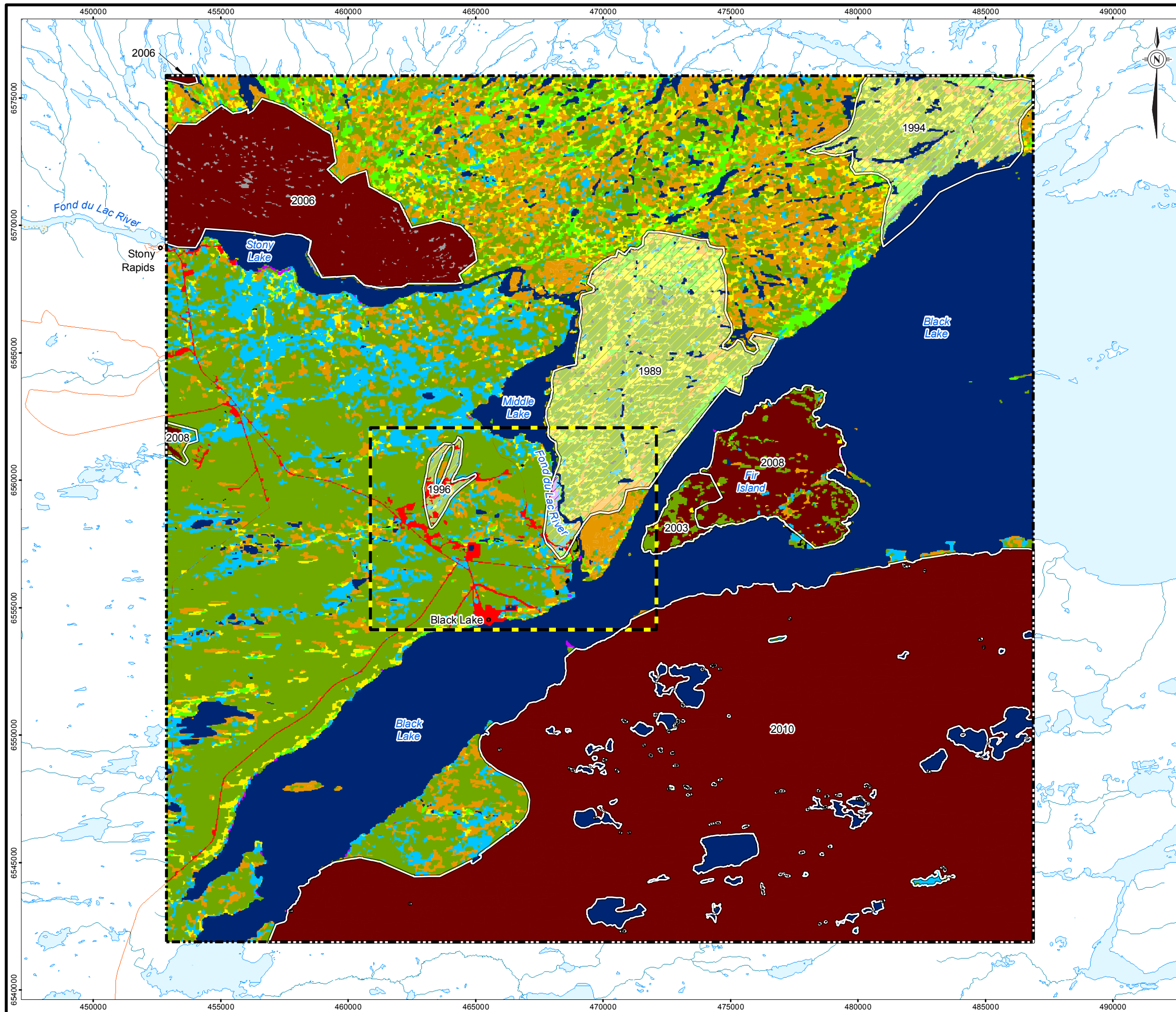
The primary ELC map unit within the RSA is Recent Burn and accounts for approximately 31.1% (35,993 ha) of the RSA (Table 4.3-1; Figure 4.3-1). Recent burn areas were affected by fire in 2003, 2006, 2008, and 2010. Regenerating map units represent areas that were historically affected by fire during 1989, 1994, and 1996 and account for approximately 7.5% (8,656 ha) of the RSA. The most abundant upland map unit is the Jack Pine map unit and accounts for approximately 18.6% (21,492 ha) of the study area. Wetlands cover approximately 5.4% (6,213 ha) of the RSA. Existing Disturbance in the RSA (e.g., roads, communities) account for approximately 0.8% (889 ha) of the RSA. Approximately 22.7% (26,275 ha) of the RSA is covered with Open Water.

Table 4.3-1: Absolute and Relative Area of Ecological Landscape Classification Map Units within the Regional Study Area

Ecological Landscape Classification Map Unit	Area (ha)	Proportion of RSA (%)
Bedrock	347	0.3
Jack Pine	21,492	18.6
Jack Pine/Black Spruce	117	0.1
Spruce	8,887	7.7
Mixedwood	3,658	3.2
Deciduous	2,971	2.6
Wetland	6,213	5.4
Riparian	53	<0.1
Open Water	26,275	22.7
Regenerating Jack Pine	4,793	4.1
Regenerating Jack Pine/Black Spruce	48	<0.1
Regenerating Spruce	707	0.6
Regenerating Mixedwood	2,002	1.7
Regenerating Deciduous	854	0.7
Regenerating Wetland	229	0.2
Regenerating Riparian	23	<0.1
Recent Burn	35,993	31.1
Existing Disturbance	889	0.8
Unclassified	50	<0.1
Total	115,600	100

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

RSA = regional study area; ha = hectares; % = percent; <= less than.

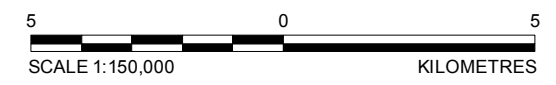


LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA
- ▭ FOREST FIRES (1989-2010)
- ▭ BEDROCK
- ▭ JACK PINE
- ▭ JACK PINE / BLACK SPRUCE
- ▭ SPRUCE
- ▭ MIXEDWOOD
- ▭ DECIDUOUS
- ▭ WETLAND
- ▭ RIPARIAN
- ▭ OPEN WATER
- ▭ REGENERATING JACK PINE
- ▭ REGENERATING JACK PINE / BLACK SPRUCE
- ▭ REGENERATING SPRUCE
- ▭ REGENERATING MIXEDWOOD
- ▭ REGENERATING DECIDUOUS
- ▭ REGENERATING WETLAND
- ▭ REGENERATING RIPARIAN
- ▭ RECENT BURN
- ▭ EXISTING DISTURBANCE
- ▭ UNCLASSIFIED

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6
 LANDSAT SCENE WAS ACQUIRED ON JUNE 24, 2010. THE CLASSIFICATION SHOWN HAS BEEN CREATED FROM THIS 30 METRE RESOLUTION LANDSAT SCENE.
 SASKATCHEWAN FIRE HISTORY DATA OBTAINED FROM THE GOVERNMENT OF SASKATCHEWAN



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
ECOLOGICAL LANDSCAPE CLASSIFICATION FOR THE REGIONAL STUDY AREA			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN	LMR/SM	12/07/13
	CHECK	ME	24/07/13
	REVIEW	BC	24/07/13
SCALE AS SHOWN		REV. 0	FIGURE: 4.3-1

4.3.1.2 Local Study Area

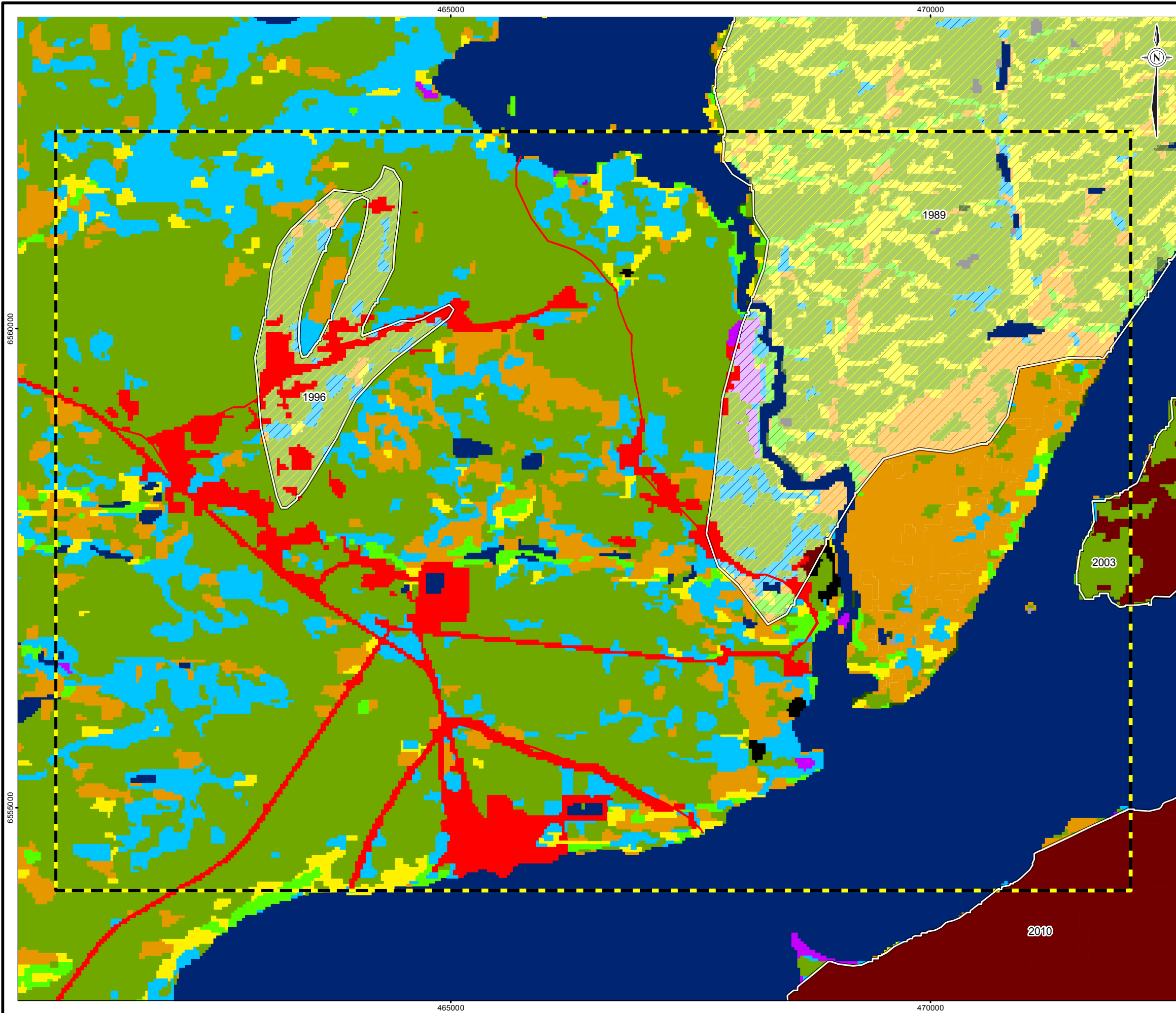
The same 19 ELC map units that occur within the RSA occur within the LSA (Table 4.3-2). The mapped distribution of ELC map units for the LSA is presented in Figure 4.3-2. The primary ELC map unit within the LSA is the Jack Pine map unit and accounts for approximately 35.6% (3,165 ha) (Table 4.3-1; Figure 4.3-1). Regenerating map units within the LSA represent areas that were historically affected by fire during 1989 and 1996 and account for approximately 18.0% (1,601 ha) of the LSA. The Wetland map unit and the Regenerating Wetland map unit cover approximately 11.9% (1,057 ha) of the LSA. The Recent Burn map unit accounts for approximately 0.9% (83 ha). The Existing Disturbance map unit (e.g., roads, communities) account for approximately 5.8% (516 ha) of the LSA. Approximately 16.0% (1,423 ha) of the LSA is covered with Open Water.

Table 4.3-2: Absolute and Relative Area of Ecological Landscape Classification Map Units within the Local Study Area

Ecological Landscape Classification Map Unit	Area (ha)	Proportion of LSA (%)
Bedrock	5	0.1
Jack Pine	3,165	35.6
Jack Pine/Black Spruce	7	0.1
Spruce	809	9.1
Mixedwood	188	2.1
Deciduous	104	1.2
Wetland	957	10.8
Riparian	8	0.1
Open Water	1,423	16.0
Regenerating Jack Pine	963	10.8
Regenerating Jack Pine/Black Spruce	4	<0.1
Regenerating Spruce	183	2.1
Regenerating Mixedwood	261	2.9
Regenerating Deciduous	67	0.8
Regenerating Wetland	100	1.1
Regenerating Riparian	23	0.3
Recent Burn	83	0.9
Existing Disturbance	516	5.8
Unclassified	14	0.2
Total	8,881	100

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

LSA = local study area; ha = hectares; % = percent; < = less than



- LEGEND**
- TERRESTRIAL LOCAL STUDY AREA
 - FOREST FIRES (1989-2010)
 - BEDROCK
 - JACK PINE
 - JACK PINE / BLACK SPRUCE
 - SPRUCE
 - MIXEDWOOD
 - DECIDUOUS
 - WETLAND
 - RIPARIAN
 - OPEN WATER
 - REGENERATING JACK PINE
 - REGENERATING JACK PINE / BLACK SPRUCE
 - REGENERATING SPRUCE
 - REGENERATING MIXEDWOOD
 - REGENERATING DECIDUOUS
 - REGENERATING WETLAND
 - REGENERATING RIPARIAN
 - RECENT BURN
 - EXISTING DISTURBANCE
 - UNCLASSIFIED

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6
 LANDSAT SCENE WAS ACQUIRED ON JUNE 24, 2010. THE CLASSIFICATION SHOWN HAS BEEN CREATED FROM THIS 30 METRE RESOLUTION LANDSAT SCENE.
 SASKATCHEWAN FIRE HISTORY DATA OBTAINED FROM THE GOVERNMENT OF SASKATCHEWAN



PROJECT				
TAZI TWÉ HYDROELECTRIC PROJECT				
TITLE				
ECOLOGICAL LANDSCAPE CLASSIFICATION FOR THE LOCAL STUDY AREA				
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.	
	DESIGN		SCALE AS SHOWN	
	GIS	LMR/SM	12/07/13	REV. 0
	CHECK	KM	24/07/13	FIGURE: 4.3-2
	REVIEW	BC	24/07/13	

4.3.1.3 Ecological Landscape Classification Map Unit Descriptions

The 19 ELC map units that were found in the RSA and LSA are described in the following section. The forest stratum helps to define the composition and structure of the ELC map units, and species present in each stratum are summarized from the 2010 and 2012 field surveys ([Appendix IV.2](#); [Table IV.2-2](#) and [IV.2-3](#)). As outlined in [Section 4.2.1](#), collected data used to describe the ELC map units includes:

- tree species in the main canopy;
- if present, tree species in the sub-canopy;
- species in the tall shrub layer;
- species in the low shrub layer;
- forbs and graminoid species;
- bryophytes; and
- ground dwelling lichens.

Epiphytic lichens were usually present in trace amounts. Characteristic species observed in each vegetation stratum within each ELC map unit are described in the following sub-sections.

4.3.1.3.1 Bedrock

The Bedrock ELC map unit consists of a subxeric (dry) to very xeric moisture regime. The ground surface is characterized by exposed bedrock or boulders. Soils are absent or thin, and if present, occur in cracks and crevices in the bedrock. The nutrient regime is very poor.

The Bedrock ELC map unit is characterized by patchy vegetation. Tree cover was sparse within this ELC map unit with average cover of 5%. Jack pine, black spruce and/or paper birch were the dominant tree species. The most common shrub species that were observed included ground juniper (*Juniperus communis*), bearberry (*Arctostaphylos uva-ursi*), and jack pine and paper birch tree saplings. Common forb species included anemone species (*Anemone* sp.), wild sarsaparilla (*Aralia nudicaulis*), harebell (*Campanula rotundifolia*), pink corydalis (*Corydalis sempervirens*), parsley fern (*Cryptogramma acrostichoides*), fragrant shield fern (*Dryopteris fragrans*), narrow-leaved hawkweed (*Hieracium umbellatum*), rock polypody (*Polypodium virginianum*), three-toothed cinquefoil (*Potentilla tridentata*), common pink wintergreen (*Pyrola asarifolia*), and three-toothed saxifrage (*Saxifraga tricuspidata*). Graminoid ground cover was generally sparse, covering 5% or less. Bryophytes covered between 5 and 20%, with stair-step moss (*Hylocomium splendens*) and awned haircap (*Polytrichum piliferum*) occurring most frequently. A large proportion of the ground was dominated by lichens such as reindeer lichens (*Cladina mitis*, *Cladina rangiferina*, and *Cladina stellaris*), and may cover up to 45% of the ground.

4.3.1.3.2 Jack Pine

The Jack Pine ELC map unit is associated with sandy parent materials and tended to be associated with xeric to submesic areas, and were nutrient poor. This map unit was observed to contain small areas of exposed bedrock. Jack pine was the dominant main canopy species, had an average height of 8 m, an average diameter at breast height (DBH) of 11 cm, and an average age at breast height of 57 years. Trace amounts of trembling aspen and white birch were present in the main canopy layer at some locations. Shrub species included bearberry (*Arctostaphylos uva-ursi*), Labrador tea (*Rhododendron groenlandicum* syn. *Ledum groenlandicum*),

blueberry (*Vaccinium myrtilloides*), bog cranberry (*Vaccinium vitis-idaea*), and ground juniper. Tree saplings of black spruce and jack pine were also present in the shrub layer (<2 m in height). Common forb species included three-toothed saxifrage, northern bastard toadflax (*Geocaulon lividum*), and rusty woodsia (*Woodsia ilvensis*). Graminoids cover was very sparse and may be less than 2% or absent. Common bryophytes included wavy dicranum (*Dicranum polysetum*), ciliate hedwigia moss (*Hedwigia ciliata*), Schreber's moss (*Pleurozium schreberi*), and hair-cap species (*Polytrichum* species). Lichens are prevalent in this ELC map unit, with green reindeer lichen (*Cladina mitis*), grey reindeer lichen (*Cladina rangiferina*), and northern reindeer lichen (*Cladina stellaris*) most abundant.

4.3.1.3.3 Jack Pine/Black Spruce

The Jack Pine/Black Spruce ELC map unit was associated with sandy parent materials and was associated with xeric to submesic sites and were nutrient poor. This map unit was observed to contain small areas of exposed bedrock. This ELC map unit had a composition of 60% jack pine and 40% black spruce in the main canopy. A sub-canopy of jack pine and black spruce was also present. Trace amounts of white birch was also present in the sub-canopy. Jack pine DBH ranged from 11 to 13 cm, and heights from 7.8 to 9.3 m. Age at breast height for jack pine in this ELC was not obtained because of poor sample integrity. Black spruce DBH ranged from 11 to 18.4 cm, heights of from 6 to 12.8 m, and age at breast height ranged from 28 to 95 years. Dominant shrubby species included crowberry (*Empetrum nigrum*), bearberry, Labrador tea, blueberry, and bog cranberry. Tree saplings of black spruce and jack pine were also present in the shrub layer (<2 m in height). Northern bastard toadflax and bunchberry (*Cornus canadensis*) were forb species most commonly observed in this map unit, however, forbs only cover 5% or less. Graminoids were only present in trace amounts. Schreber's moss, green reindeer lichen, grey reindeer lichen, and northern reindeer lichen are abundant.

4.3.1.3.4 Spruce

Black spruce is the dominant main canopy species; jack pine, white spruce, and trembling aspen were present in trace amounts. Tree species present in the sub-canopy included black spruce; trace amounts of white birch was present at some locations. Black spruce had an average DBH of 11.4 cm, an average tree height of 10.1 m, and average age at breast height of 46 years. Green alder (*Alnus viridis*) and black spruce were common tall shrubs observed in this ELC map unit. Dominant low shrubs observed included leatherleaf (*Chamaedaphne calyculata*), Labrador tea, and bog cranberry. Forb species included bunchberry (*Cornus canadensis*), stiff club-moss (*Lycopodium annotinum*), common pink wintergreen (*Pyrola asarifolia*), and northern bastard toadflax. Bryophytes observed most frequently included stair-step moss (*Hylocomium splendens*), liverwort (*Ptilidium ciliare*), and Schreber's moss. Lichen species were dominated by green and northern reindeer lichen, although other common lichen species observed included black-footed reindeer lichen (*Cladina stygia*), studded leather lichen (*Peltigera aphthosa*), and rough pelt (*Peltigera scabrosa*). These subhygric to mesic sites have a medium to poor nutrient regime. Black spruce dominated stands tend to occur in lower topographic positions, and exposed bedrock outcrops may be present.

4.3.1.3.5 Mixedwood

The Mixedwood ELC map unit tended to be subxeric to subhydryc and typically medium in nutrient status. Mixedwood stands typically occurred on sandy parent materials, and small areas of exposed bedrock were often present. This ELC map unit consists of 40% to 60% of both deciduous and coniferous species in the overstory. Deciduous species included trembling aspen, white birch and/or balsam poplar, and coniferous species included white spruce, black spruce and/or jack pine. White birch in this ELC map unit was between 9 and 16 m tall, DBH of 14 to 16.4 cm, and age at breast height of approximately 89 years. Trembling aspen was approximately 14 m tall, DBH of approximately 20 cm, and age at breast height was approximately 44 years. White spruce trees

ranged from 10 to 15 m tall, a DBH of 18 to 58 cm, and age at breast height ranging from 47 to 86 years of age. Black spruce occurring in this map unit was 10.5 to 14.8 m tall, DBH of 11.4 to 18.9 cm, and age at breast height on 69 to 92 years.

Species occurring in the tall shrub layer most commonly included green alder and mountain alder (*Alnus viridis* ssp. *crispa*), although river alder (*Alnus incana* ssp. *tenuifolia* [syn. *A. rugosa*]) and pin cherry (*Prunus pensylvanica*) also occurred in this layer. In addition, paper birch, white spruce, black spruce, and trembling aspen were also observed. Shrubs most commonly observed in the low shrub layer included wild red raspberry (*Rubus idaeus*), northern black current (*Ribes hudsonianum*), prickly rose (*Rosa acicularis*), low-bush cranberry (*Viburnum edule*), Labrador tea, blueberry, and bog cranberry. Common forb species included bunchberry, northern bastard toadflax, stiff club-moss (*Lycopodium annotinum*), ground cedar (*Diphasiastrum complanatum* [syn. *Lycopodium complanatum*]), and one-sided wintergreen (*Orthilia secunda* [syn. *Pyrola secunda*]). Graminoid ground cover was sparse and covered 2% or less of the understory, and was predominantly composed of northern rice grass (*Oryzopsis pungens*). Bryophytes were dominantly Schreber's moss and stair-step moss and covered approximately 50%. Lichens occurred in trace amounts and were dominantly flattened snow lichen (*Cetraria nivalis* [syn. *Flavocetraria nivalis*]), green reindeer lichen, northern reindeer lichen, black-footed reindeer lichen, and *Stereocaulon* species.

4.3.1.3.6 Deciduous

The Deciduous ELC map unit is subxeric to submesic and medium to poor in nutrient status. Deciduous stands predominantly occur on sandy parent materials, and small areas of exposed bedrock are often present. White birch and trembling aspen are dominant main and sub-canopy species; white spruce and/or black spruce were also present, although the coniferous species typically occurred in the sub-canopy. White birch trees in this ELC map unit ranged from 11 to 15.6 m in height and had DBH of 12 to 20 cm. Age at breast height of white birch was approximately 57 years. Trembling aspen tree height ranged from 9.3 to 14.3 m and had DBH of 14.3 to 19.9 cm. Age at breast height was not determined for trembling aspen.

Common species occurring in the tall shrub layer were green alder, mountain alder, white birch, white spruce and black spruce. Low shrub species included bearberry, twinflower, blueberry, bog cranberry, and low-bush cranberry. Saplings of white spruce, black spruce, white birch, and trembling aspen were also commonly present in the low shrub layer (<2 m in height). Forbs observed included bunchberry, northern bastard toadflax, and ground cedar. Graminoids covered 2% or less. Bryophytes present included Schreber's moss, purple horn-toothed moss (*Ceratodon purpureus*), and *Brachythecium* species and cover 10% to 20%. Common lichens included green reindeer lichen, grey reindeer lichen, *Stereocaulon* species, and veinless pelt (*Peltigera malacea*) and covered approximately 10%.

4.3.1.3.7 Wetland

The Wetland ELC map unit includes bogs, fens, and swamps. These areas occupy level and depressional areas where water tends to be stagnant. Because these different wetland types could not be separated in the ELC, these are mapped together. However, each wetland type was surveyed during the field programs, therefore, subclasses for the Wetland ELC map unit are described below.

4.3.1.3.7.1 Bog subclass

The Bog subclass includes both treed and shrubby bogs. Treed bogs include areas where tree cover amounts to greater than 15% crown closure. The vegetation usually consisted of a stunted black spruce tree cover (average 5.3 m in height). Labrador tea, bog cranberry, small bog cranberry (*Oxycoccus microcarpus* [syn.

Vaccinium oxycoccos]), and black spruce saplings were the dominant species present in the shrub layer. The dominant forb present in treed bogs is cloudberry (*Rubus chamaemorus*). Graminoids comprised less than 1% of the ground cover. Bryophytes covered 70% and dominant bryophytes included rusty peat moss (*Sphagnum fuscum*), acute-leaved peat moss (*Sphagnum capillifolium*), and Schreber's moss. Green reindeer lichen is the most common lichen and generally covered 30% or less. The nutrient regime ranged from poor to very poor and drainage was poor to very poor.

Shrubby bogs occur where the tree cover amounts to less than 15% crown closure. Shrub species observed usually included Labrador tea, small bog cranberry, and bog rosemary (*Andromeda polifolia*). Bog cranberry may also be present. The forb observed in shrubby bogs was round-leaved sundew (*Drosera rotundifolia*) and cloudberry may also be present. Graminoids cover less than 5% of the ground cover and included water sedge (*Carex aquatilis*) and sheathed cotton grass (*Eriophorum vaginatum*). Dominant bryophytes included peat moss (*Sphagnum angustifolium*) and rusty peat moss. Similar to treed bogs, the nutrient regime ranged from poor to very poor, and drainage was poor to very poor.

4.3.1.3.7.2 Fen subclass

The Fen subclass includes treed, shrubby, and graminoid fens. Treed fens include areas where tree cover amounts to greater than 15% crown closure. The nutrient regime ranged from poor to rich, and drainage was poor to very poor. Tree species observed included black spruce and tamarack (*Larix laricina*) and were approximately 7 m tall. Shrubs commonly present included dwarf birch (*Betula pumila*), northern laurel (*Kalmia polifolia*), sweet gale (*Myrica gale*), myrtle-leaved willow (*Salix myrtillifolia*), leatherleaf, Labrador tea, bog rosemary, bog cranberry, and small bog cranberry. Tamarack and black spruce were also present in the shrub layer. Common forb species included bunchberry, common horsetail (*Equisetum arvense*), dwarf scouring rush (*Equisetum scirpoides*), woodland horsetail (*Equisetum sylvaticum*), northern grass-of-parnassus (*Parnassia palustris*), small butterwort (*Pinguicula villosa*), cloudberry and round-leaved sundew. Marsh cinquefoil (*Potentilla palustris*) and three-leaved Solomon's seal (*Smilacina trifolia*) were present in more nutrient rich treed fens. Graminoids present included water sedge, sheathed cotton grass, northern bog sedge (*Carex gynocrates*), and bluejoint (*Calamagrostis canadensis*), and covered up to 35%. Bryophytes covered between 50% to 95% and included tufted moss (*Aulacomnium palustre*), stair-step moss (*Hylocomium splendens*), Schreber's moss, slender hair-cap (*Polytrichum strictum*), peat moss, rusty peat moss, Warnstorff's peat moss (*Sphagnum warnstorffii*), and golden moss (*Tomentypnum nitens*). Lichens covered between 2% and 25% and were dominated by green reindeer lichen, black-footed reindeer lichen, and *Peltigaria* species.

Shrubby fens occur where the tree cover amounts to less than 15% crown closure and shrub cover is greater than 25%. Nutrient regime ranged from poor to rich, and drainage was poor to very poor. Tree species observed included black spruce and tamarack and covered up to 5%. Shrubs covered between 35% and 60% and included beaked willow (*Salix bebbiana*), dwarf birch, Labrador tea, leatherleaf, northern laurel, and small bog cranberry. Tamarack and black spruce were also present in the shrub layer. Forbs present included cloudberry and round-leaved sundew. Marsh cinquefoil and three-leaved Solomon's seal were present in more nutrient rich shrubby fens. Graminoids covered approximately 65% and included water sedge. Bryophytes included rusty peat moss, peat moss, midway peat moss, brown moss (*Drepanocladus aduncus*), and golden moss (*Tomentypnum nitens*). Lichens were present in trace amounts.

Graminoid fens occur where graminoids are the dominant vegetation, shrub cover is less than 25%, and tree cover is less than 6%. Nutrient regime ranged from moderate to rich, and drainage was poor to very poor. No trees were observed in graminoid fens. Shrubs covered approximately 20% and included bog rosemary, dwarf

birch, leatherleaf, northern laurel, Labrador tea, small bog cranberry, bog willow (*Salix pedicellaris*). Black spruce saplings were also present in this layer. Forb species observed included buck-bean (*Menyanthes trifoliata*), three-leaved Solomon's seal, and round-leaved sundew. Graminoids included water sedge, short sedge (*Carex canescens*), few-fruited sedge (*Carex oligosperma*), bog sedge (*Carex paupercula*), thin-flowered sedge (*Carex tenuiflora*), small-bottle sedge (*Carex utriculata*), and sheathed cotton grass. Dominant bryophytes included peat moss, midway peat moss, golden moss (*Tomentypnum nitens*), and twisted bog moss (*Sphagnum contortum*). Other bryophytes present included tufted moss, slender hair-cap, *Sarmentypnum* moss (*Sarmentypnum exannulatum*), copper wire moss (*Pohlia nutans*), liverwort (*Scapania paludicola*), Swartz's polytrichum moss (*Polytrichum swartzii*), and Cosson's limprichtia moss (*Scorpidium cossonii*). Lichens were not observed in graminoid fen.

4.3.1.3.7.3 Swamp subclass

The Swamp subclass includes treed and shrubby swamps. Treed swamps include areas where tree cover amounts to greater than 15% crown closure. Nutrient regime ranged from moderate to rich, and drainage was poor to very poor. Tree species observed included white birch, white spruce, black spruce, and trembling aspen. Tamarack was observed in trace amounts. Shrub species included gray alder, river alder, Labrador tea, twinflower, prickly rose, bog cranberry, low-bush cranberry, beaked willow, northern black current (*Ribes hudsonianum*), bristly black current (*Ribes lacustre*), and Scouler's willow (*Salix scouleriana*). Forbs observed included bunchberry, woodland horsetail, oak fern (*Gymnocarpium dryopteris*), bishop's-cap (*Mitella nuda*), common pink wintergreen, dewberry (*Rubus pubescens*), and early blue violet (*Viola adunca*). Graminoids observed included bluejoint, mud sedge and sheathed sedge. Dominant bryophytes included tufted moss, stair-step moss, Schreber's moss, and peat moss. Lichens were observed in trace amounts.

Shrubby fens occur where the tree cover amounts to less than 15% crown closure and shrub cover is greater than 25%. Nutrient regime ranged from moderate to rich, and drainage was poor to very poor. Shrubs included Scouler's willow (*Salix scouleriana*), northern black current, and Labrador tea. Paper birch was also present in the shrub layer. Forbs present included coltsfoot (*Petasites frigidus*), palmate-leaved coltsfoot (*Petasites frigidus* var. *palmatus*), meadow horsetail (*Equisetum pratense*), woodland horsetail, and Lapland buttercup (*Ranunculus lapponicus*). Graminoids covered approximately 60% and included mud sedge, two-seeded sedge (*Carex disperma*), inland sedge (*Carex interior*), Norway sedge (*Carex norvegica*), brownish sedge (*Carex brunnescens*), short sedge (*Carex canescens*), and bluejoint. Bryophytes included tufted mass, stair-step moss, giant water moss (*Calliergon giganteum*), and acute-leaved peat moss (*Sphagnum capillifolium*). Lichens were present in trace amounts.

4.3.1.3.8 Riparian

The Riparian ELC map unit includes areas adjacent to rivers, streams, and lakes. Nutrient regimes ranged from moderate to rich, and moisture regimes ranged from mesic to hydric, depending on proximity to the waterbody and/or slope position. Tree cover was approximately 10% or absent. Common tree species included black spruce, paper birch, white spruce, and tamarack. Shrubs, on average, covered 40% and included green alder, gray alder (*Alnus incana*), mountain alder, dwarf birch, northern laurel, Labrador tea, sweet gale, bristly black current, beaked willow, and flat-leaved willow (*Salix planifolia*). White and black spruce also occurred in this layer. Dominant forbs included bulb-bearing water-hemlock (*Cicuta bulbifera*), water arum (*Calla palustris*), swamp horsetail (*Equisetum fluviatile*), marsh cinquefoil, and common pink wintergreen. Dominant graminoids included bluejoint, rough hair grass (*Agrostis scabra*), water sedge, small bottle sedge (*Carex utriculata*), tufted hair grass (*Deschampsia cespitosa*), creeping spike rush (*Eleocharis palustris*), thread rush (*Juncus filiformis*), and big head rush (*Juncus vaseyi*). Common bryophytes included tufted moss, liverwort (*Blepharostoma*

trichophyllum), heart-leaved feather moss (*Calliergon cordifolium*), brown moss, Stair-step moss, Schreber's moss, and Swartz's polytrichum moss (*Polytrichum swartzii*). Lichens were present in trace amounts.

4.3.1.3.9 Open Water

All water bodies present on the landscape, including Black Lake, Stony Lake, Middle Lake, other lakes, ponds, rivers, and creeks. Emergent and/or submergent aquatic vegetation may be present.

4.3.1.3.10 Regenerating Map Units

The following Regenerating ELC map units represent areas that were affected by fire in 1989, 1994, and 1996; enough regeneration has occurred in these areas that regenerating areas are considered young forest. Following a disturbance, forest renewal occurs in a series of successional stages that are initiated by the establishment of pioneering species. Forests in this map unit were determined to be young seral, young climax, and disclimax. Young seral successional status is when early seral communities are established and are characterized by young and even-aged stands. Young climax differs from young seral because the stand composition is typical of the climax forest expected for the location, but community structure has not yet developed. Young climax is also characterized by a young, even-aged stand with a uniform canopy height. Disclimax is where the species composition of the area differs from that expected for the location and was observed in the RSA in the Regenerating Wetlands ELC map unit.

4.3.1.3.10.1 Regenerating Jack Pine

The Regenerating Jack Pine map unit tended to be subxeric to submesic and nutrient poor. This map unit often contained small areas of exposed bedrock. Jack pine was the dominant tree species observed and covered approximately 18%; balsam poplar was also present. Species observed in the tall shrub layer included jack pine, green alder, trembling aspen, and beaked sedge. Low shrubs included bearberry, northern laurel, Labrador tea, blueberry, and bog cranberry. Jack pine, white birch, and black spruce also occurred in the low shrub layer. Forbs species included bunchberry, fireweed (*Chamerion angustifolium* ssp. *angustifolium* [syn. *Epilobium angustifolium*]), ground-fir (*Diphasiastrum sitchense* [syn. *Lycopodium sitchense*]), common horsetail, wild lily-of-the-valley (*Maianthemum canadense*), cloudberry, and three-toothed saxifrage. Hay sedge (*Carex siccata*) and northern reed grass (*Calamagrostis inexpansa*) were the only graminoids observed. Only trace amounts of the bryophyte awned hair-cap was present. Lichens coverage was variable, and predominantly included the species green reindeer lichen and grey reindeer lichen.

4.3.1.3.10.2 Regenerating Jack Pine/Black Spruce

The Regenerating Jack Pine/Black Spruce map unit tended to be xeric to submesic and nutrient poor. This map unit often contained small areas of exposed bedrock. A tree layer was present in this ELC map unit, and jack pine was dominant; black spruce and paper birch were also present. Trees covered approximately 15%. Species observed in the tall shrub layer included jack pine, black spruce, and green alder. Low shrubs included bearberry, northern laurel, Labrador tea, prickly rose, blueberry, bog bilberry, and bog cranberry. Forbs observed included goldthread (*Coptis trifolia*), bunchberry, ground-fir, fireweed, harebell, three-toothed cinquefoil, pick corydalis, three-toothed saxifrage, hooded ladies'-tresses (*Spiranthes romanzoffiana*), and an unknown fern species. A sparse graminoid cover was observed and included hay sedge. Schreber's moss and juniper hair-cap (*Polytrichum juniperinum*) were observed and covered less than 5%. Green reindeer lichen, grey reindeer lichen, and brown-foot cladonia (*Cladonia gracilis* ssp. *turbinata*), were also observed.

4.3.1.3.10.3 Regenerating Spruce

No sample plots were completed in this ELC type. Species present are expected to be similar to those occurring in the unburned spruce map unit, except that stands occurring in the Regenerating Spruce map unit would be young seral or young climatic. These sites are likely subhygric to mesic and have a medium to poor nutrient regime. Exposed bedrock outcrops may be present.

4.3.1.3.10.4 Regenerating Mixedwood

The Regenerating Mixedwood ELC map unit tended to be subxeric to subhydric and typically medium to poor in nutrient status. Regenerating Mixedwood occurred on sandy parent materials and small areas of exposed bedrock were present. Tree cover was, on average, 15%. Dominant tree species present included paper birch, black spruce, jack pine, and trembling aspen. Species occurring in the tall shrub layer included mountain alder, green alder, white birch, black spruce, jack pine, and trembling aspen. Species occurring in the low shrub layer included white birch, black spruce, jack pine, trembling aspen, bearberry, crowberry, Labrador tea, bristly black current, prickly rose, wild red raspberry, willow species, blueberry, and bog cranberry. Dominant forbs included fireweed, bunchberry, northern bastard toadflax, ground-fir, stiff club-moss and ground-cedar (*Diphasiastrum complanatum* [syn. *Lycopodium complanatum*]). Graminoids covered approximately 5% and species observed included bluejoint, bent sedge, hay sedge, hairy wild rye, and northern rice grass. Bryophytes typically covered 25 to 50% and were dominantly wavy dicranum, stair-step moss, Schreber's moss, and juniper hair-cap moss. Lichens covered, on average, 50%, and dominant species included green reindeer lichen and brown-foot cladonia.

4.3.1.3.10.5 Regenerating Deciduous

The Regenerating Deciduous ELC map unit was observed to be subxeric to mesic and medium to poor in nutrient status. Regenerating Deciduous stands predominantly occurred on sandy parent materials, and small areas of exposed bedrock were often present. Trees covered up to 10% and included white birch, jack pine, and trembling aspen. Species recorded in the tall shrub layer included white birch, jack pine, trembling aspen, and pin cherry. Black spruce was also present. Low shrubs include bearberry, Labrador tea, twinflower, prickly rose, blueberry, bog cranberry, and low-bush cranberry. Forbs covered less than 10% and included bunchberry, pink corydalis, fireweed, northern bastard toadflax, stiff-club moss, wintergreens, and three-toothed saxifrage. Graminoids covered approximately 1%. Bryophytes observed included wavy dicranum, stair-step moss, and juniper hair-cap moss. Green reindeer lichen was also observed.

4.3.1.3.10.6 Regenerating Wetland

The Regenerating Wetland ELC map unit includes regenerating bogs, regenerating fens, and regenerating swamps. These areas occupy level and depressional areas where water tends to be stagnant. Because these different regenerating wetland types could not be separated in the ELC, these are mapped together. However, regenerating bogs, regenerating fens, and regenerating swamps were surveyed during field programs; therefore, subclasses for Regenerating Wetland are described below.

Regenerating Bog Subclass

The Regenerating Bog subclass includes regenerating bogs. No trees or tall shrubs were present in this ELC subclass. Tree species recorded in the low shrub layer included jack pine and black spruce. Other low shrubs included leatherleaf, northern laurel, bog rosemary, small bog cranberry, and bog cranberry. No forbs or graminoids were observed. Rusty peat moss was the dominant bryophyte observed. Lichen covered less than 1%.

Regenerating Fen Subclass

The Regenerating Fen subclass includes regenerating fens. Trees observed in regenerating fen included black spruce, tamarack, and jack pine, but only covered 2% or less. Tall shrubs included black spruce, tamarack, jack pine, and gray alder. White birch and willows were also present. Species recorded in the low shrub layer included river alder, dwarf birch, white birch, leatherleaf, crowberry, northern laurel, Labrador tea, small bog cranberry, beaked willow, myrtle-leaved willow, autumn willow (*Salix serissima*), and bog cranberry. Tamarack, black spruce and jack pine were also present in this layer. Fireweed, woodland horsetail, northern grass-of-parnassus (*Parnassia palustris*), dwarf raspberry (*Rubus arcticus* [syn. *R. acaulis*]), cloudberry, and three-leaved Solomon's seal were the dominant forbs observed. Graminoids covered up to 30% and included bluejoint, water sedge, two-seeded sedge, mud sedge, sheathed sedge, and sheathed cotton grass. Dominant bryophytes included tufted moss, wavy dicranum, Schreber's moss, rusty peat moss, Warnstorff's peat moss, and golden moss (*Tomentypnum nitens*). Lichens covered 15% or less and included green reindeer lichen, black-footed reindeer lichen, and brown-foot cladonia.

Regenerating Swamp Subclass

The Regenerating Swamp subclass includes regenerating swamps. Where trees were present they included black spruce and white birch, and covered 15% to 20%. Species recorded in the tall shrub layer included green alder, tamarack, black spruce, and willows. Low shrubs included leatherleaf, northern laurel, Labrador tea, bog cranberry, small bog cranberry, and wild red raspberry. Forbs observed were common horsetail and cloudberry. Graminoids observed were dominantly sedges (*Carex* species). Bryophytes included peat moss, rusty peat moss, and Schreber's moss.

4.3.1.3.10.7 Regenerating Riparian

No sample plots were completed in this ELC type. Species present are expected to be similar to those occurring in the unburned Riparian map unit, except that stands occurring in the Regenerating Riparian map unit would be young seral or young climatic. Similar to the Riparian map unit, these sites likely have nutrient regimes that range from moderate to rich and moisture regimes of mesic to hydric, depending on proximity to the waterbody and/or slope position.

4.3.1.3.11 Recent Burn

The Recent Burn ELC map unit represents areas that have been affected by fire in 2003, 2006, 2008, and 2010. Trees, when present, covered 5% or less, and included paper birch, balsam poplar and jack pine. Shrubs covered 10% to 25% and included species such as mountain alder, white birch, jack pine, bearberry, Labrador tea, Canada buffaloberry (*Shepherdia canadensis*), blueberry, and bog cranberry. The dominant forb present was fireweed; however, trace amounts of species such as bunchberry, pink corydalis, northern bastard toadflax, and kidney-leaved violet were also present. Graminoids were somewhat more abundant and covered, on average, 20% to 25%. Graminoids observed included bluejoint, silvery-flowered sedge (*Carex aenea*), bent sedge, sand sedge (*Carex houghtoniana*), and hay sedge. Bryophytes and lichens were observed in trace amounts.

4.3.1.3.12 Existing Disturbance

This map unit is the result of existing human related disturbances such as the Black Lake sewage lagoon, roads, cut lines, borrow/gravel pits, Camp Grayling, and villages. This map unit does not include the natural disturbances from fire; fire related disturbances are captured in the Recent Burn and Regenerating map units.

4.3.1.3.13 Unclassified

The Unclassified ELC map unit is the result of areas in the imagery where the spectral characteristics were unique and did not fit into any of the ELC map units defined above. In addition, these areas could not be placed in one of the above classes because no ground truth data were collected in these locations, therefore they remain unclassified.

4.3.2 Biodiversity

A total of 118 locations were sampled as part of the DVI (40 plots), and listed plant surveys (78 plots) and were used for the determination of biodiversity (Table 4.3-3). In total, 363 plant species were identified during field programs. This total includes 166 vascular plants (including 7 trees, 36 shrubs and subshrubs, 80 forbs, and 43 graminoids), 86 bryophytes, and 111 ground-dwelling and epiphytic lichens (Table 4.3-4; Appendix IV.2; Table IV.2-3). All plant species recorded in each ELC map unit are listed in Appendix IV.2 (Table IV.2-2).

Table 4.3-3: Number of Detailed Vegetation Inventory and Listed Plant Survey Plots per Ecological Landscape Classification Map Unit in the Regional and Local Study Areas

Ecological Landscape Classification Map Unit	Detailed Vegetation Inventory Plots	Listed Plant Survey Plots	Total Number of Survey Plots
Bedrock	3	4	7
Jack Pine	2	6	8
Jack Pine/Black Spruce	3	4	7
Spruce	2	5	7
Mixedwood	7	13	20
Deciduous	4	3	7
Wetland ^(a)	-	-	-
Bog subclass	2	2	4
Fen subclass	4	7	11
Swamp subclass	3	2	5
Riparian	2	6	8
Open Water	0	0	0
Regenerating Jack Pine	2	4	6
Regenerating Jack Pine/Black Spruce	0	3	3
Regenerating Spruce	0	0	0
Regenerating Mixedwood	3	7	10
Regenerating Deciduous	0	4	4
Regenerating Wetland ^(a)	-	-	-
Regenerating Bog subclass	1	0	1
Regenerating Fen subclass	2	1	3
Regenerating Swamp subclass	0	2	2

Table 4.3-3: Number of Detailed Vegetation Inventory and Listed Plant Survey Plots per Ecological Landscape Classification Map Unit in the Regional and Local Study Areas (continued)

Ecological Landscape Classification Map Unit	Detailed Vegetation Inventory Plots	Listed Plant Survey Plots	Total Number of Survey Plots
Regenerating Riparian	0	0	0
Recent Burn	1	4	5
Existing Disturbance	0	0	0
Unclassified	N/A	N/A	N/A
Total	40	78	118

^(a) All wetland types in the Regional Study Area are mapped in these map units; however bogs, fens, and swamps and regenerating wetland areas were identified and surveyed during field programs, and therefore subclasses for these map units are described. N/A = not applicable; - = not completed

4.3.2.1 Species Richness by Ecological Landscape Classification Map Unit

The number of vascular, non-vascular, lichen and total species among each ELC map unit was calculated as one measure of biodiversity. The highest number of vascular plant species occurred within the Riparian ELC map unit, Mixedwood ELC map unit, and Wetland map unit – fen subclass (63, 55, and 54 vascular species, respectively) (Table 4.3-4). The highest number of non-vascular plant species occurred within the Mixedwood ELC map unit, and the highest number of ground-dwelling and epiphytic lichens was observed in the Jack Pine/Black Spruce ELC map unit (Table 4.3-4).

The Mixedwood ELC map unit had the highest total species diversity at 136 species (Table 4.3-4). A total of 102 species occurred in the Fen subclass, and the Deciduous and Riparian ELC map units had 88 species each. The lowest number of vascular plant species occurred within Regenerating Swamp subclass (21 species), Regenerating Jack Pine/Black Spruce (29 species), Regenerating Deciduous (29 species) and Recent Burn (29 species).

4.3.2.2 Total Number of Listed Species

A total of 51 listed plant species occurrences were documented during field surveys and are described in more detail in Section 4.3.3. These species are listed by the SKCDC; however, none of these species are listed under COSEWIC, SARA or the *Wildlife Act*. The highest numbers of listed species were found in the Mixedwood ELC map unit with 20 listed species, which were all lichens (Table 4.3-4). Eighteen listed lichen species were found in the Jack Pine/Black Spruce ELC map unit, and 16 (15 lichens and one fern) were found in the Bedrock ELC map unit. No listed species were found in the Recent Burn or Regenerating Deciduous ELC map units (Table 4.3-4).

Table 4.3-4: Biodiversity Measures by Ecological Landscape Classification Map Unit within the Regional Study Area

Ecological Landscape Classification Map Unit	Number of Sample Sites ^(a)	Number of Vascular Plants	Number of Non-vascular Plants	Number of Lichens	Total Number of Species	Number of Listed Species Occurrences	Number of Species Unique to ELC Type ^(b)
Bedrock	7	39	8	39	86	16	10
Jack Pine	8	31	13	30	74	14	3
Jack Pine/Black Spruce	7	25	8	49	82	18	7
Spruce	7	25	8	15	48	5	2
Mixedwood	20	55	37	44	136	20	28
Deciduous	7	29	19	40	88	10	12
Wetland ^(c)	-	-	-	-	-	-	-
Bog subclass	4	12	15	22	49	10	3
Fen subclass	11	54	23	25	102	9	17
Swamp subclass	5	32	22	13	67	5	14
Riparian	8	63	2	23	88	2	25
Open Water	-	-	-	-	-	1 ^(d)	-
Regenerating Jack Pine	6	23	2	7	32	3	0
Regenerating Jack Pine/Black Spruce	3	23	2	4	29	1	3
Regenerating Spruce	0	-	-	-	-	-	-
Regenerating Mixedwood	10	31	11	28	70	11	4
Regenerating Deciduous	4	23	4	2	29	0	1
Regenerating Wetlands ^(c)	-	-	-	-	-	-	-
Regenerating Bog subclass	1	7	3	8	18	9	0
Regenerating Fen subclass	3	36	16	16	68	10	9
Regenerating Swamp subclass	2	17	4	0	21	5	1

Table 4.3-4: Biodiversity Measures by Ecological Landscape Classification Map Unit within the Regional Study Area (continued)

Ecological Landscape Classification Map Unit	Number of Sample Sites ^(a)	Number of Vascular Plants	Number of Non-vascular Plants	Number of Lichens	Total Number of Species	Number of Listed Species Occurrences	Number of Species Unique to ELC Type ^(b)
Regenerating Riparian	0	-	-	-	-	-	-
Recent Burn	5	25	3	1	29	0	5
Existing Disturbance	0	-	-	-	-	-	-
Unclassified	N/A	-	-	-	-	-	-
Total Number of Species	118	166	86	111	363	51^(e)	144

Note: Numbers presented are total number of species found in that ELC map unit. The same species may occur in more than one ELC map unit.

The Existing Disturbance ELC map unit is the result of existing human related disturbances such as roads, cut lines, and villages.

The Unclassified ELC map unit is the result of areas in the imagery where the spectral characteristics were unique and did not fit into any of the other ELC map units and could not be placed in one of the above classes because no ground truth data were collected in these locations, therefore they remain unclassified.

^(a) The number of sample sites is based on listed plant surveys completed in 2010 and 2012, and Detailed Vegetation Inventory plots completed in 2012. These numbers do not include ground truth/reconnaissance plots.

^(b) Does not include unidentified species.

^(c) Totals were not completed for this map unit because the variation of numbers of plant species observed in each of the subclasses.

^(d) alternate-flowered water-milfoil was documented at a riparian plot that included a portion of open water; therefore this observation was placed in the open water map unit and not counted in the riparian map unit.

^(e) This includes 6 forbs, 1 graminoid, and 44 lichens documented in 2010 and 2012.

ELC = Ecological Landscape Classification; N/A = not applicable; - = not completed

4.3.2.3 Total Number of Unique Species

Calculating the total number of unique species within ELC types is a way of expressing habitat uniqueness ([Table 4.3-4](#)). The Mixedwood and Riparian ELC map units had the highest numbers of unique species with 28 and 25 species, respectively. No unique species were found in Regenerating Jack Pine ELC map unit and the Regenerating bog subclass.

4.3.2.4 Species Richness by Sample Plot

Species richness for vascular plants, bryophytes (non-vascular), and lichens are shown in [Table 4.3-5](#). Among the highest values for vascular plant species richness are the Regenerating Fen subclass, Swamp subclass, and Mixedwood ELC map units. Mixedwood, Riparian, and Deciduous map units had the highest bryophyte values. Lichen richness was highest in Bedrock, Deciduous, and Jack Pine/Black Spruce ELC map units. Overall species richness was observed to be highest in Regenerating Fen subclass and Mixedwood and Deciduous ELC map units. The Regenerating Jack Pine ELC map unit was found to have the lowest species richness.

Table 4.3-5: Species Richness by Detailed Vegetation Sample Plots in the Regional Study Area

Ecological Landscape Classification Map Unit	Number of Detailed Vegetation Plots Sampled	Vascular Species Richness		Non-vascular Species Richness ^(a)		Lichen Species Richness		Total Species Richness	
		Min	Max	Min	Max	Min	Max	Min	Max
Bedrock	3	9	17	0	6	7	30	21	42
Jack Pine	2	8	12	3	5	12	16	25	31
Jack Pine/Black Spruce	3	5	12	3	5	17	26	33	37
Spruce	2	7	11	3	4	6	11	16	26
Mixedwood	7	7	21	2	16	2	20	23	46
Deciduous	4	9	16	2	14	1	27	28	46
Wetland ^(b)	-	-	-	-	-	-	-	-	-
Bog subclass	2	6	11	4	12	0	22	10	43
Fen subclass	4	7	14	5	12	0	14	26	31
Swamp subclass	3	8	25	2	10	0	12	29	30
Riparian	2	11	17	12	15	0	1	27	29
Open water	0	-	-	-	-	-	-	-	-
Regenerating Jack Pine	2	4	10	1	1	2	6	7	17
Regenerating Jack Pine/Black Spruce	0	-	-	-	-	-	-	-	-
Regenerating Spruce	0	-	-	-	-	-	-	-	-
Regenerating Mixedwood	3	5	13	2	7	7	16	18	32
Regenerating Deciduous	0	-	-	-	-	-	-	-	-
Regenerating Wetlands ^(b)	-	-	-	-	-	-	-	-	-
Regenerating Bog subclass	1	7	-	3	-	8	-	18	-
Regenerating Fen subclass	2	18	29	8	13	7	13	33	55
Regenerating Swamp subclass	0	-	-	-	-	-	-	-	-

Table 4.3-5: Species Richness by Detailed Vegetation Sample Plots in the Regional Study Area (continued)

Ecological Landscape Classification Map Unit	Number of Detailed Vegetation Plots Sampled	Vascular Species Richness		Non-vascular Species Richness ^(a)		Lichen Species Richness		Total Species Richness	
		Min	Max	Min	Max	Min	Max	Min	Max
Regenerating Riparian	0	-	-	-	-	-	-	-	-
Recent Burn	1	10	-	1	-	1	-	12	-
Existing Disturbance	0	-	-	-	-	-	-	-	-
Unclassified	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: The Existing Disturbance ELC map unit is the result of existing human related disturbances such as roads, cut lines, and villages.

The Unclassified ELC map unit is the result of areas in the imagery where the spectral characteristics were unique and did not fit into any of the other ELC map units and could not be placed in one of the above classes because no ground truth data were collected in these locations, therefore they remain unclassified.

^(a) includes bryophytes, which include mosses, liverworts, and hornworts.

^(b) Totals were not completed for this map unit because the variation of numbers of plant species observed in each of the subclasses.

min = minimum; max = maximum; - = not completed; N/A = not applicable

4.3.3 Listed Plant Species and Listed Plant Habitat Potential

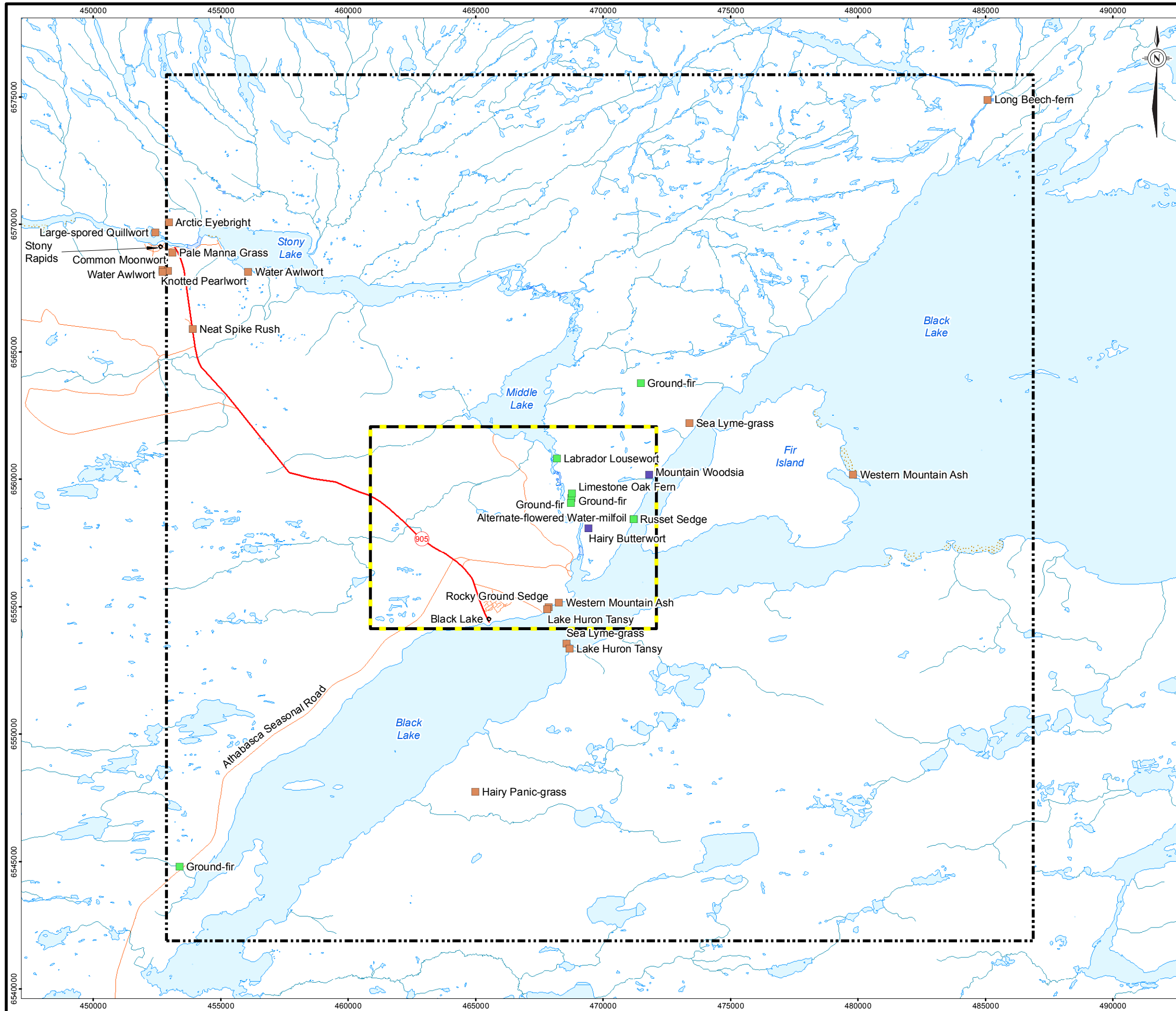
4.3.3.1 Listed Plant Species Occurrences

Listed vascular plant species confirmed to occur within the RSA are in [Figure 4.3-3](#) and [Table 4.3-6](#) and listed lichen species are in [Figure 4.3-4](#) and [Table 4.3-7](#). Sixteen provincially listed vascular plant species and 44 provincially listed lichen species have been documented within the RSA. Two historical and seven current listed plant observation locations occur within the LSA ([Figure 4.3-3](#)). Lake Huron tansy (*Tanacetum bipinnatum* ssp. *huronense* [syn. *Tanacetum huronense* var. *floccosum*]), a historical observation within the LSA, is listed as Special Concern under COSEWIC (2012) and as Special Concern under Schedule 1 of SARA (2012b). This species is not identified as a provincial wild species at risk under the *Wildlife Act* (1998) and was not observed during the 2010 and 2012 field programs.

Six provincial listed forbs and one listed graminoid were documented during the 2010 and 2012 field programs ([Figure 4.3-3](#) and [Table 4.3-6](#)). For a list of all species with potential to occur within the RSA, see [Appendix IV.2 \(Table IV.2-4\)](#). For specific locations where these species were observed, see [Appendix IV.2 \(Table IV.2-5\)](#). Documented species in 2010 and 2012 included ground-fir (*Diphasiastrum sitchense* [syn. *Lycopodium sitchense*]), limestone oak fern (*Gymnocarpium jessoense* ssp. *parvulum*), alternate-flowered water milfoil (*Myriophyllum alterniflorum*), Labrador lousewort (*Pedicularis labradorica*), hairy butterwort (*Pinguicula villosa*), mountain woodsia (*Woodsia scopulina*), and Russet sedge (*Carex saxatilis* [syn. *Carex saxatilis* var. *romalea*]). Ground-fir was observed at four locations, two of which occur within the LSA. These observations were in Regenerating Jack Pine, Regenerating Jack Pine/Black Spruce, Regenerating Mixedwood, and Jack Pine ELC map units. Limestone oak fern was observed on a sparsely vegetation bedrock outcrop in the Jack Pine ELC map unit. Alternate-flowered water milfoil was observed just off the shore in Black Lake. Labrador lousewort was observed in a Regenerating Poor Fen. Hairy butterwort was documented in the Fen subclass – Wetland ELC map unit on the side of a Sphagnum hummock along a game trail in a treed poor fen. Mountain woodsia was found in crevices on a bedrock outcrop in the Bedrock ELC map unit. Russet sedge was found in the Riparian ELC map unit along the shore of Black Lake. No COSEWIC or SARA listed species were observed within the RSA and LSA during the 2010 and 2012 field surveys.

The 44 provincial listed lichen species observed were widely distributed in the LSA and RSA ([Figure 4.3-4](#) and [Table 4.3-7](#)). For specific locations where these species were observed, see [Appendix IV.2 \(Table IV.2-3\)](#). All unburned ELC map units had between 5 and 20 listed lichen species, with the exception of the Riparian map unit which had 1 listed lichen observation. Regenerating ELC map units had between 0 and 10 listed lichen observations. Recent burn had no listed lichen species observations.

The numbers of provincial and federal listed species observations documented during field programs does not preclude the potential for other listed species to occur within the RSA. Northern areas of the province are not as easily accessed and explored, therefore documented sightings of listed plants are often limited. Listed plant occurrences at a site can be missed due to timing of plant surveys because the species presence can vary annually and locally. In addition, climatic fluctuations may not allow adequate time for plants to mature and produce flowers, making them more difficult to spot and identify. Available microhabitats within larger habitat types can vary over time and space. Therefore, a listed plant survey cannot confirm the absence of listed plants or listed plant communities; it can only confirm their presence.



LEGEND

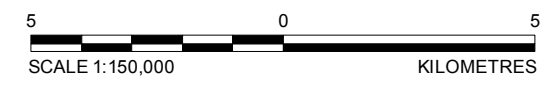
- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY

LISTED PLANT SPECIES

- 2010 OBSERVATION
- 2012 OBSERVATION
- HISTORIC OBSERVATION
- TERRESTRIAL REGIONAL STUDY AREA
- TERRESTRIAL LOCAL STUDY AREA

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6
 HISTORIC LISTED PLANT OBSERVATION LOCATIONS OBTAINED FROM THE SASKATCHEWAN CONSERVATION DATA CENTRE, 2012.



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
LOCATIONS OF LISTED PLANT SPECIES OBSERVATIONS IN THE REGIONAL STUDY AREA			
<p>Golder Associates Saskatoon, Saskatchewan</p>	PROJECT 10-1365-0004		FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	SM 17/07/13	REV. 0
	CHECK	KM 24/07/13	FIGURE: 4.3-3
REVIEW	BC 24/07/13		

Table 4.3-6: Listed Vascular Plant Species Confirmed to Occur Within the Regional and Local Study Areas

Common Name	Scientific Name	Provincial Ranking ^(a)	Habitat Preference ^(b) , Location, Sighting Circa
Trees and Shrubs			
Western mountain ash	<i>Sorbus scopulina</i>	S2	Upper beach borders or shore wood and wooded bank slopes. Tobey Point of Fir Island, Black Lake and in mossy rock by lake, 1980 and 1981.
Forbs			
Lake Huron tansy ^(c)	<i>Tanacetum bipinnatum</i> ssp. <i>huronense</i> (syn. <i>Tanacetum huronense</i> var. <i>floccosum</i>)	S2S3	Broad sandy beaches and beach terraces, moist depressions at the base of sheltered dune slopes. Observed in RSA on a sandy beach, south exposure west shore of Black Lake, 1981, and on a sandy beach, north exposure, east shore of Black Lake, 1980.
Arctic eyebright	<i>Euphrasia subarctica</i>	S1S2	Mesic open woods clearings, rocky shores and drier sedge-fen borders. Observed along paths in coniferous forest in north west of RSA near Stony Rapids, 1961
Long beech-fern	<i>Phegopteris connectilis</i>	S2	Wet woods and in soil on banks and shores or on moist rocky hillsides and ledges. Observed along Chipman River, Black Lake, 1987.
Ground-fir	<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	S2	Dry, sandy coniferous woods. Observed in Regenerating Jack Pine/Black Spruce habitat, Regenerating Mixedwood habitat, Regenerating Jack Pine, and Jack Pine habitat, 2012
Limestone oak fern	<i>Gymnocarpium jessoense</i> ssp. <i>parvulum</i>	S2S3	Woods, on granitic slopes and outcrops. Observed on a sparsely vegetated bedrock outcrop, 2012
Alternate-flowered water-milfoil	<i>Myriophyllum alterniflorum</i>	S1	Shallow lakes. Aquatic just off shore in Black Lake, 2012
Labrador lousewort	<i>Pedicularis labradorica</i>	S2	Open black spruce woods, treed bogs, regenerating burns, and lichen-tundra. Observed in Regenerating Poor Fen, 2012
Hairy butterwort	<i>Pinguicula villosa</i>	S2S3	On sphagnum hummocks in treed bogs or muskeg. Observed on the side of a Sphagnum hummock on game trail in a treed poor fen, 2010
Mountain woodsia	<i>Woodsia scopulina</i>	S1	Granitic or calcareous cliffs, outcrops, and rocky slopes. In crevices on a bedrock outcrop, 2010
Graminoids (sedges, grasses, and rushes)			
Knotted pearlwort	<i>Sagina nodosa</i> spp. <i>borealis</i>	S2	Wet sandy or rocky lake shores. Observed within the northwest portion of the RSA, 1981.
Water awlwort	<i>Subularia aquatica</i> var. <i>americana</i>	S3	Shallow water at the margins of sandy or gravelly lakes and slow streams. Observed in mud on the margin of a river with shallow water in the northwest of the RSA, 1963, and at the south shore of stony rapids, 1980.

Table 4.3-6: Listed Vascular Plant Species Confirmed to Occur Within the Regional and Local Study Areas (continued)

Common Name	Scientific Name	Provincial Ranking ^(a)	Habitat Preference ^(b) , Location, Sighting Circa
Sea lyme-grass	<i>Elymus mollis</i>	S2	Sandy lake beaches and dunes. Observed on a sandy beach, south exposure west shore of Black Lake and Black Lake "Sandy Point" on the east shore, 1981
Hairy panic-grass	<i>Dichanthelium acuminatum</i> var. <i>fasciculatum</i>	S2	Dry, sandy open woods and clearings, exposed rock outcrops. Observed on boulder till of large drumlin, Regenerating Jack Pine south facing slope southeast of Stony Rapids, 1982.
Neat spike rush	<i>Eleocharis nitida</i>	S2	Open moist shores, pond edges, wet depression clearings, and poor fens. Observed 2 miles south of Stony Rapids in roadside ditch, in the northwest portion of the RSA, 1961.
Pale manna grass	<i>Torreyochloa pallida</i> var. <i>fernaldii</i>	S2	Wet sandy beaches and marshy or floating sedge-fen shores. Observed in a swampy area in the north west of the RSA near Stony Rapids, 1960
Russet sedge	<i>Carex saxatilis</i> (syn. <i>Carex saxatilis</i> var. <i>rhomalea</i>)	S2	Marshy, peaty, sandy, or rocky shores. Observed on a sandy beach, southern exposure west shore of Black Lake, 1980 and 1981. Observed in a riparian habitat next to Black Lake, 2012.

Notes: Common names obtained from SKCDC (2012d, e), Johnson et al. (1995) USDA NRCS (2012), and ACIMS (2012).

No species listed under COSEWIC (2012), SARA (2012b), or *Wildlife Act* (1998) were observed during 2010 and 2012 field programs.

^(a) Saskatchewan Conservation Data Centre Tracked Species for Vascular Plants (SKCDC 2012a), and Tracked Species for Non-Vascular Plants (SKCDC 2012b), where;

S1 = extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals);

S2 = rare (6 to 20 occurrences in Saskatchewan or few remaining individuals);

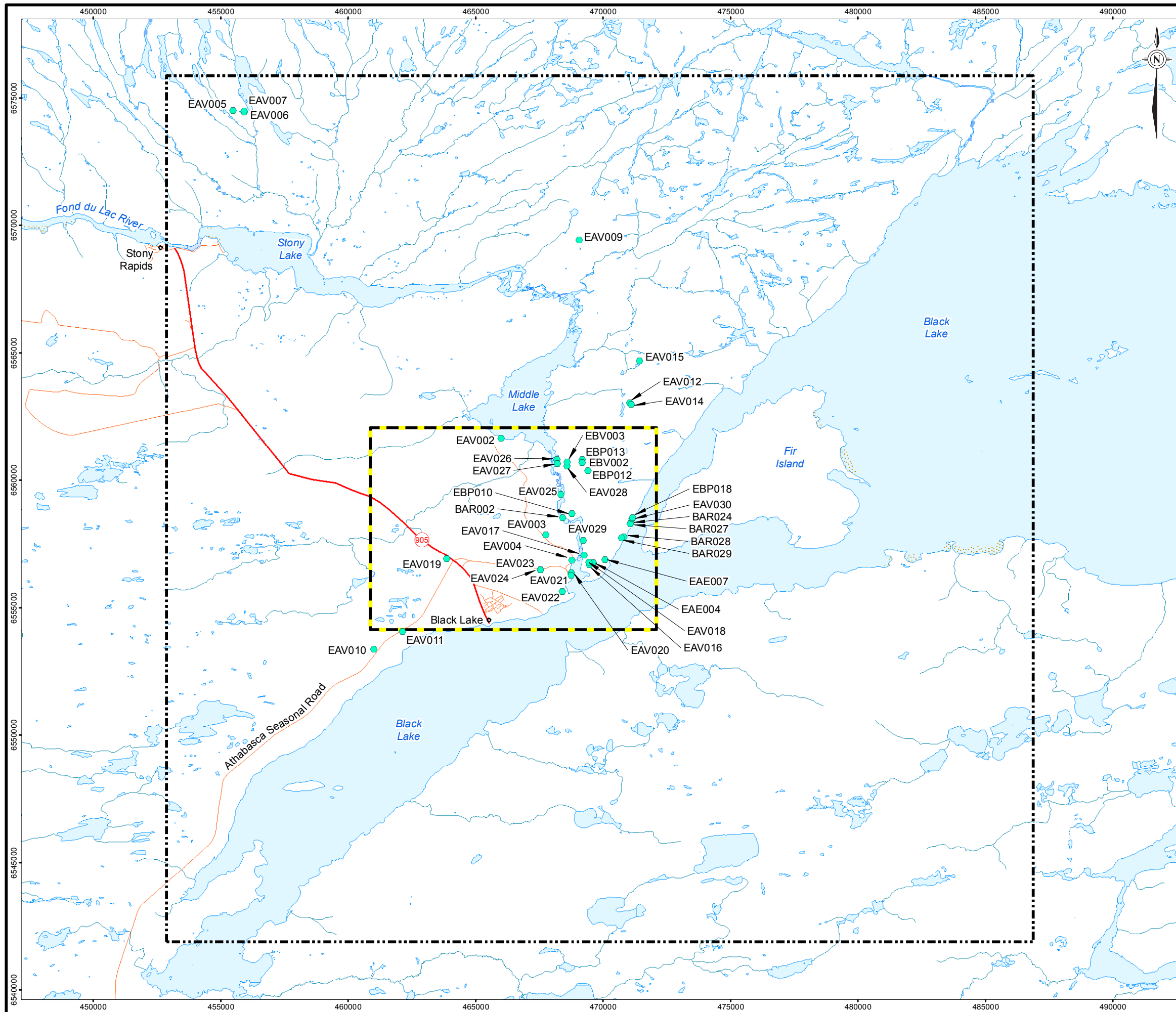
S3 = rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places);

S4 = common (more than 100 occurrences in Saskatchewan, generally widespread and abundant, may be rare in part of its range); and

S5 = very common (more than 100 occurrences in Saskatchewan, widespread and abundant, may be rare in part of its range).

^(b) Preferred habitats obtained from Harms et al. (1992), Flora of North America (2012), and SKCDC (2012).

^(c) Listed as Special Concern under COSEWIC (2012), as Special Concern under Schedule 1 of SARA (2012b). This species is not identified as a provincial wild species at risk under the *Wildlife Act* (1998).



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- LOCATION CONTAINING LISTED LICHEN SPECIES
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

NOTE
 FOR THE LICHEN SPECIES OBSERVED AT EACH LOCATION, REFER TO APPENDIX IV, TABLE IV.2-5

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT		TAZI TWÉ HYDROELECTRIC ROJECT	
TITLE		LOCATIONS OF LISTED LICHEN OBSERVATIONS IN THE REGIONAL STUDY AREA	
<p>Golder Associates Saskatoon, Saskatchewan</p>	PROJECT	10-1365-0004	FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	LMR/SM	12/07/13
	CHECK	KM	24/07/13
	REVIEW	BC	24/07/13
		FIGURE: 4.3-4	

Table 4.3-7: Listed Ground-dwelling and Epiphytic Lichen Species Confirmed to Occur Within the Local and Regional Study Areas

Common Name	Scientific Name	Provincial Ranking ^(a)	ELC Map Unit(s) Observed
Concentric ring lichen	<i>Arctoparmelia centrifuga</i>	S2S3	Bedrock, Jack Pine/Black Spruce, Deciduous, Wetland (Bog)
Rippled ring lichen	<i>Arctoparmelia separata</i>	S1S2	Wetland (Bog)
Horsehair	<i>Bryoria furcellata</i>	S3	Jack Pine, Spruce, Mixedwood
Speckled horsehair	<i>Bryoria fuscescens</i>	S3	Bedrock, Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland (Bog), Wetland (Fen), Wetland (Swamp), Regenerating Mixedwood
Shiney horsehair lichen	<i>Bryoria glabra</i>	S1	Jack Pine/Black Spruce, Mixedwood, Wetland (Fen)
Old man's beard	<i>Bryoria simplicior</i>	S3	Jack Pine/Black Spruce, Regenerating Mixedwood
Iceland lichen	<i>Cetraria ericetorum</i>	S3S4	Deciduous
Quill lichen	<i>Cladonia amaurocraea</i>	S2	Bedrock, Jack Pine, Jack Pine/Black Spruce, Mixedwood, Deciduous, Wetland (Bog), Regenerating Mixedwood
Powdered funnel lichen	<i>Cladonia cenotea</i>	S3	Mixedwood
Cup lichen	<i>Cladonia coniocraea</i>	S2	Mixedwood
Organ-pipe lichen	<i>Cladonia crispata</i>	S3	Bedrock, Jack Pine/Black Spruce, Regenerating Mixedwood, Regenerating Wetland (Fen)
British soldiers	<i>Cladonia cristatella</i>	S3	Bedrock, Jack Pine, Jack Pine/Black Spruce, Regenerating Jack Pine, Regenerating Mixedwood, Regenerating Wetland (Bog), Regenerating Wetland (Fen)
Cup lichen	<i>Cladonia cyanipes</i>	S3	Jack Pine/Black Spruce, Deciduous
Many-forked cladonia	<i>Cladonia furcata</i>	S1	Bedrock
Lipstick powderhorn	<i>Cladonia macilenta</i>	S2	Regenerating Mixedwood
Red-fruited pixie-cup	<i>Cladonia pleurota</i>	S2	Bedrock, Jack Pine, Mixedwood
Antlered powderhorn	<i>Cladonia subulata</i>	S2	Bedrock, Regenerating Jack Pine, Regenerating Mixedwood, Regenerating Wetland (Fen)
Greater sulphur cup	<i>Cladonia sulphurina</i>	S2	Jack Pine/Black Spruce, Mixedwood, Regenerating Mixedwood, Regenerating Wetland (Fen)
Salted starburst lichen	<i>Imshaugia aleurites</i>	S2	Bedrock, Jack Pine, Mixedwood
American starburst lichen	<i>Imshaugia placorodia</i>	S1	Jack Pine, Jack Pine/Black Spruce,
Hagen's rim lichen	<i>Lecanora hagenii</i>	S2	Jack Pine/Black Spruce, Wetland (Fen)
Rim lichen	<i>Lecanora subintricata</i>	S1	Jack Pine/Black Spruce, Deciduous, Wetland (Fen)

Table 4.3-7: Listed Ground-dwelling and Epiphytic Lichen Species Confirmed to Occur Within the Local and Regional Study Areas (continued)

Common Name	Scientific Name	Provincial Ranking ^(a)	ELC Map Unit(s) Observed
Alpine camouflage lichen	<i>Melanelia stygia</i>	S1	Bedrock, Wetland (Bog)
Abraded camoflage lichen	<i>Melanelia subaurifera</i>	S2S3	Mixedwood
Powdery saucer lichen	<i>Ochrolechia androgyna</i>	S1	Wetland (Fen)
Green starburst lichen	<i>Parmeliopsis ambigua</i>	S3	Jack Pine, Mixedwood, Wetland (Bog), Wetland (Fen)
Gray starburst lichen	<i>Parmeliopsis hyperopta</i>	S3	Jack Pine, Jack Pine/Black Spruce, Mixedwood, Deciduous, Wetland (Fen), Regenerating Mixedwood,
Studded leather lichen	<i>Peltigera aphthosa</i>	S2S3	Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland (Swamp), Riparian, Regenerating Wetland (Fen)
Veinless pelt	<i>Peltigera malacea</i>	S3	Mixedwood, Deciduous, Wetland (Fen)
Rough pelt	<i>Peltigera scabrosa</i>	S2	Spruce
Star rosette lichen	<i>Physcia stellaris</i>	S3S4	Mixedwood
Punctured ramalina	<i>Ramalina dilacerata</i>	S3	Mixedwood
Hooded ramalina	<i>Ramalina obtusata</i>	S3	Mixedwood
Easter lichen	<i>Stereocaulon paschale</i>	S2	Bedrock, Jack Pine, Wetland (Bog)
Strangospora lichen	<i>Strangospora moriformis</i>	S1	Deciduous
Fringed wrinkle-lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	S3	Bedrock, Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland (Bog), Wetland (Fen), Wetland (Swamp), Regenerating Mixedwood
Peppered rock tripe	<i>Umbilicaria deusta</i>	S2S3	Bedrock
Blistered rock tripe	<i>Umbilicaria hyperborea</i>	S2	Bedrock, Wetland (Bog)
Punctured rock tripe	<i>Umbilicaria torrefacta</i>	S1	Regenerating Wetland (Fen)
Fishbone beard lichen	<i>Usnea filipendula</i>	S2	Jack Pine/Black Spruce
Beard lichen	<i>Usnea fulvoreaegens</i>	S1	Jack Pine/Black Spruce
Powdered beard lichen	<i>Usnea lapponica</i>	S3	Mixedwood, Wetland (Swamp)
Straw beard lichen	<i>Usnea scabrata</i>	S1	Bedrock, Jack Pine/Black Spruce
Beard lichen	<i>Usnea subfloridana</i>	S3S4	Mixedwood, Wetland (Swamp)

Notes: Common names obtained from SKCDC (2012 e), Johnson et al. (1995) USDA NRCS (2012), and ACIMS (2012).

No species listed under COSEWIC (2012), SARA (2012b), or *Wildlife Act* (1998) were observed during field programs.

^(a) Saskatchewan Conservation Data Centre Tracked Species List for Lichens and Fungi (SKCDC 2012e), where;

S1 = extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals);

S2 = rare (6 to 20 occurrences in Saskatchewan or few remaining individuals);

S3 = rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places);

S4 = common (more than 100 occurrences in Saskatchewan, generally widespread and abundant, may be rare in part of its range); and

S5 = very common (more than 100 occurrences in Saskatchewan, widespread and abundant, may be rare in part of its range).

ELC = Ecological Landscape Classification

4.3.3.2 Listed Plant Habitat Potential

Based on the habitat descriptions outlined above and according to listed plant habitat potentials (Harms et al. 1992; Flora of North America 1993+; SKCDC 2012 d, e, f), the Regenerating ELC map units (except

Regenerating Mixedwood), Recent Burn and Existing Disturbance ELC map units would be considered to have low to moderate/low potential to support listed plant species (Table 4.3-8). Spruce, Deciduous, Regenerating Mixedwood, and Wetland ELC map units are considered to have moderate to high/moderate potential for listed plant species. The Jack Pine, Jack Pine/Black Spruce, Mixedwood, and Riparian ELC map units have high potential to support listed plant species. The Bedrock ELC map unit is considered to have a very high potential. Within all map units, where exposed bedrock is present, these microhabitats are considered to have higher potential for listed plant species occurrence. Exposed rock provides microhabitats such as moist crevices for plants such as ferns.

Table 4.3-8: Potential of Ecological Landscape Classification Map Units in the Regional and Local Study Areas to Support Listed Plant Species

ELC Map Unit	Potential Number of Listed Species	Listed Plant Habitat Potential
Bedrock	29	Very High
Jack Pine	19	High
Jack Pine/Black Spruce	20	High
Spruce	11	Moderate
Mixedwood	22	High
Deciduous	11	Moderate
Wetland	-	High/Moderate
Bog subclass	19	High
Fen Subclass	20	High
Swamp Subclass	13	Moderate
Riparian	20	High
Open Water ^(a)	8	Moderate
Regenerating Jack Pine	4	Low
Regenerating Jack Pine/Black Spruce	2	Low
Regenerating Spruce	2	Low
Regenerating Mixedwood	11	Moderate
Regenerating Deciduous	1	Low
Regenerating Wetland	-	Moderate/Low
Regenerating Bog subclass	11	Moderate
Regenerating Fen subclass	11	Moderate
Regenerating Swamp subclass	7	Low
Regenerating Riparian	7	Low
Recent Burn	1	Low
Existing Disturbance	5	Low
Unclassified	N/A	Unclassified

^(a) Water generally represents deep water, which has a low listed plant habitat potential. However, it is classed with a moderate listed plant habitat potential as it is also associated with shallow water (e.g., littoral zones) where a relatively high number of rare plants may be found.

N/A = not applicable; - = not completed

The distribution of listed plant species habitat potential within the RSA and LSA is shown in Table 4.3-9 and Figure 4.3-5. Very high and high listed plant species habitat potential covers 25,667 ha (22.2%) of the RSA, and

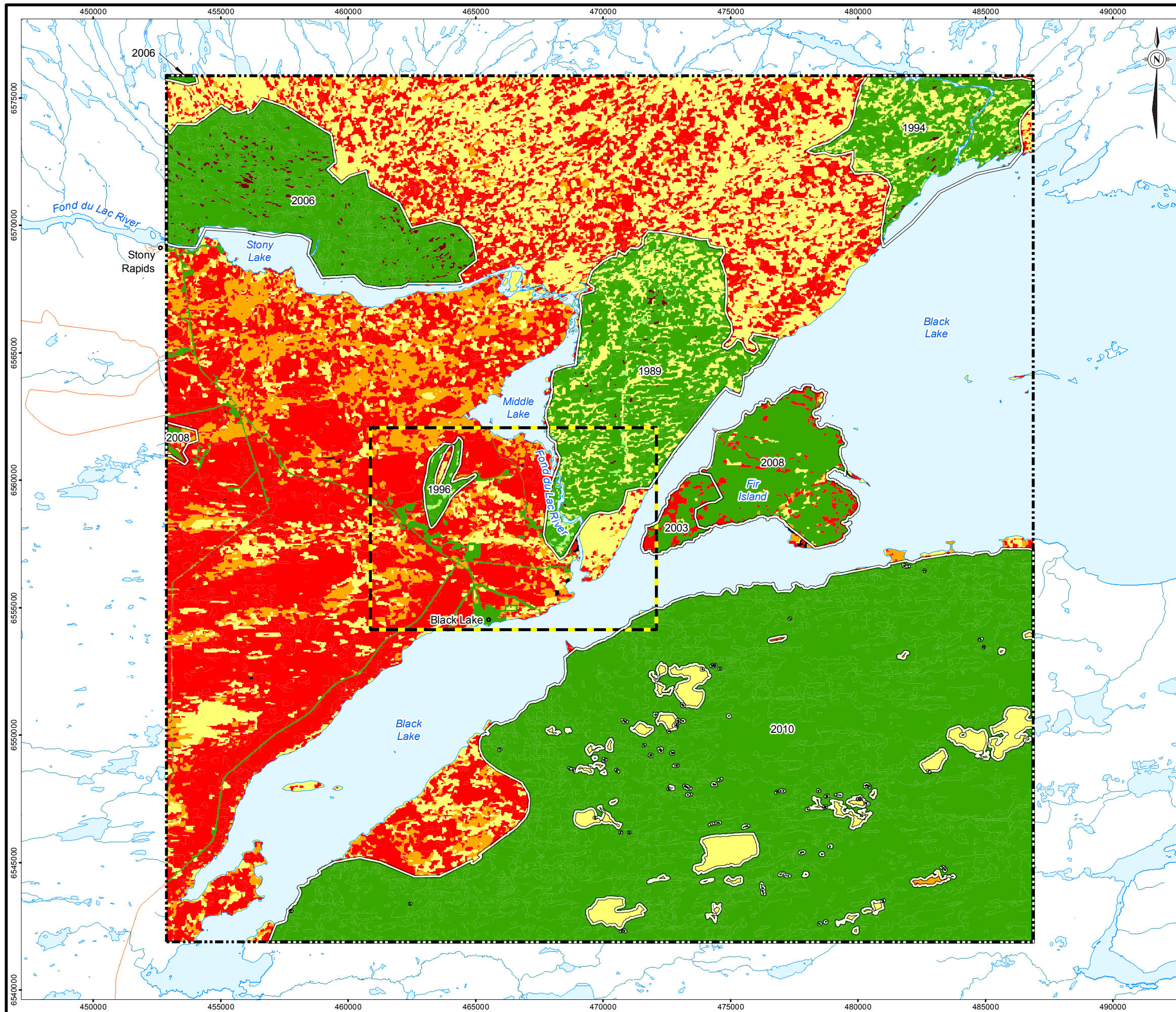
3,374 ha (38%) of the LSA. The high/moderate listed habitat potential class is the result of the differences between bog, fen, and swamp subclasses within the Wetland ELC map unit, where the bog and fen subclasses were considered to have high habitat potential, and swamp is considered to have moderate habitat potential. Similar to this, the moderate/low listed plant species habitat potential is a result of the differences between the Regenerating Bog, Fen, and Swamp subclasses, where Regenerating Bog and Fen have a moderate listed plant species potential, and the Regenerating Swamp has low potential. Areas of low listed plant species habitat potential represent 43,307 ha (37.5%) of the RSA, and 1,839 ha (20.7%) of the LSA.

Table 4.3-9: Distribution of Listed Plant Species Habitat Potential within the Regional and Local Study Areas

Listed Plant Habitat Potential	Regional Study Area		Local Study Area	
	Area (ha)	Proportion of RSA (%)	Area (ha)	Proportion of LSA (%)
Very High	347	0.3	5	0.1
High	25,319	21.9	3,368	37.9
High/Moderate	6,213	5.4	957	10.8
Moderate	40,135	34.7	2,597	29.2
Moderate/Low	229	0.2	100	1.1
Low	43,307	37.5	1,839	20.7
Unclassified	50	<0.1	14	0.2
Total	115,600	100	8,881	100

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

ha = hectares; % = percent; RSA = regional study area; LSA = local study area

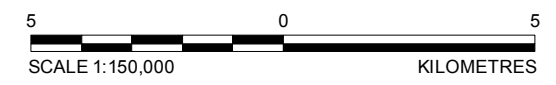


LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA
- ▭ FOREST FIRES (1989-2010)
- LISTED PLANT HABITAT POTENTIAL
 - VERY HIGH
 - HIGH
 - HIGH/MODERATE
 - MODERATE
 - MODERATE/LOW
 - LOW
 - UNCLASSIFIED

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6
 LANDSAT SCENE WAS ACQUIRED ON JUNE 24, 2010. THE CLASSIFICATION SHOWN HAS BEEN CREATED FROM THIS 30 METRE RESOLUTION LANDSAT SCENE.
 SASKATCHEWAN FIRE HISTORY DATA OBTAINED FROM THE GOVERNMENT OF SASKATCHEWAN



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
LISTED PLANT HABITAT POTENTIAL WITHIN THE REGIONAL STUDY AREA			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	LMR/SM	12/07/13
	CHECK	KM	24/07/13
	REVIEW	BC	24/07/13
			REV. 0
FIGURE: 4.3-5			

4.3.4 Traditional Use Plants

The proposed Project area has been used traditionally by the Aboriginal people of the region for generations (Annex IV). However, while there has been some decline in active participation in hunting, trapping, fishing, and gathering activities by Aboriginal people over time, these activities continue to hold an important place in the lifestyle of people living in the Athabasca region, including the communities of Black Lake and Stony Rapids (Black Lake and Stony Rapids KPI Program 2012).

Traditional uses of forest plant species are numerous. Most traditional plants were used for food, medicine, and tools. Gathered goods such as berries, herbs, mushrooms, and medicinal plants are used for local trade, sale and/or gifts (ALUPIAP 2003). Some traditional uses of forest resources include:

- fish net floats - et'áídzéré (Dene);
- baskets - t'ili (Dene);
- snowshoes - ay (Dene);
- tipi poles - nibáli (Dene);
- meat drying racks - dziⁿlhtí (Dene);
- hide stretcher -edhé dechéné (Dene);
- windbreaks - ónuréⁿtthel (Dene);
- toboggans - beth chéné (Dene);
- deadfall traps - dachét'aⁿ (Dene);
- spring-pole snares - xuíé (Dene);
- toss-pole snare - dalháⁿt'aⁿ (Dene);
- dragging pole snares - bíⁿlh (Dene); and
- canoe - Ts'I (Dene); Api cheman (Cree); (ALUPIAP 2003).

Timber production in the Athabasca region is not commercially viable. Some timber permits are issued for small areas for commercial firewood purposes, although most people cut firewood for their own use. Some plants have also been used by community members for specific purposes; for example, mosses were once used by local residents in babies' diapers and for cleaning (Black Lake and Stony Rapids KPI Program 2012).

Current gathering for domestic use is largely for berries, particularly blueberries (*Vaccinium* spp.), bog cranberries (*Vaccinium* spp.), moss berries (*Vaccinium* spp.), and strawberries (*Fragaria virginiana*), as well as other edible vegetation, like mushrooms, when available (Black Lake and Stony Rapids KPI Program 2012). Berries are generally used for jam production and freezing (Black Lake and Stony Rapids KPI Program 2012).

A list of traditional use plants applicable to the RSA is provided in [Table 4.3-10](#). This list is a general list of plant species used and potentially still used as traditional use plants.

Table 4.3-10: Traditional Use Plants of the Northern Boreal Forest

Common Name	Scientific Name	Traditional Use
Trees		
Black spruce	<i>Picea mariana</i>	food, medicine, shelter, fuel, tools ^(a,c)
Jack pine	<i>Pinus banksiana</i>	food, medicine, tools, shelter, fuel ^(b,c)
Paper birch	<i>Betula papyrifera</i>	food, medicine, tools, fuel ^(a,c)
Tamarack	<i>Larix laricina</i>	medicine, fuel ^(a,c)
Trembling aspen	<i>Populus tremuloides</i>	food, medicine, tools, fuel ^(b,c)
White spruce	<i>Picea glauca</i>	food, medicine, shelter, fuel, tools ^(a,c)
Shrubs and Subshrubs		
Kinnikinnick or bearberry	<i>Arctostaphylos uva-ursi</i> / <i>A. rubra</i>	food ^(a)
Blackberry	<i>Ribes hudsonianum</i>	food ^(a)
Blueberry	<i>Vaccinium myrtilloides</i> / <i>V. angustifolium</i>	food, medicine ^(a,c)
Bog bilberry	<i>Vaccinium uliginosum</i> / <i>V. caespitosum</i>	food, medicine ^(a,c)
Bog cranberry/ lingonberry	<i>Vaccinium vitis-idaea</i>	food, medicine ^(a,c)
Cloudberry	<i>Rubus chamaemorus</i>	food ^(a)
Crowberry	<i>Empetrium nigrum</i>	food, medicine ^(a)
Gooseberry	<i>Ribes oxycanthoides</i>	food, medicine ^(b)
Alder	<i>Alnus</i> spp.	medicine, fuel ^(a)
High-bush cranberry	<i>Viburnum edule</i>	food, medicine ^(b)
Juniper	<i>Juniperus communis</i>	medicine (berries) ^(a)
Labrador tea	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	food, medicine ^(a)
Moss berry	<i>Vaccinium</i> spp.	food ^(c)
Prickly rose	<i>Rosa acicularis</i>	food, medicine ^(a)
Raspberry	<i>Rubus ideaus</i>	food ^(a)
Wild strawberry	<i>Fragaria virginiana</i>	food ^(c)
Willow	<i>Salix</i> spp.	fuel, food, tools, medicine ^(a)
Other Species		
Acerbic bulrush	<i>Schoenoplectus acutus</i>	food, medicine, baskets ^(b)
Lichen	<i>Cladina</i> spp., <i>Cetraria</i> spp., <i>Parmelia</i> spp., <i>Actinogyra</i> spp.	food, medicine ^(b)
Mushrooms	N/A	food ^(c)
Sphagnum moss	<i>Sphagnum</i> spp.	medicine, diapers ^(a)

Note: spp. = multiple species.

^(a) Johnson et al. (1995)

^(b) Marles et al. (2000)

^(c) Black Lake and Stony Rapids KPI Program (2012)

N/A = not applicable; spp. = species; syn. = synonym

4.3.4.1 Traditional Use Plant Habitat Potential

Many traditional use plants such as black spruce, willow, crowberry, bog cranberry, Labrador tea, and prickly rose are common in a number of different ELC map units. However, there are a few traditional use species such as acerbic bulrush (*Schoenoplectus acutus*) and tamarack that are more restricted in their distribution and tend to only be associated with a few ELC map units. Within an ELC map unit these species may be locally abundant.

Based on the habitat requirements of traditional use species, the Bedrock, Regenerating Jack Pine, Regenerating Riparian, and Recent Burn ELC map units would be considered to have low potential to support traditional use plant species (Table 4.3-11). Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Regenerating Mixedwood, and Regenerating Deciduous ELC map units are considered to have high potential for traditional use plant species. Wetland and Regenerating Wetland ELC map units were classed as moderate/high because of the differences in habitat potentials of each of the subclasses present in these ELC map units. Swamp and Regenerating Swamp were rated as high, whereas Bog, Fen, Regenerating Bog, and Regenerating Fen were rated as having a moderate potential to support traditional use species.

Table 4.3-11: Potential of Ecological Landscape Classification Map Units in the Regional and Local Study Areas to Support Traditional Use Plants

ELC Map Unit	Potential Number of Traditional Use Species	Traditional Use Plant Habitat Potential
Bedrock	5	Low
Jack Pine	7	Moderate
Jack Pine/Black Spruce	11	High
Spruce	13	High
Mixedwood	17	High
Deciduous	11	High
Wetland	-	Moderate/High
Bog subclass	8	Moderate
Fen Subclass	9	Moderate
Swamp Subclass	15	High
Riparian	9	Moderate
Open Water	0	Very low
Regenerating Jack Pine	4	Low
Regenerating Jack Pine/Black Spruce	9	Moderate
Regenerating Spruce	9	Moderate
Regenerating Mixedwood	13	High
Regenerating Deciduous	12	High
Regenerating Wetland	-	Moderate/High
Regenerating Bog subclass	9	Moderate
Regenerating Fen subclass	10	Moderate
Regenerating Swamp subclass	11	High

Table 4.3-11: Potential of Ecological Landscape Classification Map Units in the Regional and Local Study Areas to Support Traditional Use Plants (continued)

ELC Map Unit	Potential Number of Traditional Use Species	Traditional Use Plant Habitat Potential
Regenerating Riparian	6	Low
Recent Burn	4	Low
Existing Disturbance	0	Very low
Unclassified	N/A	Unclassified

ELC = Ecological Landscape Classification; N/A = not applicable; - = not completed

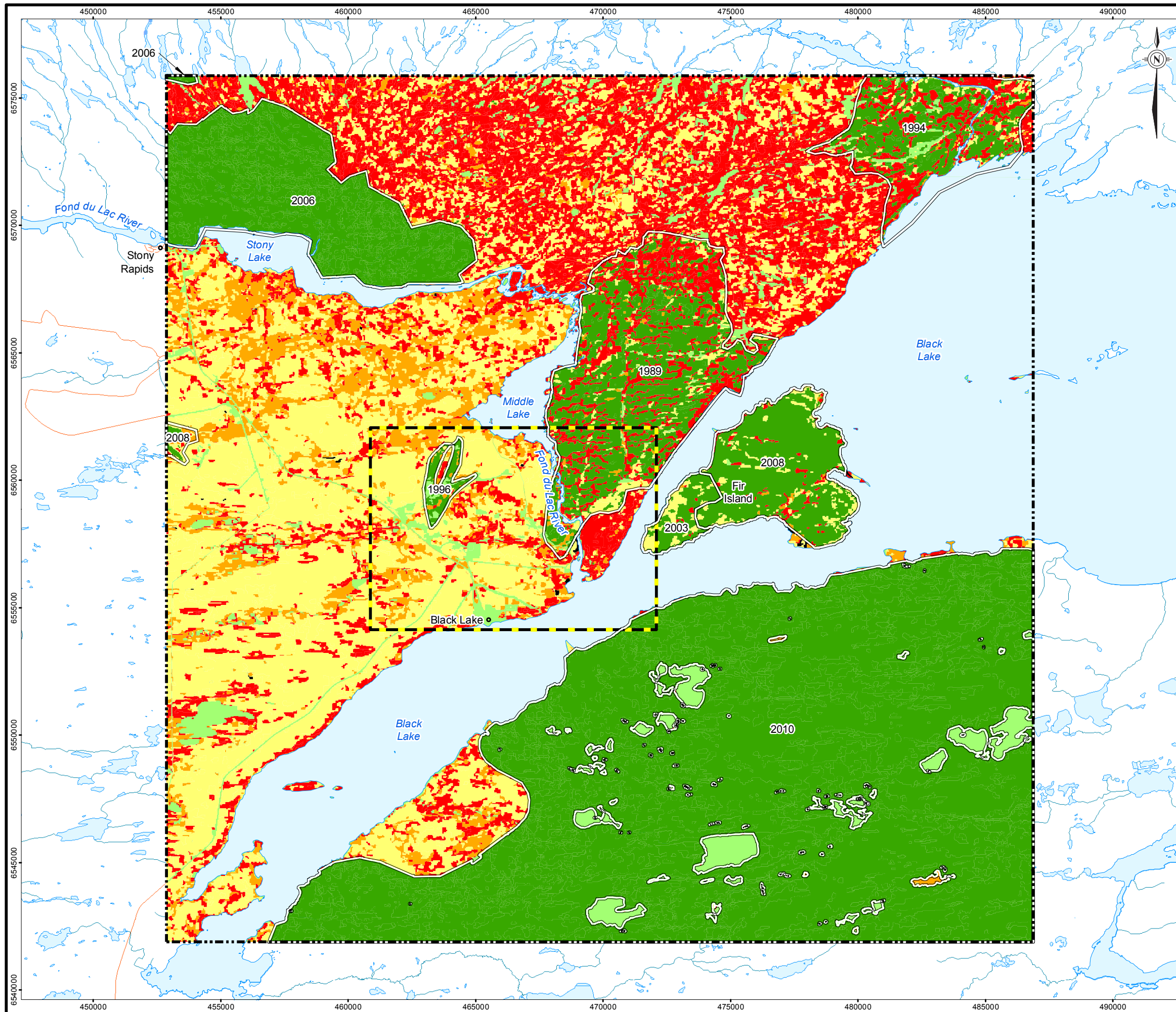
The distribution of traditional use plant species habitat potential within the RSA and LSA is shown in [Table 4.3-12](#) and [Figure 4.3-6](#). High and moderate/high traditional use plant species habitat potential covers 24,931 ha (21.6%) of the RSA, and 2,493 ha (28.1%) of the LSA. Areas of low and very low traditional use plant species habitat potential represent 68,320 ha (59.1%) of the RSA, and 3,013 ha (33.9%) of the LSA.

Table 4.3-12: Distribution of Traditional Use Plant Species Habitat Potential within the Regional and Local Study Areas

Traditional Use Plant Habitat Potential	Regional Study Area		Local Study Area	
	Area (ha)	Proportion of RSA (%)	Area (ha)	Proportion of LSA (%)
High	18,488	16.0	1,436	16.2
Moderate/high	6,442	5.6	1,057	11.9
Moderate	22,299	19.3	3,360	37.8
Low	41,156	35.6	1,074	12.1
Very Low	27,164	23.5	1,939	21.8
Unclassified	50	<0.1	14	0.2
Total	115,600	100	8,881	100

Note: Numbers are rounded for presentation purposes. Therefore, it may appear that the totals do not equal the sum of the individual values.

ha = hectares; % = percent; RSA = regional study area; LSA = local study area



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA
- ▭ FOREST FIRES (1989-2010)
- TRADITIONAL USE PLANT HABITAT POTENTIAL
 - HIGH
 - MODERATE/HIGH
 - MODERATE
 - LOW
 - VERY LOW
 - UNCLASSIFIED

REFERENCE

DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6
 LANDSAT SCENE WAS ACQUIRED ON JUNE 24, 2010. THE CLASSIFICATION SHOWN HAS BEEN CREATED FROM THIS 30 METRE RESOLUTION LANDSAT SCENE.
 SASKATCHEWAN FIRE HISTORY DATA OBTAINED FROM THE GOVERNMENT OF SASKATCHEWAN



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
TRADITIONAL USE PLANT HABITAT POTENTIAL WITHIN THE REGIONAL STUDY AREA			
<p>Golder Associates Saskatoon, Saskatchewan</p>	PROJECT	10-1365-0004	FILE No.
	DESIGN		SCALE AS SHOWN
	GIS	LMR/SM	17/07/13
	CHECK	KM	24/07/13
	REVIEW	BC	24/07/13
			REV. 0
FIGURE: 4.3-6			

4.4 Summary

4.4.1 General Setting

The vegetation section of the environmental baseline report provides baseline information that can be used to predict and monitor direct and indirect effects of the Project on vegetation resources. The vegetation baseline report presents a review and interpretation of qualitative and quantitative information from literature and data collected during the 2010 to 2012 field programs. The key objective of the vegetation baseline report is to describe and characterize the existing vegetation types, listed plant species and listed plant habitats, and traditional use plants and traditional use plant habitats.

The RSA was selected based on the predicted spatial extent of the combined direct and indirect effects on wildlife from the Project, because the soils and vegetation present in the Project area and LSA are also present across the RSA. The RSA consists of an approximate 115,600 ha area centred on the Project. The LSA is approximately 8,881 ha centered on the anticipated Project footprint. The LSA was based on the predicted direct and small-scale indirect effects from the Project on the terrestrial environment.

The RSA and LSA are situated on a transitional area between the boundaries of the Taiga Shield and Boreal Shield Ecozones in Saskatchewan (Acton et al. 1998). The north portion of the RSA is in the Uranium City Upland Landscape Area within the Tazin Lake Upland Ecoregion of the Taiga Shield Ecozone. The south and southeastern portion of the RSA is situated in the Lower Cree River Plain and Fond du Lac Lowland Landscape areas of the Athabasca Plains Ecoregion of the Boreal Shield Ecozone. This area is characterized by a subarctic climate with long, very cold winters and short, cool summers. Permafrost is uncommon but may occur in localized areas of deep organic terrain.

4.4.2 Ecological Land Classification in the Regional and Local Study Areas

4.4.2.1 Methods

An ELC map was developed for the RSA and LSA using Landsat satellite imagery (30 by 30 m pixel, June 24, 2010), and eCognition 8.7 object-based remote sensing analysis software. Information collected during the field surveys was used to correlate Landsat imagery to field survey information. In recent history, multiple fires have affected the RSA. Therefore, fire history data were obtained from the Government of Saskatchewan and incorporated into the ELC after the completion of the supervised classification. Once the classification was complete, selected locations from vegetation field programs and wildlife breeding bird surveys, other than those used as field-validated observation points, were compared against the classification for a visual accuracy assessment. The ELC map was used to determine the abundance and distribution of vegetation types (ELC map units; habitats) within the RSA and LSA.

4.4.2.2 Results

Nineteen distinct ELC map units (habitat types) were classified in the RSA and LSA, and include Bedrock, Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland, Riparian, Open Water, Regenerating map units, Recent Burn, Existing Disturbance, and Unclassified. The Wetland ELC map unit and Regenerating wetland ELC map unit includes bogs, fens, swamps, Regenerating Bog, Regenerating Fen, and Regenerating Swamp. Because these different wetland types could not be separated in the ELC, these are mapped together. The Regenerating ELC map units represent areas that were affected by fire in 1989, 1994, and 1996; enough regeneration has occurred in these areas that regenerating areas are considered young forest. The Recent Burn ELC map unit represents areas that have been affected by fire in 2003, 2006, 2008, and 2010. The overall accuracy of the ELC classification was 71%.

Approximately 22.7% (26,275 ha) of the RSA is covered with Open Water. The primary ELC map unit within the RSA is Recent Burn and accounts for approximately 31.1% (35,993 ha) of the RSA. Recent Burn areas were affected by fire in 2003, 2006, 2008, and 2010. Regenerating map units represent areas that were historically affected by fire during 1989, 1994, and 1996 and account for approximately 7.5% (8,656 ha) of the RSA. The most abundant upland map unit is the Jack Pine map unit and accounts for approximately 18.6% (21,492 ha) of the RSA. Wetlands cover approximately 5.4% (6,213 ha) of the RSA. The Existing Disturbance map unit (e.g., roads, communities) account for approximately 0.8% (889 ha) of the RSA.

The primary ELC map unit within the LSA is Jack Pine and accounts for approximately 35.6% (3,165 ha). Regenerating map units within the LSA represent areas that were historically affected by fire during 1989 and 1996 and account for approximately 18.0% (1,601 ha) of the LSA. Wetlands (including the Regenerating Wetland map unit) cover approximately 11.9% (1,057 ha) of the LSA. The Recent Burn map unit accounts for approximately 0.9% (83 ha). The Existing Disturbance map unit (e.g., roads, communities) account for approximately 5.8% (516 ha) of the LSA. Approximately 16.0% (1,423 ha) of the LSA is covered with Open Water.

4.4.3 Biodiversity

4.4.3.1 Methods

Species diversity was determined using DVI and listed plant survey data collected during the field surveys completed in 2010 and 2012. Species diversity was assessed for each ELC map unit based on the numbers of vascular, non-vascular, and lichen species, the number of listed plant species, and the number of species unique to each ELC map unit. Species richness was calculated from the DVI data.

4.4.3.2 Results

A total of 118 locations were sampled as part of the DVI (40 plots), and listed plant surveys (78 plots) and were used for the determination of biodiversity. In total, 363 plant species were identified during field programs. This total includes 166 vascular plants (7 trees, 36 shrubs and subshrubs, 80 forbs, and 43 graminoids), 86 bryophytes, and 111 ground-dwelling and epiphytic lichens.

The highest numbers of vascular plant species occurred within the Riparian ELC map unit, Mixedwood ELC map unit, and Wetland map unit – Fen subclass (63, 55, and 54 vascular species, respectively). The highest number of non-vascular plant species occurred within the Mixedwood ELC map unit, and the highest number of ground-dwelling and epiphytic lichens was observed in the Jack Pine/Black Spruce ELC map unit.

The Mixedwood ELC map unit had the highest total species diversity with 136 species. A total of 102 species occurred in the Fen subclass, and the Mixedwood and Riparian ELC map units had 88 species each. The lowest number of vascular plant species occurred within the Regenerating Swamp subclass (21 species), Regenerating Jack Pine/Black Spruce (29 species), Regenerating Deciduous (29 species) and Recent Burn (29 species).

The highest numbers of listed species were found in the Mixedwood ELC map unit with 20 listed species, which were all lichens. Eighteen listed lichen species were found in the Jack Pine/Black Spruce ELC map unit, and 16 species (15 lichens and one fern) were found in the Bedrock ELC map unit. No listed species were found in the Recent Burn or Regenerating Deciduous ELC map units.

The Mixedwood and Riparian ELC map units had the highest numbers of unique species with 28 and 25 species, respectively. No unique species were found in the Regenerating Jack Pine ELC map unit and the Regenerating Bog subclass.

Among the highest values for vascular plant species richness are the Regenerating Fen subclass, Swamp subclass, and Mixedwood ELC map units. Mixedwood, Riparian, and Deciduous map units had the highest bryophyte values. Lichen richness was highest in Bedrock, Deciduous, and Jack Pine/Black Spruce ELC map units. Overall species richness was observed to be highest in Regenerating Fen subclass, Mixedwood and Deciduous ELC map units. The Regenerating Jack Pine ELC map unit was found to have the lowest species richness.

4.4.4 Listed Plant Species and Listed Plant Species Habitat Potential

4.4.4.1 Methods

Prior to field surveys completed in 2010 and 2012, federal and provincial status documents, provincial tracking lists, and known distributions were used to develop an inventory of listed plant species with the potential to occur within the RSA and LSA. This information supported the identification of habitats that had potential to support listed plant species. Habitats present within ELC map units were assessed for potential to support listed plant species. Field survey results and habitat preference of listed species were used to determine the potential of each ELC map unit to support listed plant species

4.4.4.2 Results

Sixteen provincially listed vascular plant species and 44 provincially listed lichen species have been documented within the RSA. Two historical and seven current listed plant observation locations occur within the LSA. Lake Huron tansy (*Tanacetum bipinnatum* ssp. *huronense* [(syn. *Tanacetum huronense* var. *floccosum*)]), a historical observation within the LSA, is listed as Special Concern under COSEWIC (2012) and as Special Concern under Schedule 1 of SARA (2012b). This species is not identified as a provincial wild species at risk under the *Wildlife Act* (1998) and was not observed during the 2010 and 2012 field programs.

Six listed forbs and one listed graminoid were documented during the 2010 and 2012 field programs. These included ground-fir (*Diphasiastrum sitchense* [syn. *Lycopodium sitchense*]), limestone oak fern (*Gymnocarpium jessoense* ssp. *parvulum*), alternate-flowered water millfoil (*Myriophyllum alterniflorum*), Labrador lousewort (*Pedicularis labradorica*), hairy butterwort (*Pinguicula villosa*), mountain woodsia (*Woodsia scopulina*), and Russet sedge (*Carex saxatilis* [syn. *Carex saxatilis* var. *rhomalea*]). Ground-fir was observed at four locations, two of which occur within the LSA. These observations were in Regenerating Jack Pine, Regenerating Jack Pine/ Black Spruce, Regenerating Mixedwood, and Jack Pine ELC map units. Limestone oak fern was observed on a sparsely vegetation bedrock outcrop in the Jack Pine ELC map unit. Alternate-flowered water milfoil was observed just off the shore in Black Lake. Labrador lousewort was observed in a Regenerating Poor fen. Hairy butterwort was documented in the Fen subclass – Wetland ELC map unit on the side of a Sphagnum hummock along a game trail in a treed poor fen. Mountain woodsia was found in crevices on a bedrock outcrop in the Bedrock ELC map unit. Russet sedge was found in the Riparian ELC map unit along the shore of Black Lake. No COSEWIC or SARA listed species were observed within the RSA and LSA during the 2010 and 2012 field surveys.

The 44 listed lichen species observed were widely distributed in the LSA and RSA. All unburned ELC map units had between 5 and 20 listed lichen species, with the exception of the Riparian map unit which had 1 listed lichen

observation. Regenerating ELC map units had between 0 and 10 listed lichen observations. Recent Burn had no listed lichen species observations.

The Regenerating ELC map units (except Regenerating Mixedwood), Recent Burn ELC map unit and Existing Disturbance ELC map units would be considered to have low to moderate/low potential to support listed plant species. Spruce, Deciduous, Regenerating Mixedwood, and Wetland ELC map units are considered to have moderate to high/moderate potential for listed plant species. The Jack Pine, Jack Pine/Black Spruce, Mixedwood, and Riparian ELC map units have high potential to support listed plant species. The Bedrock ELC map unit is considered to have a very high potential. Within all map units, where exposed bedrock is present, these microhabitats are considered have higher potential for listed plant species occurrence. Exposed rock provides microhabitats such as moist crevices for plants such as ferns.

Very high and high listed plant species habitat potential covers 25,667 ha (22.2%) of the RSA, and 3,374 ha (38%) of the LSA. Areas of low listed plant species habitat potential represent 43,307 ha (37.5%) of the RSA, and 1,839 ha (20.7%) of the LSA.

4.4.5 Traditional Use Plant and Traditional Use Plant Habitat Potential

4.4.5.1 Methods

The occurrence and potential of traditional use plants within the RSA and LSA was determined through field surveys and by assessing the traditional use plant habitat potential of ELC map units. Interviews with resource users were completed to identify important resource use areas near the Project and information on the plant species currently used in the area was also collected (Annex VI). A general list of traditional use plants applicable to the RSA was developed based on known plant species that have been or are potentially still used in the area. Habitats present within ELC map units were assessed for potential to support traditional use plant species. Field survey results and habitat preference of traditional use plant species were used to determine the potential of each ELC map unit to support traditional use plant species.

4.4.5.2 Results

Most traditional use plants were used for food, medicine, and tools. Gathered goods such as berries, herbs, mushrooms, and medicinal plants are used for local trade, sale and/or gifts. Many traditional use plants such as black spruce, willow, crowberry, bog cranberry, Labrador tea, and prickly rose are common in a number of different ELC map units. However, there are a few traditional use species such as acerbic bulrush and tamarack that are more restricted in their distribution and tend to only be associated with a few ELC map units. Current gathering for domestic use is largely for berries, particularly blueberries, bog cranberries, moss berries, and strawberries, as well as other edible vegetation, like mushrooms, when available (Black Lake and Stony Rapids KPI Program 2012). Berries are generally used for jam production and freezing (Black Lake and Stony Rapids KPI Program 2012).

Based on the habitat requirements of traditional use species, the Bedrock, Regenerating Jack Pine, Regenerating Riparian, and Recent Burn ELC map units would be considered to have low potential to support traditional use plant species. Jack Pine/ Black Spruce, Spruce, Mixedwood, Deciduous, Regenerating Mixedwood, and Regenerating Deciduous ELC map units are considered to have high potential for traditional use plant species. Wetland and Regenerating Wetland were classed as moderate/high because of the differences in habitat potentials of each of the subclasses present in the Wetland ELC map unit. Swamp and Regenerating Swamp subclasses were rated as high, whereas Bog, Fen, Regenerating Bog, and Regenerating Fen subclasses were rated as having a moderate potential to support traditional use species.

High and moderate/high traditional use plant species habitat potential covers 24,931 ha (21.6%) of the RSA, and 2,493 ha (28.1%) of the LSA. Areas of low and very low traditional use plant species habitat potential represent 68,320 ha (59.1%) of the RSA, and 3,013 ha (33.9%) of the LSA.

5.0 WILDLIFE

5.1 Introduction

Climate, soils, topography, hydrological features, and vegetation influence wildlife habitat and therefore, the diversity and abundance of wildlife species present in an area. Small changes to any of these environmental components can potentially affect wildlife and wildlife habitat. A series of baseline wildlife surveys were completed to determine available habitat types and abundance and diversity of wildlife species present in the RSA and LSA. This information will be used to assess potential effects to wildlife and wildlife habitat from the Project. The wildlife baseline report includes information from current scientific literature, grey literature (e.g., government reports), and baseline wildlife surveys completed in 2012, as well as results from analyses of data collected during the baseline wildlife surveys in 2012. This information and these data will be also used to determine mitigation and management plans for wildlife in the LSA in order to minimize and limit negative effects to habitat and wildlife from construction and operation of the Project.

The key objectives of the wildlife baseline are:

- to identify wildlife species occurrence, abundance, and distribution within the LSA and RSA;
- to document the potential and observed occurrences of protected or listed wildlife (provincial and federal) in the LSA and RSA;
- to identify important habitat features and describe the use of habitats by wildlife in the LSA and RSA; and
- to use the information to assess the potential direct and indirect effects from the Project, and other past, current, and future projects in the RSA on the abundance and distribution of wildlife populations.

To meet these objectives, the wildlife baseline has been organized into the following sections.

[Section 5.2](#) provides detailed descriptions of data collection methods for wildlife species potentially occurring near the Project.

[Section 5.3](#) qualitative and quantitative information on the population status and distribution of VCs, local habitats, seasonal habitat use, and seasonal movement or high use areas. Where data are available, descriptions of other species occurring near the Project also are provided.

Wildlife surveys completed within the LSA and RSA were selected to maximize efficiency in data collection without sacrificing scientific merit. Surveys performed include: amphibian calling surveys, upland breeding bird surveys, waterbird surveys, ungulate aerial surveys, winter track count surveys, and raptor nest surveys. These surveys were selected because they are widely used in the areas of wildlife conservation, and are nonintrusive to animals and habitat.

5.2 Methods

5.2.1 Wildlife Habitat

Habitat types that occur within the LSA and RSA were identified by the Ecological Landscape Classification (ELC; [Section 4.3-1](#)).

5.2.2 Provincial and Federal Listed Species

Incidental observations of provincially and federally listed species within the RSA were recorded during field surveys. Prior to beginning surveys in the LSA and RSA, a list of listed species was generated from reviewing federal and provincial wildlife and conservation legislation and documents.

Federal status documents that were reviewed include the database of wildlife species assessed by the COSEWIC (2012) and the SARA (2012a). The COSEWIC is an independent body of experts that identifies and assesses which wildlife species are considered to be at risk. The COSEWIC reports its results to the Canadian government and the public. The Canadian government takes a COSEWIC designation into consideration when determining those species that should be protected under SARA. Species listed under SARA are separated into three different schedules. Schedule 1 is the official list of wildlife species at risk, and classifies species as being extirpated, endangered, threatened, or of special concern (SARA 2012a). Once listed, actions to protect and recover a listed species are implemented. Schedule 2 and Schedule 3 list species that were designated as species at risk by COSEWIC prior to October 1999 and must be reassessed using revised criteria before they can be added to Schedule 1 of SARA.

Provincially, status determination of wildlife species was based on a review of the SKCDC vertebrate tracking list (SKCDC 2012g) and the Wild Species at Risk Regulations (1999). The SKCDC vertebrate tracking list provides standardized information on the ecological status of wildlife species and communities within the province. The SKCDC has a ranking system that indicates a species' risk of extirpation from the province, and does not necessarily reflect its management policy. For example, some species may be rare within Saskatchewan but are considered common within North America. The Wild Species at Risk Regulations (1999) lists wildlife species that are protected under the *Wildlife Act* (1998) in Saskatchewan.

In addition to federally listed and provincially tracked species, wildlife species in the RSA are also protected by the following legislation and documents:

- *Migratory Birds Convention Act* (1994); and
- Saskatchewan Activity Restriction Guidelines (SKCDC 2003).

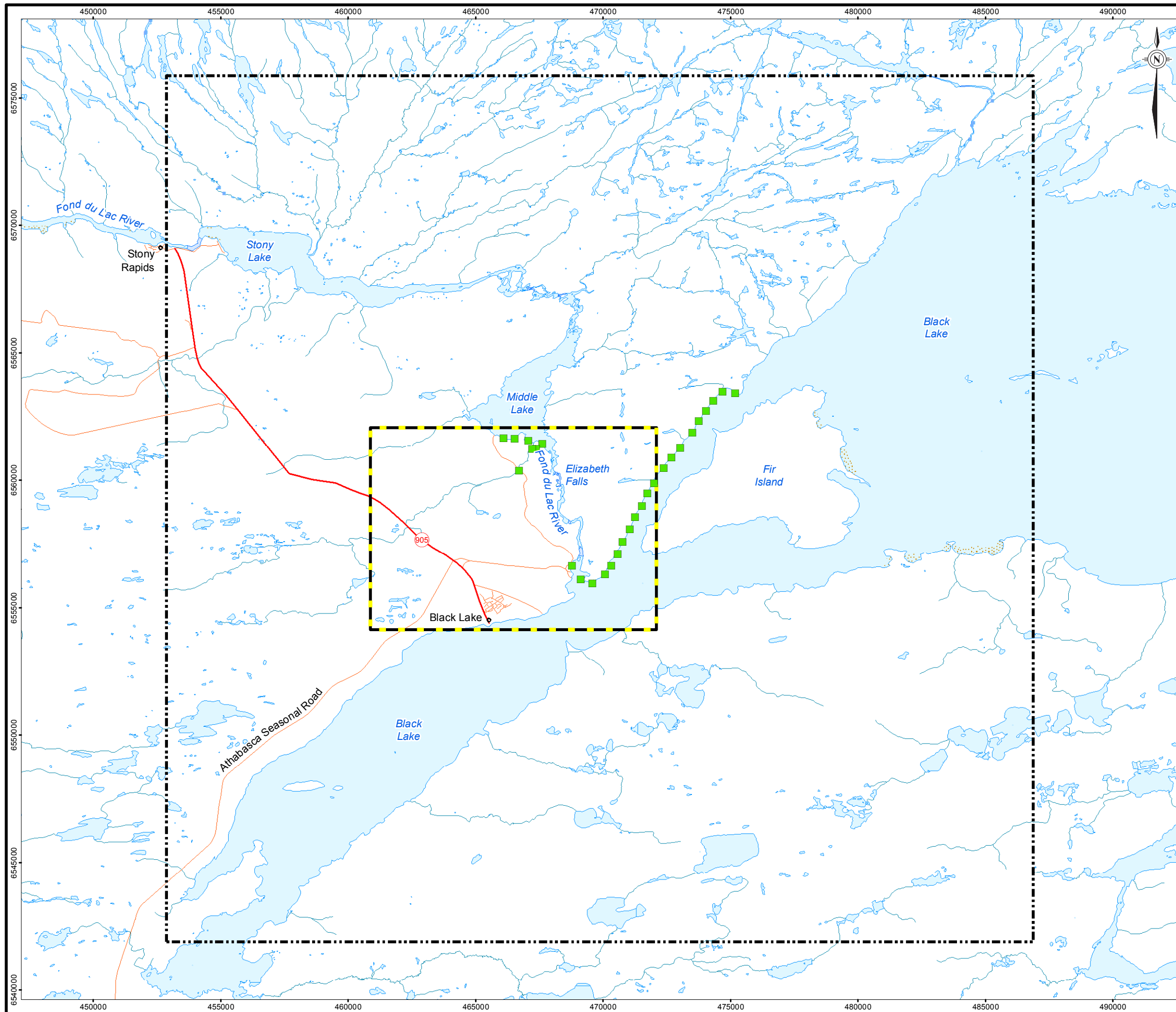
5.2.3 Traditional and Non-Traditional Use

Traditional use of wildlife was determined from traditional use surveys (Annex VI), government reports, and other grey literature.

5.2.4 Amphibians

Amphibian calling surveys were completed to determine amphibian occurrence and relative abundance within the LSA. Surveys at 28 locations were completed in the LSA on May 28, June 2, and June 13, 2012 (Figure 5.2-1). Amphibian calling surveys began one half-hour after sunset and followed the protocol used for the Great Lakes Coastal Wetland Monitoring Plan (Timmermans et al. 2008). Observers listened for amphibian calls for three minutes following a one minute waiting period at each survey location. The call chorus was given an index value based on the number of frogs singing at each location. Call index values were classified as:

- **Calling Index 1** - Individual counted – calls not simultaneous;
- **Calling Index 2** - Calls distinguishable – some simultaneous calling; and
- **Calling Index 3** - Full chorus – calls continuous and overlapping.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- AMPHIBIAN CALLING SURVEY LOCATION
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE LOCATIONS OF AMPHIBIAN CALLING SURVEYS, 2012			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
SCALE AS SHOWN		REV.	0
FIGURE: 5.2-1			

Waterbody characteristics were recorded at each survey location, including air and water temperature, turbidity, water depth, waterbody type, and species of emergent plants.

5.2.5 Semi-aquatic Mammals

Semi-aquatic mammals (e.g., muskrat [*Ondatra zibethicus*], beaver [*Castor canadensis*], American mink [*Mustela vison*] and river otter [*Lontra canadensis*]) observations were recorded in the LSA and RSA in conjunction with waterbird breeding and productivity surveys (Section 5.2.9). Observers recorded semi-aquatic mammal sightings, as well as evidence of semi-aquatic mammal activity (e.g., tracks, lodges, dams, and houses) for all wetlands located within 200 m of observers, while flying waterbird transects. Incidental observations of semi-aquatic mammals and evidence of semi-aquatic mammal activity were also recorded during other baseline surveys in 2012.

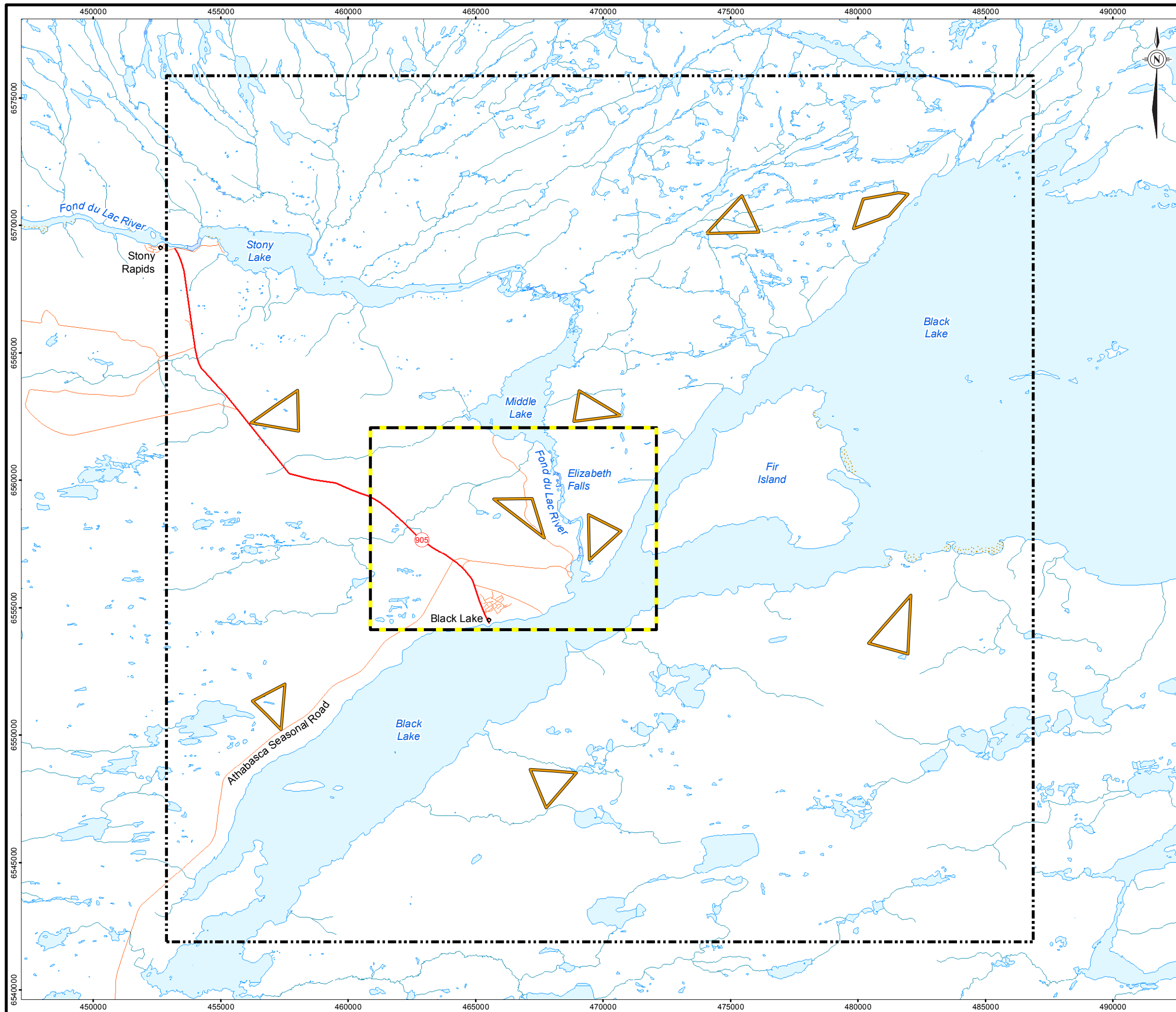
5.2.6 Carnivores and Terrestrial Furbearers

The presence and relative abundance of carnivores and furbearers were determined from winter track count (WTC) surveys in the RSA. Nine transects (5.1 to 7.3 km in length) were established in the RSA. Each transect was surveyed twice: once between January 7 and 17, 2012 and once between February 16 and 19, 2012 (Figure 5.2-2). The length of WTC survey transects equalled 48 km over eight habitat types.

Habitats surveyed during the WTC surveys were combined when appropriate to increase sample sizes within habitat types; thereby creating a more robust statistical analysis. This resulted in eight habitat types (ELC map units) used for analysis, including Wetland, Recent Burn, Deciduous, Jack Pine, Jack Pine/Black Spruce, Regenerating, Spruce, and Open Water. These habitat types deviated from the ELC classification (Section 4.3.1) by the grouping of Regenerating habitat into one category for this analysis due to insufficient sample sizes within the individual regenerating habitat types.

A Global Positioning System (GPS) unit was used to record the start and end points of each transect, as well as changes in habitat types. Transects were traversed by three observers using snowshoes. Tracks were recorded within 1.5 m of either side of the transect. A single track intercept was recorded as one observation. Although a set of tracks created by the same individual may have crossed the transect at multiple locations, each time the tracks crossed the transect they were recorded as an observation. Trails (i.e., a packed down path with more than one set of tracks) that crossed transects were assumed to represent three times the activity level of a single track. Networks were defined as multiple tracks and trails crossing the transect within a certain distance. The definition of 'network' was defined at different spatial scales depending on the size of the animal. A new network was recorded every metre for small- to medium-sized animals (e.g., weasels [*Mustela* spp.], snowshoe hare [*Lepus americanus*], red fox [*Vulpes vulpes*]), while a new network was recorded every 30 m for large animals (e.g., moose, wolf).

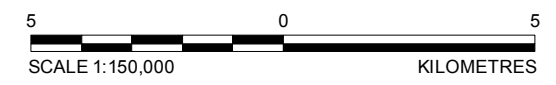
Winter track count surveys took place a minimum of 12 hours after a snowfall of 2 cm or more. Snow conditions were rated by observers as good, fair, or poor. Surveys were postponed during high winds or a snowfall event. Observers collected data on the species' tracks observed, habitat type, and the number of tracks observed by each species within each habitat type sampled. Fisher (*Martes pennanti*) and American marten (*Martes americana*) tracks are difficult to distinguish as there is size overlap between male marten and female fisher; therefore, tracks for these species were combined in the analysis. Weasel tracks were also compiled for analyses due to difficulties distinguishing among species.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- WINTER TRACK COUNT TRANSECT
- TERRESTRIAL REGIONAL STUDY AREA
- TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE LOCATIONS OF WINTER TRACK COUNT SURVEY TRANSECTS, 2012			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
SCALE AS SHOWN		REV. 0	FIGURE: 5.2-2

The number of tracks was standardized by the number of days since last snowfall, as snowfall influences the visibility of snow tracks. The adjusted track density (TKD) was the number of tracks per km sampled per number of days since last snowfall to the nearest half-day. The number of days since last snowfall was determined from observations in the field or talking with local residents. Mean adjusted track densities (with associated standard error) are presented for each species and habitat type. These calculations were completed to determine the relative activity level of carnivores, furbearers, and ungulates within habitats in the RSA.

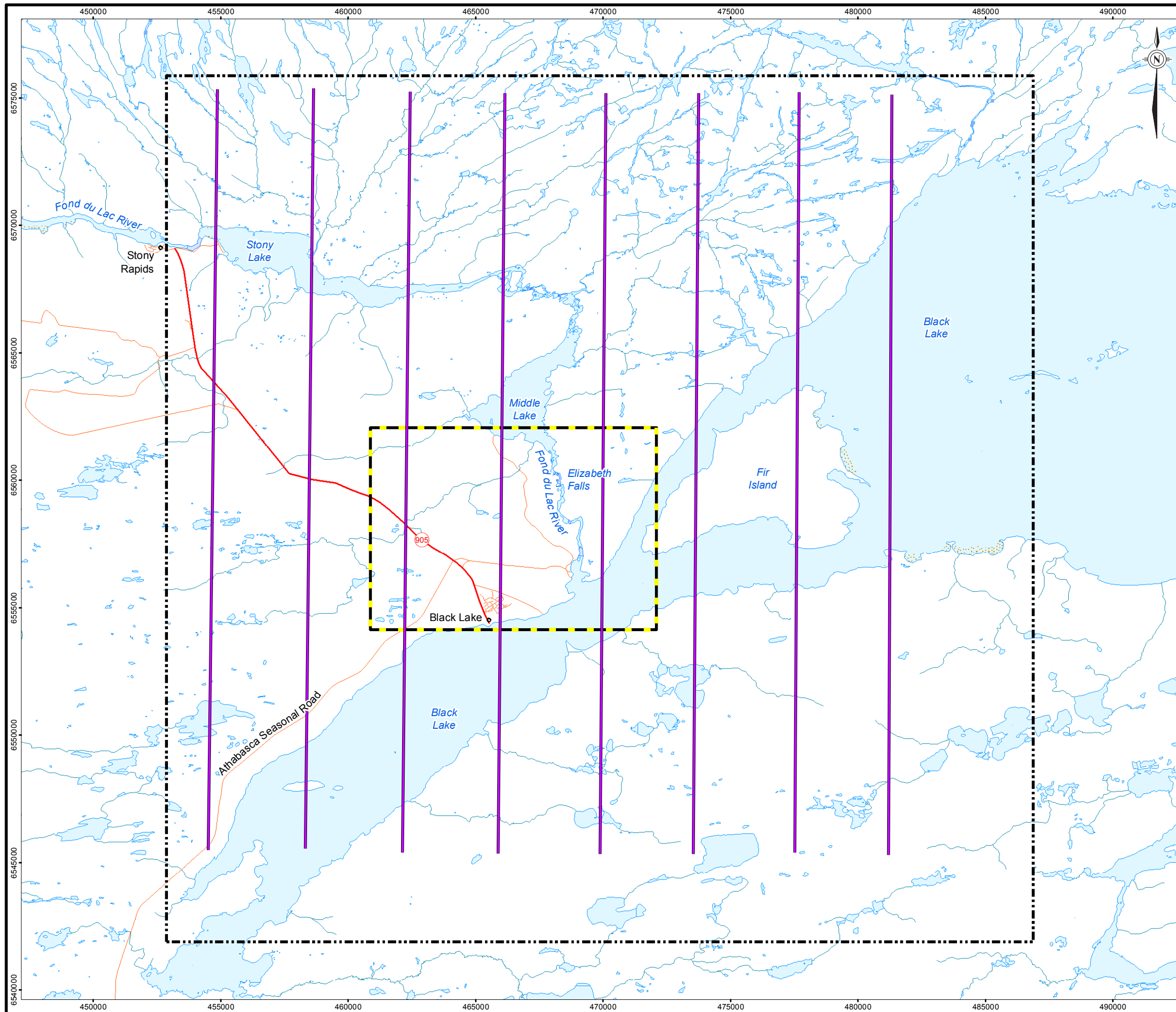
5.2.7 Ungulates

Estimates of ungulate (e.g., moose, caribou [*Rangifer tarandus* or *Rangifer tarandus groenlandicus*]) density, distribution, and population size in the RSA were determined from WTC surveys (Section 5.2.6) and an ungulate aerial survey.

Ungulate aerial surveys were completed to estimate the density, population size, and distribution of ungulates within the RSA. Eight transects were flown using a Bell 206 helicopter on January 15 and February 20, 2012. Transects were 30 km in length and were spaced 3.7 km apart (Figure 5.2-3). Transect survey strip width was 400 m wide (i.e., 200 m on either side of the helicopter). Surveys were completed at an altitude of approximately 100 m above ground level at an average speed of 90 kilometres per hour (km/h). Surveys covered approximately 96 km² (6.2%) of the RSA.

Ungulates observed within the survey strip width were considered to be on-transect. All ungulates observed outside of the survey strip width were recorded as incidental observations. Information recorded included species, group size, sex of individuals (if possible), and habitat type, as well as ambient weather conditions. Sightings of other wildlife species observed during the survey were also recorded as incidental observations.

Transect specific density (number of individuals/km²) for ungulates was estimated by dividing the total number of individuals of a species observed on a transect by the transect area. This process was repeated for each transect (n = 8) to approximate mean density and standard error of ungulates observed during the survey. The estimated number of ungulates within the RSA was calculated by dividing the number of individuals observed by the proportion of the RSA surveyed.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- UNGULATE AERIAL TRANSECT LOCATION
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
LOCATIONS OF UNGULATE AERIAL SURVEY TRANSECTS, 2012			
 Golder Associates Saskatoon, Saskatchewan	PROJECT 10-1365-0004		FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
SCALE AS SHOWN		REV.	0
FIGURE: 5.2-3			

5.2.8 Upland Breeding Birds

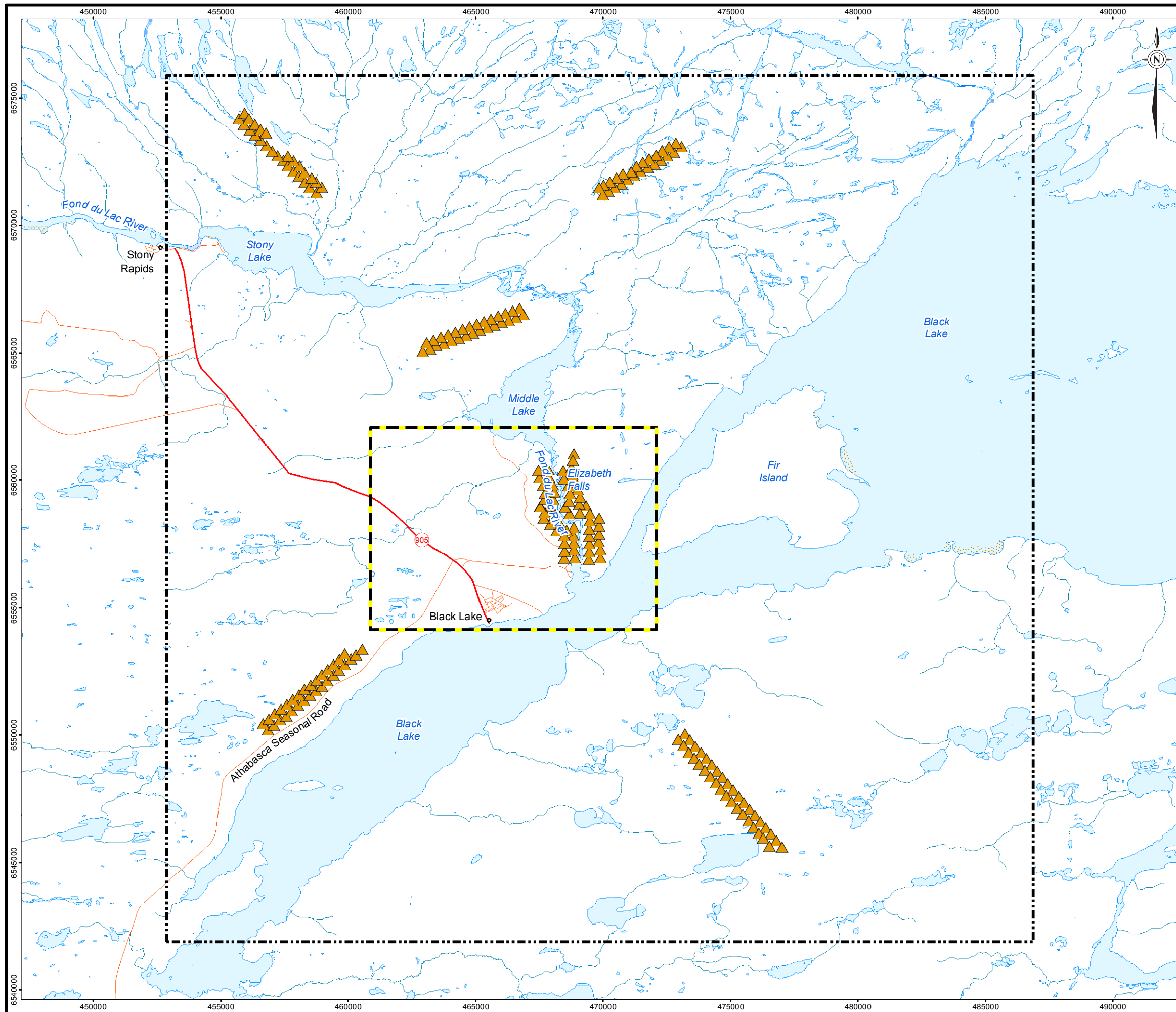
Upland breeding birds include ptarmigan, grouse, shorebirds, woodpeckers, nighthawks, and songbirds (excluding common raven [*Corvus corax*]). Upland breeding bird surveys (BBS) were completed in the RSA to determine species' densities, and community richness and abundance. A total of 211 BBS plots were surveyed across 9 terrestrial habitat types between May 30 and June 9, 2012 (Figure 5.2-4). Ptarmigan and grouse tracks were also recorded during WTC surveys (Section 5.2.6). Rock ptarmigan (*Lagopus muta*) and willow ptarmigan (*Lagopus lagopus*) tracks were combined for analysis, as were sharp-tailed grouse (*Tympanuchus phasianellu*), spruce grouse (*Falci pennis canadensis*), and ruffed grouse (*Bonasa umbellus*) tracks because of the difficulty in distinguishing among species.

The point count survey technique described by Ralph et al. (1993) was used to complete the BBS. Surveys were completed between sunrise and 10:00 a.m. during calm weather days. Surveys were postponed during adverse weather conditions (e.g., rain events and periods of high winds [i.e., wind speed greater than 20 km/h]) as these events could potentially reduce the likelihood of hearing and identifying species (Ralph et al. 1993).

Point counts were ten minutes in duration preceded by a one minute acclimation period. Survey plots were established with a 100 m radius. Observations recorded as within 50 m from the observers were used in statistical analyses. Observations of upland breeding birds outside of 100 m, flyovers, and fly-throughs were recorded as incidentals and were used for generating a comprehensive species list (Appendix IV.3, Table IV.3-1) but were not used in the analyses. Observers recorded the plot location using a GPS unit, as well as all species observed or heard, sex of the individual (if possible), behaviour, habitat type, and weather conditions. Detailed notes on plant community composition were also recorded at each point count station. Point count stations were a minimum of 300 m apart to avoid repeated sampling of individual birds.

Rarefaction (bootstrap) techniques were used to generate species richness estimates to determine if sampling was sufficient to estimate total upland breeding bird species richness within the RSA (Gotelli and Colwell 2001). Two curves were generated; one curve included only observations within 50 m of observers and the other included all upland breeding bird observations (i.e., incidental observations) recorded during BBS. An individual plot was considered the unit of replication and the data set was re-sampled 100 times using program EstimateS (Ver. 8, Colwell 2006).

Human error in distance estimation of auditory bird observations may cause bias in bird density estimates (Allredge et al. 2007). To limit this bias, observers record the distance from the plot center to visual observations of bird species within and outside of the sampling radius (i.e., 50 m) using a range finder (Bayne 2009). These data can be used to calculate an effective detection radius (Buckland et al. 2001). The effective detection radius can be used as a detectability correction factor for density estimates by reducing bias in density estimates that may arise from missing birds within the sampling radius, recording birds inside the sampling radius as outside of the sampling radius, or recording birds outside of the sampling radius as inside of the sampling radius (Buckland et al. 2001). However, visual observations of birds during the BBS were rare because of the forested environment. Therefore, the effective detection radius was calculated using the formula:



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- ▲ UPLAND BREEDING BIRD POINT COUNT STATION
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE LOCATIONS OF UPLAND BREEDING BIRD POINT COUNT SURVEYS, 2012			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
SCALE AS SHOWN		REV.	0
			FIGURE: 5.2-4

$$EDR = \sqrt{\frac{2}{\left(\frac{2}{k^2}\right) * \ln\left(\frac{n}{n_2}\right)}}$$

where k = the distance at which birds are declared as being in our out of the surveyed distance (i.e., 50 m), n = total number of birds detected, and n_2 = total numbers of birds recorded outside value of k (Bayne 2009).

Point count observations were categorized into one of nine habitat types with two levels of analysis completed. A species-level analysis examined the density of individual species within each habitat type. A community-level analysis examined the density and richness of all species within each habitat type. Species richness, and not a heterogeneity index (e.g., Shannon's Diversity Index), was used as a measure of community diversity for each habitat type based on Costello et al. (2004), which concluded that species richness provides the most suitable univariate measure of community diversity. Density was calculated as the number of individuals per area surveyed (i.e., the effective detection radius) and included only bird species that were recorded as within the sampling radius (i.e., 50 m). One-way analysis of variance (ANOVA) and Tukey-Kramer mean comparisons were calculated in JMP 7.0 (SAS Institute 2007) and were used to determine if density of birds differed across habitat types. Species richness for each habitat type was determined using individuals recorded as within the sampling radius (i.e., 50 m).

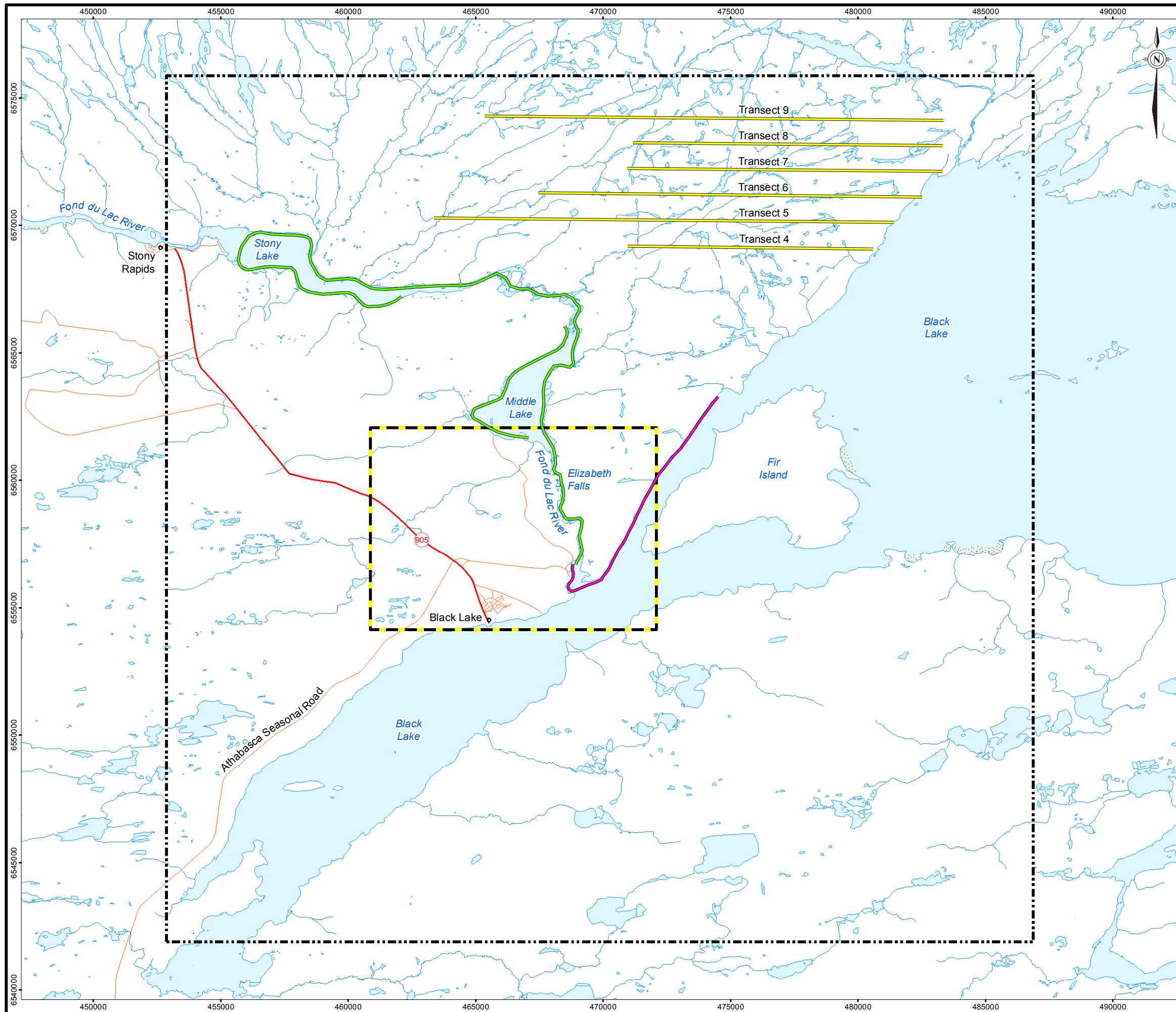
5.2.9 Waterbirds

Waterbirds include loons, grebes, swans, geese, ducks, scoters, mergansers, American coot (*Fulica americana*), sandhill crane (*Grus canadensis*), gulls, and terns. Aerial transects to determine waterbird breeding adult density in the RSA were flown on June 1 and July 19, 2012. Transects (8 to 47 km in length) were flown along the shore of Black Lake, along the Fond du Lac River (including Stony Lake and Middle Lake) and in the northeastern RSA (6 linear transects) (Figure 5.2-5). Transect survey strip width was 400 m wide (i.e., 200 m on either side of the helicopter). Surveys were completed using a Bell 206 helicopter at an altitude of approximately 100 m above ground level and an average speed of 80 km/h. The Black Lake and Fond du Lac River transects were divided into 1 km segments, which were used for calculating waterbird densities (mean \pm 1 Standard Error [SE]) (i.e., densities were calculated based on 0.4 km²). For the Northeastern portion of the RSA, transect density was determined by calculating the total open water area for each transect (Table 5.2-1) and dividing the quantity of waterbirds observed on each transect by the total open water area.

Table 5.2-1: Total Area Sampled per Transect in the Northeastern Regional Study Area during Waterbird Breeding and Productivity Surveys, 2012

Transect Number	Open Water Area (ha)	Transect Area (ha)	% Open Water
4	8.12	397.20	2.04%
5	36.22	733.59	4.94%
6	73.70	614.48	11.99%
7	23.96	507.61	4.72%
8	48.03	498.56	9.63%
9	43.22	732.83	5.90%

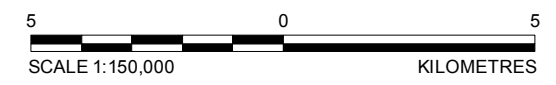
ha = hectares, % = percent



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- SURVEY TRANSECT
- BLACK LAKE
- FOND du LAC RIVER
- NORTHEASTERN RSA
- TERRESTRIAL REGIONAL STUDY AREA
- TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT			
TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE			
LOCATIONS OF WATERBIRD BREEDING AND PRODUCTIVITY AERIAL SURVEY TRANSECTS, 2012			
 Golder Associates Saskatoon, Saskatchewan	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
		SCALE AS SHOWN	REV. 0
			FIGURE: 5.2-5

5.2.10 Raptors

Surveys to locate raptor stick nests were completed in the RSA in conjunction with the waterbird breeding and productivity surveys ([Section 5.2.8](#)). Nest observations were marked with a GPS waypoint, as well as the species, number of individuals, and habitat type. Raptor nests that were found during the waterbird breeding survey were revisited during the waterbird productivity survey to determine nest success. Incidental observations of raptors were recorded during other wildlife baseline surveys in 2012.

5.3 Results

5.3.1 Wildlife Habitat

The ELC identified 18 ELC map units (i.e., wildlife habitat) and 1 unclassified ELC map unit ([Section 4.3.1](#)). These include the following:

- Bedrock;
- Jack Pine;
- Jack Pine/Black Spruce;
- Spruce;
- Mixedwood;
- Deciduous;
- Wetland (which includes Bogs, Fens, and Swamps);
- Riparian;
- Open Water;
- Regenerating Jack Pine;
- Regenerating Jack Pine/Black Spruce;
- Regenerating Spruce;
- Regenerating Mixedwood;
- Regenerating Deciduous;
- Regenerating Wetland (which includes Regenerating Bogs, Fens, and Swamps);
- Regenerating Riparian;
- Recent Burn;
- Existing Disturbance; and
- Unclassified.

Recent burn areas were affected by fire in 2003, 2006, 2008, and 2010. Regenerating map units represent areas that were historically affected by fire during 1989, 1994, and 1996. The most abundant upland map unit is the Jack Pine map unit and accounts for approximately 18.6% (21,492 ha) of the RSA. Wetlands cover approximately 5.4% (6,213 ha) of the RSA. The Existing Disturbance map unit (e.g., roads, communities) account for approximately 0.8% (889 ha) of the RSA. Approximately 22.7% (26,275 ha) of the RSA is covered with Open Water.

5.3.2 Provincial and Federal Listed Species

Twenty-eight provincial and federal listed species have the potential to occur in the RSA ([Table 5.3-1](#)). Three of these 28 species are listed as threatened and 4 are listed as species of special concern under Schedule 1 of the SARA (2012b). One species is listed as a species of special concern under Schedule 3 of SARA (2012b). Five species have been recommended by COSEWIC (2012) for protection under SARA (2012b), but are not currently protected. Two of these species are recommended to be listed as endangered, one as threatened, and two as species of special concern. An additional 15 species are tracked by the Province of Saskatchewan (SKCDC 2012g); these 15 species are not protected under SARA (2012b) or the *Wildlife Act* (1998), and are not recommended to be listed by COSEWIC (2012).

A total of three provincially-tracked, two COSEWIC-recommended, and one SARA-listed species were observed during wildlife baseline surveys in 2012 ([Appendix IV.3, Table IV.3-2](#)). The only SARA-listed species observed was olive-sided flycatcher (*Contopus cooperi*), which was incidentally observed in Recent Burn habitat during the BBS. Horned grebe (*Podiceps auritus*) and wolverine (*Gulo gulo*), are the COSEWIC-recommended species that were observed. Horned grebe was observed during waterbird breeding surveys, while wolverine tracks were recorded during WTC surveys. Bald eagle (*Haliaeetus leucocephalus*) and sandhill crane, both provincially-tracked species, were observed during the waterbird breeding and productivity surveys. Tundra swan (*Cygnus columbianus*) and trumpeter swan (*Cygnus buccinator*) are both provincially-tracked species. Unknown swan species were incidentally observed during the BBS.

Additional information on provincially and federally listed mammal, upland breeding bird, waterbird, and raptor species is presented in [Sections 5.3.6, 5.3.7, 5.3.8, 5.3.9, and 5.3.10](#), respectively.

Table 5.3-1: Provincial and Federal Listed Species Having Potential to Occur in the Regional Study Area, 2012

Common Name	Scientific Name	SARA Status ^(a)	COSEWIC Status ^(b)	Provincial Status ^(c)	Potential of Occurrence in the Regional Study Area	Species Observed in the Regional Study Area
Mammals						
Woodland Caribou	<i>Rangifer tarandus caribou</i>	Threatened - Schedule 1	Threatened	S3	Low to Moderate – The nearest known woodland caribou conservation unit is located approximately 30 km south of the Project (SKCDC 2012h). The only sign of caribou that was found during terrestrial baseline surveys was decades-old caribou antlers.	No
Barren-ground Caribou	<i>Rangifer tarandus groenlandicus</i>	No Status	Not Listed	S3S4	Low – The Bathurst caribou herd has traveled within 70 km of the northern boundary of the RSA in 1997, 1999, 2000, and 2001 (Stimson 2009). However, the closest this herd has been since 2001 is 260 km north of the RSA. The closest the Ahiak caribou herd has been recorded to the RSA is 70 km north. The Beverly caribou herd has not been recorded within 90 km of the RSA. The only sign of caribou that was found during terrestrial baseline surveys was decades-old caribou antlers.	No
Wolverine	<i>Gulo gulo</i>	No Status	Special Concern	S3S4	High – Species densities are higher in areas with a high density of ungulates (COSEWIC 2003). Species population density is considered to be moderately high in the area surrounding the RSA.	Yes
Little Brown Myotis	<i>Myotis lucifugus</i>	No Status	Endangered	Not Tracked	Moderate – Species roosting locations include old buildings and under rocks and bark (Fenton and Barclay 1980).	No
Northern Myotis	<i>Myotis septentrionalis</i>	No Status	Endangered	Not Tracked	Moderate – Species prefers to roost in decaying trees and under bark of deciduous trees (Caceres and Barclay 2000).	No
Birds						
Red-throated Loon	<i>Gavia stellata</i>	No Status	Not Listed	S1B	Low – Species was fall transient in the 08 74O mapsheet (Smith 1996), which cover part of the RSA, prior to 1996. Species prefers to nest in small lakes and wetlands in the circumpolar region and rarely is found nesting in northern Saskatchewan (Barr et al. 2000).	No
Horned Grebe	<i>Podiceps auritus</i>	No Status	Special Concern	S5B	High – Species prefers shallow, freshwater water bodies less than 10 ha in size (Stedman 2000).	Yes
Tundra Swan	<i>Cygnus columbianus</i>	No Status	Not Listed	S5M	Moderate – Species may migrate through the RSA (Limpert and Earnst 1994). Species did temporarily nest at Stony Lake from 1973-1980 (Smith 1996). However this was a very unusual circumstance; species usually nests on the tundra.	Yes ^(d)
Trumpeter Swan	<i>Cygnus buccinator</i>	No Status	Not Listed	S3B	Low – Species is a rare visitor in Saskatchewan, outside of breeding colonies in Cypress Hills and Greenwater Lake (Smith 1996).	Yes ^(d)
Bald Eagle	<i>Haliaeetus leucocephalus</i>	No Status	Not at Risk	S5B, S4M, S4N	High – Species is listed as a confirmed breeder in the 01 to 03 74O mapsheets (Smith 1996), which contains part of the RSA. Nests in forested areas adjacent to fish-bearing water bodies (Buehler 2000).	Yes
Golden Eagle	<i>Aquila chrysaetos</i>	No Status	Not Listed	S3B, S4M, S3N	Low – Species has scattered breeding throughout northern Saskatchewan (Kochert et al. 2002). Species nests on cliffs in northern Saskatchewan (Smith 1996).	No
Peregrine Falcon	<i>Falco peregrinus anatum/tundrius</i>	Special Concern - Schedule 1	Special Concern	S1B, S4M, S2N	Low - Species nests on cliffs in natural environments (White et al. 2002).	No
Sandhill Crane	<i>Grus canadensis</i>	No Status	Not Listed	S2B, S4M	High – Prefers to breed in isolated open bogs and marshes (Tacha et al. 1992).	Yes
Yellow Rail	<i>Coturnicops noveboracensis</i>	Special Concern - Schedule 1	Special Concern	S3B, S2M	Low – Species distribution in Saskatchewan is not well known (Bookhout 1995). Species breeds in sedge wetlands.	No
Red-necked Phalarope	<i>Phalaropus lobatus</i>	No Status	Not Listed	S4B, S3M	Low – The RSA is on the southern boundary of the species' breeding range (Rubega et al. 2000). Red-necked phalaropes were recorded as a fall migrant in the 04 72P mapsheet, which covers the part of the RSA, prior to 1966 (Smith 1996).	No
Caspian Tern	<i>Sterna caspia</i>	No Status	Not at Risk	S2B, S2M	Low – Nests on islands in rivers in the western interior of North America (Cuthbert and Wires 1999).	No
Great Gray Owl	<i>Strix nebulosa</i>	No Status	Not at Risk	S3B, S3N	Moderate – Nest in open bogs and fens (Bull and Duncan 1993). Species avoids dry pine stands.	No
Short-eared Owl	<i>Asio flammeus</i>	Special Concern - Schedule 3	Special Concern	S3B, S2N	Low to Moderate – Range overlaps the RSA (COSEWIC 2008). Species nests in bogs and marshes in the boreal forest.	No
Northern Hawk-owl	<i>Surnia ulula</i>	No Status	Not at Risk	S3B, S5N	Moderate to High – Prefers to nest in moderately dense coniferous or mixed wood forests adjacent to open areas, such as those cleared by fire (Duncan and Duncan 1998).	No
Boreal Owl	<i>Aegolius funereus</i>	No Status	Not Listed	S3B, S3N	Low to Moderate – Prefers to nest in mature coniferous forests with a large amount of snags (Hayward and Hayward 1993).	No
Common Nighthawk	<i>Chordeiles minor</i>	Threatened - Schedule 1	Threatened	S4S5B, S4S5M	Moderate to High – Prefers to nest in open areas such as recently burned areas and open forests (Brigham et al. 2011). Species is listed as a confirmed breeder in the 01/02 74N mapsheet, which is adjacent to the RSA (Smith 1996).	No

Table 5.3-1: Provincial and Federal Listed Species that have the Potential to Occur in the Regional Study Area, 2012 (continued)

Common Name	Scientific Name	SARA Status ^(a)	COSEWIC Status ^(b)	Provincial Status ^(c)	Potential of Occurrence in the Regional Study Area	Species Observed in the Regional Study Area
Pileated Woodpecker	<i>Dryocopus pileatus</i>	No Status	Not Listed	S4B, S3N	Low – Prefers to nest in late successional deciduous and mixed wood forests (Bull and Jackson 2011).	No
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened - Schedule 1	Threatened	Not Tracked	High – Species is a fairly common breeder the boreal forests of Saskatchewan (Smith 1996), and prefers to nest near forest openings or in semi-open to open forests (Altman and Sallabanks 2000).	Yes
Barn Swallow	<i>Hirundo rustica</i>	No Status	Threatened	Not Tracked	Moderate – Primarily nests on artificial structures such as buildings, bridges, and culverts (Brown and Bomberger-Brown 1999). Species is listed as a possible breeder in the 04 74O and 05 74P mapsheets (Smith 1996), which contains part of the RSA.	No
Northern Shrike	<i>Lanius excubitor</i>	No Status	No Status	S1B, S4N	Low – Species has been documented as a confirmed breeder in the 02 74N mapsheet (Smith 1996) adjacent to the RSA. Species breeds in the northern boreal forest (Cade and Atkinson 2002).	No
Rusty Blackbird	<i>Euphagus carolinus</i>	Special Concern - Schedule 1	Special Concern	S4B	Moderate to High – Strictly uses riparian areas and prefers wetlands adjacent to open areas such as recently burned areas and lichen dominated open forests (Avery 1995).	No
Pine Grosbeak	<i>Pinicola enucleator</i>	No Status	No Status	S2B, S4N	Moderate – Species breeds in the subarctic and boreal conifer forests (Adkisson 1999). Species has been documented as a fall transient in the RSA (Smith 1996).	No
Amphibians						
Northern Leopard Frog	<i>Rana pipiens</i>	Special Concern - Schedule 1	Special Concern	S3	Low – Although suitable overwintering and breeding habitat is abundant in the RSA, suitable summer foraging is limited. The presence of all three habitat types in close proximity to each other is necessary for species' survival (COSEWIC 2009).	No

^(a) Species at Risk Act (SARA 2012b)

^(b) Committee on the Status of Endangered Wildlife in Canada (COSEWIC 2012)

^(c) Saskatchewan Conservation Data Centre (SKCDC 2012g)

Provincial Rank Definitions

S1 Extremely Rare – 5 or fewer occurrences in Saskatchewan, or very few remaining individuals.

S2 Rare – 6 to 20 occurrences in Saskatchewan, or few remaining individuals.

S3 Rare/Uncommon – 21 to 100 occurrences in Saskatchewan; may be rare and local throughout province or may be abundant in places).

S4 Common – more than 100 occurrences; generally widespread and abundant, but may be rare in parts of its range.

S5 Very Common – more than 100 occurrences wide spread and abundant, but may be rare in parts or its range.

B – for a migratory species, rank applies to the breeding population in the province.

M – for a migratory species, rank applies to the transient population in the province.

N – for a migratory species, rank applies to the non-breeding population in the province.

^(d) An unidentified swan species was incidentally observed while completing baseline wildlife surveys.

5.3.3 Traditional and Non-traditional Use

The Project is located on the Chicken Indian Reserve. Traditional use of species in the RSA includes hunting of wolf, black bear, and moose and trapping of smaller mammals such as American marten, snowshoe hare, and red squirrel (*Tamiasciurus hudsonicus*) (Annex VI, Section 4.1.5).

Non-traditional use of wildlife species is managed in the RSA, which is located in WMZ 76. There are two black bear hunting seasons in WMZ 76: April 15 to June 30, and August 25 to October 14 (MOE 2012). One bear, of either sex, can be taken by resident and non-resident hunters; only female bears with young-of-year cubs cannot be hunted. Moose can be hunted in the RSA, by residents and non-residents, between September 1 and November 30; one bull moose can be taken per person.

Trapping dates for fur-bearing species expected to occur in the RSA is listed in [Table 5.3-2](#). Trapping in WMZ 76 is by application to the Saskatchewan Ministry of Environment (MOE) only.

Table 5.3-2: Trapping Season Dates for Furbearing Species that are Expected to Occur in the Regional Study Area for the 2012 to 2013 Season

Common Name	Scientific Name	Trapping Dates
Black Bear	<i>Ursus americanus</i>	September 1, 2012 – May 31, 2012
Wolf	<i>Canis lupus</i>	October 15, 2012 – March 15, 2013
Coyote	<i>Canis latrans</i>	October 15, 2012 – March 15, 2013
Red Fox	<i>Vulpes vulpes</i>	October 15, 2012 – March 15, 2013
Arctic Fox	<i>Alopex lagopus</i>	October 15, 2012 – March 15, 2013
Lynx	<i>Lynx canadensis</i>	November 1, 2012 – March 1, 2013
Wolverine	<i>Gulo gulo</i>	October 15, 2012 – February 15, 2012
Fisher	<i>Martes pennanti</i>	November 1, 2012 – March 1, 2013
American Marten	<i>Martes americana</i>	November 1, 2012 – March 1, 2013
Weasel species	<i>Mustela</i> spp.	November 1, 2012 – March 1, 2013
Mink	<i>Mustela vison</i>	November 1, 2012 – March 1, 2013
Beaver	<i>Castor canadensis</i>	October 1, 2012 – May 31, 2013
Muskrat	<i>Ondatra zibethicus</i>	October 15, 2012 – May 31, 2013
River Otter	<i>Lontra canadensis</i>	November 1, 2012 – April 30, 2013
Red Squirrel	<i>Tamiasciurus hudsonicus</i>	November 1, 2012, March 15, 2013

Snow geese (*Chen caerulescens*) can be hunted between April 1 and May 31. Snow geese, Canada geese (*Branta canadensis*), and sandhill cranes can be hunted from September 1 to December 16. Ducks, American coots, and Wilson’s snipes (*Gallinago delicata*) can be hunted in the RSA between September 1 and December 16. Ptarmigan species can be hunted in the RSA from November 1 to March 31. Sharp-tailed grouse, ruffed grouse, and spruce grouse can be hunted in the RSA from September 15 to December 7.

5.3.4 Amphibians

Amphibians were recorded at 18 of the 28 survey locations ([Appendix IV.3, Table IV.3-3](#)). Only wood frog (*Rana sylvatica*) and boreal chorus frog (*Pseudacris maculata*) were heard during surveys. Amphibian species that have historic ranges that overlap the RSA but were not heard or observed during the wildlife baseline surveys are Canadian toad (*Bufo hemiophrys*) and northern leopard frog (*Rana pipiens*).

A summary of the weather and wetland conditions during the amphibian surveys is shown in [Table 5.3-3](#). Amphibian surveys occurred along the shore of Middle Lake and Black Lake, as well as in some wetland areas and along some streams in the LSA.

Table 5.3-3: Wetland and Weather Conditions during the Amphibian Calling Surveys, 2012

	May 28	June 2	June 13
Wetland Conditions			
Water temperature range (°C)	2 to 11	4 to 8	not collected
Wetland type	permanent stream, slow flowing river, bog/fen	lake	lake
Wetland substrate	silt/mud, sand/gravel, cobble	sand/gravel, cobble	cobble
Most common and most abundant aquatic emergent vegetation observed	<i>Carex</i> spp., <i>Salix</i> spp.	none	none
Weather Conditions			
Maximum daily air temperature (°C) ^(a)	22	18	21
Air temperature range during survey (°C)	8 to 12	5 to 9	not collected

^(a) Environment Canada (2012a)
°C = degrees Celcius

5.3.4.1 Boreal Chorus Frog

5.3.4.1.1 Population Status and Distribution

The boreal chorus frog is found in many parts of North America, ranging from the northeastern part of British Columbia east to Ontario, and from the central United States to the Northwest Territories (CARCNET 2012a). Like other northern amphibians, boreal chorus frogs can hibernate through the winter because their blood and other tissues are resistant to freezing. Boreal chorus frogs hibernate in soil in upland habitats. Boreal chorus frogs are one of the first amphibians to emerge in the spring and may come out of hibernation before the snow melts (B.C. Frogwatch Program 2012a). Breeding occurs soon after emerging from hibernation and females can lay up to 1,500 eggs. Eggs hatch after a couple of weeks and adults can live up to two years.

5.3.4.1.2 Habitat Selection and Foraging

Boreal chorus frogs live in a variety of habitats such as wet meadows, moist brush, grasslands, forests, and some residential and agricultural areas (B.C. Frogwatch Program 2012a). They breed in shallow standing water, including seasonal ponds, ditches, and flooded meadows. Tadpoles are herbivorous and consume algae. Adult boreal chorus frogs prefer ants and spiders, but will also consume beetles, aphids, snails, millipedes, caterpillars, mites, and springtails.

5.3.4.2 Wood Frog

5.3.4.2.1 Population Status and Distribution

Wood frogs occur throughout most of North America, ranging from the southern Appalachians to the boreal forest (CARCNET 2012b). They can overwinter in northern climates because their blood and other tissues are resistant to freezing. Wood frogs hibernate in soil, using root channels and burrows made by other animals. Reproduction begins as soon as spring melt occurs and females typically lay their eggs together in masses containing 2,000 to 3,000 eggs (B.C. Frogwatch Program 2012b). Eggs hatch between 4 and 8 days after laying, and metamorphosis is completed 45 to 80 days after hatching. Adults reach maturity at two years and can live up to four years.

5.3.4.2.2 Habitat Selection and Foraging

Wood frogs inhabit marshes, wet meadows, moist brush, and riparian areas (B.C. Frogwatch Program 2012b). Wood frogs breed in shallow ponds, marshy lake edges, flooded meadows, and slow-moving stretches of streams. Tadpoles are herbivorous, consuming algae and plant material. Adult wood frogs consume insects, worms, snails, millipedes, and molluscs.

5.3.5 Semi-aquatic Mammals

There are four species of semi-aquatic mammals that have the potential to occur in the RSA: muskrat, beaver, river otter, and mink. Sign or sightings of all four species were recorded during baseline surveys in 2012 ([Appendix IV.3, Table IV.3-4](#)).

5.3.5.1 Muskrat

5.3.5.1.1 Population Status and Distribution

Musk rats occur throughout most of North America, with the exception of Florida and coastal Georgia and South Carolina (Allen and Hoffman 1984). Muskrat is not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species.

Muskrat territories range from 40 to 100 m in diameter (Danell 1978); with larger territories usually present in areas of low emergent vegetation cover (Allen and Hoffman 1984). Musk rats are promiscuous and males compete over females (Aleksiuk 1986). Breeding occurs immediately after spring break-up in March, April, or May.

In the 2008-2009 and 2009-2010 trapping seasons, muskrat were the highest marketed pelt and third highest total value harvested animal in the Northern Fur Conservation Area (MOE 2010, 2011). Musk rats were ranked as 'common' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. The Project is located in the N-80 Fur Management Zone in the Northern Fur Conservation Area of Saskatchewan. No muskrat pelts were sold in the N-80 Fur Management Zone in either the 2008-2009 or 2009-2010 season.

Three muskrat tracks were recorded in Jack Pine habitat during WTC surveys ([Appendix IV.3, Table IV.3-4](#)). Single tracks accounted for 100% of track observations recorded during WTC surveys. No observations of muskrat individuals or muskrat houses or feeding areas were made during other baseline surveys.

5.3.5.1.2 Habitat Selection and Foraging

Musk rats occur in marshes, ponds, lakes, and slow-moving rivers. Water at a site must be deep enough to not freeze in the winter, but shallow enough to allow the growth of aquatic vegetation (ideal water depth is between 1 and 2 m) (Aleksiuk 1986). Musk rats build a variety of structures depending on habitat conditions. Along rivers, where bank substrate is appropriate for digging, they construct extensive burrows with underwater entrances as a defence against predators. In marshes, muskrat build lodges out of vegetation and mud. They also build feeding platforms and "push ups," shelters made of vegetation that cover a hole in the ice, which are used for feeding and as breathing holes.

Musk rats are primarily herbivores, although they will eat some animal matter (Allen and Hoffman 1984). Broad-leaved cattail (*Typha latifolia*) is a preferred food source (Bellrose 1950) and can support two to seven times as many individuals as other vegetation types (Allen and Hoffman 1984). Stream-dwelling muskrats tend to have more diverse diets than those that live in marshes. Individuals that inhabit lakes are more opportunistic feeders and may ingest more animal matter than other populations (Allen and Hoffman 1984).

5.3.5.2 Beaver

5.3.5.2.1 Population Status and Distribution

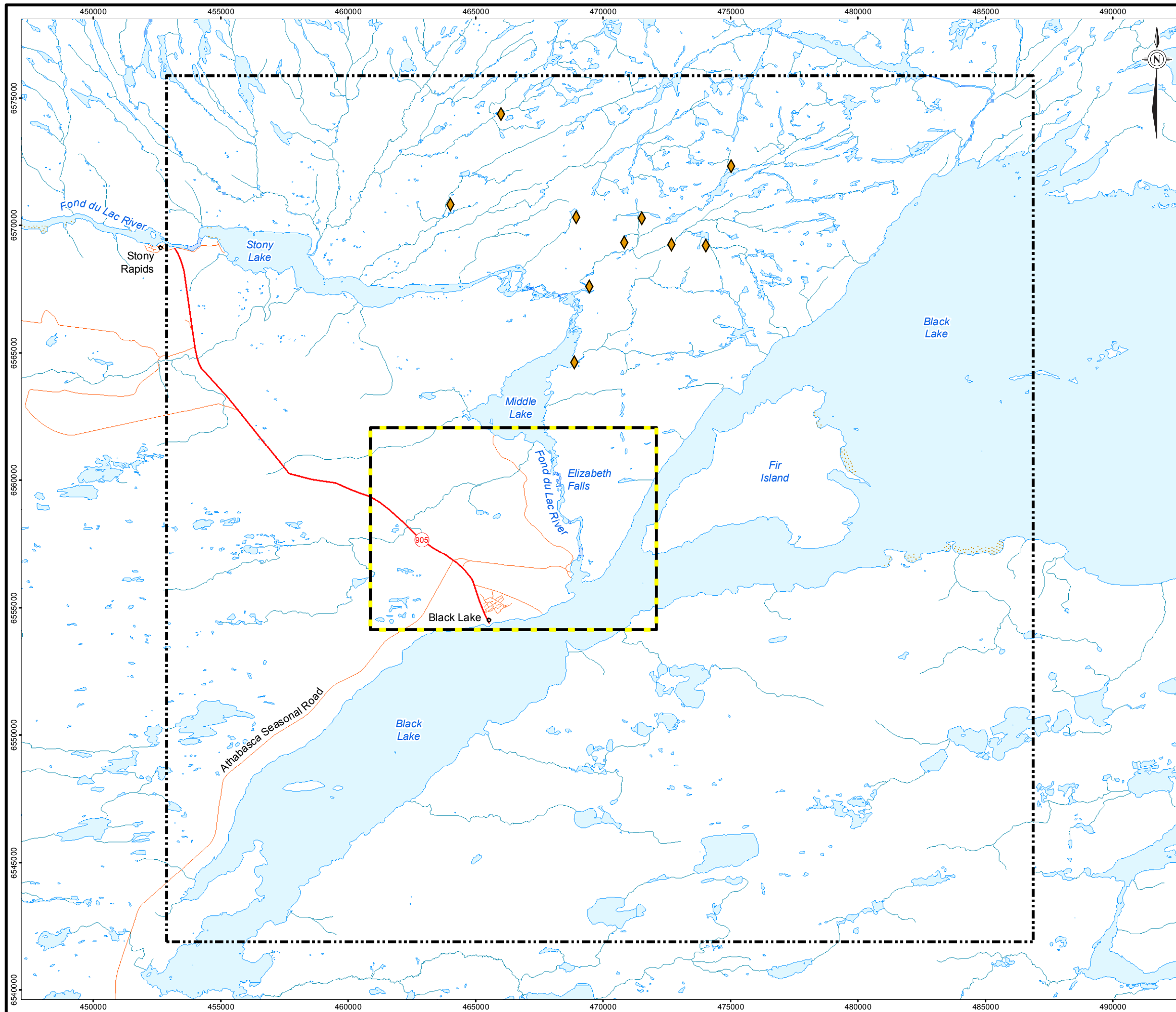
Beavers are commonly found in forested and non-forested areas throughout North America (Jenkins and Busher 1979). Beaver populations are currently stable, and are considered to be widespread, abundant, and secure across North America.

In the 2008-2009 and 2009-2010 trapping seasons, beaver were the second most harvested animal in the Northern Fur Conservation Area, by total value and number of pelts marketed (MOE 2010, 2011). Beavers were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. The Project is located in the N-80 Fur Management Zone in the Northern Fur Conservation Area of Saskatchewan. No beaver pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season, however nine beaver pelts were sold in the N-80 zone in the 2009-2010 season. Two beavers and ten lodges and dams were incidentally observed during the waterbird breeding surveys on June 1, 2012 (Figure 5.3.-1; Appendix IV.3, Table IV.3-5).

5.3.5.2.2 Habitat Selection and Foraging

Beavers require deep water to prevent their lodge entrances from freezing during the winter. In areas where water levels are low, beavers build dams to provide a constant water depth. In areas where water is naturally deep, lodges are built on lake or river margins (Allen 1983). Reductions of water flows in stream or rivers can expose lodge entrances and food caches, which can leave beavers vulnerable to predation (Boyle and Owens 2007). Increased flows may flood lodges or wash away lodges, dams, and food caches.

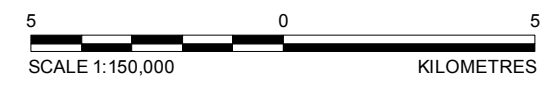
Beavers are herbivores and may forage up to 100 m from riparian areas (Boyle and Owens 2007). Beavers eat the leaves, twigs, and bark of woody plants, as well as many species of aquatic and terrestrial herbaceous vegetation (Allen 1983). Diet will vary seasonally. Trembling aspen (*Populus tremuloides*), willow (*Salix* spp.), balsam poplar (*Populus balsamifera*), and alder (*Alnus* spp.) are preferred in the summer, while conifers and the rhizomes and roots of aquatic vegetation are important food sources during the winter. Beavers cache food to sustain them through the winter months.



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- ◆ INCIDENTAL BEAVER DAM AND LODGE OBSERVATION
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE LOCATIONS OF BEAVER DAM AND LODGE OBSERVATIONS IN THE REGIONAL STUDY AREA, 2012			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
SCALE AS SHOWN		REV.	0
			FIGURE: 5.3-1

5.3.5.3 River Otter

5.3.5.3.1 Population Status and Distribution

River otters are found in forested areas throughout Canada and the United States (Larivière and Walton 1998). Populations in North America are currently stable, but populations had greatly declined between European settlement and the early 1900s because of the unregulated fur harvest, water pollution, and habitat degradation (Sefass and Polechla 2008). Water quality and furbearer management regulations have allowed river otters to re-establish themselves throughout much of their historic range.

A total of 379 and 310 otter pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No otter pelts were sold in the N-80 Fur Management Zone in either season. River otters were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. One river otter was caught in a hoop trap during spring fish spawning surveys in 2012; One river otter was also incidentally observed during amphibian calling surveys in May, 2012 ([Appendix IV.3, Table IV.3-5](#)).

5.3.5.3.2 Habitat Selection and Foraging

River otters require permanent waterbodies and are often found in waterbodies with beaver dams and lodges (Larivière and Walton 1998). River otters prefer flowing water (e.g., streams, rivers) over still waterbodies (e.g., lakes, ponds). River otters are sensitive to water quality and are often used as a biological indicator (bioindicator) because of their position near the top of the food chain (Larivière and Walton 1998). Otters readily accumulate mercury, organochlorine compounds, and other chemicals in their tissues from dietary items over their lifetime. A study in California found that diet and presence of parasites were found to be more important contributors to otter stress levels than human activity and proximity (Zalewski 2011).

River otters primarily consume fish, although frogs and crustaceans are also commonly eaten (Larivière and Walton 1998). Small mammals, molluscs, reptiles, birds, and fruits are consumed opportunistically.

5.3.5.4 American Mink

5.3.5.4.1 Population Status and Distribution

American mink are found throughout Canada and much of the United States except for arid regions of the south and southwest (Larivière 1999). Mink populations are considered stable and accidental introductions from mink farms have allowed for an increase in geographic distribution in North America. They are considered abundant across much of their range with average densities from 0.1 to 0.7 mink/km². Mink are not a provincially (SKCDC 2012g) or federally (COSEWIC 2012; SARA 2012b) listed species.

A total of 1,176 and 764 mink pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). Four mink pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season and one mink pelt was sold during the 2009-2010 season. Mink were ranked as 'common' in the Northern Fur Conservation Area in the 2008-2009 season but increased to 'abundant' during the 2009-2010 season, according to trapper questionnaire surveys.

Mink tracks were observed in Wetland, Jack Pine, Regenerating, and Open Water habitat types during winter track surveys ([Table 5.3-4; Appendix IV.3, Table IV.3-4](#)). Track density was highest in Open Water habitat; however, this habitat has a high variance because of the small sample size associated with this habitat type. Single tracks accounted for 100% of track observations recorded during winter track surveys.

Table 5.3-4: American Mink Snow Track Density among Habitats within the Regional Study Area, 2012

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	0.57 ^(b)	10.75	2.26
Recent Burn	7	0	0	1.74
Deciduous	8	0	0	21.70
Jack Pine	50	0.25 ± 0.18	12.31	6.74
Jack Pine/Black Spruce	20	0	0	0.50
Regenerating	5	0.17 ^(b)	0.87	4.09
Spruce	19	0	0	1.09
Open Water	3	0.85 ^(b)	2.54	9.70
Total	131	N/A	26.47	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean reported because species was only observed once in habitat type.
km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.5.4.2 Habitat Selection and Foraging

American mink primarily inhabit semi-aquatic habitats but can be found in xeric habitats if food is plentiful (Larivière 1999). Their long tubular body allow them to seek out prey in burrows along shorelines while their webbed toes make them ideal swimmers. Mink are generalist predators and primarily consume local prey such as fish, amphibians (mostly frogs), crustaceans, muskrats, and other small mammals; however, birds, aquatic invertebrates, and earthworms will all be consumed if encountered. They are also an important predator on waterfowl and colonial waterbird species, where they consume both adults and chicks.

5.3.6 Carnivores and Terrestrial Furbearers

Ten carnivore and terrestrial furbearer species and species groups were observed during baseline surveys in 2012 (Appendix IV.3, Table IV.3-6).

5.3.6.1 Black Bear

5.3.6.1.1 Population Status and Distribution

Black bear is not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species. Black bears hibernate during winter, so the activity of bears within the RSA will vary seasonally. Black bear abundance within the RSA is also expected to vary between years in response to denning behaviour and food availability. Bears have a low level of den reuse and den locations are often several kilometres apart between consecutive years (Linnell et al. 2000). Black bears are also sensitive to disturbance during winter hibernation and may abandon their dens if disturbance occurs within 1 km of their den site (Linnell et al. 2000). Because black bear home range size fluctuates in response to food availability, fewer bears may be present within the RSA during years of low food abundance. During these times, individual home ranges will be larger because bears will be forced to travel greater distances to obtain adequate amounts of forage (Pelchat and Ruff 1986).

Black bear home range sizes are between 18 and 125 km² in Washington (Koehler and Pierce 2003) and 186 and 464 km² in southwestern Manitoba (Pacas and Paquet 1994). Black bear home ranges may overlap but individual bears maintain small core areas within their home ranges as exclusive territories (Pacas and Paquet 1994). Black bear cubs separate from their mother between two and four years of age (Schwartz and Franzmann 1992). Dispersal occurs between May and July, and males tend to disperse farther from natal home ranges than females (Schwartz and Franzmann 1992). Movement of male black bears is high in the spring

when males travel large distances to mate with females (Young and Ruff 1982). Foraging movement is also greater at this time of year.

The black bear population in Saskatchewan in 2003 was thought to have declined relative to previous years (Arsenault 2005). Black bears occur at a moderate density in the region surrounding the Project. One black bear was incidentally observed while completing the waterbird breeding survey. One bear was also observed at Camp Grayling during the summer wildlife surveys. Other observations of black bear activity in the RSA include scat and partially consumed white sucker (*Catostomus commersonii*) that were found during the spring fish spawning survey in 2010 (Appendix IV.3, Table IV.3-5).

5.3.6.1.2 Habitat Selection and Foraging

Black bears require habitat that provides them with cover for security and an abundance of forage; therefore, preferred black bear habitat is a mixture of forested and open areas (Larivière 2001). Black bears also require secluded areas for denning. Dens may be made in tree cavities, crevices, caves, or under large rocks.

Black bears are omnivorous but most of their diet consists of herbaceous vegetation. Horsetails (*Equisetum* spp.), graminoid species (e.g., grasses and sedges), and animal matter make up the majority of black bear early spring diet (Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989; Schwartz and Franzmann 1991; Larivière 2001). Bears prey on moose calves 0 to 30 days of age, at which time moose calves are able to outrun the bears (Schwartz and Franzmann 1991). Snowshoe hares, adult moose carcasses, and birds and their eggs also make up an important part of early spring black bear diet. Later in the spring and throughout the summer, insects become important staples in black bear diets (Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989). Most of the buildup of fat reserves for the winter hibernation comes from berries, which make up the majority of the late summer and fall diet (Beeman and Pelton 1980; Graber and White 1983; Raine and Kansas 1989; Larivière 2001).

5.3.6.2 Wolf

5.3.6.2.1 Population Status and Distribution

Wolf is not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species. The main prey species for wolves in the RSA is moose. Wolf home ranges in northeastern Alberta, where moose is also the dominant prey species, cover between 357 and 1,779 km² (winter) and 195 to 629 km² (summer) (Fuller and Keith 1980). However, Jędrzejewski et al. (2007) report that wolf home range sizes average 370 km² at latitude 50° N and 950 km² at latitude 60° N. The Project is located at approximately 59° N latitude. Wolf spring and summer ranges are smaller than winter ranges because packs are limited by pup mobility during these periods.

Although the number of wolf pelts sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons was fairly small (210 and 138 pelts, respectively) when compared to other species, the monetary value of these pelts was over \$20,000 each season (MOE 2010, 2011). Wolves were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. No wolf pelts were sold in the N-80 Fur Conservation Zone during either season. One wolf track was observed in frozen water (ice) habitat during the WTC surveys in January, 2012 (Appendix IV.3, Table IV.3-5). Three wolves were incidentally observed on Stony Lake while flying during the winter fish telemetry surveys in February, 2012. Wolf scat was observed during the spring fish spawning survey in 2010.

5.3.6.2.2 Habitat Selection and Foraging

Wolf habitat preference is likely dependent on optimizing fitness by reducing travel costs, while at the same time maintaining potential for encountering prey (Alexander et al. 2005). Wolves use cutlines and other linear

disturbances for ease of movement (James and Stuart-Smith 2000; Shell Canada 2007). Wolves in the boreal forest prefer open areas and tend to avoid dense conifer cover in winter (Penner 1976). Wolves use upland areas more often than peatlands, possibly due to a higher density of moose in upland areas (McLoughlin et al. 2005).

Den site selection is not well understood for wolves in forested habitats in northern environments (Norris et al. 2002). Wolves have been observed to prefer coniferous forest stands and avoid hardwood stands when selecting a den site (Norris et al. 2002). However, wolves may prefer to create dens in coniferous forest stands because of the type of soil associated with these sites and not because of forest type alone (Theuerkauf et al. 2003).

Wolves are opportunistic hunters, primarily targeting weak, young, or old animals; however, wolves are capable of bringing down healthy prey. Moose and woodland caribou are the primary prey species of wolves in the northern boreal forest (Fuller and Keith 1980). Depending on the area and the time of year, a wolf's diet may also include snowshoe hare, fox, ground squirrels (*Spermophilus* spp.), lemmings, voles, ptarmigan, and waterbirds and their eggs. Beavers are an important secondary food source for wolves in boreal environments (Tremblay et al. 2001).

5.3.6.3 Red Fox

5.3.6.3.1 Population Status and Distribution

Red fox moved into Saskatchewan and became abundant following the coyote eradication program in 1952 (Johnson and Sargent 1977). The home range size of a red fox will vary, and is usually smaller when prey densities are high because of reduced foraging effort (Larivière and Pasitschniak-Arts 1996). In areas with high food abundance, fox home ranges may be 5 to 12 km² (Fox 2007). Home ranges may be up to 49 km² in areas with less suitable habitat (Jones and Theberge 1982). Red fox have been shown to travel up to 170 km (Rosatte 2002); however, more typical values are 3 to 122 km for males and 3 to 50 km for females (Trehwella et al. 1988).

Red foxes can have one of three pelt colors (red, silver, and cross). A total of 207 red, 37 cross, and 4 silver pelts were sold in the Northern Fur Conservation Area during the 2008-2009 season (MOE 2010). In the 2009-2010 season 149 red, 31 cross, and 4 silver pelts were sold in the Northern Fur Conservation Area (MOE 2011). Red fox were ranked as 'common' in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. One silver and one red fox pelt were sold in the N-80 Fur Conservation Zone during the 2008-2009 season.

Red fox tracks were recorded in Wetland, Recent Burn, Jack Pine, Regenerating, and Spruce habitat types during WTC surveys in 2012 (Table 5.3-5; Appendix IV.3, Table IV.3-6). Track density was highest in Wetland habitat. Single tracks accounted for 100% of winter track observations.

Table 5.3-5: American Red Fox Snow Track Density among Habitats within the Regional Study Area, 2012.

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	0.53 ^(b)	9.98	2.26
Recent Burn	7	0.10 ^(b)	0.73	1.74
Deciduous	8	0	0	21.70
Jack Pine	50	0.36 ± 0.19	18.20	6.74
Jack Pine/Black Spruce	20	0	0	0.50
Regenerating	5	0.31 ^(b)	1.54	4.09
Spruce	19	0.02 ^(b)	0.30	1.09
Open Water	3	0	0	9.70
Total	131	N/A	30.76	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean reported because species was only observed once in habitat type.

km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.6.3.2 Habitat Selection and Foraging

Red foxes in Finland were found to prefer pine forests and open bogs (Pulliainen 1981). Red foxes in Yellowstone National Park were found to prefer forested areas over open areas (Van Etten et al. 2007).

Red fox diet primarily consists of small rodents, rabbits, and squirrels (Larivière and Pasitschniak-Arts 1996). Carrion, birds, fish, amphibians, insects, fruit, and seeds may also be eaten.

5.3.6.4 Lynx

5.3.6.4.1 Population Status and Distribution

Lynx are not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species. Lynx home range size varies with the abundance of prey and the season. Larger home ranges are required when prey density is low, and lynx have larger ranges in the summer than the winter (Keith 1993). Lynx home ranges in the Northwest Territories cover 15 to 25 km² (ENR 2012a).

Mating occurs between February and March, and the young are born between April and May. The young disperse between 9 and 12 months of age (Keith 1993; Poole 1997). Unlike other mammal species, in which primarily males disperse, both male and female dispersal is common in lynx (Brand and Keith 1979; Poole 1997; Campbell and Strobeck 2006). Adults may abandon their home range territories during periods of low snowshoe hare densities and disperse to other areas. Long distance dispersals of 830 km (O'Donoghue et al. 1997) and 1,000 km (Slough and Mowat 1996) have been reported for lynx during cyclic lows of the snowshoe hare cycle.

A total of 415 and 425 lynx pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No lynx pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season; however one lynx pelt was sold during the 2009-2010 season. Lynx were ranked as 'common' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

Lynx tracks were recorded at nearly equal densities in Wetland (0.09) and Jack Pine habitat (0.10 ± 0.06) types ([Appendix IV.3, Table IV.3-6](#)). Single tracks accounted for 100% of the winter track observations.

5.3.6.4.2 Habitat Selection and Foraging

Lynx favour old-growth boreal forest with a dense undercover of thickets and windfalls (Keith 1993); however, they will occupy other habitat types if there is minimal forest cover and adequate prey abundance. Lynx in the Northwest Territories selected dense deciduous and coniferous forest, shrubland, and meadow habitats over wetlands and open black spruce forests (Poole et al. 1996). Mowat and Slough (2003) found that lynx in the Yukon used regenerating forest and riparian habitats more often than mature white spruce forest during the summer. Riparian habitats had greater use during the winter than other habitat types (Mowat and Slough 2003).

Lynx primarily feed on snowshoe hare and in times of high hare densities will feed on little else (ENR 2012a). However, in times of low snowshoe hare densities lynx diets may be supplemented by grouse, ptarmigan, voles, mice, squirrels, foxes, and carrion (Nellis et al. 1972; Brand et al. 1976; Brand and Keith 1979). Lynx populations throughout North America are closely tied to, and lag one to two years behind, the cyclic fluctuations of snowshoe hare populations (Brand et al. 1976; Poole 1994). There can be large emigrations of lynx from the boreal forest to southern latitudes in times of low hare populations (Keith 1993).

5.3.6.5 Wolverine

5.3.6.5.1 Population Status and Distribution

Wolverine, the largest member of the weasel family, has a circumpolar distribution in the tundra, taiga plains, and boreal forests of North America (Weir 2004). The western Canada population is listed as a species 'of special concern' (COSEWIC 2003; 2012) and currently has no status under SARA (2012b).

Wolverines are highly adaptable, tending to change their location and distribution over time. Wolverines are known for their large home ranges and extensive movements in search of food, and during dispersal (Hash 1987). Males occupy territories from about 230 to 1,580 km², and females from about 50 to 400 km² (Hornocker and Hash 1981; Gardner 1985; Whitman et al. 1986; Banci 1987; Copeland 1996; Landa et al. 1998). Smaller home ranges for females likely results from limitations on movement imposed during nursing (Hornocker and Hash 1981; Gardner 1985; Banci 1987). The size of a home range will vary seasonally, yearly, with habitat type, and with the age of the animal (Banci 1987).

Food availability is the primary factor determining movements and home range requirements (Hornocker and Hash 1981; Banci 1994). Wolverine populations generally exhibit low densities, which are likely related to their large home range requirements. Wolverines will defend territories from members of the same sex, although there may be some overlap in home ranges (Krebs and Lewis 2000). Home ranges will overlap substantially with those of the opposite sex (Banci and Harestad 1990; Copeland 1996). Individuals of the same sex may also tolerate each other when resources are abundant, predictable, and not easily defendable (Banci 1987).

Male juvenile wolverines disperse between 7 and 18 months of age, and females disperse between 7 and 26 months of age (Vangen et al. 2001). A large proportion of males (83%) and females (69%) were reported to disperse in Norway (Vangen et al. 2001).

A total of 17 and 11 wolverine pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No wolverine pelts were sold in the N-80 Fur Management Zone in either season. Wolverine were ranked as 'scarce' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

Wolverine tracks were observed only in the Jack Pine habitat type ([Appendix IV.3, Table IV.3-6](#)). Single tracks accounted for 100% of wolverine track observations recorded during WTC surveys.

5.3.6.5.2 Habitat Selection and Foraging

Wolverines are associated with a variety of habitat types (Hatler 1989). Habitat use typically depends on adequate food resources and den site availability. Wolverines occur more frequently where large ungulates are common and where carrion is abundant from hunter kills, predation, and natural mortality (COSEWIC 2003). Preferred landscape features appear to depend less on vegetation characteristics, and more on the structure of the terrain and availability of secure hiding cover for dens and food caching (Lofroth 2001).

Den site requirements for wolverines in the boreal forest are not well understood. The persistence of snow cover at a den site through the spring is an important factor for wolverines throughout their range (Magoun and Copeland 1998; Aubry et al. 2007; Copeland et al. 2007).

Wolverines are scavengers and predators that will cache food for future use. Wolverine feed opportunistically and their diet generally reflects annual and seasonal changes in food availability (Magoun 1987). Although wolverines are capable of taking large ungulates as live prey, the presence of ungulates in the diet is mostly the result of scavenging (Hornocker and Hash 1981; Gardner 1985; Banci 1987; Copeland 1996). The remnants of a caribou carcass may be cached in den sites or in deep crevasses of rocky terrain for later consumption. The interdependence of wolverine on other large carnivores, such as wolves and black bear, to provide carrion is unclear.

Ungulates are important in the wolverine diet year round (Banci 1994), but the summer diet is more varied. Small mammals, such as lemmings and voles, waterbirds and their eggs, ptarmigan, and other wolverines, are also hunted opportunistically (Gardner 1985; Hash 1987; Magoun 1987; Banci 1994). Plants and berries may also be consumed (Banci 1994).

5.3.6.6 Fisher and American Marten

5.3.6.6.1 Population Status and Distribution

Historically, marten have been trapped for fur in North America, and populations have declined since European contact (Buskirk and Ruggiero 1994). Marten are not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species. Marten are the most important fur bearing species in the RSA; 78 and 122 pelts were sold in the N-80 Fun Management Zone during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). A total of 3,739 and 3,186 marten pelts were sold in the Northern Fur Conservation Area in the 2008-2009 and 2009-2010 season, respectively. The monetary value of these pelts comprised 43% and 40% of the total monetary value in this area for the 2008-2009 and 2009-2010 seasons, respectively.

Martens breed between July and August, and the young are born in March or April of the following year (Strickland et al. 1982). Marten occupy larger home ranges than would be expected for a mammal of their size (Buskirk and Ruggiero 1994). Adult males occupy ranges of 0.8 to 45 km², and adult females occupy ranges of 0.42 to 27 km² (Burnett 1981; Mech and Rogers 1977; Latour et al. 1994; Smith and Schaefer 2002). Marten home ranges vary as a function of geographic area, habitat type, and prey density (Soutiere 1979; Thompson and Colgan 1987). Marten movements have not been rigorously studied, and reports on the dispersal period ranges from August to October (Buskirk and Ruggiero 1994). There is no information on the dispersal distance in juveniles or adults. One marten was incidentally observed during BBS in May, 2012.

Fisher, once considered widespread in Canada and the central United States, has had their range and population size decreased due to trapping and habitat loss (Powell and Zielinski 1994, Proulx et al. 2004). However, because of wildlife management practices and controlled reintroductions, fisher now inhabit much of their historic range. Fisher are not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed

species. In Fur Management Zone N-80, no fishers were trapped in either the 2008-2009 or 2009-2010 seasons (MOE 2010, 2011). A total of 930 and 800 fisher pelts were sold in the Northern Fur Conservation Area in the 2008-2009 and 2009-2010 seasons, respectively. Fisher were ranked as 'abundant' in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

The breeding season for fisher lasts from late January through early April (Powell and Zielinski 1994). Females are sexually mature at one year of age and produce their first litter at two years of age (Powell and Zielinski 1994). Litter size varies between 2.0 to 3.9 kits (Powell and Zielinski 1994, Frost and Krohn 1994) with females being ready to breed again within 10 days of giving birth. Kits do not open their eyes until about seven or eight weeks and are capable of killing prey by the age of four months (Powell and Zielinski 1994). Males have larger home ranges than females, and a male's territory may overlap with those of multiple females (Powell and Zielinski 1994, Koen et al 2007). Home range sizes vary from approximately 17 to 85 km² for males and 4 to 32 km² for females (Powell and Zielinski 1994). By one year of age juvenile fisher have established their own territories often dispersing between 10 and 42 km with no significant difference between the sexes (Arthur et al. 1993).

Fisher and marten tracks were recorded in all eight habitat types during WTC surveys in 2012 (Table 5.3-6; Appendix IV.3, Table IV.3-6). Open Water and Regenerating habitats had the highest track densities; however, these densities have a high variance due to the small sample size associated with these habitat types. Jack Pine habitat had the next highest track density. Single tracks accounted for 100% of winter track observations.

Table 5.3-6: Fisher and American Marten Snow Track Density among Habitats within the Regional Study Area, 2012

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	0.37 ^(b)	7.08	2.26
Recent Burn	7	0.84 ± 0.55	5.91	1.74
Deciduous	8	0.38 ± 0.29	3.04	21.70
Jack Pine	50	1.56 ± 0.50	78.08	6.74
Jack Pine/Black Spruce	20	1.16 ± 0.39	23.27	0.50
Regenerating	5	1.86 ± 1.12	9.31	4.09
Spruce	19	1.49 ± 0.66	28.28	1.09
Open Water	3	4.63 ± 3.48	13.88	9.70
Total	131	N/A	168.86	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean reported because species was only observed once in habitat type.
km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.6.6.2 Habitat Selection and Foraging

Marten have been classified as requiring late succession forests and are intolerant of habitat types with sparse canopy cover (Buskirk and Ruggiero 1994; Chapin et al. 1997; Smith and Schaefer 2002). Some studies suggest that marten are closely associated with late-succession mesic conifer forests that have complex physical structure near the ground (Buskirk and Ruggiero 1994). However, other studies suggest that requirements of canopy cover and structure near the ground can be met in a variety of habitat types (Chapin et al. 1997).

Wildfire may provide a mosaic of habitats for marten to use throughout various life stages (Nelson et al. 2008). Marten do use burned areas, but burned habitat is avoided relative to its availability on the landscape (Latour 1994). Non-breeding individuals were found in higher densities in six to nine year old burn versus mature sites; however, breeding individuals were only found in low densities in recently burned areas (Paragi et al. 1996; Fisher and Wilkinson 2005). Non-breeding individuals may be responding to the high density of microtine prey species that can be found in burned areas (Nelson et al. 2008).

Although there is little information available on denning sites that are preferred by marten, especially in western and northern North America, studies have reported marten to be highly selective of sites used for denning. Marten have separate denning sites for parturition and raising their young with both den types reported to be found only in old-growth forest (Ruggiero et al. 1998). Burns may not provide adequate denning habitat for marten.

Marten diet varies seasonally. In summer, marten eat bird eggs and nestlings, insects, fish, and young mammals. Their winter diet is more restricted and is comprised of small to medium sized mammals. Snowshoe hare is an important prey species for marten and can consist of 3% to 64% of marten diet by biomass (Poole and Graf 1996). Marten diet, body fat, ovulation rates, and juvenile recruitment vary with snowshoe hare density.

Fishers primarily inhabit mid to late successional coniferous and mixed coniferous-deciduous forests (Powell and Zielinski 1994). A fully formed canopy layer, thick understory, and abundance of coarse woody debris provide cover for fishers to hunt and protect them from predators. Young stands of forest are also used to supplement foraging (Powell and Zielinski 1994). Habitat selection is likely less influenced by tree species composition than by prey abundance and diversity.

Denning sites are selected for the protection they provide and are often associated with late-successional forests (Powell and Zielinski 1994). Females primarily choose denning sites in tree hollows or snags high above the ground, or fallen logs. One to three dens are used during kit rearing; the natal den where parturition occurs and one or more maternal dens used to raise the kits. Once kits reach the age of eight to ten weeks they are moved to the maternal den.

Fishers are generalist predators and scavengers that require large ranges to secure resources. They are one of the only predators of porcupines (*Erethizon dorsatum*), but also prey heavily upon snowshoe hares (Powell and Zielinski 1994). Scavenging for bird eggs in trees is also a common foraging technique as well as eating carrion when encountered.

5.3.6.7 Weasel Species

5.3.6.7.1 Population Status and Distribution

Least weasels (*Mustela nivalis*) are the smallest members of Order *Carnivora* in North America (Sheffield and King 1994). Their range in North America extends from the central United States into northern Canada (Simms 1979, Tikhonov et al. 2008). Their range has been expanding on the western and southern extremes due to their ability to use various habitats (Sheffield and King 1994). Least weasels are considered rare in North America with large variation in their abundance correlated with habitat type and prey density. Least weasels usually have two litters per year of approximately six young per litter, with the first litter usually occurring in the spring (Sheffield and King 1994, Amstislavsky and Ternovskaya 2000). The young are born pink and hairless, but by 49 days of age they are able to hunt and kill prey. Females become sexually mature at around three months of age and can produce a litter in the same year (Amstislavsky and Ternovskaya 2000). Males have

larger home ranges (0.6-26.2 ha) than females (0.2-7.0 ha), although range size is highly variable. Least weasel is not a provincially (SKCDC 2012g) or federally (COSEWIC 2012, SARA 2012b) listed species.

Short-tailed weasels (*Mustela erminea*), also referred to as ermine or stoat, are a medium-sized mustelid species in Order *Carnivora*. In North America they range from northern Canada to the central United States (Simms 1979, King 1983). Their distribution overlaps with that of the least weasel, but dietary preference lead to niche partitioning between these species (Simms 1979, King 1983). Short-tailed weasel have one litter per year with between 4 and 13 young (King 1983, Amstislavsky and Ternovskaya 2000). The young are born naked and hairless, but are able to hunt at approximately three months of age. Females are sexually mature at 20 days of age, but have their first litter the following spring (King and Moody 1982, Amstislavsky and Ternovskaya 2000). Males generally have home ranges between 10 and 40 ha that may intercept many of the smaller home ranges of females (King 1983). Short-tailed weasel is not a provincially (SKCDC 2012g) or federally (COSEWIC 2012; SARA 2012b) listed species. No other weasel species have the potential to occur in the RSA.

No weasel species were reported to be trapped in the N-80 Fur Management Zone in either the 2008-2009 or 2009-2010 seasons (MOE 2010, 2011). A total of 1,379 and 855 weasel pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 season, respectively. Weasels were ranked as 'abundant' in both seasons, according to trapper questionnaire surveys.

Weasel tracks were recorded in all habitat types except Open Water during WTC surveys (Table 5.3-7; Appendix IV.3, Table IV.3-6). Track density was highest in the Regenerating habitat type; however, there is a high variance associated with this estimate due to a small sample size. Track densities were also high in Jack Pine/Black Spruce and Spruce habitat types. Single tracks accounted for 100% of the winter track observations.

Table 5.3-7: Weasel Species Snow Track Density among Habitats within the Regional Study Area, 2012

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	1.79 ^(b)	34.01	2.26
Recent Burn	7	0.17 ^(b)	1.16	1.74
Deciduous	8	0.63 ± 0.34	5.05	21.70
Jack Pine	50	1.38 ± 0.33	69.03	6.74
Jack Pine/Black Spruce	20	1.59 ± 0.59	31.71	0.50
Regenerating	5	2.86 ± 1.34	14.31	4.09
Spruce	19	1.76 ± 0.87	33.42	1.09
Open Water	3	0	0	9.70
Total	131	N/A	188.70	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean reported because species was only observed once in habitat type.
km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.6.7.2 Habitat Selection and Foraging

Both least and short-tailed weasels are specialist predators. Because of the overlap in distribution and habitat these species have evolved specialized prey preferences to partition resources (Simms 1979). Short-tailed weasels prefer to prey on rabbits and smaller mammals, but least weasels prey almost exclusively on microtine rodents (e.g., voles, lemmings) and mice (Simms 1979, King 1983, Sheffield and King 1994). However, both species will supplement their diets with bird eggs, insects, amphibians and reptiles, other small mammals, and

berries. Although there is a high degree of sympatric habitat use between these species, least weasels are rarely found in the tundra while short-tailed weasels are not found south of the boreal forest (Simms 1979).

5.3.6.8 Snowshoe Hare

5.3.6.8.1 Population Status and Distribution

Snowshoe hares occur throughout Saskatchewan, except for the southwest corner of the province. Snowshoe hare populations undergo cyclical fluctuations that are about ten years long (Krebs et al. 2001). At the population peak, hares can be extremely abundant, reaching densities of 12 to 15 hares/ha (Pattie and Fisher 1999). Population cycles occur roughly at about the same time throughout the species' range, although the timing of peaks may vary by one to three years between regions. A snowshoe hare's home range is approximately 6 to 10 hectares.

Snowshoe hare tracks were found in all habitats types except for Open Water. Track density was highest in Jack Pine habitat (Table 5.3-8; Appendix IV.3, Table IV.3-6). Single tracks accounted for 84% of snowshoe hare winter track count observations. Trails accounted for 15% of WTC observations, while networks accounted for 1%. A total of nine snowshoe hare were incidentally observed during WTC surveys and ungulate aerial surveys in 2012 (Appendix IV.3, Table IV.3-5).

Table 5.3-8: Snowshoe Hare Snow Track Density among Habitats within the Regional Study Area, 2012

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	10.97 ± 4.21	208.42	2.26
Recent Burn	7	17.09 ± 9.64	119.61	1.74
Deciduous	8	9.20 ± 4.35	73.64	21.70
Jack Pine	50	51.78 ± 13.98	2,589.24	6.74
Jack Pine/Black Spruce	20	26.85 ± 6.08	537.07	0.50
Regenerating	5	14.40 ± 6.41	72.00	4.09
Spruce	19	35.73 ± 8.43	678.81	1.09
Open Water	3	0	0	9.70
Total	131	N/A	4,278.79	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event. km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.6.8.2 Habitat Selection and Foraging

Snowshoe hares prefer habitats with a dense understory, which helps protect them from predators and provides them with food (Reid 2006; Maletzke et al. 2008). Hares establish an intricate network of trails within their territory between resting and feeding areas, which are used by other species, such as squirrels, porcupines, and skunks (Reid 2006). Snowshoe hares primarily consume herbaceous plants, grass, and berries during the summer (Forsyth 1985; Reid 2006). They also eat leaves from shrubs. Their winter diet consists of small twigs, buds, and bark from many coniferous and deciduous species.

5.3.6.9 American Red Squirrel

5.3.6.9.1 Population Status and Distribution

The boreal and mixed forests and mountainous areas of the United States and Canada are the home to the American red squirrel (Steele 1998). Red squirrel densities vary from 0.3 to 2.0 squirrels/ha depending on

abundance of food. Territory size is variable (0.24 to 0.98 ha) and depends on habitat and resource abundance (Steele 1998). Young are often born in the spring with an average litter number of 3.2 to 5.4 young (Kemp and Keith 1970, Steele 1998). Squirrels in the western extent of their range usually have only one litter per year while those from the east often have two litters. The young are born pink and hairless, but within seven weeks they venture outside the nest and are independent by approximately ten weeks (Steele 1998). Red squirrels are not a provincial (SKCDC 2012g) or federal (COSEWIC 2012; SARA 2012b) listed species.

Red squirrel pelts represent approximately one million dollars annually for the Province of Alberta and between one and three million squirrels are harvested in Canada each year (Kemp and Keith 1970). No squirrel pelts were sold during the 2008-2009 or 2009-2010 seasons in the N-80 Fur Management Zone (MOE 2010, 2011). In the Northern Fur Conservation Area 1,867 and 2,237 squirrel pelts were sold in the 2008-2009 and 2009-2010 seasons, respectively. Squirrels were ranked as 'abundant' in the 2008-2009 season, but only as 'common' in the 2009-2010 season according to trapper questionnaire surveys.

Red squirrel tracks were found in all habitats types except for Wetland and Open Water (Table 5.3-9; Appendix IV.3, Table IV.3-6). Track density was highest in Regenerating habitat; however, there is a large variance associated with this density estimate due to a small sample size. Red squirrel track density was next highest in Jack Pine habitat. Single tracks accounted for 100% of red squirrel winter track observations

Table 5.3-9: American Red Squirrel Snow Track Density among Habitats within the Regional Study Area, 2012

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	0	0.00	2.26
Recent Burn	7	0.62 ^(b)	4.37	1.74
Deciduous	8	0.37 ± 0.25	2.93	21.70
Jack Pine	50	0.98 ± 0.36	48.80	6.74
Jack Pine/Black Spruce	20	1.01 ± 0.71	20.11	0.50
Regenerating	5	2.52 ± 2.19	12.58	4.09
Spruce	19	0.93 ± 0.62	17.76	1.09
Open Water	3	0	0.00	9.70
Total	131	N/A	106.55	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean reported because species was only observed once in habitat type.

km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.6.9.2 Habitat Selection and Foraging

Red squirrels require mature trees for foraging, breeding, and dietary requirements. Mature forest with dense canopy layers provide shelter, nests for breeding, and escape routes from predators (Steele 1998). Coniferous seeds are the primary food source of red squirrels, which they hoard in caches that are used during the winter. Red squirrels supplement their diets with fungi, flowers, tree sap, tree bark, berries, seeds, and other plant material. Animal matter also supplements their diets and includes bird eggs, hatchling and adult birds and insects (Steele 1998).

5.3.7 Ungulates

5.3.7.1 Moose

5.3.7.1.1 Population Status and Distribution

Moose populations in Saskatchewan are ranked as common (SKCDC 2012i) and are not listed federally (COSEWIC 2012; SARA 2012b). Moose range across all of Saskatchewan from the Boreal Shield and Boreal Forest in the north to the Aspen Parkland and prairies of the south (MOE 2009). There are an estimated 50,000 moose in Saskatchewan (MOE 2009). The area with the highest density of moose is the mixed wood section of the Boreal Forest; however, densities in the Aspen Parkland and prairies to the south have been increasing (MOE 2009). Moose density in similar habitat in Ontario from 1990 to 1995 was estimated to be 0.209 moose/km² (McKenney et al. 1998).

Moose cows usually select areas in immediate proximity to small ponds and marshes for calving. Stenhouse et al. (1994) found that mean annual home range for cows in the Mackenzie Valley, Northwest Territories was 174 km² (± 31 km², n = 29). This home range estimate was larger than those reported for adult moose in other parts of North America (Stenhouse et al. 1994), which may indicate that forage abundance was lower (Mace et al. 1984; Risenhoover 1986).

Moose are primarily threatened by direct and indirect habitat loss, altered predator/prey relationships, and hunting. Their primary predators are wolves and bears, which most often kill calves, although adults can also become prey (Ballard and Van Ballenberghe 1997). Predation and snow conditions are interrelated factors that can affect moose survival and recruitment (Telfer and Kelsall 1984, Dussault et al. 2005). When snow is deep, moose gather in areas of shallow snow, which increases predation risk from wolves. In addition, snow depth of over 80 cm greatly hinders their movements and reduces the availability of suitable browse species above the snowpack (Hundertmark et al. 1990).

Currently in Saskatchewan, moose populations are managed by controlled hunting seasons for residents and non-residents (MOE 2009). Due to the increase in moose populations throughout southern Saskatchewan the MOE has opened moose hunting in many southern WMZs since 2006. In 2012, 700 additional moose licenses are being issued for a total of 3,710 licenses issued for farmland and transitional zones in Saskatchewan (MOE 2012).

Moose tracks were highest in Deciduous habitat during the WTC surveys (Table 5.3-10; Appendix IV.3, Table IV.3-7). Single tracks accounted for 100% of moose winter track observations. Total moose density (± 1 SE) during the aerial surveys was estimated to be lower in January (0.06 ± 0.04 /km²) than in February (0.07 ± 0.02 /km²). Calf density was similar between the two survey periods (0.01 /km² in January and 0.02 ± 0.01 /km² in February). Adult density was also similar between survey periods (0.05 ± 0.03 /km² in January and 0.05 ± 0.02 /km² in February). Moose were observed 17 times during aerial surveys (11 groups consisting of 1 to 3 individuals) (Appendix IV.3, Table IV.3-8). Two moose (one adult and one calf) were incidentally observed during waterbird breeding surveys in June 2012 (Appendix IV.3, Table IV.3-5).

Table 5.3-10: Moose Snow Track Density among Habitats within the Regional Study Area, 2012.

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	0	0	2.26
Recent Burn	7	0	0	1.74
Deciduous	8	0.42 ± 0.30	3.33	21.70
Jack Pine	50	0.17 ± 0.16	8.30	6.74
Jack Pine/Black Spruce	20	0.28 ± 0.27	5.65	0.50
Regenerating	5	0	0	4.09
Spruce	19	0.21 ± 0.12	3.90	1.09
Open Water	3	0	0	9.70
Total	131	N/A	21.18	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event. km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.7.1.2 Habitat Selection and Foraging

Optimal moose habitat consists of deciduous shrub and ground layers within deciduous, mixed, and conifer forests that offer edge or disturbed areas of early successional vegetation (Poole and Stuart-Smith 2003; Osko et al. 2004). Deciduous browse is a primary food source, varying from twigs and bark in the winter, to leaves in the spring and summer (URSUS and Komex 1997). In spring moose tend to seek out low elevation areas, usually wetlands, muskeg lowlands, and river floodplains, as this is typically where the first green-up occurs (Stelfox 1993). Moose obtain the majority of their annual salt requirements from pond lilies and aquatic vegetation (Stelfox 1993). They tend to continue to use these areas in the summer periods when they will also feed in adjacent forest stands.

Moose are positively influenced by wildfire because fire increases the availability of deciduous browse species that moose depend on throughout the winter (MacCracken and Viereck 1990; Collins and Helm 1997). Moose densities were found to be greatest in 10 to 26 year old burned areas (Maier et al. 2005). Moose occupation of burned areas will vary with fire intensity, as severely burned areas will have little vegetation growth for up to five years (Gasaway et al. 1989).

During summer, moose use upland forests and eat fresh shoots and leaves from deciduous shrubs and young deciduous trees (mainly trembling aspen and balsam poplar). However, they are also known to browse on young coniferous trees, such as balsam fir (*Abies balsamea*), in the summer, if available. Moose diet in summer is typically made up of 74% shrubs and trees, 25% forbs, and 1% graminoids (Rednecker 1987). During the fall and winter, moose typically prefer habitats where adequate browse is available. Preferred fall and winter browse includes red-osier dogwood (*Cornus sericea*), dwarf birch (*Betula pumila*), alder (*Alnus* spp.), beaked hazelnut (*Corylus cornuta*), willow species, trembling aspen, and balsam poplar, among others (Stelfox 1993). To access this forage, habitats with high cover of shrub species, such as shrubby fens and bogs, and riparian habitats with open canopies, are usually preferred, particularly in late winter. Shrub height is important during winter conditions, as forage shrub species must be higher than the snowpack to be accessed by moose and other ungulates.

5.3.7.2 Barren-ground Caribou

5.3.7.2.1 Population Status and Distribution

Barren-ground caribou are primarily distributed throughout Arctic areas in North America, where they spend the summers on the tundra but enter the boreal forest during the winter. During the last 15 years, 7 of 8 Arctic caribou herds present in the NWT have appeared to decline (Porcupine, Cape Bathurst, Bluenose East, Bluenose West, Bathurst, Beverly, and Qamanirjuaq) (NWT General Status Ranking Program 2012; Fisher et al. 2009; BQCMB 2008, 2009). Of the eight barren-ground caribou herds that inhabit the NWT, four herds have the potential to occur in northern Saskatchewan (i.e., Beverly, Qamanirjuaq, Bathurst, and Ahiak herds) (Gunn et al. 2011).

Beverly herd size was estimated at 276,000 in 1994 but has suffered a large decline in recent years. Data from breeding cows on the calving grounds declined from 5,737 in 2004 to 93 in 2008 (BQCMB 2008). This decline has been attributed to the herd shifting its calving distribution from the traditional grounds to the Queen Maud Gulf area (Nagy et al. 2011). Some cows may have also joined the Ahiak herd. Surveys of the Beverly herd calving grounds in 2008 found that for every 100 cows there was estimated to be only 15 calves (BQCMB 2008). This is far below the usual 80 calves per 100 cows. The Bathurst herd has also decline substantially since the 1990s with an estimated population of 472,000 in 1986 and an estimated population of 32,000 in 2009 (ENR 2012b). The number of breeding cows on the Bathurst calving grounds was estimated at 151,000 in 1996 but declined by almost 50% to 80,756 in 2003 (Gunn et al. 2005). The Ahiak herd has not been well studied or managed in the past due to its calving ground location and range overlap with the Bathurst and Beverly herds (Gunn et al. 2011). In 1986, the herd was estimated to be 11,265 increasing to 83,164 in 1996 and 123,226 in 2006. There was a 60% decline in the size of the herd found on the calving grounds from 2006 to 2009; however, there was an increase in numbers on the calving ground in 2010. The size of the Qamanirjuaq herd was considered low in the 1980s but increased to 496,000 caribou in 1994 (Gunn et al. 2011). Since then there has been a slight decrease to 348,000 in 2008; although the calf to cow ratio decreased from 42 calves to 100 cows in 1996 to less than 20 calves for 100 cows between 2006 and 2008 (BQCMB 2011). The number of animals in barren-ground caribou herds cycles at relatively regular intervals, for example, 30 to 60 years (Zalatan et al. 2006, Kendrick et al. 2005). Although these natural fluctuations in herd size appear to be linked to changes in climatic patterns and winter range quality (Gunn 2009, Vors and Boyce 2009, Ferguson and Messier 2000; Weladji and Holand 2003), the exact mechanisms responsible for generating these population cycles are unknown.

Although there were no observations of barren-ground caribou in the RSA during the 2012 wildlife baseline surveys, reports from tracking of satellite-collared caribou from the four herds have indicated their proximity to the RSA in the past. In 2001, caribou from the Bathurst herd were recorded approximately 17 km north of the RSA. Satellite tracking data from 2004 and 2006 indicate that some of the Ahiak herd was recorded 89 km north of the RSA and some of the Beverly herd was recorded 62 km north of the RSA, respectively (Stimson 2009). In the winter of 1979, the Beverly herd overwintered in northern Saskatchewan (Thomas et al. 1998). In the winter of 2004 to 2005, the Qamanirjuaq herd was radio-tracked into northeastern Saskatchewan near Wollaston Lake (BQCMB 2005).

The Beverly and Qamanirjuaq herds' ranges include part of northern Saskatchewan (BQCMB 2011). The recent increase in surveys of the Ahiak herd has also indicated that its range extends into northern Saskatchewan (Gunn et al. 2011). However, these herds have recently decreased their winter migration into northern Saskatchewan and southern NWT (BQCMB 2011). Barren-ground caribou hunting is managed in northern

Saskatchewan but only within WMZ 76 which borders the NWT (MOE 2009). Caribou from the Qamanirjuaq and Beverly herds are often hunted near Wollaston Lake in northeastern Saskatchewan and near Selwyn Lake on the Saskatchewan NWT border (MOE 2009). The only sign of caribou found during terrestrial baseline surveys was decades-old caribou antlers.

5.3.7.2.2 Habitat Selection and Foraging

A number of natural large-scale environmental factors can influence the foraging behaviour, energetics, survival, and reproduction of caribou populations. Food abundance and quality on summer and winter ranges are important elements in barren-ground caribou population dynamics (Reimers 1983; Skogland 1990; Post and Klein 1999). Snow conditions, such as depth and hardness, also affect the movement rate and food accessibility for caribou (Stuart-Smith et al. 1997). Extreme weather events, such as late spring snowfall or late snowmelt, can influence access to food and result in lower calf weights or delayed parturition (i.e., births), which influences survival of young (Skogland 1984; Adamczewski et al. 1987; Cameron et al. 1993). High insect abundance can also decrease forage intake, milk production, calf growth, and calf survival (Helle and Tarvainen 1984; Russell et al. 1998). Factors that influence adult female food intake from summer through winter also determine pregnancy rate and parturition rate. A complex interaction exists between habitat and caribou foraging and movement patterns that is not well understood for caribou herds. For example, studies of caribou have shown that the historical cumulative effect of overgrazing on calving, summer, or winter ranges can result in periodic range shifts and large population fluctuations (Messier et al. 1988; Ferguson and Messier 2000).

Variation in barren-ground caribou movement and distribution occurs within and among years, and for different populations. Caribou population numbers naturally fluctuate, and caribou expand their range when populations increase and limit their distribution when populations decrease (Banfield and Jakimchuk 1980; Bergerud et al. 1984; Heard and Calef 1986). Although the precise timing and location of barren-ground caribou movements between winter ranges and calving grounds are unpredictable, general corridors and the broad timing of movements are known.

Barren-ground caribou migrate from wintering grounds in the boreal forest, north to calving grounds in the tundra. Pregnant cows lead the northern migration in late winter/early spring, followed by juveniles and bulls (Miller 1992). After calving, cows and calves begin to migrate back to the winter range. As spring turns into summer, the cows meet up with the bulls that have continued to travel north (COSEWIC 2004). In August and September, the caribou move across the tundra towards the treeline. The rut occurs in October, and may last for two to three weeks. The distribution of barren-ground caribou changes constantly during the winter as they search for places where the food is abundant and the snow is the shallowest (COSEWIC 2004). When spring arrives, the caribou once again begin their migration to the calving grounds.

5.3.7.3 Woodland Caribou

5.3.7.3.1 Population Status and Distribution

Most woodland caribou populations have declined in recent years (COSEWIC 2002). The boreal ecotype of woodland caribou is listed as 'rare/uncommon' in Saskatchewan (SKCDC 2012g) and 'threatened' by COSEWIC (2012) and SARA (2012b). Woodland caribou are distributed across the forested and mountainous regions of Canada, reaching the northern limit of their range in the NWT (COSEWIC 2002). Woodland caribou do not have definitive calving grounds like barren-ground caribou, although individual females often show fidelity to previous calving sites (Edmonds and Smith 1991; Dzus 2001). Instead pregnant females separate themselves from other caribou for calving.

Woodland caribou boreal population was estimated to be 34,000 in the boreal region of Canada in 2000 to 2002 (COSEWIC 2002) and 32,000 in 2011 (Environment Canada 2012b). However, population numbers and trends for woodland caribou in Canada are poorly known; low densities, large land area, and multiple jurisdictions inhibit accurate population estimates. The life history of boreal woodland caribou gives insight into their population declines because of their solitary occurrence (low densities to reduce predation) and low fecundity (cows typically do not reproduce until three year of age and have only one calf per year) (COSEWIC 2002; Environment Canada 2012). Their need for mature to old-growth coniferous forests (COSEWIC 2002) is also a limiting factor for population growth. There are two local populations of boreal woodland caribou in Saskatchewan; the northern population in the boreal shield is considered to be of unknown size and sustainability while the southern boreal plains population is ranked as not sustainable (Environment Canada 2012). There are an estimated 5,000 boreal woodland caribou in Saskatchewan with approximate densities of 3.0 to 3.5 caribou/100 km² in preferred habitat (COSEWIC 2002). Range sizes for female tracked caribou in Saskatchewan's boreal plains ranged from 208 to 1,240 km² among five populations studied from 1992 to 1996 (Rettie and Messier 2001).

No woodland caribou were observed in the RSA during the wildlife survey period. The nearest known woodland caribou conservation unit is located approximately 30 km south of the Project (SKCDC 2012g). The only sign of caribou that was found during terrestrial baseline surveys was decades-old caribou antlers.

5.3.7.3.2 Habitat Selection and Foraging

Woodland caribou are not migratory and remain in forested habitats year round (Dzus 2001). The woodland caribou rut occurs in early- to mid-October (Edmonds and Bloomfield 1984). In November, woodland caribou disperse into smaller groups throughout their annual home range (Dzus 2001). When snow depth increases, caribou tend to move into areas of higher tree cover since movement and feeding are easier in these areas (Fuller and Keith 1981).

Foraging behaviour, energetics, survival, and reproduction of woodland caribou populations can be influenced by many environmental factors. Deep, crusted snow can affect energy expenditure and food accessibility for caribou (Stuart-Smith et al. 1997). Extreme winter conditions can influence access to food and result in lower calf weights, delayed parturition, or starvation, which influences calf survival (Skogland 1984; Adamczewski et al. 1987; Cameron et al. 1993; Dzus 2001). Female nutrition status from summer to winter also affects pregnancy rate and parturition rate (Dzus 2001). Caribou recruitment (Environment Canada 2008), distribution (Schaefer and Pruitt 1991; Dunford 2003; Joly et al. 2003; Vors et al. 2007; Courtois et al. 2007; Schaefer and Mahoney 2007; Dalerum et al. 2007), and persistence (Schaefer and Mahoney 2007; Vors et al. 2007; Wittmer et al. 2007; Sorenson et al. 2008) are also negatively affected by the level of disturbance (anthropogenic and burned) within caribou ranges.

5.3.8 Upland Breeding Birds

5.3.8.1 Population Status and Distribution

Sauer et al. (2012) describes population change information for North American bird species, as estimated from the road-side North American Breeding Bird Survey, which has been completed since 1966. Estimates of population trends are available for various regions, states, and provinces. Population trends in the Boreal Softwood Shield region, encompassing northern Saskatchewan eastward through Quebec (NABCI 2012), from 1966 to 2010 are available for 34 of the 36 upland breeding bird species that were recorded within 50 m of observers during BBS in the RSA ([Appendix IV.3, Table IV.3-9](#)). Two species (orange-crowned warbler [*Oreothlypis celata*] and white-crowned sparrow [*Zonotrichia leucophrys*]) did not have any data on population

trends from Sauer et al (2012) in the Boreal Softwood Shield region. However, the Boreal Avian Modelling Project (BAM 2012), a collaboration of researchers and organizations studying birds of the boreal region, has species data on birds of the boreal and hemiboreal regions (Brandt 2009) of North America. Only chipping sparrow (*Spizella passerina*) had a significantly ($P \leq 0.05$) decreasing trend (Sauer et al. 2012). Conversely, six species have significantly ($P \leq 0.05$) increasing population trends; these include winter wren (*Troglodytes hiemalis*), yellow-bellied flycatcher (*Empidonax flaviventris*), fox sparrow (*Passerella iliaca*), magnolia warbler (*Setophaga magnolia*), black-capped chickadee (*Poecile atricapillus*), and blue-headed vireo (*Vireo solitarius*). Population trends for the remaining 27 species are non-significant ($P > 0.05$).

Orange-crowned warbler has an estimated relative density of 0.14 singing males per hectare in the North Saskatchewan region, which is second highest in Canada (BAM 2012). The population trend for orange-crowned warbler is significantly ($P \leq 0.05$) decreasing in Canada. White-crowned sparrow has an estimated relative density of 0.26 to 0.50 birds/ha in the North Saskatchewan region, and has a non-significant ($P > 0.05$) increasing population trend in Canada (BAM 2012).

Grouse and ptarmigan tracks were observed during the WTC surveys ([Appendix IV.3, Table IV.3-10](#)). Spruce grouse are coniferous forest specialists that inhabit the boreal region of Canada and the northern United States (Boag and Schroeder 1992). Population studies indicate that density estimates range widely. In southwestern Alberta, the estimated densities for spruce grouse in the spring ranged from 0 to 50 birds/100 ha, while in Ontario density estimates ranged from 0 to 83 birds/100 ha (Boag and Schroeder 1992). In Saskatchewan, the 10 year (1994-2003) mean harvest for spruce grouse was 7,566 birds per year with a daily bag limit of 10 birds per person (Arsenault 2005). Ruffed grouse are an early successional forest species found across Canada and the northern United States where they are associated most closely with deciduous and mixed coniferous-deciduous forests, primarily aspen stands (Rusch et al 2000). Although they are sometimes found in boreal forests, their survival rates are much lower in this habitat. Ruffed grouse can average one drumming male per 0.5 ha in preferred habitat with average recorded densities being 22 adults per 100 ha. Sharp-tailed grouse populations, once widespread in central North America, have decreased along with grassland, steepe, and shrubland habitats (Connelly et al. 1998). They primarily nest in habitats with dense herbaceous and shrub cover but will also nest in agricultural fields such as alfalfa and wheat stubble. Breeding densities for sharp-tailed grouse vary from 0.1 leks/km² in Manitoba, 0.02 to 0.25 leks/km² in Nebraska, and 0.07 to 0.11 leks/km² in South Dakota.

Willow ptarmigan are primarily found in subarctic and subalpine regions in northern Canada during the breeding season, but move south to the boreal forest region during the winter (Hannon et al. 1998). Willow ptarmigan population densities vary across Canada with high densities (12 to 77 territories/km²) reported in British Columbia and low densities (0.5 to 1.6 pairs/km²) reported in Newfoundland (Hannon et al. 1998). Rock ptarmigan primarily breed in the tundra and mostly winter in the same area, although some of the population will travel south to the northern edge of the boreal forest during the winter (Montgomerie and Holder 2008). The potential population size of breeding rock ptarmigans in June is estimated at 2.1 to 8.4 million individuals based on an average density of 1 to 4 individuals/km². Due to limited human encroachment of their breeding range ptarmigan populations are considered to be stable and retain much of the historic breeding range (Hannon et al. 1998; Montgomerie and Holder 2008). In the North Game Bird District in Saskatchewan there is a daily bag limit of 10 ptarmigan per day and a possession limit of 20 birds (MOE 2012).

5.3.8.2 Species Level Results

The effective detection radius was calculated to be 68.55 m. The effective sampling area was therefore 1.48 ha, which was used to estimate density for species and communities. A total of 48 bird species were observed in 211 survey plots across eight different habitat types ([Appendix IV.3, Table IV.3-1](#)). This includes incidental upland bird observations (i.e., birds recorded as outside of 50 m from the plot center).

One olive-sided flycatcher (federal listed species [[Table 5.3-1](#)]) was incidentally observed outside the 50 m point count area in Recent Burn habitat during the BBS.

Thirty-six upland bird species were identified within 50 m of the observers during the BBS. Densities for these upland bird species were calculated individually for each habitat ([Table 5.3-11](#)). American redstart (*Setophaga ruticilla*) was only detected in Wetland habitat, while Nashville warbler (*Oreothlypis ruficapilla*) was only recorded in Jack Pine habitat. Yellow-bellied sapsucker (*Sphyrapicus varius*) and Wilson's warbler (*Wilsonia pusilla*) were only observed in Deciduous habitat. Northern flicker (*Colaptes auratus*), tree swallow (*Tachycineta bicolor*), cedar waxwing (*Bombycilla cedrorum*), red crossbill (*Loxia curvirostra*), winter wren, and white-crowned sparrow were observed only in Recent Burn habitat. No bird species were determined to be unique to Regenerating, Mixed Forest, Jack Pine/Black Spruce, or Spruce habitats. Hermit thrush (*Catharus guttatus*), palm warbler (*Setophaga palmarum*), yellow-rumped warbler (*Setophaga coronata*), dark-eyed junco (*Junco hyemalis*), and chipping sparrow were observed in all habitat types. Yellow-rumped warbler was the most abundant species in Deciduous, Jack Pine, Regenerating, Mixed Forest, Jack Pine/Black Spruce, and Spruce habitats, while dark-eyed junco was the most abundant species in Recent Burn habitat. Dark-eyed junco and palm warbler were the most abundant species in Wetland habitat.

Table 5.3-11: Mean (\pm 1SE) Density (individuals per hectare) of Upland Breeding Bird Species among Habitats in the Regional Study Area, 2012

Common Name	Scientific Name	Wetland (n = 28)	Recent Burn (n = 46)	Deciduous (n = 31)	Jack Pine (n = 32)	Mixed Forest (n = 15)	Jack Pine/Black Spruce (n = 23)	Regenerating Jack Pine (n = 15)	Spruce (n = 21)
Yellow-bellied Sapsucker	<i>Sphyrapicus varius</i>	0	0	0.02 ^(a)	0	0	0	0	0
Black-backed Woodpecker	<i>Picoides arcticus</i>	0	0.10 \pm 0.04	0	0	0	0.03 ^(a)	0	0
Northern Flicker	<i>Colaptes auratus</i>	0	0.01 ^(a)	0	0	0	0	0	0
Alder Flycatcher	<i>Empidonax alnorum</i>	0.05 \pm 0.03	0.03 \pm 0.02	0.07 \pm 0.04	0	0	0.03 ^(a)	0.09 \pm 0.06	0
Least Flycatcher	<i>Empidonax minimus</i>	0	0	0.02 ^(a)	0	0.05 ^(a)	0	0	0.06 \pm 0.04
Yellow-bellied Flycatcher	<i>Empidonax flaviventris</i>	0.02 ^(a)	0	0.02 ^(a)	0	0.05 ^(a)	0	0	0
Blue-headed Vireo	<i>Vireo solitarius</i>	0	0	0.02 ^(a)	0	0.14 \pm 0.07	0.03 ^(a)	0	0
Gray Jay	<i>Perisoreus canadensis</i>	0	0	0	0.06 \pm 0.05	0	0.03 ^(a)	0	0.13 \pm 0.08
Tree Swallow	<i>Tachycineta bicolor</i>	0	0.01 ^(a)	0	0	0	0	0	0
Boreal Chickadee	<i>Parus hudsonica</i>	0.02 ^(a)	0	0	0	0	0	0	0.03 ^(a)
Winter Wren	<i>Troglodytes troglodytes</i>	0	0.01 ^(a)	0	0	0	0	0	0
Ruby-crowned Kinglet	<i>Regulus calendula</i>	0.07 \pm 0.04	0	0.02 ^(a)	0.25 \pm 0.08	0.09 \pm 0.06	0.03 ^(a)	0.05 ^(a)	0.35 \pm 0.10
American Robin	<i>Turdus migratorius</i>	0	0.06 \pm 0.03	0	0	0	0	0.05 ^(a)	0
Hermit Thrush	<i>Catharus guttatus</i>	0.05 \pm 0.03	0.13 \pm 0.04	0.04 \pm 0.03	0.15 \pm 0.07	0.18 \pm 0.10	0.09 \pm 0.05	0.09 \pm 0.06	0.03 ^(a)
Swainson's Thrush	<i>Catharus ustulatus</i>	0.02 ^(a)	0	0.02 ^(a)	0.06 \pm 0.04	0	0.03 ^(a)	0.05 ^a	0.16 \pm 0.06

Table 5.3-11: Mean (\pm 1SE) Density (individuals per hectare) of Upland Breeding Bird Species among Habitats in the Regional Study Area, 2012 (continued)

Common Name	Scientific Name	Wetland (n = 28)	Recent Burn (n = 46)	Deciduous (n = 31)	Jack Pine (n = 32)	Mixed Forest (n = 15)	Jack Pine/Black Spruce (n = 23)	Regenerating Jack Pine (n = 15)	Spruce (n = 21)
Cedar Waxwing	<i>Bombycilla cedrorum</i>	0	0.03 \pm 0.02	0	0	0	0	0	0
Bay-breasted Warbler	<i>Setophaga castanea</i>	0	0	0.02 ^(a)	0	0.05 ^(a)	0.03 ^(a)	0	0.03 ^(a)
Blackpoll Warbler	<i>Dendroica striata</i>	0	0	0.09 \pm 0.05	0	0.05 ^(a)	0	0.05 ^a	0.10 \pm 0.05
Magnolia Warbler	<i>Dendroica magnolia</i>	0	0	0.02 ^(a)	0	0	0	0	0.03 ^(a)
Palm Warbler	<i>Dendroica palmarum</i>	0.34 \pm 0.10	0.07 \pm 0.03	0.15 \pm 0.05	0.08 \pm 0.04	0.27 \pm 0.11	0.12 \pm 0.05	0.59 \pm 0.13	0.26 \pm 0.09
Yellow-rumped Warbler	<i>Dendroica coronata</i>	0.27 \pm 0.09	0.16 \pm 0.04	0.39 \pm 0.08	0.85 \pm 0.11	0.72 \pm 0.17	0.59 \pm 0.12	0.72 \pm 0.12	0.45 \pm 0.12
Yellow Warbler	<i>Dendroica petechia</i>	0.02 ^(a)	0	0.02 ^(a)	0	0	0	0	0
American Redstart	<i>Setophaga ruticilla</i>	0.02 ^(a)	0	0	0	0	0	0	0
Nashville Warbler	<i>Oreothlypis ruficapilla</i>	0	0	0	0.02 ^(a)	0	0	0	0
Tennessee Warbler	<i>Oreothlypis peregrina</i>	0.07 \pm 0.04	0	0.13 \pm 0.05	0	0	0.12 \pm 0.07	0	0
Orange-crowned Warbler	<i>Oreothlypis celata</i>	0.05 \pm 0.03	0	0.02 ^(a)	0.02 ^(a)	0.05 ^(a)	0.06 \pm 0.04	0	0.06 \pm 0.04
Northern Waterthrush	<i>Parkesia noveboracensis</i>	0.05 \pm 0.03	0	0.04 \pm 0.03	0	0	0	0	0
Wilson's Warbler	<i>Wilsonia pusilla</i>	0	0	0.02 ^(a)	0	0	0	0	0
Chipping Sparrow	<i>Spizella passerina</i>	0.31 \pm 0.10	0.22 \pm 0.05	0.02 ^(a)	0.13 \pm 0.06	0.09 \pm 0.06	0.06 \pm 0.04	0.23 \pm 0.11	0.06 \pm 0.04

Table 5.3-11: Mean (\pm 1SE) Density (individuals per hectare) of Upland Breeding Bird Species among Habitats in the Regional Study Area, 2012 (continued)

Common Name	Scientific Name	Wetland (n = 28)	Recent Burn (n = 46)	Deciduous (n = 31)	Jack Pine (n = 32)	Mixed Forest (n = 15)	Jack Pine/Black Spruce (n = 23)	Regenerating Jack Pine (n = 15)	Spruce (n = 21)
Fox Sparrow	<i>Passerella iliaca</i>	0.07 \pm 0.04	0.01 ^(a)	0.02 ^(a)	0.11 \pm 0.04	0	0.03 ^(a)	0	0.10 \pm 0.05
Lincoln's Sparrow	<i>Melospiza lincolni</i>	0.12 \pm 0.06	0.03 \pm 0.02	0.04 \pm 0.03	0	0	0	0	0
Swamp Sparrow	<i>Melospiza georgiana</i>	0.02 ^(a)	0	0	0	0	0.03 ^(a)	0	0
White-crowned Sparrow	<i>Zonotrichia leucophrys</i>	0	0.01 ^(a)	0	0	0	0	0	0
White-throated Sparrow	<i>Zonotrichia albicollis</i>	0.05 \pm 0.03	0.03 \pm 0.02	0.09 \pm 0.04	0	0	0.03 ^(a)	0.05 ^(a)	0.03 ^(a)
Dark-eyed Junco	<i>Junco hyemalis</i>	0.34 \pm 0.08	0.29 \pm 0.06	0.17 \pm 0.05	0.51 \pm 0.09	0.32 \pm 0.09	0.12 \pm 0.05	0.18 \pm 0.08	0.06 \pm 0.04
Red Crossbill	<i>Loxia curvirostra</i>	0	0.03 ^(a)	0	0	0	0	0	0

^(a) Only the mean is reported as the species was only recorded at one site within the habitat type.
n = number of point count survey locations; \pm = plus or minus

Grouse showed a preference for coniferous habitats in the RSA (Table 5.3-12). Track density was highest in Jack Pine/Black Spruce and second highest in Wetland habitat type. Single tracks accounted for 100% of the winter track observations.

Table 5.3-12: Grouse Snow Track Density among Habitats within the Regional Study Area, 2012.

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	2.02 ± 1.39	38.38	2.26
Recent Burn	7	0	0	1.74
Deciduous	8	0	0	21.70
Jack Pine	50	0.14 ± 0.13	6.78	6.74
Jack Pine/Black Spruce	20	4.17 ± 3.73	83.35	0.50
Regenerating	5	1.32 ^(b)	6.61	4.09
Spruce	19	0.19 ^(b)	3.59	1.09
Open Water	3	0.85 ^(b)	2.54	9.70
Total	131	N/A	141.25	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/ wind event.

^(b) Only mean density is reported because species was only recorded at one site in habitat type. km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

Ptarmigan tracks were recorded in all eight habitat types (Table 5.3-13). Track density was highest in Deciduous habitat type; however, there is a high variance associated with this estimate due to a small sample size. Track densities were second highest in Jack Pine/Black Spruce habitat type. Single tracks accounted for 97% of the winter track observations, while trails and networks accounted for 1%, and 2%, respectively.

Table 5.3-13: Ptarmigan Snow Track Density among Habitats within the Regional Study Area, 2012.

Habitat Type	Sample Size	Mean TKD ^(a) (± 1SE)	Total TKD ^(a)	Distance Sampled (km)
Wetland	19	4.66 ± 2.67	88.51	2.26
Recent Burn	7	5.41 ± 4.46	37.89	1.74
Deciduous	8	18.35 ± 10.95	146.78	21.70
Jack Pine	50	2.26 ± 0.73	112.80	6.74
Jack Pine/Black Spruce	20	6.75 ± 2.48	135.06	0.50
Regenerating	5	2.34 ± 1.43	11.68	4.09
Spruce	19	3.75 ± 1.77	71.25	1.09
Open Water	3	3.16 ^(b)	9.47	9.70
Total	131	N/A	613.43	47.81

^(a) TKD = Number of tracks per kilometre surveyed per days since last snow fall/wind event.

^(b) Only mean density is reported because species was recorded only one time in habitat type. km = kilometre; N/A = not applicable; ± = plus or minus; SE = standard error

5.3.8.3 Community Level Results

Relative abundance of bird species (birds per hectare) was calculated for each habitat type. Jack Pine habitat had the highest mean density of birds (Table 5.3-14). Species richness was highest in Regenerating and Spruce

habitat. Recent Burn and Jack Pine/Black Spruce habitats had the lowest species abundance and richness of the surveyed habitats.

Table 5.3-14: Density (birds/hectare) and Observed Species Richness of Upland Birds for Habitats in the Regional Study Area, 2012

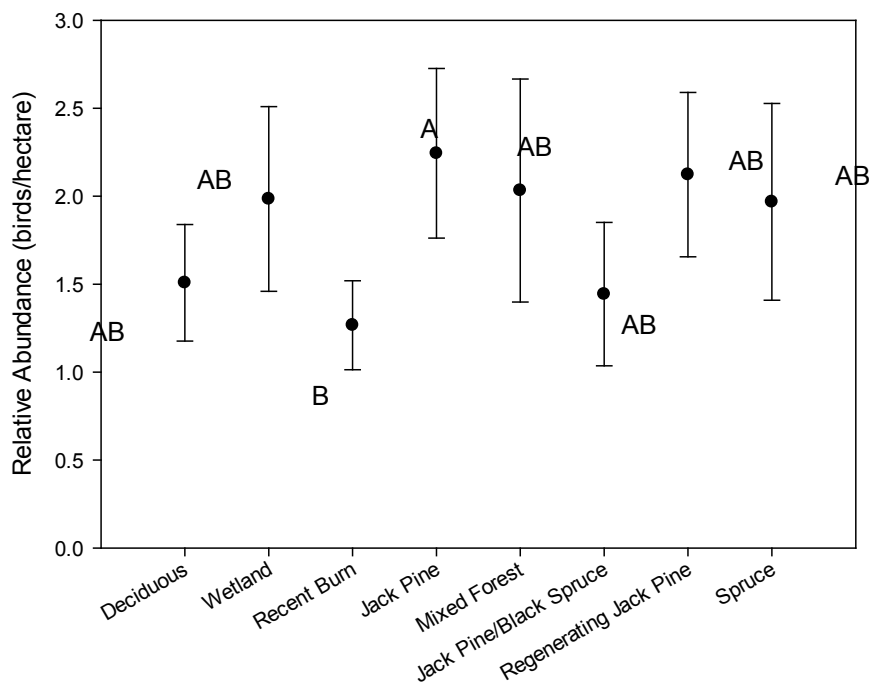
Habitat Type	Number of Plots	Density		Species Richness	
		Mean \pm 1SE	Min – Max	Mean \pm 1SE	Min – Max
Wetland	28	1.98 \pm 0.26	0 - 5.42	2.50 \pm 0.30	0 - 6
Recent Burn	46	1.27 \pm 0.13	0 - 4.06	1.78 \pm 0.16	0 - 4
Deciduous	31	1.51 \pm 0.16	0 - 3.39	2.10 \pm 0.22	0 - 5
Jack Pine	32	2.24 \pm 0.24	0 - 5.42	2.44 \pm 0.21	0 - 5
Mixed Forest	15	2.03 \pm 0.30	0 - 4.06	2.47 \pm 0.35	0 - 5
Jack Pine/Black Spruce	23	1.44 \pm 0.20	0 - 4.06	1.83 \pm 0.24	0 - 5
Regenerating Jack Pine	15	2.12 \pm 0.22	0.68 - 3.39	2.60 \pm 0.25	1 - 5
Spruce	21	1.97 \pm 0.27	0 - 4.74	2.57 \pm 0.31	0 - 5

SE = standard error; Min = minimum; Max = maximum; \pm = plus or minus

Mean abundance of birds in Jack Pine and Recent Burn habitats were significantly different from each other (Figure 5.3-2) ($F_{7, 203} = 3.42$, $P < 0.01$; Tukey-Kramer HSD test, $P \leq 0.05$). No statistical difference was detected between Wetland, Deciduous Forest, Mixed Forest, Jack Pine/Black Spruce, Regenerating Jack Pine, and Spruce habitats types based on bird density.

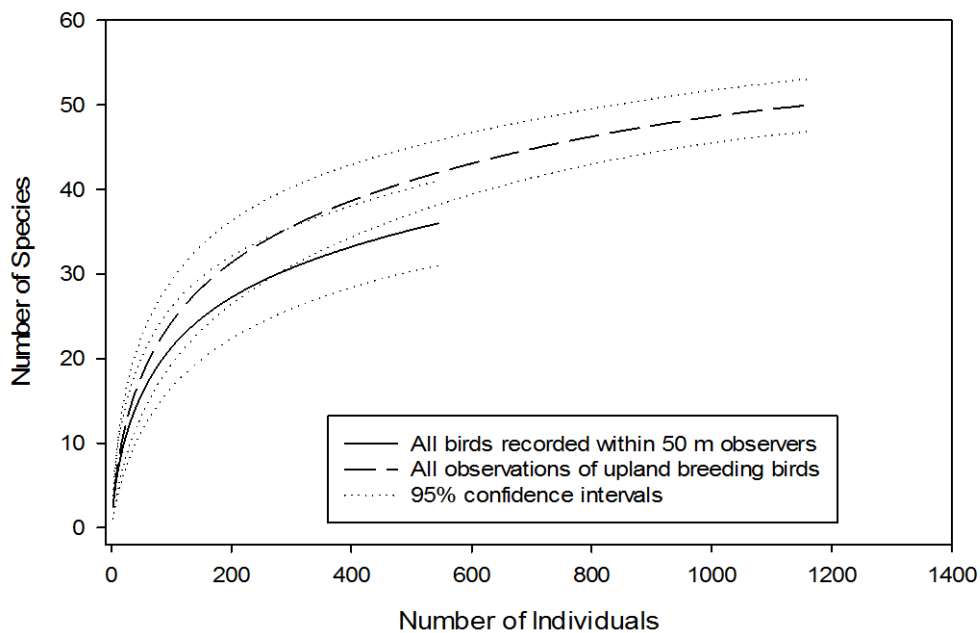
A total of 36 species were recorded within the 50 m sampling radius during the BBS. The 95% confidence interval associated with the species accumulation curve using these 36 species was 31 to 41 species based on 545 observed individuals (Figure 5.3-3). A total of 48 species were recorded within 100 m of observers during the BBS. The 95% confidence interval associated with the species accumulation curve using these 48 species was 46 to 53 species based on 1,046 observed individuals (Figure 5.3-3). When comparing the species accumulation curve for all species observed to the curve for species recorded within the 50 m sampling radius it is apparent that the 50 m sampling radius was insufficient to record all bird species that may be present in the RSA. The species accumulation curve for all observations approaches an asymptote (ever diminishing returns for increasing sampling effort). This suggests that the level of BBS survey effort was adequate to determine upland breeding bird species richness in the RSA.

Figure 5.3-2: Mean (\pm 95% CI) Relative Abundance (birds per hectare) of Upland Breeding Birds among Habitat Types



Notes: Habitat means with different letters are significantly different from each other

Figure 5.3-3: Species Richness Curve (95% Confidence Intervals) for Upland Breeding Birds within the Regional Study Area, 2012



5.3.8.4 Habitat Selection and Foraging

Nest requirements (e.g., tree cavities) designate where certain bird species will nest and breed and indicate habitat preferences specific to each species. Habitat preferences were assigned by accessing species information from Birds of North American Online (BNA 2012), and BAM (2012). Deciduous forest breeding birds were the most numerous species observed during the BBS within the RSA and accounted for 36% of the 36 upland species recorded within 50 m of the observer. Coniferous forest birds accounted for 19% of the upland species, while open area/shrubland, Recent Burn, and mixed forest species accounted for 17%, 14%, and 14%, respectively.

Most upland breeding birds observed within the RSA are insectivorous, although they will also occasionally eat seeds, fruit, and other arthropods (BNA 2012). Some exceptions to this are American crow, which is omnivorous, and cedar waxwing, which is primarily fructivorous. Spruce grouse, sharp-tailed grouse, ruffed grouse, willow ptarmigans, and rock ptarmigans are all primarily herbivores but will occasionally consume invertebrates.

5.3.9 Waterbirds

5.3.9.1 Population Status and Distribution

The U.S. Fish and Wildlife and Canadian Wildlife Service have completed waterbird surveys throughout Canada and some of the northern United States since 1955. The traditional survey area that covers the Project study areas is the northern Saskatchewan, northern Manitoba, and western Ontario Region. Waterbird populations in northern Saskatchewan, northern Manitoba, and western Ontario have significantly decreased over the last 57 years (-21%; $P < 0.001$) from the long-term average (1955 to 2010), but the 2012 populations increased by 13% compared to the 2011 season (Zimpfer et al. 2012), ([Appendix IV.3, Table IV.3-11](#)). In 2012, mallard (*Anas platyrhynchos*), American wigeon (*Anas americana*), green-winged teal (*Anas crecca*) blue-winged teal (*Anas discors*), northern shoveler (*Anas clypeata*), northern pintail (*Anas acuta*), and redhead (*Aythya americana*) had population increases from the 2011 season. Alternatively, gadwall (*Anas strepera*), canvasback (*Aythya valisineria*), and scaup species (greater and lesser scaup [*Aythya marila* and *A. affinis*]) populations in northern Saskatchewan and Manitoba decreased from the 2011 to 2012 season. Gadwall was the only species to show a population increase (17%) in the long term average (Zimpfer et al. 2012).

Sauer et al. (2012) describes population change information for North American bird species, as estimated from the road-side North American Breeding Bird Survey, which has been completed since 1966. Estimates of population trends are available for various regions, states, and provinces. Populations trends in the Boreal Softwood Shield Region are available for 4 of the 14 waterbird species that were recorded during breeding and productivity surveys in 2012 (Sauer et al. 2012; [Appendix IV.3, Table IV.3-12](#)). One waterbird species (common merganser [*Mergus merganser*]), had a non-significant ($P > 0.05$) decreasing population trend. Conversely, three waterbird species (common goldeneye [*Bucephala clangula*], mallard, and sandhill cranes) have non-significant ($P > 0.05$) increasing population trends. Population trends for the remaining ten species were not recorded in this region ([Appendix IV.3, Table IV.3-12](#)).

Nine species and three unidentified species groups (merganser species, duck species, and gull species) were recorded in the RSA during waterbird breeding surveys in 2012 ([Appendix IV.3, Table IV.3-13](#)). Densities for these 12 waterbird species and species groups were calculated individually for the three surveyed areas (i.e., Black Lake, Fond du Lac River, and Northeastern RSA) ([Table 5.3-15](#)). Black Lake had the lowest number of waterbird species present with only mallard and an unidentified merganser species. The Fond du Lac River surveys had the highest species diversity with seven species and three unidentified species groups. American

wigeon, northern shoveler, surf scoter (*Melanitta perspicillata*), and white-winged scoter (*Melanitta fusca*) were only observed in the Fond du Lac River survey area. Waterbodies in the Northeastern RSA had five waterbird species and three unidentified species groups. Canada goose and bufflehead (*Bucephala albeola*) were only observed in the Northeastern RSA transects. In total, mallard and unidentified merganser species were the most abundant waterbirds observed during the breeding surveys.

Table 5.3-15: Adult Density (birds/hectare) (\pm 1SE) during Waterbird Breeding Surveys within the Regional Study Area, 2012

Common Name	Scientific Name	Black Lake (n = 11)	Fond du Lac River (n = 45)	Northeastern RSA (n = 6)	Total (n = 90)
Canada Goose	<i>Branta canadensis</i>	0	0	0.053 \pm 0.040	0.004 \pm 0.003
Mallard	<i>Anas platyrhynchos</i>	0.009 \pm 0.006	0.081 \pm 0.027	0.081 \pm 0.051	0.047 \pm 0.014
American Wigeon	<i>Anas americana</i>	0	0.004 \pm 0.003	0	0.002 \pm 0.001
Northern Shoveler	<i>Anas clypeata</i>	0	0.001 ^(a)	0	0.001 ^(a)
Blue-winged Teal	<i>Anas discors</i>	0	0.001 ^(a)	0.009 ^(a)	0.001 ^(a)
Bufflehead	<i>Bucephala albeola</i>	0	0	0.042 \pm 0.021	0.003 \pm 0.002
Surf scoter	<i>Melanitta perspicillata</i>	0	0.009 ^(a)	0	0.005 ^(a)
White-winged scoter	<i>Melanitta deglandi</i>	0	0.011 ^(a)	0	0.006 ^(a)
Unidentified Merganser Species	<i>Merginae</i> species	0.009 ^(a)	0.060 \pm 0.018	0.237 \pm 0.064	0.047 \pm 0.010
Unidentified Duck Species	<i>Anatidae</i> species	0	0.010 \pm 0.004	0.034 \pm 0.016	0.007 \pm 0.002
Sandhill Crane	<i>Grus canadensis</i>	0	0.001 ^(a)	0.024 \pm 0.016	0.002 \pm 0.001
Unidentified Gull Species	<i>Laridae</i> species	0	0.008 \pm 0.004	0.029 \pm 0.010	0.006 \pm 0.002

^(a) Only the mean is reported as the species was only recorded at one site within the habitat type.
 RSA = Regional study area; n = number of transects segments; \pm = plus or minus; SE = standard error

Eight species and four unidentified species groups (scoter species, duck species, gull species, and tern species) were recorded in the RSA during waterbird productivity surveys in 2012 ([Appendix IV.3, Table IV.3-13](#)). Densities for these 12 adult waterbird species and species groups were calculated individually for the 3 surveyed areas ([Table 5.3-16](#)). Black Lake had the lowest number of waterbird species present with only an unidentified gull species observed. The Fond du Lac River surveys had the highest species diversity with seven species and four unidentified species groups. Mallard, common merganser, scaup species (greater and lesser), unidentified scoter species, and unidentified tern species were only observed in the Fond du Lac River survey area. The Northeastern RSA surveys had five waterbird species and one unidentified species group. Horned grebe was only observed in the Northeastern RSA transects. In total, common merganser was the most abundant waterbird observed during the productivity surveys.

Table 5.3-16: Adult Density (birds/hectare) (\pm 1SE) during Waterbird Productivity Surveys within the Regional Study Area, 2012

Common Name	Scientific Name	Black Lake (n = 11)	Fond du Lac River (n = 45)	Northeastern RSA (n = 6)	Total (n = 62)
Horned Grebe	<i>Podiceps auritus</i>	0	0	0.007 ^(a)	0.001 ^(a)
Mallard	<i>Anas platyrhynchos</i>	0	0.009 \pm 0.004	0	0.006 \pm 0.003
American Wigeon	<i>Anas americana</i>	0	0.007 \pm 0.003	0.06 ^(a)	0.011 \pm 0.006
Green-winged Teal	<i>Anas crecca</i>	0	0.003 \pm 0.002	0.041 \pm 0.041	0.006 \pm 0.004
Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	0	0.017 \pm 0.008	0	0.012 \pm 0.006
Common Goldeneye	<i>Bucephala clangula</i>	0	0.004 \pm 0.003	0.023 ^(a)	0.005 \pm 0.003
Bufflehead	<i>Bucephala albeola</i>	0	0.004 \pm 0.003	0.062 ^(a)	0.009 \pm 0.006
Unidentified Scoter species	<i>Melanitta</i> species	0	0.003 \pm 0.002	0	0.002 ^(a)
Common Merganser	<i>Mergus merganser</i>	0	0.033 \pm 0.015	0	0.024 \pm 0.011
Unidentified Duck species	<i>Anatidae</i> species	0	0.006 \pm 0.003	0.144 \pm 0.073	0.018 \pm 0.009
Unidentified Gull species	<i>Laridae</i> species	0.007 \pm 0.004	0.006 \pm 0.002	0	0.005 \pm 0.002
Unidentified Tern species	<i>Sternidae</i> species	0	0.013 ^(a)	0	0.01 ^(a)

^(a) Only the mean is reported as the species was only recorded at one site within the habitat type.
 RSA = regional study area; n = number of transect segments; \pm = plus or minus; SE = standard error

Seven juvenile waterbird species and juveniles of one unidentified species groups (duck species) were recorded in the RSA during waterbird productivity surveys in 2012 ([Appendix IV.3, Table IV.3-13](#)). Densities for these eight juvenile waterbird species and species groups were calculated individually for the three surveyed areas ([Table 5.3-17](#)). The Northeastern RSA transect had the highest species diversity with five waterbird species and one unidentified species group observed. Horned grebe, green-winged teal, bufflehead, and unidentified duck species were only observed in the Northeastern RSA transects. Four waterbird species were observed in the Fond du Lac River area. Mallard and scaup species were only observed in the Fond du Lac river area. In total, scaup species were the most abundant juvenile waterbird species observed during the productivity surveys.

Table 5.3-17: Juvenile Density (birds/ha) (\pm 1SE) during Waterbird Productivity Surveys within the Regional Study Area, 2012

Common Name	Scientific Name	Black Lake (n = 11)	Fond du Lac River (n = 45)	Northeastern RSA (n = 6)	Total (n = 62)
Horned Grebe	<i>Podiceps auritus</i>	0	0	0.005 ^(a)	0
Mallard	<i>Anas platyrhynchos</i>	0	0.002 ^(a)	0	0.002 ^(a)
American Wigeon	<i>Anas americana</i>	0	0.002 ^(a)	0.051 ^(a)	0.006 \pm 0.005
Green-winged Teal	<i>Anas crecca</i>	0	0	0.028 ^(a)	0.003 ^(a)
Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	0	0.011 \pm 0.006	0	0.008 \pm 0.005
Common Goldeneye	<i>Bucephala clangula</i>	0	0.002 ^(a)	0.018 ^(a)	0.003 \pm 0.002
Bufflehead	<i>Bucephala albeola</i>	0	0	0.041 ^(a)	0.004 ^(a)
Unidentified Duck species	<i>Anatidae</i> species	0	0	0.031 \pm 0.024	0.003 \pm 0.002

^(a) Only the mean is reported as the species was only recorded at one site within the habitat type.
 RSA = Regional study area; n = number of transect segments; \pm = plus or minus; SE = standard error

5.3.9.2 Habitat Selection and Foraging

The Western Boreal Forest is ranked third out of the 25 most important and threatened waterfowl habitats in North America (Ducks Unlimited Canada 2005). These important waterfowl areas act both as an important staging area for waterbird migration and as a valuable breeding area for many species of waterbirds including scoters, mallards, scaup species, American wigeons, green-winged teals, buffleheads, mergansers, common goldeneye, loons, and others.

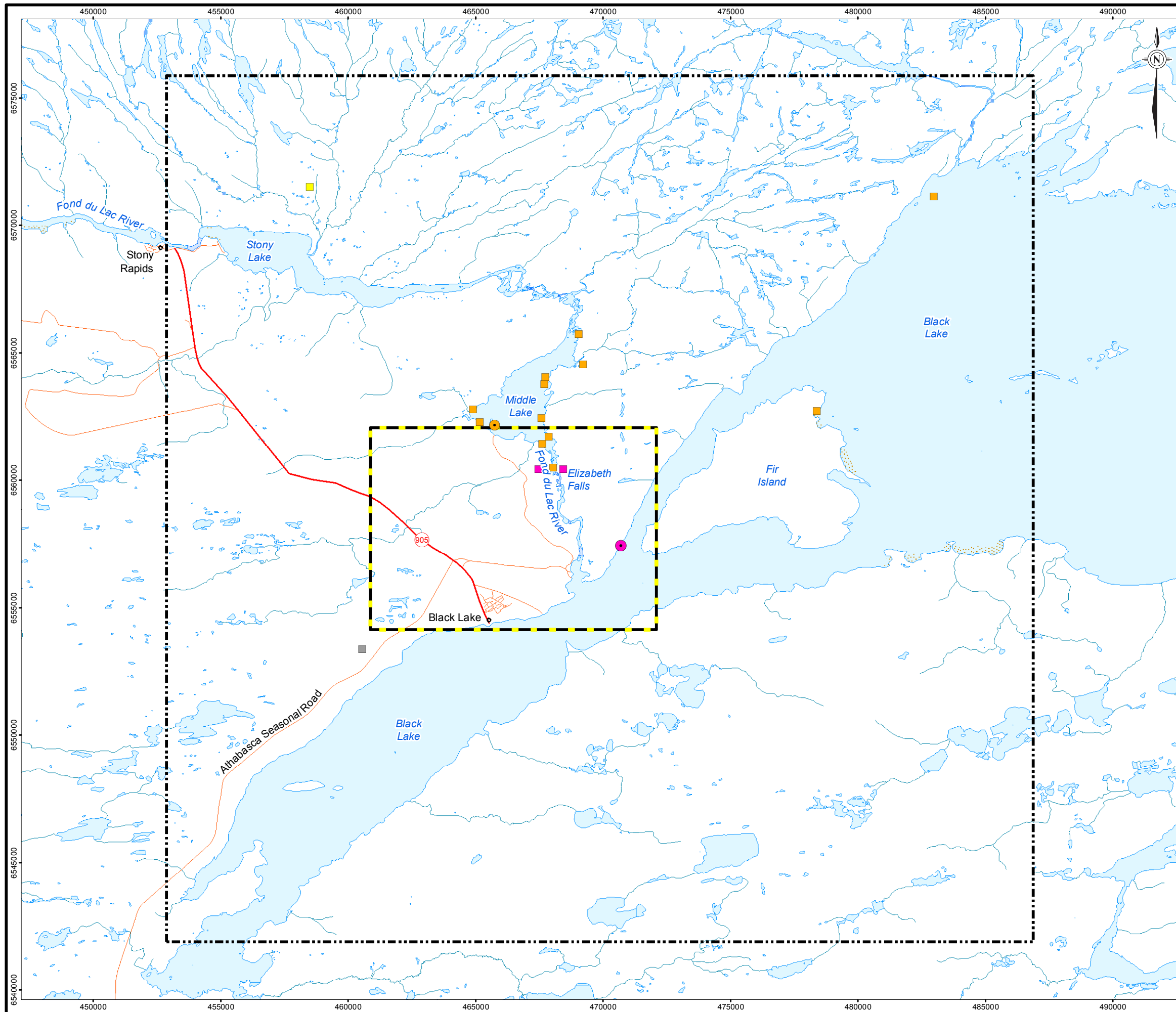
Dabbling ducks (e.g., mallards, American wigeon, and scoters) nest in upland areas while diving ducks (e.g., scaup species) nest over water in emergent vegetation or on structures such as beaver lodges. Mergansers, goldeneyes, and buffleheads nest in tree cavities. The variety of aquatic habitats in the boreal forest provides food items such as aquatic vegetation, invertebrates, and fish supporting many species of waterbirds. Waterfowl young are dependent on invertebrates during their first four weeks of life because invertebrates satisfy protein requirements for feather development (Hornung 2005).

5.3.10 Raptors

5.3.10.1 Population Status and Distribution

Population trends in the Boreal Softwood Region are available for five raptor species that have potential to occur in the RSA (Sauer et al. 2012; Appendix IV.3, Table IV.3-14). American kestrel (*Falco sparverius*) have a significantly ($P \leq 0.05$) decreasing population trend, while merlin (*Falco columbarius*) have a significantly ($P \leq 0.05$) increasing population trend. Sharp-shinned hawk (*Accipiter striatus*), red-tailed hawk (*Buteo jamaicensis*), and northern harrier (*Circus cyaneus*) have non-significant ($P > 0.05$) increasing population trends. Incidental observations of raptors are reported below.

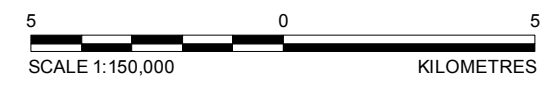
No specific raptor surveys were performed in the RSA during the 2012 field season. All raptor observations were recorded during other survey periods and include both individual species and nest observations (Figure 5.3-4). One individual bald eagle, one bald eagle nest, and one osprey (*Pandion haliaetus*) nest were



LEGEND

- VILLAGE
- HIGHWAY
- ROAD
- RIVER
- WATERBODY
- BALD EAGLE
- OSPREY
- MERLIN
- SHARP-SHINNED HAWK
- BALD EAGLE NEST
- OSPREY NEST
- ▭ TERRESTRIAL REGIONAL STUDY AREA
- ▭ TERRESTRIAL LOCAL STUDY AREA

REFERENCE
 DATUM: NAD83 PROJECTION: UTM ZONE 13
 NTS MAPSHEETS: 73P/3,4,5,6



PROJECT TAZI TWÉ HYDROELECTRIC PROJECT			
TITLE LOCATIONS OF INCIDENTAL OBSERVATIONS OF RAPTOR SPECIES IN THE REGIONAL STUDY AREA, 2012			
 Golder Associates <small>Saskatoon, Saskatchewan</small>	PROJECT	10-1365-0004	FILE No.
	DESIGN	SM	17/07/13
	CHECK	ME	25/07/13
	REVIEW	BC	25/07/13
			SCALE AS SHOWN REV. 0
			FIGURE: 5.3-4

observed during spring fish spawning surveys in 2010 (Appendix IV.3, Table IV.3-14). One bald eagle was observed during amphibian calling surveys, and one sharp-shinned hawk and one osprey were observed during upland BBS in 2012. Nine bald eagle individuals, one bald eagle nest, and one osprey individual were observed during waterbird breeding surveys, while three bald eagles were observed during waterbird productivity surveys in 2012.

Red-tailed hawks are one of the most widespread raptor species in North America ranging from Mexico to central Canada (Preston and Beane 2009). Populations of red-tailed hawks have been increasing or remaining stable in North America over the last four decades (Preston and Beane 2009; Sauer et al. 2012). Their ability to use various nesting habitats (e.g., natural and man-made structures) may be partially influencing these increases.

The sharp-shinned hawk is the smallest member of the accipiter group (subfamily: *Accipitrinae*), which are forest nesting hawks that prefer to hunt birds (Bildstein and Meyer 2000). This species is difficult to accurately census during the breeding season due to their preference to nest in the forest interior; however, population estimates from migration studies suggest they are stable. Nesting density is estimated at 0.88 nests/km² in New Brunswick and between 0.08 and 0.32 nests/km² in Alaska (Bildstein and Meyer 2000).

Northern Goshawk (*Accipiter gentilis*) is the largest accipiter species in North America and is widespread in Canada and parts of the northern and western United States where mature coniferous forests are found (Squires and Reynolds 1997). Populations are considered stable in Canada and not at risk, but a subspecies (*Accipiter gentilis laingi*) native to British Columbia is considered threatened under SARA (2012b). Densities of goshawk in the mid-latitudes of the western United States is estimated at 3.6 to 10.7 pairs per/km², while densities in Pennsylvania are estimated at 1.17 pairs/100 km² (Squires and Reynolds 1997). Although populations are considered stable, timber harvesting has a large effect on nesting habitat and can cause nest failure if harvesting activities occur too close to nests.

Merlins, a medium-sized falcon species, are a mature forest species found throughout the boreal and mixed forest regions of Canada and northern areas of the United States (Warkentin et al. 2005). In the last few decades they have shown an increased preference for nesting in cities and towns. North American populations are considered stable with an estimated population of 650,000 in Canada and the United States in 2004. Densities vary from 20 pairs/100 km² in Alberta to 3.8 pairs/100 km² in Montana and 25.4 pairs/100 km² in Saskatchewan (Warkentin et al. 2005).

Ospreys are widespread across North America ranging from the northern boreal forest to both the Atlantic and Pacific coasts and the Gulf of Mexico (Poole et al. 2002). Although their population was in severe decline from the 1950's-1970's with losses of up to 90% of breeding pairs in some areas, today their population is stable and increasing. The banning of dichlorodiphenyltrichloroethane (DDT) has led to an increase in breeding pairs throughout North America. There is little information on population densities but a 1980 study estimated 10,000 to 12,000 breeding pairs in Canada and Alaska. However, substantial increases in breeding pairs of between 50% to 100% in areas have occurred since 1990 (Poole et al. 2002).

Northern harriers are found throughout Saskatchewan and prefer open areas; they are often seen soaring low over grassland and wetland areas (Macwhirter et al. 1996). Data from the road-side North American Breeding Bird Survey indicate that numbers are highest (1.1 - 1.9 birds/route) in the provinces and states of the northern Great Plains (Alberta, Saskatchewan, Manitoba, Montana, North and South Dakota) (Macwhirter et al. 1996).

The variable diets of peregrine falcons have allowed them to inhabit a large geographic area, from the tundra to the tropics, and most habitat types (White et al. 2002). Populations decreased and many local populations were extirpated because of DDT usage from 1940 to 1970. Reintroductions and captive breeding programs have helped to re-establish populations in the United States and Canada; however, the *anatum* subspecies is ranked as threatened and the *tundrius* subspecies is ranked as special concern by SARA (2012b). The *anatum* subspecies breeds in almost all Canadian provinces; including Saskatchewan (COSEWIC 2007) and has the possibility to occur in the RSA. The minimum population size for *anatum* peregrine falcons was estimated at 969 individuals in 2005 (COSEWIC 2007). This population is expected to continue to increase in size in Canada and expand into historic nesting areas.

The short-eared owl (*Asio flammeus*) population in Canada was estimated at 350,000 birds in 2008 (COSEWIC 2008). Data suggests that short-eared owl populations have decreased approximately 23% in the last 10 years. In Canada, short-eared owls are most common in the Prairie Provinces and along the Arctic coast, although they breed throughout Canada. The population trend for short-eared owl in Saskatchewan from 1986 to 2006 is decreasing but this trend is non-significant ($P > 0.05$) (CWS 2009).

Several species of owls are confirmed breeders in the boreal forest region of Saskatchewan (Smith 1996). These species include barred owl (*Strix varia*), boreal owl (*Aegolius funereus*), great gray owl (*Strix nebulosa*), great horned owl (*Bubo virginianus*), long-eared owl (*Asio otus*), northern saw-whet owl (*Aegolius acadicus*), and northern hawk owl (*Surnia ulula*). Snowy owls (*Bubo scandiacus*) breed in the tundra region, but may use open areas in the boreal forest region during the winter (Parmelee 1992). Boreal owl, great gray owl, barred owl, and northern hawk-owl are all provincially listed species (SKCDC 2012g), while shorted-eared owl is a provincially and federally listed species (SKCDC 2012g; SARA 2012b) (Table 5.3-1). No owl species were observed during wildlife surveys in the RSA during the 2012 field season.

5.3.10.2 Habitat Selection and Foraging

Red-tailed hawks are very adaptable and can be found in a variety of habitats across North America. They prefer nesting in open areas interspersed with patches of trees or other elevated perches (e.g., power line poles and other man-made structures) and have been observed nesting on buildings in cities (Preston and Beane 2009). Small mammals and rodents are their primary prey but birds, reptiles, and invertebrates may supplement diets in different habitats. Diet breadth and nesting preferences allow them to be the most abundant and widespread raptor species in North America (Preston and Beane 2009).

Sharp-shinned hawks are a widespread species found in dense forest habitat across North America (Bildstein and Meyer 2000). They prefer nesting in dense forests with some conifer present at elevations ranging from sea level to alpine regions. Sharp-shinned hawks prefer contiguous forest areas and avoid edge and patchy habitats. Their primary food source is small birds complemented by small mammals and large invertebrates.

Northern goshawk is a forest species often found nesting in mature boreal or mixed forest habitats with a high closed canopy (Squires and Reynolds 1997). They hunt in the forest interior using short flights between perches where they hide and waits for prey to emerge. Sometimes goshawks hunt along the forest edge using a similar hide and wait foraging tactic. Goshawks take a wide variety of prey including small to medium sized mammals (e.g., squirrels, rabbits, and hares), birds, and sometimes reptiles.

Merlins are primarily a tree nesting species but records from northern Canada and Europe have found ground nesting to be used in habitats without trees present (Warkentin et al. 2005). Merlins are found throughout Saskatchewan and are common in cities. They prefer hunting in open habitats where they often take small birds

while on the wing, usually after surprising them into the air by emerging from cover at high speed. Small birds make up the majority of prey, complemented by invertebrates, mammals, and reptiles.

Osprey are not associated with a specific habitat type and instead are found in areas with fish-bearing water bodies, nesting structures providing shelter from predators, and sufficiently long ice-free season allowing for the fledging of young (Poole et al. 2002). Fish make up the majority (~99%) of their diet but this can be complemented with birds, small mammals, reptiles, and amphibians. Foraging success has been correlated with the amount of emergent and submergent vegetation present in waterbodies, as increased weed density decreases foraging success.

The northern harrier breeding range spans across the northern United States and central Canada from Nova Scotia to Alaska (Smith et al. 2011). They have a preference for open habitats (e.g., wetlands, grasslands, tundra) where they primarily nest in vegetation on the ground. Northern harriers have a diverse diet primarily composed of small mammals (e.g., rodents, voles, shrews), but also includes reptiles, amphibians, birds, and invertebrates (Smith et al. 2011).

Peregrine falcons have no geographic preference or biome requirements for nesting but prefer to nest on open cliff areas (White et al. 2002). In recent decades there has also been an increase the amount of peregrine falcons nesting on man-made structure (e.g., buildings, bridges). Dietary items are variable depending on biome inhabited, but birds are the primarily dietary item complemented by small mammals (especially bats) and sometime fish stolen from osprey.

Short-eared owls are a wide ranging species that breeds in most of Canada and the northern United States (Wiggins et al. 2006). They nest and hunt in open areas (e.g., wetlands, tundra, grassland, shrubland, agricultural land) preferring to nest on the ground in habitats with vegetation less than 50 cm tall. Short-eared owl population trends have been observed to closely follow vole population cycles which are their primary food source. Other dietary items include other small mammals (e.g., shrews, pocket gophers, rabbits) and birds.

5.4 Summary

5.4.1 General Setting

The wildlife section of the environmental baseline report provides baseline information that can be used to predict and monitor direct and indirect effects of the Project on wildlife and wildlife habitat. The wildlife baseline report presents a review and interpretation of qualitative and quantitative information from literature and data collected during the 2012 field program. The key objectives of the wildlife baseline are:

- to identify wildlife species occurrence, abundance, and distribution within the LSA and RSA;
- to document the potential and observed occurrences of protected or listed wildlife (provincial and federal) in the LSA and RSA;
- to identify important habitat features and describe the use of habitats by wildlife in the LSA and RSA; and
- to use the information to assess the potential direct and indirect effects from the Project, and other past, current, and proposed future projects in the RSA on the abundance and distribution of wildlife populations.

The RSA was selected based on the predicted spatial extent of the combined direct and indirect effects on wildlife from the Project. The RSA consists of an 115,600 ha area centred on the Project. The LSA is

approximately 8,881 ha in size, centered on the anticipated Project footprint. The LSA was based on the predicted direct and small-scale indirect effects from the Project on the terrestrial environment.

The RSA and LSA are situated on a transitional area between the boundaries of the Taiga Shield and Boreal Shield Ecozones in Saskatchewan (Acton et al. 1998). The north portion of the RSA is in the Uranium City Upland Landscape Area within the Tazin Lake Upland Ecoregion of the Taiga Shield Ecozone. The south and southeastern portion of the RSA is situated in the Lower Cree River Plain and Fond du Lac Lowland Landscape areas of the Athabasca Plains Ecoregion of the Boreal Shield Ecozone. This area is characterized by a subarctic climate with long, very cold winters and short, cool summers.

5.4.2 Wildlife Habitat

Nineteen habitat types (ELC map units) were classified in the RSA and include Bedrock, Jack Pine, Jack Pine/Black Spruce, Spruce, Mixedwood, Deciduous, Wetland, Riparian, Open Water, Regenerating, Recent Burn, Existing Disturbance, and Unclassified map units. The primary ELC map unit within the RSA is Recent Burn and accounts for approximately 31.1% (35,993 ha) of the RSA. Recent burn areas were affected by fire in 2003, 2006, 2008, and 2010. Regenerating map units represent areas that were historically affected by fire during 1989, 1994, and 1996 and account for approximately 7.5% (8,656 ha) of the RSA. The most abundant upland map unit is the Jack Pine map unit and accounts for approximately 18.6% (21,492 ha) of the study area. Wetlands cover approximately 5.4% (6,213 ha) of the RSA. The Existing Disturbance map unit (e.g., roads, communities) account for approximately 0.8% (889 ha) of the RSA. Approximately 22.7% (26,275 ha) of the RSA is covered with Open Water.

5.4.3 Provincial and Federal Listed Species

5.4.3.1 Methods

Incidental observations of provincially and federally listed species within the RSA were recorded during field surveys. Prior to beginning surveys in the LSA and RSA, a list of listed species was generated from reviewing federal and provincial wildlife and conservation legislation and documents.

5.4.3.2 Results

Twenty-eight provincial and federal listed species have the potential to occur in the RSA. Three of these 28 species are listed as threatened and 4 are listed as species of special concern under Schedule 1 of the *SARA* (2012b). One species is listed as a species of special concern under Schedule 3 of *SARA* (2012b). Five species have been recommended by COSEWIC (2012) for protection under *SARA* (2012b), but are not currently protected. Two of these species are recommended to be listed as endangered, one as threatened, and two as species of special concern. An additional 15 species are tracked by the Province of Saskatchewan (SKCDC 2012g); these 15 species are not protected under *SARA* (2012b) or the *Wildlife Act* (1998), and are not recommended to be listed by COSEWIC (2012).

A total of three provincially-tracked, two COSEWIC-recommended, and one *SARA*-listed species were observed during wildlife baseline surveys in 2012. The only *SARA*-listed species observed was olive-sided flycatcher (*Contopus cooperi*), which was incidentally observed in Recent Burn habitat during the BBS. Horned grebe (*Podiceps auritus*) and wolverine (*Gulo gulo*), are the COSEWIC-recommended species that were observed. Horned grebe was observed during waterbird breeding surveys, while wolverine tracks were recorded during WTC surveys. Bald eagle (*Haliaeetus leucocephalus*) and sandhill crane, both provincially-tracked species, were observed during the waterbird breeding and productivity surveys. Tundra swan (*Cygnus columbianus*) and

trumpeter swan (*Cygnus buccinator*) are both provincially-tracked species. Unidentified swan species were incidentally observed during the BBS.

5.4.4 Traditional and Non-traditional Use

5.4.4.1 Methods

Traditional use of wildlife was determined from traditional use surveys (Annex VI), government reports, and other grey literature.

5.4.4.2 Results

The Project is located on the Chicken Indian Reserve. Traditional use of species in the RSA includes hunting of wolf, black bear, and moose, and trapping of smaller mammals such as American marten, snowshoe hare, and red squirrel.

Non-traditional use of wildlife species is managed in the RSA, which is located in WMZ 76. There are two black bear hunting seasons in WMZ 76: April 15 to June 30, and August 25 to October 14 (MOE 2012). One bear, of either sex, can be taken by resident and non-resident hunters; only female bears with young-of-year cubs cannot be hunted. Moose can be hunted in the RSA, by residents and non-residents, between September 1 and November 30; one bull moose can be taken per person.

Trapping dates for fur-bearing species expected to occur in the RSA is listed in [Table 5.3-2](#). Trapping in WMZ 76 is by application to the MOE only.

Snow goose can be hunted between April 1 and May 31. Snow geese, Canada geese, and sandhill cranes can be hunted from September 1 to December 16. Ducks, American coots, and Wilson's snipes can be hunted in the RSA between September 1 and December 16. Ptarmigan species can be hunted in the RSA from November 1 and March 31. Sharp-tailed grouse, ruffed grouse, and spruce grouse can be hunted in the RSA from September 15 and December 7.

5.4.5 Amphibians

5.4.5.1 Methods

Amphibian call surveys were completed to determine amphibian occurrence and relative abundance within the LSA. Surveys at 28 locations were completed in the LSA on May 28, June 2, and June 13, 2012. Species heard, waterbody characteristics were recorded at each survey location, including air and water temperature, turbidity, water depth, waterbody type, and emergent plant species present.

5.4.5.2 Results

Amphibians were recorded at 18 of the 28 survey locations. Only wood frog and boreal chorus frog (were heard during surveys. Amphibian species that have historic ranges that overlap the RSA but were not heard or observed during the wildlife baseline surveys are Canadian toad and northern leopard frog.

5.4.6 Semi-aquatic Mammals

5.4.6.1 Methods

Semi-aquatic mammals (e.g., muskrat, beaver, American mink, and river otter) observations were recorded in the LSA and RSA in conjunction with waterbird breeding and productivity surveys. Observers recorded semi-aquatic mammal sightings, as well as evidence of semi-aquatic mammal activity (e.g., tracks, lodges, dams, and houses) for all wetlands located within 200 m of observers, while flying waterbird transects. Incidental

observations of semi-aquatic mammals and evidence of semi-aquatic mammal activity were also recorded during other baseline surveys in 2012.

5.4.6.2 Results

Muskrat

Muskrats occur throughout most of North America, with the exception of Florida and coastal Georgia and South Carolina (Allen and Hoffman 1984). Muskrat is not a provincial or federal listed species.

In the 2008-2009 and 2009-2010 trapping seasons, muskrat were the highest marketed pelt and third highest total value harvested animal in the Northern Fur Conservation Area (MOE 2010, 2011). Muskkrats were ranked as 'common' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. The Project is located in the N-80 Fur Management Zone in the Northern Fur Conservation Area of Saskatchewan. No muskrat pelts were sold in the N-80 Fur Management Zone in either the 2008-2009 or 2009-2010 season.

Three muskrat tracks were recorded in Jack Pine habitat during winter track count (WTC) surveys. Single tracks accounted for 100% of track observations recorded during WTC surveys. No observations of muskrat individuals or muskrat houses or feeding areas were made during other baseline surveys.

Beaver

Beavers are commonly found in forested and non-forested areas throughout North America (Jenkins and Busher 1979). Beaver populations are currently stable, and are considered to be widespread, abundant, and secure across North America.

In the 2008-2009 and 2009-2010 trapping seasons, beaver were the second most harvested animal in the Northern Fur Conservation Area, by total value and number of pelts marketed (MOE 2010, 2011). Beavers were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. No beaver pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season, however nine beaver pelts were sold in the N-80 zone in the 2009-2010 season. Two beavers and ten lodges and dams were incidentally observed during the waterbird breeding surveys on June 1, 2012.

River Otter

River otters are found in forested areas throughout Canada and the United States (Larvière and Walton 1998). Populations in North America are currently stable, but populations had greatly declined between European settlement and the early 1900s because of the unregulated fur harvest, water pollution, and habitat degradation (Sefass and Polechla 2008). Water quality and furbearer management regulations have allowed river otters to re-establish themselves throughout much of their historic range.

A total of 379 and 310 otter pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No otter pelts were sold in the N-80 Fur Management Zone in either season. River otters were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. One river otter was caught in a hoop trap during spring fish spawning surveys in 2012, and one river otter was incidentally observed during amphibian surveys in 2012.

American Mink

American mink are found throughout Canada and much of the United States except for arid regions of the south and southwest (Larivière 1999). Mink populations are considered stable and accidental introductions from mink farms have allowed for an increase in geographic distribution in North America. They are considered abundant across much of their range with average densities from 0.1 to 0.7 mink/km². Mink are not a provincially or federally listed species.

A total of 1,176 and 764 mink pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). Four mink pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season and one mink pelt was sold during the 2009-2010 season. Mink were ranked as 'common' in the Northern Fur Conservation Area in the 2008-2009 season but increased to 'abundant' during the 2009-2010 season, according to trapper questionnaire surveys.

Mink tracks were observed in Wetland, Jack Pine, Regenerating, and Open Water habitat types during winter track surveys. Track density was highest in Open Water habitat; however, this habitat has a high variance because of the small sample size associated with this habitat type. Single tracks accounted for 100% of track observations recorded during winter track count surveys.

5.4.7 Carnivores and Terrestrial Furbearers

5.4.7.1 Methods

The presence and relative abundance of carnivores and furbearers were determined from winter track count surveys in the RSA. Nine transects (5.1 to 7.3 km in length) were established in the RSA. Each transect was surveyed twice: once between January 7 and 17, 2012, and once between February 16 and 19, 2012. The length of winter track count survey transects equalled 48 km over eight habitat types.

5.4.7.2 Results

Ten carnivore and terrestrial furbearer species and species groups were observed during baseline surveys in 2012.

Black Bear

Black bear is not a provincial or federal listed species. Black bears hibernate during winter, so the activity of bears within the RSA will vary seasonally.

The black bear population in Saskatchewan in 2003 was thought to have declined relative to previous years (Arsenault 2005). Black bears occur at a moderate density in the region surrounding the Project. One black bear was incidentally observed while completing the waterbird breeding survey. One bear was also observed at Camp Grayling during the summer wildlife surveys. Other observations of black bear activity in the RSA include scat and partially consumed white sucker that were found during the spring fish spawning survey in 2010.

Wolf

Wolf is not a provincial or federal listed species. Although the number of wolf pelts sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons was fairly small (210 and 138 pelts, respectively) when compared to other species, the monetary value of these pelts was over \$20,000 each season (MOE 2010, 2011). Wolves were ranked as 'abundant' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. No wolf pelts were sold in the N-80 Fur Conservation Zone during either season. One wolf track was observed in frozen water (ice) habitat during

the winter track count surveys in January, 2012. Three wolves were incidentally observed on Stony Lake while flying during the winter fish telemetry surveys in February, 2012. Wolf scat was observed during the spring fish spawning survey in 2010.

Red Fox

Red foxes can have one of three pelt colors (red, silver, and cross). A total of 207 red, 37 cross, and 4 silver pelts were sold in the Northern Fur Conservation Area during the 2008-2009 season (MOE 2010). In the 2009-2010 season 149 red, 31 cross, and 4 silver pelts were sold in the Northern Fur Conservation Area (MOE 2011). Red fox were ranked as 'common' in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys. One silver and one red fox pelt were sold in the N-80 Fur Conservation Zone during the 2008-2009 season.

Red fox tracks were recorded in Wetland, Recent Burn, Jack Pine, Regenerating, and Spruce habitat types during winter track count surveys in 2012. Track density was highest in Wetland habitat. Single tracks accounted for 100% of winter track observations.

Lynx

Lynx are not a provincial or federal listed species. Lynx home range size varies with the abundance of prey and the season. A total of 415 and 425 lynx pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No lynx pelts were sold in the N-80 Fur Management Zone in the 2008-2009 season, but one lynx pelt was sold during the 2009-2010 season. Lynx were ranked as 'common' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

Lynx tracks were recorded at nearly equal densities in Wetland (0.09) and Jack Pine habitat (0.10 ± 0.06) types. Single tracks accounted for 100% of the winter track observations.

Wolverine

The western Canada population of wolverine is listed as a species 'of special concern' (COSEWIC 2003; 2012) and currently has no status under *SARA* (2012b). A total of 17 and 11 wolverine pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). No wolverine pelts were sold in the N-80 Fur Management Zone in either season. Wolverine were ranked as 'scarce' in the Northern Fur Conservation Area in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

Wolverine tracks were observed only in the Jack Pine habitat type. Single tracks accounted for 100% of wolverine track observations recorded during WTC surveys.

Fisher and American Marten

Marten are not a provincial or federal listed species. Marten are the most important fur bearing species in the RSA; 78 and 122 pelts were sold in the N-80 Fur Management Zone during the 2008-2009 and 2009-2010 seasons, respectively (MOE 2010, 2011). A total of 3,739 and 3,186 marten pelts were sold in the Northern Fur Conservation Area in the 2008-2009 and 2009-2010 season, respectively. The monetary value of these pelts comprised 43% and 40% of the total monetary value in this area for the 2008-2009 and 2009-2010 seasons, respectively.

Fisher are not a provincial or federal listed species. In Fur Management Zone N-80, no fishers were trapped in either the 2008-2009 or 2009-2010 seasons (MOE 2010, 2011). A total of 930 and 800 fisher pelts were sold in the Northern Fur Conservation Area in the 2008-2009 and 2009-2010 seasons, respectively. Fisher were ranked as 'abundant' in both the 2008-2009 and 2009-2010 seasons, according to trapper questionnaire surveys.

Fisher and marten tracks were recorded in all eight habitat types during winter track count surveys in 2012. Open Water and Regenerating habitats had the highest track densities; however, these densities have a high variance due to the small sample size associated with these habitat types. Jack Pine habitat had next highest track density. Single tracks accounted for 100% of winter track observations.

Weasel Species

Least weasels are the smallest members of Order *Carnivora* in North America (Sheffield and King 1994). Short-tailed weasels are a medium-sized mustelid species. No weasel species were reported to be trapped in the N-80 Fur Management Zone in either the 2008-2009 or 2009-2010 seasons (MOE 2010, 2011). A total of 1,379 and 855 weasel pelts were sold in the Northern Fur Conservation Area during the 2008-2009 and 2009-2010 season, respectively. Weasels were ranked as 'abundant' in both seasons, according to trapper questionnaire surveys.

Weasel tracks were recorded in all habitat types except Open Water during winter track count surveys. Track density was highest in the Regenerating habitat type; however, there is a high variance associated with this estimate due to a small sample size. Track densities were also high in Jack Pine/Black Spruce and Spruce habitat types. Single tracks accounted for 100% of the winter track observations.

Snowshoe Hare

Snowshoe hare tracks were found in all habitats types except for Open Water. Track density was highest in Jack Pine habitat. Single tracks accounted for 84% of snowshoe hare winter track count observations. Trails accounted for 15% of WTC observations, while networks accounted for 1%. A total of nine snowshoe hare were incidentally observed during WTC surveys and ungulate aerial surveys in 2012.

American Red Squirrel

Red squirrel pelts represent approximately one million dollars annually for the Province of Alberta and between one and three million squirrels are harvested in Canada each year (Kemp and Keith 1970). No squirrel pelts were sold during the 2008-2009 or 2009-2010 seasons in the N-80 Fur Management Zone (MOE 2010, 2011). In the Northern Fur Conservation Area 1,867 and 2,237 squirrel pelts were sold in the 2008-2009 and 2009-2010 seasons, respectively. Squirrels were ranked as 'abundant' in the 2008-2009 season, but only as 'common' in the 2009-2010 season according to trapper questionnaire surveys.

Red squirrel tracks were found in all habitats types except for Wetland and Open Water. Track density was highest in Regenerating habitat; however, there is a large variance associated with this density estimate due to a small sample size. Red squirrel track density was next highest in Jack Pine habitat. Single tracks accounted for 100% of red squirrel winter track observations

5.4.8 Ungulates

5.4.8.1 Methods

Estimates of ungulate (e.g., moose, barren-ground and woodland caribou) density, distribution, and population size in the RSA were determined from winter track count surveys and an ungulate aerial survey. Ungulate aerial surveys were completed to estimate the density, population size, and distribution of ungulates within the RSA. Eight transects were flown on January 15 and February 20, 2012. Transects were 30 km in length and were spaced 3.7 km apart. Transect survey strip width was 400 m wide (i.e., 200 m on either side of the helicopter). Surveys were completed at an altitude of approximately 100 m above ground level at an average speed of 90 km/h. Surveys covered approximately 96 km² (6.2%) of the RSA.

5.4.8.2 Results

Moose

Moose populations in the Tazin Lake Upland and Athabasca Plains Ecoregions are ranked as common and are not listed federally. There are an estimated 50,000 moose in Saskatchewan (MOE 2009). The area with the highest density of moose is the mixed wood section of the Boreal Forest; however, densities in the Aspen Parkland and prairies to the south have been increasing (MOE 2009). Moose density in similar habitat in Ontario from 1990 to 1995 was estimated to be 0.209 moose/km² (McKenney et al. 1998). Currently in Saskatchewan, moose populations are managed by controlled hunting seasons for residents and non-residents (MOE 2009).

Moose tracks were highest in Deciduous habitat during the winter track count surveys. Single tracks accounted for 100% of moose winter track observations. Total moose density ($\pm 1SE$) during the aerial surveys was estimated to be lower in January ($0.06 \pm 0.04/\text{km}^2$) than in February ($0.07 \pm 0.02/\text{km}^2$). Calf density was similar between the two survey periods ($0.01/\text{km}^2$ in January and $0.02 \pm 0.01/\text{km}^2$ in February). Adult density was also similar between survey periods ($0.05 \pm 0.03/\text{km}^2$ in January and $0.05 \pm 0.02/\text{km}^2$ in February). Moose were observed 17 times during aerial surveys (11 groups consisting of 1 to 3 individuals). Two moose (one adult and one calf), were incidentally observed during waterbird breeding surveys in June 2012.

Barren-ground Caribou

Barren-ground caribou are primarily distributed throughout Arctic areas in North America, where they spend the summers on the tundra but enter the boreal forest during the winter. During the last 15 years, 7 of 8 Arctic caribou herds present in the NWT have appeared to decline (Porcupine, Cape Bathurst, Bluenose East, Bluenose West, Bathurst, Beverly, and Qamanirjuaq) (NWT General Status Ranking Program 2012; Fisher et al. 2009; BQCMB 2008, 2009). Of the eight barren-ground caribou herds that inhabit the NWT, four herds have the potential to occur in northern Saskatchewan (i.e., Beverly, Qamanirjuaq, Bathurst, and Ahiaik herds) (Gunn et al. 2011).

Although there were no observations of barren-ground caribou in the RSA during the 2012 wildlife baseline surveys, reports from tracking of satellite-collared caribou from the four herds have indicated their proximity to the RSA in the past. In 2001, caribou from the Bathurst herd were recorded approximately 17 km north of the RSA. Satellite tracking data from 2004 and 2006 indicate that some of the Ahiaik herd was recorded 89 km north of the RSA and some of the Beverly herd was recorded 62 km north of the RSA, respectively (Stimson 2009). In the winter of 1979, the Beverly herd overwintered in northern Saskatchewan (Thomas et al. 1998). In the winter of 2004 to 2005, the Qamanirjuaq herd was radio-tracked into northeastern Saskatchewan near Wollaston Lake (BQCMB 2005).

The Beverly and Qamanirjuaq herds' ranges include part of northern Saskatchewan (BQCMB 2011). The recent increase in surveys of the Ahiak herd has also indicated that its range extends into northern Saskatchewan (Gunn et al. 2011). However, these herds have recently decreased their winter migration into northern Saskatchewan and southern NWT, and the Beverly calving ground has shifted farther north (Nagy et al. 2011). Barren-ground caribou hunting is managed in northern Saskatchewan but only within WMZ 76 which borders the NWT (MOE 2009). Caribou from the Qamanirjuaq and Beverly herds are often hunted near Wollaston Lake in northeastern Saskatchewan and near Selwyn Lake on the Saskatchewan NWT border (MOE 2009). The only sign of caribou that was found during terrestrial baseline surveys was decades-old caribou antlers.

Woodland Caribou

Most woodland caribou populations have declined in recent years (COSEWIC 2002). The boreal ecotype of woodland caribou is listed as 'rare/uncommon' in Saskatchewan (SKCDC 2012g) and 'threatened' by COSEWIC (2012) and SARA (2012b). Woodland caribou are distributed across the forested and mountainous regions of Canada, reaching the northern limit of their range in the NWT (COSEWIC 2002). Woodland caribou do not have definitive calving grounds like barren-ground caribou, although individual females often show fidelity to previous calving sites (Edmonds and Smith 1991; Dzus 2001). Instead pregnant females separate themselves from other caribou for calving.

Woodland caribou boreal population was estimated to be 34,000 in the boreal region of Canada in 2000 to 2002 (COSEWIC 2002) and 32,000 in 2011 (Environment Canada 2012b). However, population numbers and trends for woodland caribou in Canada are poorly known; low densities, large land area, and multiple jurisdictions inhibit accurate population estimates. The life history of boreal woodland caribou gives insight into their population declines because of their solitary occurrence (low densities to reduce predation) and low fecundity (cows typically do not reproduce until three year of age and have only one calf per year) (COSEWIC 2002; Environment Canada 2012b). Their need for mature to old-growth coniferous forests (COSEWIC 2002) is also a limiting factor for population growth. There are two local populations of boreal woodland caribou in Saskatchewan; the northern population in the boreal shield is considered to be of unknown size and sustainability, while the southern boreal plains population is ranked as not sustainable (Environment Canada 2012). There are an estimated 5,000 boreal woodland caribou in Saskatchewan with approximate densities of 3.0 to 3.5 caribou/100 km² in preferred habitat (COSEWIC 2002). Range sizes for female tracked caribou in Saskatchewan's boreal plain ranged from 208 to 1,240 km² among five populations studied from 1992 to 1996 (Rettie and Messier 2001).

No woodland caribou were observed in the RSA during the wildlife survey period. The nearest known woodland caribou conservation unit is located approximately 30 km south of the Project. The only sign of caribou that was found during terrestrial baseline surveys was decades-old caribou antlers.

5.4.9 Upland Breeding Birds

5.4.9.1 Methods

Upland breeding bird surveys were completed in the RSA to determine species' densities, and community richness and abundance. A total of 211 BBS plots were surveyed across 9 terrestrial habitat types between May 30 and June 9, 2012. The point count survey technique described by Ralph et al. (1993) was used to complete the BBS.

Point count observations were categorized into one of nine habitat types with two levels of analysis completed. A species-level analysis examined the density of individual species within each habitat type. A community-level

analysis examined the density and richness of all species within each habitat type. Species richness, and not a heterogeneity index (e.g., Shannon's Diversity Index), was used as a measure of community diversity for each habitat type based on Costello et al. (2004), which concluded that species richness provides the most suitable univariate measure of community diversity. Density was calculated as the number of individuals per area surveyed (i.e., the effective detection radius) and included only bird species that were recorded as within the sampling radius (i.e., 50 m). One-way ANOVA and Tukey-Kramer mean comparisons were calculated in JMP 7.0 (SAS Institute 2007) and were used to determine if density of birds differed across habitat types. Species richness for each habitat type was determined using individuals recorded as within the sampling radius (i.e., 50 m).

5.4.9.2 Results

Population trends in the Boreal Softwood Shield region, encompassing northern Saskatchewan eastward through Quebec (NABCI 2012), from 1966 to 2010 are available for 34 of the 36 upland breeding bird species that were recorded with 50 m of observers during BBS in the RSA. Two species (orange-crowned warbler and white-crowned sparrow) did not have any data on population trends from Sauer et al (2012) in the Boreal Softwood Shield region. However, BAM (2012), a collaboration of researchers and organizations studying birds of the boreal region, has species data on birds of the boreal and hemiboreal regions (Brandt 2009) of North America. Only chipping sparrow had a significantly ($P \leq 0.05$) decreasing trend (Sauer et al. 2012). Conversely, six species have significantly ($P \leq 0.05$) increasing population trends; these include winter wren, yellow-bellied flycatcher, fox sparrow, magnolia warbler, black-capped chickadee, and blue-headed vireo. Population trends for the remaining 27 species are non-significant ($P > 0.05$).

Orange-crowned warbler has an estimated relative density of 0.14 singing males per hectare in the North Saskatchewan region, which is second highest in Canada (BAM 2012). The population trend for orange-crowned warbler is significantly ($P \leq 0.05$) decreasing in Canada. White-crowned sparrow has an estimated relative density of 0.26 to 0.50 birds/ha in the North Saskatchewan region, and has a non-significant ($P > 0.05$) increasing population trend in Canada (BAM 2012).

Grouse and ptarmigan tracks were observed during the winter track count surveys. Spruce grouse are coniferous forest specialists that inhabit the boreal region of Canada and the northern United States (Boag and Schroeder 1992). Population studies indicate that density estimates range widely. In southwestern Alberta, the estimated densities for spruce grouse in the spring ranged from 0 to 50 birds/100 ha, while in Ontario density estimates ranged from 0 to 83 birds/100 ha (Boag and Schroeder 1992). Ruffed grouse are an early successional forest species found across Canada and the northern United States where they are associated most closely with deciduous and mixed coniferous-deciduous forests, primarily aspen stands (Rusch et al. 2000). Although they are sometimes found in boreal forests, their survival rates are much lower in this habitat. Ruffed grouse can average one drumming male per 0.5 ha in preferred habitat with average recorded densities being 22 adults per 100 ha. Sharp-tailed grouse populations, once widespread in central North America have decreased along with grassland, steepe, and shrubland habitats (Connelly et al. 1998). They primarily nest in habitats with dense herbaceous and shrub cover but will also nest in agricultural fields such as alfalfa and wheat stubble. Breeding densities for sharp-tailed grouse vary from 0.1 leks/km² in Manitoba, 0.02 to 0.25 leks/km² in Nebraska, and 0.07 to 0.11 leks/km² in South Dakota.

Willow ptarmigan are primarily found in subarctic and subalpine regions in northern Canada during the breeding season, but move south to the boreal forest region during the winter (Hannon et al. 1998). Willow ptarmigan

population densities vary across Canada with high densities (12 to 77 territories/km²) reported in British Columbia and low densities (0.5 to 1.6 pairs/km²) reported in Newfoundland (Hannon et al. 1998). Rock ptarmigan primarily breed in the tundra and mostly winter in the same area, although some of the population will travel south to the northern edge of the boreal forest during the winter (Montgomerie and Holder 2008). The potential population size of breeding rock ptarmigans in June is estimated at 2.1 to 8.4 million individuals based on an average density of 1 to 4 individuals/ km². Due to limited human encroachment of their breeding range ptarmigan populations are considered to be stable and retain much of the historic breeding range (Hannon et al. 1998; Montgomerie and Holder 2008).

The effective detection radius was calculated to be 68.55 m. The effective sampling area was therefore 1.48 ha, which was used to estimate density for species and communities. A total of 48 bird species were observed in 211 survey plots across eight different habitat types. This includes incidental upland bird observations (i.e., birds recorded as outside of 50 m from the plot center).

One olive-sided flycatcher (federal listed species) was incidentally observed outside the 50 m point count area in Recent Burn habitat during the BBS.

Thirty-six upland bird species were identified within 50 m of the observers during the BBS. Densities for these upland bird species were calculated individually for each habitat. American redstart was only detected in Wetland habitat, while Nashville warbler was only recorded in Jack Pine habitat. Yellow-bellied sapsucker and winter wren were only observed in Deciduous habitat. Northern flicker, tree swallow, cedar waxwing, red crossbill, winter wren, and white-crowned sparrow were observed only in Recent Burn habitat. No bird species were determined to be unique to Regenerating, Mixed Forest, Jack Pine/Black Spruce, or Spruce habitats. Hermit thrush, palm warbler, yellow-rumped warbler, dark-eyed junco, and chipping sparrow were observed in all habitat types. Yellow-rumped warbler was the most abundant species in Deciduous, Jack Pine, Regenerating, Mixed Forest, Jack Pine/Black Spruce, and Spruce habitats, while dark-eyed junco was the most abundant species in Recent Burn habitat. Dark-eyed junco and palm warbler were the most abundant species in Wetland habitat.

Grouse showed a preference for coniferous habitats in the RSA. Track density was highest in Jack Pine/Black Spruce and second highest in Wetland habitat type. Single tracks accounted for 100% of the winter track observations.

Ptarmigan tracks were recorded in all eight habitat types. Track density was highest in Deciduous habitat type; however, there is a high variance associated with this estimate due to a small sample size. Track densities were second highest in Jack Pine/Black Spruce habitat type. Single tracks accounted for 97% of the winter track observations, while trails and networks accounted for 1%, and 2%, respectively.

Relative abundance of bird species (birds per hectare) was calculated for each habitat type. Jack Pine habitat had the highest mean density of birds. Species richness was highest in Regenerating and Spruce habitat. Recent Burn and Jack Pine/Black Spruce habitats had the lowest species abundance and richness of the surveyed habitats.

Mean abundance of birds in Jack Pine and Recent Burn habitats were significantly different from each other ($F_{7, 203} = 3.42, P < 0.01$; Tukey-Kramer HSD, $P \leq 0.05$). No statistical difference was detected between Wetland,

Deciduous Forest, Mixed Forest, Jack Pine/Black Spruce, Regenerating Jack Pine, and Spruce habitats types based on bird density.

A total of 36 species were recorded within the 50 m sampling radius during the BBS. The 95% confidence interval associated with the species accumulation curve using these 36 species was 31 to 41 species based on 545 observed individuals (Figure 5.3-3). A total of 48 species were recorded within 100 m of observers during the BBS. The 95% confidence interval associated with the species accumulation curve using these 48 species was 46 to 53 species based on 1,046 observed individuals (Figure 5.3-3). When comparing the species accumulation curve for all species observed to the curve for species recorded within the 50 m sampling radius it is apparent that the 50 m sampling radius was insufficient to record all bird species that may be present in the RSA. The species accumulation curve for all observations approaches an asymptote (ever diminishing returns for increasing sampling effort). This suggests that the level of BBS survey effort was adequate to determine upland breeding bird species richness in the RSA.

5.4.10 Waterbirds

5.4.10.1 Methods

Waterbirds include loons, grebes, swans, geese, ducks, scoters, mergansers, American coot, sandhill crane, gulls, and terns. Aerial transects to determine waterbird breeding adult density in the RSA were flown on June 1 and July 19, 2012. Transects (8 to 47 km in length) were flown along the shore of Black Lake, along the Fond du Lac River (including Stony Lake and Middle Lake) and in the northeastern RSA (6 linear transects). Transect survey strip width was 400 m wide (i.e., 200 m on either side of the helicopter). Surveys were flown at an altitude of approximately 100 m above ground level and an average speed of 80 km/h. The Black Lake and Fond du Lac River transects were divided into 1 km segments, which were used for calculating waterbird densities (mean \pm 1 SE) (i.e., densities were calculated based on 0.4 km²). For the Northeastern portion of the RSA, transect density was determined by calculating the total open water area for each transect and dividing the quantity of waterbirds observed on each transect by the total open water area.

5.4.10.2 Results

Waterbird populations in northern Saskatchewan, northern Manitoba, and western Ontario have significantly decreased over the last 57 years (-21%; $P < 0.001$) from the long-term average (1955 to 2010), but the 2012 populations increased by 13% compared to the 2011 season (Zimpfer et al. 2012). In 2012, mallard, American wigeon, green-winged teal, blue-winged teal, northern shoveler, northern pintail, and redhead had population increases from the 2011 season. Alternatively, gadwall, canvasback, and scaup species (greater and lesser scaup) populations in northern Saskatchewan and Manitoba decreased from the 2011 to 2012 season. Gadwall was the only species to show a population increase (17%) in the long term average (Zimpfer et al. 2012).

Nine species and three unidentified species groups (merganser species, duck species, and gull species) were recorded in the RSA during waterbird breeding surveys in 2012. Densities for these 12 waterbird species and species groups were calculated individually for the three surveyed areas (i.e., Black Lake, Fond du Lac River, and Northeastern RSA). Black Lake had the lowest number of waterbird species present with only mallard and an unidentified merganser species. The Fond du Lac River surveys had the highest species diversity with seven species and three unidentified species groups. American wigeon, northern shoveler, surf scoter, and white-winged scoter were only observed in the Fond du Lac River survey area. Waterbodies in the Northeastern RSA had five waterbird species and three unidentified species groups. Canada goose and bufflehead were only

observed in the Northeastern RSA transects. In total, mallard and unidentified merganser species were the most abundant waterbird observed during the breeding surveys.

Eight species and four unidentified species groups (scoter species, duck species, gull species, and tern species) were recorded in the RSA during waterbird productivity surveys in 2012. Densities for these 12 adult waterbird species and species groups were calculated individually for the 3 surveyed areas. Black Lake had the lowest number of waterbird species present with only an unidentified gull species observed. The Fond du Lac River surveys had the highest species diversity with seven species and four unidentified species groups. Mallard, common merganser, scaup species (greater and lesser), unidentified scoter species, and unidentified tern species were only observed in the Fond du Lac River survey area. The Northeastern RSA surveys had five waterbird species and one unidentified species group. Horned grebe was only observed in the Northeastern RSA transects. In total, common merganser was the most abundant waterbird observed during the productivity surveys.

Seven juvenile waterbird species and juveniles of one unidentified species groups (duck species) were recorded in the RSA during waterbird productivity surveys in 2012. Densities for these eight juvenile waterbird species and species groups were calculated individually for the three surveyed areas. The Northeastern RSA transect had the highest species diversity with five waterbird species and one unidentified species group observed. Horned grebe, green-winged teal, bufflehead, and unidentified duck species were only observed in the Northeastern RSA transects. Four waterbird species were observed in the Fond du Lac River area. Mallard and scaup species were only observed in the Fond du Lac river area. In total, scaup species were the most abundant juvenile waterbird species observed during the productivity surveys.

5.4.11 Raptors

5.4.11.1 Methods

Surveys to locate raptor stick nests were completed in the RSA in conjunction with the waterbird breeding and productivity surveys. Nest observations were marked with a GPS waypoint, as well as the species, number of individuals, and habitat type. Raptor nests that were found during the waterbird breeding survey were revisited during the waterbird productivity survey to determine nest success. Incidental observations of raptors were recorded during other wildlife baseline surveys in 2012.

5.4.11.2 Results

Population trends in the Boreal Softwood Region are available for five raptor species that have the potential to occur in the RSA (Sauer et al. 2012). American kestrel have a significantly ($P \leq 0.05$) decreasing population trend, while merlin have a significantly ($P \leq 0.05$) increasing population trend. Sharp-shinned hawk, red-tailed hawk, and northern harrier have a non-significant ($P > 0.05$) increasing population trends. Incidental observations of raptors are reported below.

No specific raptor surveys were performed in the RSA during the 2012 field season. All raptor observations were recorded during other survey periods and include both individual species and nest observations. One individual bald eagle, one bald eagle nest, and one osprey nest were observed during spring fish spawning surveys in 2010. One bald eagle was observed during amphibian calling surveys, and one sharp-shinned hawk and one osprey were observed during upland BBS in 2012. Nine bald eagles and one osprey were observed during waterbird breeding surveys, while three bald eagles were observed during waterbird productivity surveys in 2012.

6.0 GLOSSARY

Term	Description
Acidification	The process of becoming acid or being converted into an acid.
Baseline	A surveyed or predicted condition that serves as a reference point to which later surveys are coordinated or correlated.
Bedrock	The body of rock that underlies gravel, soil or other material.
Biodiversity	The level of variety, or diversity, that exists in a natural system, especially the number of species. Biodiversity includes the number of ecosystem types and genetic variation, within species.
Bioindicator	A species used to monitor the health or quality of an environment or ecosystem.
Bog	A peatland with weakly to moderately decomposed Sphagnum and forest peat material formed in oligotrophic environments. The bog surface is acidic and low in nutrients due to the slightly raised peat surfaces disassociating it from underlying and surrounding mineral rich soil waters.
Boreal forest	The northern hemisphere, circumpolar, tundra forest type consisting primarily of black spruce and white spruce with balsam fir, birch and aspen.
Brunisolic soil	Brunisolic soils are Boreal forest soils that primarily develop in sandy glacial sediments. These soils have undergone very limited soil formation. The diagnostic horizon is the Bm, which has undergone only slight chemical change from the original parent material although it may have a bright red colour compared to the underlying C horizon
Bryophyte	Small herbaceous plants that lack the internal structure for transporting water and nutrients, which is characteristic of vascular plants. Includes mosses, liverworts, and hornworts.
Buffering capacity	The ability of a soil to resist changes in pH.
Calcareous	Soil containing sufficient calcium carbonate, often with magnesium carbonate, to effervesce visibly when treated with cold 0.1N hydrochloric acid.
Cataract	A section of a river with a very steep descent of water.
Cation	An ion carrying a positive charge of electricity. The common soil cations are calcium (Ca), magnesium (Mg), sodium (Na), potassium (K), and hydrogen (H).
Cation exchange capacity	The maximum quantity of total cations that a soil is capable of holding, at a given pH value, for exchanging with the soil solution. Cation exchange capacity is used as a measure of fertility, and nutrient retention capacity.
CCME guidelines	Canadian Council of Ministers of the Environment; body of Environment Canada that sets ambient guidelines for air, water, soil, and contaminants.
Classification, soil	The systematic arrangement of soils into categories according to their inherent characteristics, or on some interpretation of those properties for various uses. Broad groupings are made on the basis of general characteristics, and subdivisions according to more detailed differences in specific properties.
Climate	The prevailing weather conditions of a region, as temperature, air pressure, humidity, precipitation, sunshine, cloudiness, and winds, throughout the year, averaged over a series of years.
Confidence interval	A range of values so defined that there is a specified probability that the value of a parameter lies within it.
Cryosolic soil	Cryosolic soils have horizons with permafrost. In some soils the frost action causes considerable mixing of soil horizons, which is termed cryoturbation. In these soils the permafrost layer must be within 2 m of the surface. If no strong cryoturbation has occurred the permafrost layer must be within 1 m of the surface
Disturbed land	Land that has experienced a significant change, usually as a result of human activity or natural processes such as erosion or fire.
Ecological landscape classification (ELC)	An ecological mapping process that involves the integration of site, soil, and vegetation information.

Term	Description
Ecoregion	Relatively homogeneous subdivisions of an ecozone, which are characterized by distinctive climatic zones or regional landforms.
Ecosystem	A relatively homogeneous area of organisms interacting with their environment
Erosion	(i) The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep. (ii) Detachment and movement of soil or rock by water, wind, ice, or gravity.
Fen	A fen is a peat-covered or peat-filled wetland with a high water table which is not hydrologically isolated and receives water from streams and/or groundwater.
Fen, Poor	And ecosite that is transitional between the fen and bog. A poor fen is intermediate in nutrient regime and similar floristic composition to fen and bog. Sedges and peat moss, golden and brown mosses composed the majority of the organic matter content.
Fen, Rich	A peatland with moderate to well-decomposed sedge, grass, and reed peat material from in eutrophic environments. Mineral-rich waters are at or are just above the fen surface.
Fibric material	Materials (primarily mosses, rushes, and woody materials) that are readily identifiable as to botanical origin. A fibric horizon (Of) has 40% or more of rubbed fiber by volume.
Fibrisolic soil	Fibrisolic soils are composed largely of relatively decomposed fibric organic material.
Folisolic soil	Folisolic soils are composed of upland organic (folic) materials, generally of forest origin that are either 40 cm or more in thickness, or are at least 10 cm thick if overlying bedrock or fragmental material.
Forb	An herbaceous vascular plant which is not a grass, sedge, or rush.
Forest, young seral	Forest containing early seral communities that are characterized by young and even-aged stands.
Forest, young climax	Forest with a stand composition that is typical of the climax forest expected for the location, but community structure has not yet developed and characterized by a young, even-aged stand with a uniform canopy height.
Forest, disclimax	Forest where the species composition of the area differs from that expected for the location.
Geographical information system (GIS)	A computer-based tool for analyzing, displaying and manipulating digital spatial data.
Glaciofluvial	Sediments or landforms produced by melt waters originating from glaciers or ice sheets. Glaciofluvial deposits commonly contain rounded cobbles arranged in bedded layers.
Glaciolacustrine plain	A relatively level depositional area created from the bottom sediments of lake basins deposited by glacial meltwater flowing along the margin of a glacier.
Gleysolic soil	Gleysolic soils are associated with prolonged water saturation of the soil profile. Water saturation leads to depletion of oxygen and the development of soil features associated with oxygen-depleted conditions: blue-gray colours and reddish specks (called mottles) within the soil profile. These features are the diagnostic criteria for Gleysolic soils and occur within 50 cm of the soil surface.
Graminoid	Grass-like in form.
Habitat	The physical location or type of environment in which an organism or biological population lives or occurs.
Habitat suitability index (HSI)	A numerical index that represents the capacity of a given habitat to support a selected species. These models are based on hypothesized species-habitat relationships rather than statements of proven cause and effect relationships. Habitat suitability index model results represent the interactions of the habitat characteristics and how each habitat relates to a given species.
Herb	Any flowering plant except those developing persistent woody bases and stems.
Humic material	Materials (primarily mosses, rushes, and woody materials) at an advanced stage of decomposition. It is very stable and changes little physically or chemically with time unless it is drained. The rubbed fiber content is less than 10% by volume.
Landform	A particular type of land formation.

Term	Description
Landscape	A heterogeneous land area with interacting ecosystems that are repeated in similar form throughout. From a wildlife perspective, a landscape is an area of land containing a mosaic of habitat patches within which a particular “focal” or “target” habitat patch is embedded.
Lichen	Composite organisms consisting of a fungus and a photosynthetic partner (e.g., green algae or cyanobacterium) growing together in a symbiotic relationship.
Local study area (LSA)	The area where direct effects and small-scale indirect effects from the Project are expected to occur. Occurs within the regional study area.
Lowlands	Areas with ground slopes of less than 0.5% and typically poorly drained.
Map unit	A combination of kinds of soil, terrain, or other feature that can be shown at a specified scale of mapping for the defined purpose and objectives of a particular survey.
Marsh	A mineral or a peat-filled wetland which is periodically inundated by standing or slowly moving water.
Mesic sites	Areas characterized by moderately moist habitat.
Mesisolic soil	Mesisolic soils are at a stage of decomposition intermediate between Firisols and Humisols and are dominantly composed of mesic organic materials.
Microclimate	(i) The climate of a small area resulting from the modification of the general climate by local differences in elevation or exposure. (ii) The sequence of atmospheric changes within a very small region.
Microhabitat	The small-scale physical requirements of a particular organism or population
Moisture regime	The relative moisture supply at a site available for plant growth.
Non-vascular plant	A general term for plants with no internal structure for transporting water and nutrients, and lack roots, stems, or teaves. Includes the bryophytes and algae.
Nutrients	Environmental substances (elements or compounds) such as nitrogen or phosphorus, which are necessary for the growth and development of plants and animals.
Nutrient regime	The relative supply of nutrients available for plant growth at a given site.
Organic matter	Plant and animal materials that are in various stages of decomposition.
Organic soil	Organic soils are composed of organic materials. They include most of the soils commonly known as peat, or bog/fen soils. Most Organic soils are saturated with water for prolonged periods. These soils occur widely in poorly and very poorly drained depressions and level areas and are derived from vegetation that grows in such sites. The organic layer is greater than 60-cm thick (if fibric) or 40-cm thick (if mesic or humic).
Parameter	A particular physical, chemical, or biological property that is being measured in a waterbody; whatever it is you measure in a waterbody.
Parent material	Underlying bedrock or drift deposit on which soil horizons form and are made up of consolidated or unconsolidated mineral material that has undergone some degree of physical or chemical weathering.
Permafrost	Permanently frozen soil or rock and incorporated ice and organic material that remain at or below 0°C for a minimum of two years due to natural climatic factors (van Everdingen 1998). The occurrence of permafrost increases with latitude (i.e., more northern areas permafrost is continuous, and more southern areas patches of permafrost alternate with unfrozen ground).
Pioneer species	Plant species that are the first to establish in an area after a disturbance, such as fire or vegetation clearing. These species are typically fast growing and short lived.
Plant community	A collection of plants that live together on a relatively uniform area of land with a floristic composition and structure that is distinct from surrounding vegetation.
Podzolic soil	A Podzolic soil is characterized by an accumulation of amorphous material composed mainly of humified organic matter combined in varying degrees with Al and Fe, and generally occur in course to medium textured, acidic parent materials.
Polygon	A map delineation that represents a tract of land with certain landform, soil, hydrologic and vegetation features. The smallest polygon on a 1:50,000 scale map is about 0.5 cm ² and represents a tract of about 12.5 ha.

Term	Description
P-value	A value that ranges from zero to one. The value represents the answer to a hypothesis. The probability that an observed difference between groups is due to chance. For example, during a statistical test comparing the mean of two groups, if a P-value is 0.05, then there is only 5% chance that the observed difference between the groups is a result of chance alone (e.g., sampling error, variation in populations) as opposed to a specifically tested treatment.
Reclamation	The process of reconvertng disturbed land to its former or other productive uses.
Regional study area (RSA)	A broad area defined for the description of vegetation conditions generally centred on the Project and surroundings, and including areas where indirect effects of the Project might be expected to occur. Includes the Local Study Area.
Regosolic soil	Regosolic soils lack significant soil formation and occur on very young surfaces (e.g., sand dunes or river floodplains) or unstable surfaces (e.g., upper slope positions that experience high rates of soil erosion). Regosolic soils are thin and either completely lack a B horizon or have a thin B less than 5 cm thick.
Relative abundance	The number of organisms of a particular species as a proportion of the total number of organisms of a given habitat or defined area.
Riparian	(i) The interface between an upland area and a river or stream. (ii) the floodplain portion of a river or stream corridor.
Salinity, soil	The amount of soluble salts in a soil, expressed as electrical conductivity in decisiemens per metre (dS/m) and measured by the saturated paste method or equivalent.
Shrub	A woody perennial plant differing from a tree by its low stature and by generally producing several basal shoots instead of a single trunk.
Sediment	Solid particles of material that have been derived from rock weathering. They are transported and deposited from water, ice or air as layers at the earth's surface.
Soil	The naturally occurring, unconsolidated mineral or organic material at least 10 cm thick that occurs at the earth's surface and is capable of supporting plant growth. Soil extends from the earth's surface through the genetic horizons, if present, into the underlying material to the depth of the control section (normally about 1 to 2 m). Soil development involves climatic factors and organisms, conditioned by relief and water regime, acting through time on geological materials, and thus modifying the properties of the parent material (Agriculture Canada Expert Committee on Soil Survey 1987).
Soil great group	Used in the classification of soil and is the next division of the soil order. These are differentiated on the basis of characteristics that reflect the differences in the strengths of the dominant processes or a major contribution of an additional process.
Soil horizon	A layer of mineral or organic soil material approximately parallel to the land surface that has characteristics altered by processes of soil formation. It differs from adjacent horizons in properties such as colour, structure, texture, and consistence and in chemical, biological, or mineralogical composition.
Soil macroorganisms	Invertebrates that live in the soil, and are generally visible to the naked eye. Many benefits of macroorganisms include helping to break down minerals, soil particles and nutrients. Examples include beetles, earthworms, and some nematodes.
Soil microorganisms	Any organism in soil which requires a microscope to observe. These organisms include bacteria, fungi, algae, and protozoa. Soil microorganisms are responsible for the breakdown of organic matter, conversion of inorganic compounds from one form to another, and the production of humus.
Species	(i) A group of organisms that actually or potentially interbreed and are reproductively isolated from all other such groups; (ii) a taxonomic grouping of genetically and morphologically similar individuals; (iii) the category below genus.
Species richness	The number of different species in a given area.
Soil texture	A soil property used to describe the relative proportion of different grain sizes of mineral particles in a soil.
Swamp	Wooded mineral wetland or a peatland with standing water or water gently flowing through pools or channels that persist for long periods.

Term	Description
Subsoil	The layer of soil under the topsoil on the surface of the ground, the layer of soil under the topsoil on the surface of the ground.
Taiga	A moist, circumpolar, subarctic biome dominated by coniferous species. The taiga is bound to the north by the tundra.
Terrain	The landscape or lay of the land. This term is considered to comprise specific aspects of the landscape, namely genetic material, material composition, landform (or surface expression), active and inactive processes that modify material and form, slope, aspect, and drainage conditions. Terrain analysis is the identification of the above land surface features, to a more or less defined depth and determining their areal extent. The identification of special features such as permafrost, erosion, and landforms indicating subsurface structures are included in such analyses.
Thermal regime, soil	Refers to the amount of heat available for plant growth and development during the growing period. Thermal regime also influences the presence or absence of permafrost.
Till	An unstratified, unconsolidated mass of boulders, pebbles, sand, and mud deposited by the movement or melting of a glacier.
Topography	The surface features of a region, such as hills, valleys, or rivers.
Topsoil	Uppermost layer of soil, usually the top 5 to 20 cm. It has the highest concentration of organic matter and microorganisms and is where most of the biological activity occurs. Plants generally concentrate their roots in and obtain most of their nutrients from this layer.
Traditional use plants	Plant species that were and/or are currently used for food, medicinal, spiritual, or technical/trade (i.e., tools or products for use or trade) purposes by First Nations and Métis people.
Tukey-Kramer HSD test	An <i>a posteriori</i> method for determining if two means are statistically different.
Tundra	An area between the polar icecap and taiga that is characterized by a lack of trees and permanently frozen subsoil.
Upland	Areas that have typical ground slopes of 1 to 3% and are better-drainage.
Vascular plant	Higher-order plants that have internal structure for transporting water and nutrients. Includes flowering plants, conifers, fern, clubmosses, horsetail. Does not include mosses or algae.
Vegetation	A term to describe all of the plants or plant life of a place.
Weed	A plant that is undesirable in its current location. For example, weedy species in an agricultural field may include native plants, while crop and forage plants are considered weeds in native habitat.
Weed, Invasive	Invasive weeds are typically introduced plants that have the capacity to markedly alter plant communities or displace native plants, reduce biodiversity, and can cause economic damage to private and public lands. These species are aggressive competitors for moisture, nutrients and light, and typically do not have predators or pathogens.
Weed, Prohibited	Any plant, as defined by the <i>Weed Control Act 2010</i> , that is designated by order of the minister as a prohibited weed, and includes the seeds or any other part of that plant that may grow to produce another plant.
Weed, Noxious	Any plant, as defined by the <i>Weed Control Act 2010</i> , that is designated by order of the minister as a noxious weed, and includes the seeds or any other part of that plant that may grow to produce another plant.
Weed, Nuisance	Any plant, as defined by the <i>Weed Control Act 2010</i> , that is designated by order of the minister as a nuisance weed, and includes the seeds or any other part of that plant that may grow to produce another plant.
Wildlife	A term to describe all undomesticated animals living in the wild.
Xeric sites	Areas characterized by extremely dry, nutrient poor conditions.
Zone of influence	The defined area affected by alterations or disturbances from sensory disturbance that may have an effect on wildlife abundance and distribution.

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APPENDIX IV.1

Soil Data

Soil Site ID	NAD	Zone	Easting	Northing	Landform	Slope Position	Percent Slope	Slope Length	Peat/LFH Depth (cm)	Topsoil Depth (cm)	Drainage	Parent Material ^(a)	Soil Subgroup ^(b)	Vegetation Site	ELC Class
eae002	83	13V	473214	6550160	Upland	Mid	>2-5	<70m	0	9	Rapid	GLFL	E.EB	eae002	Recent Burn
eae003	83	13V	473101	6550400	Transition	Depression	0-0.5	n/a	9	0	Imperfect	GLFL	O.G	eae003	Recent Burn
eae004	83	13V	469620	6556759	Upland/bedrock	Mid	>2-5	<70m	0	0	Very Rapid	R	R	eae004	Bedrock
eae005	83	13V	469704	6556835	Wetland	Level	>0.5-2	>70m	96	0	Very Poor	O/R	T.M	eae005	Wetland (Fen)
eae006	83	13V	469730	6556859	Upland	Mid	>0.5-2	<70m	4	0	Well	AL	O.R	eae006	Mixedwood
eae007	83	13V	470064	6556904	Upland/bedrock	Mid	>0.5-2	<70m	5	0	Well	R	R	eae007	Mixedwood
eae008	83	13V	469652	6556766	Wetland	Level	0-0.5	n/a	220+	0	Very Poor	O	TY.F	eae008	Wetland (Fen)
eae009	83	13V	453375	6544729	Upland	Mid	>0.5-2	<70m	3	11	Rapid	GLFL	E.DYB	eae009	Jack Pine
eae010	83	13V	453399	6544767	Wetland	Level	0-0.5	n/a	48	0	Very Poor	O/GCFL	T.F	eae010	Wetland (Fen)
eae011	83	13V	468948	6569228	Upland	Mid	>2-5	>70m	9	5	Mod Well	GLFL	E.DYB	eae011	Deciduous
eae012	83	13V	469014	6569152	Transition	Level	0-0.5	n/a	27	0	Poor	L	ptR.G	eae012	Wetland (Fen)
eae013	83	13V	468947	6568985	Upland/bedrock	Mid	>2-5	<70m	3	0	Very Rapid	R	R	eae013	Deciduous
eae013b	83	13V	468960	6568953	Wetland	Toe	>0.5-2	>70m	28	0	Very Poor	O	HE.FO	eae013	Deciduous
eae014	83	13V	454878	6563869	Upland	Level	0-0.5	n/a	5	9	Mod Well	GLFL	E.DYB	eae014	Jack Pine/Black Spruce
eae015	83	13V	469070	6559971	Upland/bedrock	Upper	>2-5	<70m	0	0	Rapid	R	R	eae015	Regenerating Deciduous
eae016	83	13V	468185	6560854	Upland/bedrock	Upper	>2-5	n/c	0	0	Rapid	R	R	eae016	Regenerating Deciduous
eae019	83	13V	471673	6557268	Upland	Mid	>0.5-2	<70m	4	13	Well	GLFL	O.HFP	eae019	Recent Burn
EAES001	83	13V	468708	6557377	Upland	Mid	>0.5-2	>70m	7	0	Mod Well	GLFL	O.R	eae001	Mixedwood
eap001	83	13V	469214	6556958	Wetland	Mid	>2-5	<70m	28	0	Poor	O	HE.FO	eap001	Riparian/Wetland (Swamp)
eas002	83	13V	465995	6561660	Transition	Level	0-0.5	<70m	34	0	Poor	GLFL	ptR.G	eav002	Wetland (Fen)
eas007	83	13V	455919	6574498	Wetland	Level	0-0.5	n/a	71	0	Poor	O	TY.F	eav007	Wetland (Bog)
eas008	83	13V	455662	6574582	Wetland	Level	0-0.5	n/a	105	0	Very Poor	O	HY.F	eav008	Wetland (Bog)
eas009	83	13V	469058	6569419	Wetland	Level	0-0.5	n/a	166	0	Poor	O	TY.F	eav009	Wetland (Fen)
eas010	83	13V	460996	6553374	Upland	Mid	>30-45	>70m	2	21	Rapid	GLFL	E.DYB	eav010	Regenerating Mixedwood
eas011	83	13V	462134	6554083	Upland	Lower	>0.5-2	<70m	6	6	Mod Well	GLFL	GLE.DYB	eav011	Jack Pine/ Black Spruce
eas012	83	13V	471051	6563055	Upland/bedrock	Mid	>0.5-2	<70m	2	0	Rapid	R	R	eav012	Regenerating Mixedwood
eas013	83	13V	471097	6563035	Transition	Depression	>0.5-2	>70m	27	0	Poor	GLFL	ptR.G	eav013	Wetland (Swamp)
eas014	83	13V	471104	6562975	Upland/bedrock	Mid	>2-5	<70m	0	0	Rapid	R	R	eav014	Jack Pine
eas015	83	13V	471422	6564696	Upland/bedrock	Mid	>0.5-2	<70m	0	0	Rapid	R	R	eav015	Bedrock
eas016	83	13V	469470	6556689	Upland	Mid	>15-30	<70m	27	17	Rapid	GLFL	E.DYB	eav016	Jack Pine/ Black Spruce
eas017	83	13V	469245	6557061	Wetland	Mid	>30-45	<70m	11	0	Rapid	O	HE.FO	eav017	Mixedwood
eas018	83	13V	469443	6556775	Wetland	Mid	>15-30	<70m	12	0	Very Rapid	O	HE.FO	eav018	Mixedwood
eas019	83	13V	463874	6556932	Transition	Level	0-0.5	n/a	10	0	Poor	L	R.G	eav019	Wetland (Fen)
eas024	83	13V	468966	6560107	Wetland	Level	0-0.5	n/a	123	0	Poor	O	T.F	eav024	Regenerating Wetland (Bog)
eas025	83	13V	468347	6559446	Upland	Level	0-0.5	n/a	11	0	Mod Well	FL	C.R	eav025	Mixedwood
eas026	83	13V	468194	6560835	Wetland	Level	0-0.5	n/a	88	0	Poor	O	T.F	eav026	Regenerating Wetland (Fen)
eas027	83	13V	468219	6560658	Wetland	Mid	>0.5-2	>70m	56	0	Mod Well	FOPT	HE.FO	eav027	Mixedwood
eas028	83	13V	468583	6560560	Upland	Mid	>0.5-2	<70m	2	14	Rapid	GLFL	E.DYB	eav028	Regenerating Jack Pine
eas029	83	13V	469212	6557632	Upland	Mid	>0.5-2	>70m	29	0	Very Poor	O	HE.FO	eav029	Wetland (Swamp)
eas030	83	13V	471136	6558502	Transition	Toe	>70-100	<70m	9	0	Imperfect	GLFL	R.G	eav030	Mixedwood
easc006	83	13V	455895	6574456	Upland/bedrock	Crest	>45-70	<70m	2	0	Very Rapid	R	R	eav006	Spruce
easd005	83	13V	455461	6574507	Transition	Depression	>2-5	<70m	34	0	Poor	AL	R.G	eav005	Deciduous
easl006	83	13V	455912	6574464	Transition	Lower	>15-30	<70m	11	0	Mod Well	AL	R.G	eav006	Spruce

Soil Site ID	NAD	Zone	Easting	Northing	Landform	Slope Position	Percent Slope	Slope Length	Peat/LFH Depth (cm)	Topsoil Depth (cm)	Drainage	Parent Material ^(a)	Soil Subgroup ^(b)	Vegetation Site	ELC Class
easm001	83	13V	466058	6561660	Upland	Mid	>0.5-2	<70m	13	19	Imperfect	GLFL	GLE.DYB	eav001	Riparian
easm003	83	13V	467723	6557842	Upland	Mid	>2-5	>70m	1	4	Rapid	GLFL	E.DYB	eav003	Jack Pine/ Black Spruce
easm004	83	13V	468782	6556865	Upland	Mid	>15-30	<70m	10	25	Well	GLFL	E.DYB	eav004	Deciduous
easm005	83	13V	455481	6574520	Upland	Mid	>2-5	<70m	7	5	Mod Well	GLFL	E.DYB	eav005	Deciduous
easm006	83	13V	455910	6574460	Upland	Mid	>45-70	<70m	6	0	Rapid	GLFL	O.DYB	eav006	Spruce
Easo001	83	13V	466220	6561581	Wetland	Level	0-0.5	<70m	94	0	Poor	O	T.F	N/A	-
east001	83	13V	466060	6561665	Transition	Toe	>0.5-2	<70m	7	0	Poor	GLFL	R.G	eav001	Riparian
east009	83	13V	455817	6574370	Transition	Depression	0-0.5	n/a	2	0	-	L	R.G	eat009	Regenerating Wetland
easu003	83	13V	457723	6557842	Upland	Upper	0-0.5	>70m	3	9	Rapid	GLFL	E.EB	eav003	Jack Pine/ Black Spruce
easu005	83	13V	455483	6574535	Upland/bedrock	Crest	>0.5-2	<70m	0	0	Rapid	R	R	eav005	Deciduous
eat018	83	13V	453435	6544799	Upland	Upper	>15-30	<70m	4	2	Rapid	GLFL	E.DYB	eat018	Jack Pine/Black Spruce
eat020	83	13V	468953	6569303	Upland/bedrock	Mid	>0.5-2	<70m	0	0	Very Rapid	R	R	eat020	Bedrock
eat032	83	13V	469737	6559334	Transition	Level	0-0.5	n/a	15	8	Imperfect	GLFL	ptO.G	eat032	Regenerating Mixedwood

^(a) GLFL = glaciofluvial; O = Organic; R = Bedrock; AL = Alluvial; L = Lacustrine; FL = Fluvial; FOPT/R = folic peat over bedrock.

^(b) See Table IV.1-2 for Soil Subgroup code names.

NAD = North American Datum; ELC = Ecological Landscape Classification; > = greater than; < = less than; m = metres; cm = centimetres; N/A = not applicable

Order	Subgroup Code	Full Name
Brunisolic	E.DYB	Eluviated Dystric Brunisol
	GLE.DYB	Gleyed Eluviated Dystric Brunisol
	O.DYB	Orthic Dystric Brunisol
	E.EB	Eluviated Eutric Brunisol
Gleysolic	O.G	Orthic Gleysol
	pt O.R	peaty phase Orthic Gleysol
	R.G	Rego Gleysol
	pt R.G	peaty phase Rego Gleysol
Regosolic	C.R	Cumulic Regosol
	O.R	Orthic Regosol
Podzolic	O.HFP	Orthic Humo-Ferric Podzol
Organic	TY.F	Typic Fibrisol
	T.F	Terric Fibrisol
	HY.F	Hydric Fibrisol
	T.M	Terric Mesisol
	HE.FO	Hemic Folisol
Bedrock	R	Bedrock

**Table IV.1-3: Results of B-horizon Soil Chemistry used
for Determining Brunisolic Soil Great Groups**

Site ID	pH by 0.01 M CaCl ₂	Soil Subgroup Classification ^(a)
easu003	6.14	E.EB
eae002	5.97	E.EB
easm006	4.63	O.DYB
eae014	5.24	E.DYB
eat018	5.11	E.DYB
eae009	4.69	E.DYB
eas016	4.35	E.DYB
eae011	4.38	E.DYB
eas011	4.4	GLE.DYB

^(a) E.EB = Eluviated Eutric Brunisol; O.DYB = Orthic Dystric Brunisol; E.DYB = Eluvated Dystric Brunisol; GLE.DYB = Gleyed Eluviated Dystric Brunisol

0.01 M CaCl₂ = 0.01 molar calcium chloride

**Table IV.1-4: Results of Soil Chemistry used for
Determining Podzolic Soil Subgroups**

Site	pH by 0.01 M CaCl ₂	Inorganic Carbon (%)	Total Organic Carbon (%)	Total Carbon by Combustion (%)	CaCO ₃ Equivalent (%)	Aluminum (ug/g)	Iron (ug/g)	Manganese (ug/g)	Soil Subgroup Classification
ee019	4.36	<0.10	2.64	<0.80	2.6	6900	2600	<200	O.HFP

% = percent; < = less than; ug/g = microgram per gram of soil; 0.01 M CaCl₂ = 0.01 molar calcium chloride; CaCO₃ = Calcium Chloride; O.HFP = Orthic Humo-Ferric Podzol

APPENDIX IV.2

Vegetation Data

DETAILED VEGETATION INVENTORY SURVEY LOCATIONS, 2012					
Plot Number	Sampling Date	UTM Coordinates (NAD 83)			ELC Map Unit
		Zone	Northing	Easting	
EAV001	2-Jun-2012	13V	466058	6561663	Riparian
EAV002	2-Jun-2012	13V	465994	6561661	Wetland (Fen)
EAV003	2-Jun-2012	13V	467744	6557866	Jack Pine/ Black Spruce
EAV004	2-Jun-2012	13V	468780	6556865	Deciduous
EAV005	3-Jun-2012	13V	455488	6574513	Deciduous
EAV006	3-Jun-2012	13V	455911	6574451	Spruce
EAV007	3-Jun-2012	13V	455921	6574501	Wetland (Bog)
EAV008	3-Jun-2012	13V	455666	6574591	Wetland (Bog)
EAE011	5-Jun-2012	13V	468946	6569228	Deciduous
EAV009	5-Jun-2012	13V	469054	6569429	Wetland (Fen)
EAV010	5-Jun-2012	13V	460998	6553377	Regenerating Mixedwood
EAV011	5-Jun-2012	13V	462139	6554083	Jack Pine/ Black Spruce
EAV012	6-Jun-2012	13V	471049	6563052	Regenerating Mixedwood
EAV013	6-Jun-2012	13V	471095	6563033	Wetland (Swamp)
EAV014	6-Jun-2012	13V	471104	6562975	Jack Pine
EAV015	6-Jun-2012	13V	471426	6564696	Bedrock
EAV016	7-Jun-2012	13V	469471	6556689	Jack Pine/ Black Spruce
EAV017	7-Jun-2012	13V	469248	6557069	Mixedwood
EAV018	7-Jun-2012	13V	469441	6556776	Mixedwood
EAV019	7-Jun-2012	13V	463871	6556934	Wetland (Fen)
EAV020	8-Jun-2012	13V	468758	6556371	Spruce
EAV021	8-Jun-2012	13V	468734	6556277	Deciduous
EAV022	8-Jun-2012	13V	468403	6555644	Mixedwood
EAV023	8-Jun-2012	13V	467533	6556491	Jack Pine
EAV024	9-Jun-2012	13V	468967	6560103	Regenerating Wetland (Bog)
EAV025	9-Jun-2012	13V	468347	6559447	Mixedwood
EAV026	10-Jun-2012	13V	468192	6560821	Regenerating Wetland (Fen)
EAV027	10-Jun-2012	13V	468215	6560652	Mixedwood
EAV028	10-Jun-2012	13V	468584	6560561	Regenerating Jack Pine
EAV029	10-Jun-2012	13V	469207	6557634	Wetland (Swamp)
EAV030	11-Jun-2012	13V	471148	6558495	Mixedwood
EBP013	31-Jul-2012	13V	469183	6560822	Wetland (Swamp)
EBV001	31-Jul-2012	13V	469224	6560528	Bedrock
EBV002	31-Jul-2012	13V	469180	6560715	Regenerating Mixedwood
EBV003	31-Jul-2012	13V	468584	6560730	Regenerating Wetland (Fen)
EBV004	1-Aug-2012	13V	467079	6558152	Recent Burn
EBE007	1-Aug-2012	13V	467797	6559244	Regenerating Jack Pine
EBV005	2-Aug-2012	13V	463220	6556149	Wetland (Fen)
EBV006	2-Aug-2012	13V	466261	6561602	Riparian
EBE008	2-Aug-2012	13V	468989	6556997	Mixedwood

GROUND TRUTH/RECONNAISSANCE SURVEY LOCATIONS, 2012					
Plot Number	Sampling Date	UTM Coordinates (NAD 83)			ELC Map Unit
		Zone	Northing	Easting	
gravelpit	2-Jun-2012	13V	468653	6557292	Existing Disturbance
EAT007	2-Jun-2012	13V	466318	6561563	Wetland
EAT009	2-Jun-2012	13V	455808	6574352	Regenerating Wetland
EAT011	2-Jun-2012	13V	469903	6557405	Wetland
EAT013	2-Jun-2012	13V	469921	6557570	Wetland
EAT015	2-Jun-2012	13V	470070	6557496	Spruce
EAT008	2-Jun-2012	13V	466073	6561639	Wetland
EAT010	2-Jun-2012	13V	455814	6574563	Wetland
EAT012	2-Jun-2012	13V	469905	6557477	Bedrock
EAT014	2-Jun-2012	13V	470064	6557516	Bedrock
EAT016	2-Jun-2012	13V	470230	6557239	Wetland
EAT017	2-Jun-2012	13V	469944	6556977	Wetland
EAT018	4-Jun-2012	13V	453434	6544799	Jack Pine/ Black Spruce
EAT020	4-Jun-2012	13V	468953	6569303	Bedrock
EAT019	4-Jun-2012	13V	453376	6544796	Jack Pine
EAT020B	4-Jun-2012	13V	468946	6569269	Bedrock
EAT021	6-Jun-2012	13V	471474	6563780	Regenerating Jack Pine
EAT022	6-Jun-2012	13V	469577	6556774	Bedrock
EAT001	7-Jun-2012	13V	468789	6556835	Mixedwood
EAT003	7-Jun-2012	13V	468172	6557425	Regenerating Jack Pine
EAT005	7-Jun-2012	13V	466714	6560372	Wetland
EAT023	7-Jun-2012	13V	469270	6557036	Mixedwood
EAT024	8-Jun-2012	13V	468523	6555843	Spruce
EAT025	8-Jun-2012	13V	468559	6555765	Wetland
EAT026	8-Jun-2012	13V	468197	6555739	Mixedwood
EAT030	8-Jun-2012	13V	469321	6558065	Wetland
EAT027	8-Jun-2012	13V	467834	6555741	Jack Pine
EAT031	8-Jun-2012	13V	469644	6558444	Bedrock
EAT028	8-Jun-2012	13V	467457	6556140	Jack Pine/ Black Spruce
EAT032	8-Jun-2012	13V	469737	6559334	Regenerating Mixedwood
EAT029	9-Jun-2012	13V	469186	6557619	Jack Pine/ Black Spruce
EAT033	9-Jun-2012	13V	469590	6559480	Regenerating Mixedwood
EAT034	9-Jun-2012	13V	467964	6559430	Regenerating Mixedwood
EAT035	9-Jun-2012	13V	468300	6560695	Regenerating Mixedwood
EAT002	11-Jun-2012	13V	468425	6557373	Jack Pine/ Black Spruce
EAT004	11-Jun-2012	13V	466880	6559765	Regenerating Jack Pine
EAT006	11-Jun-2012	13V	466652	6560502	Jack Pine/ Black Spruce
EBT001	1-Aug-2012	13V	468234	6558242	Jack Pine
EBT002	1-Aug-2012	13V	467228	6558702	Jack Pine
EBT003	2-Aug-2012	13V	468008	6557559	Regenerating Wetland
EBT004	2-Aug-2012	13V	467650	6560428	Spruce
EBT005	2-Aug-2012	13V	467687	6560406	Spruce

LISTED PLANT SPECIES SURVEY LOCATIONS, 2010 and 2012					
Plot Number	Sampling Date	UTM Coordinates (NAD 83)			ELC Map Unit
		Zone	Northing	Easting	
BAR001	21-Jul-2010	13V	468426	6558227	Regenerating Jack Pine
BAR002	21-Jul-2010	13V	468413	6558530	Riparian
BAR003	21-Jul-2010	13V	468369	6558389	Regenerating Jack Pine
BAR004	22-Jul-2010	13V	473205	6559942	Recent Burn
BAR005	22-Jul-2010	13V	473162	6559798	Spruce
BAR006	22-Jul-2010	13V	472980	6559785	Riparian
BAR007	22-Jul-2010	13V	471803	6560178	Bedrock
BAR008	22-Jul-2010	13V	471480	6560273	Regenerating Wetland (Swamp)
BAR009	22-Jul-2010	13V	471384	6560172	Deciduous
BAR010	22-Jul-2010	13V	471367	6560049	Mixedwood
BAR011	22-Jul-2010	13V	471384	6559998	Riparian
BAR012	23-Jul-2010	13V	469184	6556843	Spruce
BAR013	23-Jul-2010	13V	469452	6556875	Riparian
BAR014	23-Jul-2010	13V	469605	6557169	Spruce
BAR014B	23-Jul-2010	13V	469605	6557169	Bedrock
BAR015	23-Jul-2010	13V	469350	6557520	Spruce
BAR016	23-Jul-2010	13V	469497	6557278	Wetland (Fen)
BAR017	23-Jul-2010	13V	469432	6558089	Wetland (Fen)
BAR018	23-Jul-2010	13V	469394	6558435	Jack Pine
BAR019	23-Jul-2010	13V	469418	6558575	Bedrock
BAR020	23-Jul-2010	13V	469365	6558787	Regenerating Wetland (Swamp)
BAR021	23-Jul-2010	13V	469325	6558931	Regenerating Mixedwood
BAR022	23-Jul-2010	13V	469180	6559839	Regenerating Jack Pine
BAR023	23-Jul-2010	13V	469144	6560056	Regenerating Jack Pine/Black Spruce
BAR024	24-Jul-2010	13V	471080	6558336	Spruce
BAR025	24-Jul-2010	13V	471059	6558376	Bedrock
BAR027	24-Jul-2010	13V	471067	6558299	Mixedwood
BAR028	24-Jul-2010	13V	470819	6557769	Deciduous
BAR029	24-Jul-2010	13V	470713	6557746	Jack Pine
EAE001	2-Jun-2012	13V	468705	6557364	Mixedwood
EAE004	2-Jun-2012	13V	469620	6556759	Bedrock
EAE002	3-Jun-2012	13V	473212	6550158	Recent Burn
EAE005	3-Jun-2012	13V	469704	6556835	Wetland (Fen)
EAE003	3-Jun-2012	13V	473099	6550398	Recent Burn
EAE006	3-Jun-2012	13V	469736	6556856	Mixedwood
EAE007	3-Jun-2012	13V	470068	6556901	Mixedwood
EAE008	4-Jun-2012	13V	469654	6556760	Wetland (Fen)
EAE009	4-Jun-2012	13V	453371	6544724	Jack Pine
EAE010	4-Jun-2012	13V	453400	6544764	Wetland (Fen)
EAE012	5-Jun-2012	13V	469012	6569148	Wetland (Fen)
EAE013	5-Jun-2012	13V	468952	6568981	Deciduous
EAP001	7-Jun-2012	13V	469208	6556959	Wetland (Swamp)
EAE014	7-Jun-2012	13V	454881	6563873	Jack Pine/ Black Spruce
EAE015	9-Jun-2012	13V	469065	6559967	Regenerating Deciduous
EAE016	10-Jun-2012	13V	468185	6560854	Regenerating Deciduous
EAE017	10-Jun-2012	13V	469102	6560154	Regenerating Mixedwood
EAP002	11-Jun-2012	13V	471126	6558512	Mixedwood
EAE019	11-Jun-2012	13V	471671	6557266	Recent Burn
EBP001	30-Jul-2012	13V	468584	6558596	Regenerating Mixedwood
EBP002	30-Jul-2012	13V	468314	6558783	Mixedwood
EBP003	30-Jul-2012	13V	468435	6559054	Regenerating Mixedwood
EBP004	30-Jul-2012	13V	468562	6559263	Regenerating Jack Pine/Black Spruce
EBP005	30-Jul-2012	13V	468768	6559278	Regenerating Jack Pine/Black Spruce
EBP006	30-Jul-2012	13V	468789	6559407	Wetland (Fen)
EBP007	30-Jul-2012	13V	468786	6559449	Jack Pine
EBP009	30-Jul-2012	13V	468800	6558853	Regenerating Wetland (Fen)
EBP010	30-Jul-2012	13V	468770	6558680	Mixedwood
EBP011	30-Jul-2012	13V	468937	6558643	Regenerating Mixedwood
EBP012	31-Jul-2012	13V	469405	6560390	Wetland (Swamp)
EBP014	31-Jul-2012	13V	469075	6560910	Jack Pine
EBP015	31-Jul-2012	13V	468239	6560804	Mixedwood
EBP016	31-Jul-2012	13V	468439	6560668	Wetland (Fen)
EBP017	31-Jul-2012	13V	468712	6560449	Regenerating Mixedwood
EBE001	1-Aug-2012	13V	468484	6558209	Regenerating Deciduous
EBE002	1-Aug-2012	13V	468197	6558438	Regenerating Deciduous
EBE003	1-Aug-2012	13V	467811	6558094	Regenerating Jack Pine
EBE004	1-Aug-2012	13V	467630	6558015	Jack Pine/ Black Spruce
EBE005	1-Aug-2012	13V	466946	6558996	Mixedwood
EBE006	1-Aug-2012	13V	467471	6559256	Jack Pine
EBP008	1-Aug-2012	13V	468746	6559027	Regenerating Mixedwood
EBP018	1-Aug-2012	13V	471153	6558543	Mixedwood
EBP019	1-Aug-2012	13V	471323	6558834	Wetland (Fen)
EBP020	1-Aug-2012	13V	471466	6559073	Jack Pine/ Black Spruce
EBP021	1-Aug-2012	13V	471191	6558449	Riparian
EBE009	2-Aug-2012	13V	466557	6560431	Jack Pine/ Black Spruce
EBP022	2-Aug-2012	13V	466704	6560415	Riparian
EBP023	2-Aug-2012	13V	468593	6557190	Mixedwood
EBP024	2-Aug-2012	13V	468474	6556421	Mixedwood

UTM = Universal Transverse Mercator; NAD 83 = North American Datum 1983; ELC = Ecological Landscape Classification

BEDROCK INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Picea mariana</i>	black spruce	<i>Populus balsamifera</i>	balsam poplar
<i>Pinus banksiana</i>	jack pine	-	-
Tall Shrub Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Empetrum nigrum</i>	crowberry	<i>Prunus pensylvanica</i>	pin cherry
Low Shrub Layer			
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Populus tremuloides</i>	trembling aspen
<i>Betula papyrifera</i>	white birch	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Empetrum nigrum</i>	crowberry	<i>Rosa acicularis</i>	prickly rose
<i>Picea mariana</i>	black spruce	<i>Vaccinium myrtilloides</i>	blueberry
<i>Pinus banksiana</i>	jack pine	<i>Vaccinium vitis-idaea</i>	bog cranberry
Forb Layer			
<i>Campanula rotundifolia</i>	harebell	<i>Potentilla pensylvanica</i>	prairie cinquefoil
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Potentilla tridentata</i>	three-toothed cinquefoil
<i>Corydalis sempervirens</i>	pink corydalis	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Cryptogramma acrostichoides</i>	parsley fern	<i>Solidago spathulata</i> var. <i>spathulata</i> (syn. <i>S. simplex</i> ssp. <i>simplex</i>)	mountain goldenrod
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Solidago</i> species	goldenrod species
<i>Hieracium umbellatum</i>	narrow-leaved hawkweed	<i>Woodsia ilvensis</i>	rusty woodsia
<i>Lycopodium annotinum</i>	stiff club-moss	<i>Woodsia scopulina</i>	mountain woodsia
<i>Polypodium virginianum</i>	rock polypody	<i>Woodsia</i> species	<i>Woodsia</i> species
<i>Potentilla arguta</i>	white cinquefoil	-	-
Graminoid Layer			
<i>Agrostis scabra</i>	rough hair grass	<i>Oryzopsis asperifolia</i>	white-grained mountain rice grass
<i>Carex deflexa</i>	bent sedge	<i>Oryzopsis pungens</i>	northern rice grass
<i>Carex</i> species	sedge species	<i>Poa interior</i>	inland bluegrass
<i>Festuca</i> species	<i>Festuca</i> species	<i>Schizachne purpurascens</i>	purple oat grass
<i>Juncus</i> species	rush species	-	-
Bryophyte Layer			
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Polytrichum</i> cf. <i>piliferum</i>	awned hair-cap
<i>Cynodontium strumiferum</i>	Cynodontium moss	<i>Polytrichum piliferum</i>	awned hair-cap
<i>Hedwigia ciliata</i>	Ciliate hedwigia moss	<i>Polytrichum</i> species	<i>Polytrichum</i> species
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Ptilidium ciliare</i>	liverwort
Ground-dwelling and Epiphytic Lichens			
<i>Agonomia</i> species	Agnomia lichen	<i>Cladonia subulata</i>	antlered powderhorn
<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	<i>Cladonia uncialis</i>	thorn cladonia
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Evernia mesomorpha</i>	boreal oakmoss lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Cetraria sepincola</i>	<i>Cetraria</i> lichen	<i>Imshaugia aleurites</i>	salted starburst lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Lepraria</i> species	dust lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Melanelia septentrionalis</i>	northern camouflage lichen
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Melanelia stygia</i>	Alpine camouflage lichen
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cladonia coccifera</i>	British soldier lichen	<i>Stereocaulon paschale</i>	Easter lichen
<i>Cladonia crispata</i>	organ-pipe lichen	<i>Stereocaulon</i> species	<i>Stereocaulon</i> species
<i>Cladonia cristatella</i>	British soldiers	<i>Trapeliopsis granulosa</i>	mottled-disk lichen
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladonia furcata</i>	many-forked cladonia	<i>Tuckermannopsis orbata</i> (syn. <i>Cetraria orbata</i>)	variable wrinkle-lichen
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	<i>Umbilicaria deusta</i>	Peppered rock tripe
<i>Cladonia grayi</i>	Cladonia lichen	<i>Umbilicaria hyperborea</i>	Blistered rock tripe
<i>Cladonia phyllophora</i>	felt cladonia	<i>Usnea scabrata</i>	straw beard lichen
<i>Cladonia pleurota</i>	red-fruited pixie-cup	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
<i>Cladonia pyxidata</i>	pebbled pixie-cup	<i>Xanthoparmelia</i> species	<i>Xanthoparmelia</i> species
<i>Cladonia</i> species	<i>Cladonia</i> species	-	-
JACK PINE INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Picea mariana</i>	black spruce	<i>Populus tremuloides</i>	trembling aspen
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Empetrum nigrum</i>	crowberry	<i>Populus tremuloides</i>	trembling aspen
<i>Picea glauca</i>	white spruce	-	-
Low Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Pinus banksiana</i>	jack pine
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Betula papyrifera</i>	white birch	<i>Salix</i> species	willow species
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium myrtilloides</i>	blueberry
<i>Linnaea borealis</i>	twinline	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Picea mariana</i>	black spruce	-	-

JACK PINE INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer			
<i>Campanula rotundifolia</i>	harebell	<i>Gymnocarpium jessoense</i> ssp. <i>parvulum</i>	limestone oak fern
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Corydalis sempervirens</i>	pink corydalis	<i>Solidago spathulata</i> var. <i>spathulata</i> (syn. <i>S. simplex</i> ssp. <i>simplex</i>)	mountain goldenrod
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Woodsia ilvensis</i>	rusty woodsia
<i>Geocaulon lividum</i>	northern bastard toadflax	-	-
Graminoid Layer			
<i>Agrostis scabra</i>	rough hair grass	grass species	Unknown grass species
<i>Calamagrostis canadensis</i>	bluejoint	<i>Oryzopsis asperifolia</i>	white-grained mountain rice grass
<i>Carex deflexa</i>	bent sedge	<i>Oryzopsis pungens</i>	northern rice grass
<i>Carex</i> species	sedge species	<i>Oryzopsis</i> species	rice grass species
Bryophyte Layer			
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Dicranum polysetum</i>	wavy dicranum	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Dicranum</i> species	Dicranum moss	<i>Polytrichum</i> species	Polytrichum species
<i>Hedwigia ciliata</i>	Ciliate hedwigia moss	<i>Tetraplodon angustatus</i>	narrow-leaved splachnum
<i>Hylocomium splendens</i>	stair-step moss	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria furcellata</i>	burred horsehair lichen	<i>Cladonia</i> species	Cladonia species
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Cladonia uncialis</i>	thorn cladonia
<i>Cladina mitis</i>	green reindeer lichen	<i>Evernia mesomorpha</i>	boreal oakmoss lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Flavoparmelia</i> species	Flavoparmelia species
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Imshaugia aleurites</i>	salted starburst lichen
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Imshaugia placrodia</i>	American starburst lichen
<i>Cladonia cf. chlorophaea</i>	False pixie-cup	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cladonia cornuta</i>	bighorn cladonia	<i>Parmeliopsis ambigua</i>	green starburst lichen
<i>Cladonia cristatella</i>	British soldiers	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladonia grayi</i>	Cladonia lichen	<i>Stereocaulon paschale</i>	Easter lichen
<i>Cladonia phyllophora</i>	felt cladonia	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladonia pleurota</i>	red-fruited pixie-cup	<i>Umbilicaria</i> species	Umbilicaria species
<i>Cladonia pyxidata</i>	pebbled pixie-cup	<i>Vulpicida pinastri</i> (syn. <i>Tuckermannopsis pinastri</i>)	powdered sunshine lichen
JACK PINE/ BLACK SPRUCE INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Empetrum nigrum</i>	crowberry	-	-
Low Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Populus tremuloides</i>	trembling aspen
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Empetrum nigrum</i>	crowberry	<i>Rosa acicularis</i>	prickly rose
<i>Juniperus communis</i>	ground juniper	<i>Salix</i> species	willow species
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium myrtilloides</i>	blueberry
<i>Picea mariana</i>	black spruce	<i>Viburnum edule</i>	low-bush cranberry
<i>Pinus banksiana</i>	jack pine	<i>Vaccinium vitis-idaea</i>	bog cranberry
Forb Layer			
<i>Campanula rotundifolia</i>	harebell	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Cornus canadensis</i>	bunchberry	<i>Lycopodium clavatum</i>	running club-moss
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Lycopodium obscurum</i>	ground-pine
<i>Equisetum sylvaticum</i>	woodland horsetail	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Geocaulon lividum</i>	northern bastard toadflax	-	-
Graminoid Layer			
<i>Calamagrostis canadensis</i>	bluejoint	<i>Oryzopsis pungens</i>	northern rice grass
Bryophyte Layer			
<i>Cephaloziella rubella</i>	liverwort	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Dicranum fuscescens</i>	fuscous moss	<i>Pohlia nutans</i>	copper wire moss
<i>Dicranum polysetum</i>	wavy dicranum	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Hylocomium splendens</i>	stair-step moss	<i>Ptilidium pulcherrimum</i>	liverwort
Ground-dwelling and Epiphytic Lichens			
<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Imshaugia placrodia</i>	American starburst lichen
<i>Bryoria glabra</i>	shiny horsehair lichen	<i>Lecanora hagenii</i>	Hagen's rim lichen
<i>Bryoria simplicior</i>	burred horsehair lichen	<i>Lecanora pulcaris</i>	Rim lichen
<i>Buellia punctata</i>	button lichen	<i>Lecanora subintricata</i>	Rim lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Lecidea leprarioides</i>	tile lichen
<i>Cetraria sepincola</i>	Cetraria lichen	<i>Lecidea nylanderi</i>	Nylander's lecidea lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Melanelia hepatizon</i> (syn. <i>Cetraria hepatizon</i>)	Rimmed camouflage lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Melanelia septentrionalis</i>	northern camouflage lichen
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Melanelia trabeculata</i>	Camouflage lichen
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladonia chlorophaea</i>	false pixie-cup	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladonia cornuta</i>	bighorn cladonia	<i>Physcia aipolia</i>	hoary rosette lichen
<i>Cladonia crispata</i>	organ-pipe lichen	<i>Trapeliopsis granulosa</i>	mottled-disk lichen

JACK PINE/ BLACK SPRUCE INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Ground-dwelling and Epiphytic Lichens			
<i>Cladonia cristatella</i>	British soldiers	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladonia cyanipes</i>	cup lichen	<i>Tuckermannopsis orbata</i> (syn. <i>Cetraria orbata</i>)	variable wrinkle-lichen
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Usnea filipendula</i>	fishbone beard lichen
<i>Cladonia fimbriata</i>	trumpet lichen	<i>Usnea fulvoreaegens</i>	beard lichen
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	<i>Usnea hirta</i>	shaggy beard lichen
<i>Cladonia pyxidata</i>	pebbled pixie-cup	<i>Usnea scabrata</i>	straw beard lichen
<i>Cladonia</i> species	<i>Cladonia</i> species	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
<i>Cladonia sulphurina</i>	greater sulphur cup	<i>Xanthoria</i> species	<i>Xanthoria</i> species
<i>Cladonia uncialis</i>	thorn cladonia	<i>Xylographa soralifera</i>	<i>Xylographa</i> lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	-	-
SPRUCE INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Larix laricina</i>	tamarack	<i>Populus tremuloides</i>	trembling aspen
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Picea mariana</i>	black spruce
<i>Alnus viridis</i>	green alder	<i>Empetrum nigrum</i>	crowberry
<i>Betula papyrifera</i>	white birch	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Rubus idaeus</i>	wild red raspberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccos</i>)	small bog cranberry	<i>Salix</i> species	willow species
<i>Picea mariana</i>	black spruce	<i>Vaccinium myrtilloides</i>	blueberry
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Rosa acicularis</i>	prickly rose	<i>Viburnum edule</i>	low-bush cranberry
Forb Layer			
<i>Cornus canadensis</i>	bunchberry	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Equisetum arvense</i>	common horsetail	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Geocaulon lividum</i>	northern bastard toadflax	<i>Pyrola picta</i>	white-veined wintergreen
<i>Goodyera repens</i>	lesser rattlesnake plantain	<i>Rubus chamaemorus</i>	cloudberry
Graminoid Layer			
grass species	unknown grass species	<i>Calamagrostis inexpansa</i>	northern reed grass
Bryophyte Layer			
<i>Dicranum polysetum</i>	wavy dicranum	<i>Ptilium crista-castrensis</i>	knight's plume moss
<i>Dicranum</i> species	<i>Dicranum</i> moss	<i>Ptilidium pulcherrimum</i>	liverwort
<i>Hylocomium splendens</i>	stair-step moss	<i>Sphagnum angustifolium</i>	peat moss
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Sphagnum fuscum</i>	rusty peat moss
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria furcellata</i>	burred horsehair lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Peltigera neopolydactyla</i>	carpet pelt
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Peltigera scabrata</i>	Rough pelt
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	-	-
MIXEDWOOD INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Pinus banksiana</i>	jack pine
<i>Betula papyrifera</i>	white birch	<i>Populus balsamifera</i>	balsam poplar
<i>Picea glauca</i>	white spruce	<i>Populus tremuloides</i>	trembling aspen
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Picea mariana</i>	black spruce
<i>Alnus viridis</i>	green alder	<i>Pinus banksiana</i>	jack pine
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Populus tremuloides</i>	trembling aspen
<i>Betula papyrifera</i>	white birch	<i>Prunus pensylvanica</i>	pin cherry
<i>Picea glauca</i>	white spruce	<i>Salix bebbiana</i>	beaked willow
Low Shrub Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Alnus viridis</i>	green alder	<i>Populus tremuloides</i>	trembling aspen
<i>Amelanchier alnifolia</i>	saskatoon	<i>Ribes hudsonianum</i>	northern black currant
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Ribes lacustre</i>	bristly black currant
<i>Betula papyrifera</i>	white birch	<i>Rosa acicularis</i>	prickly rose
<i>Juniperus communis</i>	ground juniper	<i>Rubus idaeus</i>	wild red raspberry
<i>Linnaea borealis</i>	twinflower	<i>Vaccinium myrtilloides</i>	blueberry
<i>Picea glauca</i>	white spruce	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Picea mariana</i>	black spruce	<i>Viburnum edule</i>	low-bush cranberry
Forb Layer			
<i>Actaea rubra</i>	red and white baneberry	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Anemone</i> species	<i>Anemone</i> species	<i>Lycopodium obscurum</i>	ground-pine
<i>Aralia nudicaulis</i>	wild sarsaparilla	<i>Mitella nuda</i>	bishop's-cap
<i>Campanula rotundifolia</i>	harebell	<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen

MIXEDWOOD INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer (continued)			
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Petasites frigidus</i> var. <i>palmatus</i>	palmate-leaved coltsfoot
<i>Cornus canadensis</i>	bunchberry	<i>Polypodium virginianum</i>	rock polypody
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Dryopteris fragrans</i>	fragrant shield fern	<i>Pyrola</i> species	Wintergreen species
<i>Equisetum pratense</i>	meadow horsetail	<i>Rubus pubescens</i>	dewberry
<i>Geocaulon lividum</i>	northern bastard toadflax	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Goodyera repens</i>	lesser rattlesnake plantain	<i>Trientalis borealis</i>	northern starflower
<i>Lilium</i> species	lily species	<i>Woodsia ilvensis</i>	rusty woodsia
Graminoid Layer			
<i>Agrostis scabra</i>	rough hair grass	<i>Carex</i> species	sedge species
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex vaginata</i>	sheathed sedge
<i>Carex deflexa</i>	bent sedge	<i>Oryzopsis pungens</i>	northern rice grass
<i>Carex siccata</i>	hay sedge	-	-
Bryophyte Layer			
<i>Abietinella abietina</i> (syn. <i>Thuidium abietinum</i>)	Wiry fern moss	<i>Hypnum cupressiforme</i>	Cypress pigtail moss
<i>Amblystegium serpens</i>	Amblystegium moss	<i>Lophocolea heterophylla</i>	liverwort
<i>Aulacomnium palustre</i>	tufted moss	<i>Lophozia alpestris</i>	liverwort
<i>Barbilophozia barbata</i>	liverwort	<i>Lophozia</i> species	Lophozia species
<i>Brachythecium laetum</i> (syn. <i>Brachythecium oxycladon</i>)	Brachythecium moss	<i>Lophozia ventricosa</i>	liverwort
<i>Brachythecium salebrosum</i>	Golden ragged feather moss	<i>Oncophorus wahlenbergii</i>	mountain curved-back moss
<i>Brachythecium</i> species	Brachythecium moss	<i>Paraleucobryum longifolium</i>	long-leaved fork moss
<i>Bryum sensu lato</i> species	thread moss species	<i>Plagiothecium laetum</i>	plagiothecium moss
<i>Campylium halleri</i>	Haller's campylium moss	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Cephalozia rubella</i>	liverwort	<i>Pohlia nutans</i>	copper wire moss
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Climacium dendroides</i>	common tree moss	<i>Polytrichum</i> species	Polytrichum species
<i>Cynodontium strumiferum</i>	Cynodontium moss	<i>Ptilidium ciliare</i>	liverwort
<i>Dicranum fragillifolium</i>	cushion moss	<i>Ptilidium pulcherrimum</i>	liverwort
<i>Dicranum fuscescens</i>	fuscous moss	<i>Ptilium crista-castrensis</i>	knight's plume moss
<i>Dicranum polysetum</i>	wavy dicranum	<i>Pylaisiella polyantha</i>	pylaisiella moss
<i>Dicranum scoparium</i>	broom moss	<i>Sanionia uncinata</i> (syn. <i>Drepanocladus uncinatus</i>)	brown moss
<i>Eurhynchiastrum pulchellum</i>	Common beaked moss	<i>Tritomaria exsectiformis</i>	liverwort
<i>Hylocomium splendens</i>	stair-step moss	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria furcellata</i>	burred horsehair lichen	<i>Melanelia subaurifera</i>	abraded camouflage lichen
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Melanohalea exasperatula</i>	Lustrous brown lichen
<i>Bryoria glabra</i>	shiny horsehair lichen	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Parmeliopsis ambigua</i>	green starburst lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Peltigera malacea</i>	veinless pelt
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Physcia adscendens</i>	hooded rosette lichen
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Physcia alnophila</i>	Rosette lichen
<i>Cladonia cenotea</i>	powdered funnel lichen	<i>Physcia stellaris</i>	star rosette lichen
<i>Cladonia coniocraea</i>	cup lichen	<i>Physciella melanchra</i>	Rosette lichen
<i>Cladonia cornuta</i>	bighorn cladonia	<i>Ramalina dilacerata</i>	punctured ramalina
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Ramalina obtusata</i>	hooded ramalina
<i>Cladonia fimbriata</i>	trumpet lichen	<i>Rinodina</i> species	Rinodina species
<i>Cladonia pleurota</i>	red-fruited pixie-cup	<i>Stereocaulon</i> species	Stereocaulon species
<i>Cladonia rei</i>	Wand lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladonia</i> species	<i>Cladonia</i> species	<i>Tuckermannopsis orbata</i> (syn. <i>Cetraria orbata</i>)	variable wrinkle-lichen
<i>Cladonia sulphurina</i>	greater sulphur cup	<i>Usnea fulvovireagens</i>	beard lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	<i>Usnea hirta</i>	shaggy beard lichen
<i>Hypogymnia physodes</i>	monk's-hood lichen	<i>Usnea lapponica</i>	powdered beard lichen
<i>Imshaugia aleurites</i>	salted starburst lichen	<i>Usnea substerilis</i>	beard lichen
<i>Melanelia septentrionalis</i>	northern camouflage lichen	<i>Vulpicida pinastri</i> (syn. <i>Tuckermannopsis pinastri</i>)	powdered sunshine lichen
DECIDUOUS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Picea glauca</i>	white spruce	<i>Populus tremuloides</i>	trembling aspen
<i>Picea mariana</i>	black spruce	<i>Salix</i> species	willow species
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Populus tremuloides</i>	trembling aspen
<i>Betula papyrifera</i>	white birch	<i>Prunus</i> species	Plum species
<i>Picea glauca</i>	white spruce	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Amelanchier alnifolia</i>	saskatoon	<i>Populus tremuloides</i>	trembling aspen
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Betula papyrifera</i>	white birch	<i>Rosa acicularis</i>	prickly rose
<i>Juniperus communis</i>	ground juniper	<i>Rubus idaeus</i>	wild red raspberry
<i>Linnaea borealis</i>	twinflower	<i>Vaccinium myrtilloides</i>	blueberry
<i>Picea glauca</i>	white spruce	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Pinus banksiana</i>	jack pine	<i>Viburnum edule</i>	low-bush cranberry

DECIDUOUS INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer			
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Geocaulon lividum</i>	northern bastard toadflax
<i>Cornus canadensis</i>	bunchberry	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Spiranthes</i> species	ladies'-tresses species
<i>Dryopteris fragrans</i>	fragrant shield fern	-	-
Graminoid Layer			
<i>Calamagrostis canadensis</i>	bluejoint	<i>Oryzopsis pungens</i>	northern rice grass
<i>Carex umbellata</i> (syn. <i>C. abdita</i>)	umbellate sedge	-	-
Bryophyte Layer			
<i>Barbilophozia barbata</i>	liverwort	<i>Platygyrium repens</i>	Platygyrium moss
<i>Brachythecium</i> species	Brachythecium moss	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Bryum sensu lato</i> species	thread moss species	<i>Pohlia nutans</i>	copper wire moss
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Dicranum fuscescens</i>	fuscous moss	<i>Ptilidium ciliare</i>	liverwort
<i>Dicranum polysetum</i>	wavy dicranum	<i>Ptilidium pulcherrimum</i>	liverwort
<i>Hedwigia ciliata</i>	Ciliate hedwigia moss	<i>Pylaisiella polyantha</i>	pylaisiella moss
<i>Hylocomium splendens</i>	stair-step moss	<i>Splachnum</i> species 1	unknown Splachnum species 1
<i>Lophozia ventricosa</i>	liverwort	<i>Splachnum</i> species 2	unknown Splachnum species 2
<i>Paraleucobryum longifolium</i>	long-leaved fork moss	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Arctoparmelia aleutica</i>	Aleutian rim lichen	<i>Lecanora symmicta</i>	fused rim-lichen
<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	<i>Lecidea leprarioides</i>	tile lichen
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Melanelia septentrionalis</i>	northern camouflage lichen
<i>Buellia punctata</i>	button lichen	<i>Nephroma resupinatum</i>	Pimpled kidney lichen
<i>Candelariella lutella</i>	goldspeck lichen	<i>Parmelia fraudans</i>	Shield lichen
<i>Cetraria ericetorum</i>	Iceland lichen	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cetraria</i> species	<i>Cetraria</i> species	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Peltigera malacea</i>	veinless pelt
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Peltigera rufescens</i>	Felt pelt
<i>Cladonia chlorophaea</i>	false pixie-cup	<i>Phaeocalicium betulinum</i>	Phaeocalicium lichen
<i>Cladonia cyanipes</i>	cup lichen	<i>Physcia aipolia</i>	hoary rosette lichen
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Rinodina orculata</i>	Pepper-spore lichen
<i>Cladonia gracilis</i> ssp. <i>gracilis</i>	Smooth cladonia	<i>Rinodina septentrionalis</i>	Pepper-spore lichen
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	<i>Stereocaulon</i> species	<i>Stereocaulon</i> species
<i>Cladonia</i> species	<i>Cladonia</i> species	<i>Stereocaulon tomentosum</i>	wooly foam lichen
<i>Cladonia uncialis</i>	thorn cladonia	<i>Strangospora moriformis</i>	Strangospora lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Hypogymnia physodes</i>	monk's-hood lichen	<i>Usnea glabrata</i>	old man's beard
<i>Lecanora subintricata</i>	Rim lichen	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
WETLAND - BOG SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Picea mariana</i>	black spruce	-	-
Low Shrub Layer			
<i>Andromeda polifolia</i>	bog rosemary	<i>Picea mariana</i>	black spruce
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Empetrum nigrum</i>	crowberry	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccus</i>)	small bog cranberry	-	-
Forb Layer			
<i>Drosera rotundifolia</i>	round-leaved sundew	<i>Rubus chamaemorus</i>	cloudberry
Graminoid Layer			
<i>Carex aquatilis</i>	water sedge	<i>Eriophorum vaginatum</i>	sheathed cotton grass
Bryophyte Layer			
<i>Andreaea rupestris</i>	Black rock moss	<i>Ptilidium ciliare</i>	liverwort
<i>Aulacomnium turgidum</i>	Turgid aulacomnium moss	<i>Sphagnum angustifolium</i>	peat moss
<i>Dicranum undulatum</i>	wavy dicranum	<i>Sphagnum capillifolium</i>	acute-leaved peat moss
<i>Hylocomium splendens</i>	stair-step moss	<i>Sphagnum fuscum</i>	rusty peat moss
<i>Mylia anomala</i>	liverwort	<i>Sphagnum magellanicum</i>	midway peat moss
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Sphagnum riparium</i>	shore-growing peat moss
<i>Polytrichum juniperinum</i>	juniper hair-cap	<i>Sphagnum</i> species	<i>Sphagnum</i> species
<i>Polytrichum strictum</i>	slender hair-cap	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	<i>Cladonia deformis</i>	lesser sulphur-cup
<i>Arctoparmelia separata</i>	Rippled ring lichen	<i>Cladonia fimbriata</i>	trumpet lichen
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Evernia mesomorpha</i>	boreal oakmoss lichen
<i>Buellia punctata</i>	button lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Icmadophila ericetorum</i>	fairy puke
<i>Cetraria sepincola</i>	<i>Cetraria</i> lichen	<i>Melanelia stygia</i>	Alpine camouflage lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Parmeliopsis ambigua</i>	green starburst lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Stereocaulon paschale</i>	Easter lichen
<i>Cladina stellaris</i>	northern reindeer lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Umbilicaria hyperborea</i>	Blistered rock tripe
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen

WETLAND - FEN SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Picea mariana</i>	black spruce
<i>Larix laricina</i>	tamarack	<i>Pinus banksiana</i>	jack pine
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Salix bebbiana</i>	beaked willow
<i>Larix laricina</i>	tamarack	-	-
Low Shrub Layer			
<i>Andromeda polifolia</i>	bog rosemary	<i>Picea mariana</i>	black spruce
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Pinus banksiana</i>	jack pine
<i>Betula pumila</i>	dwarf birch	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Salix cf. candida</i>	hoary willow
<i>Empetrum nigrum</i>	crowberry	<i>Salix myrtillofolia</i>	myrtle-leaved willow
<i>Kalmia polifolia</i>	northern laurel	<i>Salix pedicellaris</i>	bog willow
<i>Larix laricina</i>	tamarack	<i>Salix</i> species	willow species
<i>Myrica gale</i>	sweet gale	<i>Vaccinium myrtilloides</i>	blueberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccos</i>)	small bog cranberry	<i>Vaccinium vitis-idaea</i>	bog cranberry
Forb Layer			
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Parnassia palustris</i>	northern grass-of-parnassus
<i>Cornus canadensis</i>	bunchberry	<i>Petasites frigidus</i> var. <i>palmatus</i>	palmate-leaved coltsfoot
<i>Drosera rotundifolia</i>	round-leaved sundew	<i>Pinguicula villosa</i>	hairy butterwort
<i>Equisetum arvense</i>	common horsetail	<i>Potentilla palustris</i>	marsh cinquefoil
<i>Equisetum scirpoides</i>	dwarf scouring-rush	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Equisetum</i> species	<i>Equisetum</i> species	<i>Ranunculus lapponicus</i>	Lapland buttercup
<i>Equisetum sylvaticum</i>	woodland horsetail	<i>Rubus arcticus</i> (syn. <i>R. acaulis</i>)	dwarf raspberry
<i>Menyanthes trifoliata</i>	buck-bean	<i>Rubus chamaemorus</i>	cloudberry
<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal
Graminoid Layer			
grass species	unknown grass species	<i>Carex oligosperma</i>	few-fruited sedge
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex parryana</i>	Parry's sedge
<i>Carex aquatilis</i>	water sedge	<i>Carex paupercula</i>	bog sedge
<i>Carex canescens</i>	short sedge	<i>Carex tenuiflora</i>	thin-flowered sedge
<i>Carex disperma</i>	two-seeded sedge	<i>Carex utriculata</i>	small bottle sedge
<i>Carex gynocrates</i>	northern bog sedge	<i>Carex vaginata</i>	sheathed sedge
<i>Carex leptalea</i>	bristle-stalked sedge	<i>Eriophorum vaginatum</i>	sheathed cotton grass
<i>Carex limosa</i>	mud sedge	-	-
Bryophyte Layer			
<i>Aulacomnium palustre</i>	tufted moss	<i>Scorpidium cossonii</i>	Cosson's limprichtia moss
<i>Barbilophozia kunzeana</i>	liverwort	<i>Sphagnum angustifolium</i>	peat moss
<i>Cephalozia lunulifolia</i>	liverwort	<i>Sphagnum contortum</i>	twisted bog moss
<i>Drepanocladus aduncus</i>	brown moss	<i>Sphagnum fallax</i>	peat moss
<i>Hylocomium splendens</i>	stair-step moss	<i>Sphagnum fuscum</i>	rusty peat moss
<i>Mylia anomala</i>	liverwort	<i>Sphagnum magellanicum</i>	midway peat moss
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Sphagnum riparium</i>	shore-growing peat moss
<i>Pohlia nutans</i>	copper wire moss	<i>Sphagnum warnstorffii</i>	Warnstorff's peat moss
<i>Polytrichum strictum</i>	slender hair-cap	<i>Straminergon stramineum</i> (syn. <i>Calliergon stramineum</i>)	Straw-coloured water moss
<i>Polytrichum swartzii</i>	Swartz's polytrichum moss	<i>Tomentypnum falcifolium</i>	golden moss
<i>Sarmentypnum exannulatum</i>	Sarmentypnum moss	<i>Tomentypnum nitens</i>	golden moss
<i>Scapania paludicola</i>	liverwort	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Ochrolechia androgyna</i>	powdery saucer lichen
<i>Bryoria glabra</i>	shiny horsehair lichen	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cetraria sepincola</i>	Cetraria lichen	<i>Parmeliopsis ambigua</i>	green starburst lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Peltigera malacea</i>	veinless pelt
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Peltigera</i> species	Pelt lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	<i>Scoliciosporum perpusillum</i>	Scoliciosporum lichen
<i>Hypogymnia physodes</i>	monk's-hood lichen	<i>Strangospora moriformis</i>	Strangospora lichen
<i>Lecanora hagenii</i>	Hagen's rim lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Lecanora subintricata</i>	Rim lichen	<i>Tuckermannopsis orbata</i> (syn. <i>Cetraria orbata</i>)	variable wrinkle-lichen
<i>Lecanora symmicta</i>	fused rim-lichen	<i>Usnea hirta</i>	shaggy beard lichen
<i>Lecidea leprarioides</i>	tile lichen	<i>Vulpicida pinastri</i> (syn. <i>Tuckermannopsis pinastri</i>)	powdered sunshine lichen
<i>Melanelia septentrionalis</i>	northern camouflage lichen	<i>Uromyces ericetorum</i>	fairy puke
WETLAND - SWAMP SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Alnus incana</i>	gray alder	<i>Picea glauca</i>	white spruce
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Populus tremuloides</i>	trembling aspen
<i>Larix laricina</i>	tamarack	<i>Salix bebbiana</i>	beaked willow
Tall Shrub Layer			
<i>Alnus incana</i>	Gray alder	<i>Picea mariana</i>	black spruce
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Salix scouleriana</i>	Scouler's willow
<i>Larix laricina</i>	tamarack	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Ribes glandulosum</i>	skunk currant
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Ribes hudsonianum</i>	northern black currant
<i>Betula papyrifera</i>	white birch	<i>Ribes lacustre</i>	bristly black currant
<i>Larix laricina</i>	tamarack	<i>Rosa acicularis</i>	prickly rose
<i>Linnaea borealis</i>	twinline	<i>Salix bebbiana</i>	beaked willow
<i>Picea mariana</i>	black spruce	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea	<i>Viburnum edule</i>	low-bush cranberry

WETLAND - SWAMP SUBCLASS INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer			
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Petasites frigidus</i>	Coltsfoot
<i>Cornus canadensis</i>	bunchberry	<i>Petasites frigidus</i> var. <i>palmatus</i>	palmate-leaved coltsfoot
<i>Equisetum pratense</i>	meadow horsetail	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Equisetum sylvaticum</i>	woodland horsetail	<i>Pyrola uniflora</i> (syn. <i>Moneses uniflora</i>)	one-flowered wintergreen
<i>Geocaulon lividum</i>	northern bastard toadflax	<i>Ranunculus gmelinii</i>	yellow water crowfoot
<i>Gymnocarpium dryopteris</i>	oak fern	<i>Ranunculus lapponicus</i>	Lapland buttercup
<i>Lilium species</i>	lily species	<i>Rubus pubescens</i>	dewberry
<i>Lycopodium annotinum</i>	stiff club-moss	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal
<i>Mitella nuda</i>	bishop's-cap	<i>Viola adunca</i>	early blue violet
<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen	-	-
Graminoid Layer			
grass species	Unknown grass species	<i>Carex interior</i>	inland sedge
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex limosa</i>	mud sedge
<i>Carex brunnescens</i>	brownish sedge	<i>Carex norvegica</i>	Norway sedge
<i>Carex canescens</i>	short sedge	<i>Carex vaginata</i>	sheathed sedge
<i>Carex disperma</i>	two-seeded sedge	-	-
Bryophyte Layer			
<i>Aulacomnium palustre</i>	tufted moss	<i>Plagiomnium ellipticum</i>	elliptic plagiomnium moss
<i>Brachythecium</i> cf. <i>mildeanum</i>	Brachythecium moss	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Brachythecium salebrosum</i>	Golden ragged feather moss	<i>Pohlia nutans</i>	copper wire moss
<i>Brachythecium</i> species	Brachythecium species	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Calliergon giganteum</i>	giant water moss	<i>Ptilidium ciliare</i>	liverwort
<i>Climacium dendroides</i>	common tree moss	<i>Ptilidium pulcherrimum</i>	liverwort
<i>Dicranum undulatum</i>	wavy dicranum	<i>Sanionia uncinata</i> (syn. <i>Drepanocladus uncinatus</i>)	brown moss
<i>Hylocomium splendens</i>	stair-step moss	<i>Scorpidium cossonii</i>	Cosson's limprichtia moss
<i>Hypnum vaucheri</i>	Vaucher's hypnum moss	<i>Sphagnum angustifolium</i>	peat moss
<i>Jamesoniella autumnalis</i>	liverwort	<i>Sphagnum capillifolium</i>	acute-leaved peat moss
<i>Lophozia ventricosa</i>	liverwort	<i>Tomentypnum nitens</i>	golden moss
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladina mitis</i>	green reindeer lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladina stygia</i>	black-footed reindeer lichen	<i>Usnea hirta</i>	shaggy beard lichen
<i>Cladonia</i> species	Cladonia species	<i>Usnea lapponica</i>	powdered beard lichen
<i>Evernia mesomorpha</i>	boreal oakmoss lichen	<i>Usnea subfloridana</i>	beard lichen
<i>Hypogymnia physodes</i>	monk's-hood lichen	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
<i>Parmelia sulcata</i>	Hammered shield lichen	-	-
RIPARIAN INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Picea mariana</i>	black spruce
<i>Larix laricina</i>	tamarack	<i>Salix bebbiana</i>	beaked willow
<i>Picea glauca</i>	white spruce	-	-
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Populus balsamifera</i>	balsam poplar
<i>Betula papyrifera</i>	white birch	<i>Salix bebbiana</i>	beaked willow
<i>Larix laricina</i>	tamarack	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Picea glauca</i>	white spruce
<i>Betula papyrifera</i>	white birch	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Betula pumila</i>	dwarf birch	<i>Ribes lacustre</i>	bristly black currant
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Salix planifolia</i>	flat-leaved willow
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Myrica gale</i>	sweet gale	<i>Viburnum edule</i>	low-bush cranberry
Forb Layer			
<i>Calla palustris</i>	water arum	<i>Polygonum amphibium</i>	water smartweed
<i>Cicuta bulbifera</i>	bulb-bearing water-hemlock	<i>Potentilla palustris</i>	marsh cinquefoil
<i>Cornus canadensis</i>	bunchberry	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Ranunculus aquatilis</i>	large-leaved white water crowfoot
<i>Equisetum fluviatile</i>	swamp horsetail	<i>Ranunculus gmelinii</i>	yellow water crowfoot
<i>Equisetum hyemale</i>	scouring-rush	<i>Ranunculus repens</i>	creeping buttercup
<i>Equisetum</i> species	<i>Equisetum</i> species	<i>Rubus arcticus</i> (syn. <i>R. acaulis</i>)	dwarf raspberry
<i>Lemna minor</i>	common duckweed	<i>Sium suave</i>	water parsnip
<i>Maianthemum canadense</i>	wild lily-of-the-valley	<i>Sparganium eurycarpum</i>	giant bur-reed
<i>Myriophyllum alterniflorum</i>	alternate-flowered water-milfoil	<i>Sparganium minimum</i> (syn. <i>Sparganium natans</i>)	slender bur-reed
<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen	<i>Viola</i> species	violet species
<i>Parnassia palustris</i>	northern grass-of-parnassus	<i>Rubus arcticus</i> (syn. <i>R. acaulis</i>)	dwarf raspberry
Graminoid Layer			
<i>Agrostis scabra</i>	rough hair grass	<i>Carex</i> species	sedge species
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex utriculata</i>	small bottle sedge
<i>Calamagrostis inexpansa</i>	northern reed grass	<i>Deschampsia cespitosa</i>	tufted hair grass
<i>Calamagrostis</i> species	reed grass species	<i>Eleocharis palustris</i>	creeping spike-rush
<i>Carex aquatilis</i>	water sedge	<i>Glyceria borealis</i>	northern manna grass
<i>Carex canescens</i>	short sedge	<i>Juncus bufonius</i>	toad rush
<i>Carex disperma</i>	two-seeded sedge	<i>Juncus filiformis</i>	thread rush
<i>Carex parryana</i>	Parry's sedge	<i>Juncus</i> species	rush species
<i>Carex saxatilis</i> (syn. <i>Carex saxatilis</i> var. <i>rhomalea</i>)	Russet sedge	<i>Juncus vaseyi</i>	big-head rush

RIPARIAN INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Bryophyte Layer			
<i>Aulacomnium palustre</i>	tufted moss	<i>Pohlia nutans</i>	copper wire moss
<i>Blepharostoma trichophyllum</i>	liverwort	<i>Pohlia</i> species	<i>Pohlia</i> species
<i>Bryum sensu lato</i> species	thread moss species	<i>Polytrichastrum longisetum</i>	Slender hair-cap moss
<i>Calliergon cordifolium</i>	Heart-leaved feather moss	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Polytrichum swartzii</i>	Swartz's polytrichum moss
<i>Climacium dendroides</i>	common tree moss	<i>Ptychostomum cyclophyllum</i>	Ptychostomum moss
<i>Drepanocladus aduncus</i>	brown moss	<i>Ptychostomum pseudotriquetrum</i>	Ptychostomum moss
<i>Hylocomium splendens</i>	stair-step moss	<i>Sarmentypnum exannulatum</i>	Sarmentypnum moss
<i>Jungermannia</i> species	liverwort	<i>Scapania</i> species	<i>Scapania</i> species
<i>Plagiomnium ellipticum</i>	elliptic plagiomnium moss	<i>Sphagnum fuscum</i>	rusty peat moss
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Tomentypnum nitens</i>	golden moss
<i>Pohlia cruda</i>	Glaucous thread moss	-	-
Ground-dwelling and Epiphytic Lichens			
lichen species	unknown lichen species	<i>Peltigera aphthosa</i>	studded leather lichen
REGENERATING JACK PINE INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Pinus banksiana</i>	jack pine	<i>Populus balsamifera</i>	balsam poplar
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Populus tremuloides</i>	trembling aspen
<i>Pinus banksiana</i>	jack pine	<i>Salix bebbiana</i>	beaked willow
Low Shrub Layer			
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Pinus banksiana</i>	jack pine
<i>Betula papyrifera</i>	white birch	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Vaccinium myrtilloides</i>	blueberry
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Picea mariana</i>	black spruce	-	-
Forb Layer			
<i>Cornus canadensis</i>	bunchberry	<i>Maianthemum canadense</i>	wild lily-of-the-valley
<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	ground-fir	<i>Rubus chamaemorus</i>	cloudberry
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Equisetum arvense</i>	common horsetail	-	-
Graminoid Layer			
<i>Calamagrostis inexpansa</i>	northern reed grass	<i>Carex</i> species	sedge species
<i>Carex siccata</i>	hay sedge	-	-
Bryophyte Layer			
<i>Polytrichum juniperinum</i>	juniper hair-cap	<i>Polytrichum piliferum</i>	awned hair-cap
Ground-dwelling and Epiphytic Lichens			
<i>Cladina mitis</i>	green reindeer lichen	<i>Cladina rangiferina</i>	grey reindeer lichen
<i>Cladonia cristatella</i>	British soldiers	<i>Cladonia</i> species	<i>Cladonia</i> species
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Cladonia subulata</i>	antlered powderhorn
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	-	-
REGENERATING JACK PINE/ BLACK SPRUCE INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Pinus banksiana</i>	jack pine
<i>Picea mariana</i>	black spruce	-	-
Low Shrub Layer			
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Vaccinium myrtilloides</i>	blueberry
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium uliginosum</i>	bog bilberry
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Rosa acicularis</i>	prickly rose	-	-
Forb Layer			
<i>Campanula rotundifolia</i>	harebell	<i>Petasites frigidus</i> var. <i>sagittatus</i>	arrow-leaved coltsfoot
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Potentilla tridentata</i>	three-toothed cinquefoil
<i>Coptis trifolia</i>	goldthread	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Cornus canadensis</i>	bunchberry	<i>Spiranthes romanzoffiana</i>	hooded ladies'-tresses
<i>Corydalis sempervirens</i>	pink corydalis	fern species	Unknown fern species
<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	ground-fir	-	-
Graminoid Layer			
<i>Carex siccata</i>	hay sedge		
Bryophyte Layer			
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Polytrichum juniperinum</i>	juniper hair-cap
Ground-dwelling and Epiphytic Lichens			
<i>Cladina mitis</i>	green reindeer lichen	<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Cladonia</i> species	<i>Cladonia</i> species
REGENERATING MIXEDWOOD INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Larix laricina</i>	tamarack	<i>Populus tremuloides</i>	trembling aspen
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Pinus banksiana</i>	jack pine
<i>Betula papyrifera</i>	white birch	-	-
Low Shrub Layer			
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Betula papyrifera</i>	white birch	<i>Ribes lacustre</i>	bristly black currant
<i>Empetrum nigrum</i>	crowberry	<i>Rosa acicularis</i>	prickly rose
<i>Larix laricina</i>	tamarack	<i>Rubus idaeus</i>	wild red raspberry
<i>Picea mariana</i>	black spruce	<i>Salix</i> species	willow species
<i>Pinus banksiana</i>	jack pine	<i>Vaccinium myrtilloides</i>	blueberry
<i>Populus tremuloides</i>	trembling aspen	<i>Vaccinium vitis-idaea</i>	bog cranberry

REGENERATING MIXEDWOOD INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer			
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Geocaulon lividum</i>	northern bastard toadflax
<i>Cornus canadensis</i>	bunchberry	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar	<i>Lycopodium obscurum</i>	ground-pine
<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	ground-fir	<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen
<i>Equisetum sylvaticum</i>	woodland horsetail	<i>Rubus chamaemorus</i>	cloudberry
REGENERATING MIXEDWOOD INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Graminoid Layer			
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex</i> species	sedge species
<i>Carex deflexa</i>	bent sedge	<i>Leymus innovatus</i> (syn. <i>Elymus innovatus</i>)	hairy wild rye
<i>Carex siccata</i>	hay sedge	<i>Oryzopsis pungens</i>	northern rice grass
Bryophyte Layer			
<i>Cephaloziella rubella</i>	liverwort	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Ceratodon purpureus</i>	Purple horn-toothed moss	<i>Pohlia nutans</i>	copper wire moss
<i>Dicranum polysetum</i>	wavy dicranum	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Hedwigia ciliata</i>	Ciliate hedwigia moss	<i>Polytrichum piliferum</i>	awned hair-cap
<i>Hylocomium splendens</i>	stair-step moss	<i>Splachnum luteum</i>	yellow collar moss
<i>Lophozia</i> species	Lophozia species	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Bryoria fuscescens</i>	speckled horsehair	<i>Cladonia</i> species	Cladonia species
<i>Bryoria simplicior</i>	old man's beard	<i>Cladonia subulata</i>	antlered powderhorn
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen	<i>Cladonia sulphurina</i>	greater sulphur cup
<i>Cladina mitis</i>	green reindeer lichen	<i>Evernia mesomorpha</i>	boreal oakmoss lichen
<i>Cladina rangiferina</i>	grey reindeer lichen	<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Cladonia amaurocraea</i>	Quill lichen	<i>Lecanora subrugosa</i>	Rim lichen
<i>Cladonia botrytes</i>	wooden soldiers	<i>Melanelia septentrionalis</i>	northern camouflage lichen
<i>Cladonia cornuta</i>	bighorn cladonia	<i>Parmelia sulcata</i>	Hammered shield lichen
<i>Cladonia crispata</i>	organ-pipe lichen	<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Cladonia cristatella</i>	British soldiers	<i>Placynthiella</i> species	Placynthiella species
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Stereocaulon tomentosum</i>	wooly foam lichen
<i>Cladonia gracilis</i> ssp. <i>gracilis</i>	Smooth cladonia	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen	<i>Usnea hirta</i>	shaggy beard lichen
<i>Cladonia macilenta</i>	lipstick powderhorn	<i>Vulpicida pinastris</i> (syn. <i>Tuckermannopsis pinastris</i>)	powdered sunshine lichen
REGENERATING DECIDUOUS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Populus tremuloides</i>	trembling aspen
<i>Pinus banksiana</i>	jack pine	-	-
Tall Shrub Layer			
<i>Betula papyrifera</i>	white birch	<i>Populus tremuloides</i>	trembling aspen
<i>Picea mariana</i>	black spruce	<i>Prunus pensylvanica</i>	pin cherry
<i>Pinus banksiana</i>	jack pine	-	-
Low Shrub Layer			
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Vaccinium myrtilloides</i>	blueberry
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Linnaea borealis</i>	twinline	<i>Viburnum edule</i>	low-bush cranberry
<i>Rosa acicularis</i>	prickly rose	-	-
Forb Layer			
<i>Cornus canadensis</i>	bunchberry	<i>Lycopodium annotinum</i>	stiff club-moss
<i>Corydalis sempervirens</i>	pink corydalis	<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Geocaulon lividum</i>	northern bastard toadflax	<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Geranium bicknellii</i>	Bicknell's geranium	-	-
Graminoid Layer			
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex siccata</i>	hay sedge
Bryophyte Layer			
<i>Dicranum polysetum</i>	wavy dicranum	<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Hylocomium splendens</i>	stair-step moss	<i>Polytrichum</i> species	<i>Polytrichum</i> species
Lichens and Epiphytes			
<i>Cladina mitis</i>	green reindeer lichen	<i>Cladonia</i> species	Cladonia species
REGENERATING WETLAND - REGENERATING BOG SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Low Shrub Layer			
<i>Andromeda polifolia</i>	bog rosemary	<i>Picea mariana</i>	black spruce
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Pinus banksiana</i>	jack pine
<i>Kalmia polifolia</i>	northern laurel	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccus</i>)	small bog cranberry	-	-
Bryophyte Layer			
<i>Sphagnum fuscum</i>	rusty peat moss	<i>Polytrichum strictum</i>	slender hair-cap
<i>Mylia anomala</i>	liverwort	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Cladina mitis</i>	green reindeer lichen	<i>Cladonia uncialis</i>	thorn cladonia
<i>Cladophila ericetorum</i>	fairy puke	<i>Cladina rangiferina</i>	grey reindeer lichen
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen
<i>Cladonia cristatella</i>	British soldiers	<i>Cladonia cornuta</i>	bighorn cladonia

REGENERATING WETLAND - REGENERATING FEN SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Larix laricina</i>	tamarack	<i>Pinus banksiana</i>	jack pine
<i>Picea mariana</i>	black spruce	-	-
Tall Shrub Layer			
<i>Alnus incana</i>	Gray alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Larix laricina</i>	tamarack	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder	<i>Picea mariana</i>	black spruce
<i>Betula papyrifera</i>	white birch	<i>Pinus banksiana</i>	jack pine
<i>Betula pumila</i>	dwarf birch	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Salix bebbiana</i>	beaked willow
<i>Empetrum nigrum</i>	crowberry	<i>Salix myrtillifolia</i>	myrtle-leaved willow
<i>Kalmia polifolia</i>	northern laurel	<i>Salix serissima</i>	autumn willow
<i>Larix laricina</i>	tamarack	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccos</i>)	small bog cranberry	-	-
Forb Layer			
<i>Aster</i> species	<i>Aster</i> species	<i>Petasites frigidus</i> var. <i>palmatus</i>	palmate-leaved coltsfoot
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Rubus arcticus</i> (syn. <i>R. acaulis</i>)	dwarf raspberry
<i>Cornus canadensis</i>	bunchberry	<i>Rubus chamaemorus</i>	cloudberry
<i>Equisetum sylvaticum</i>	woodland horsetail	<i>Senecio</i> species	Ragwort species
<i>Geocaulon lividum</i>	northern bastard toadflax	<i>Smilacina trifolia</i>	three-leaved Solomon's-seal
<i>Parnassia palustris</i>	northern grass-of-parnassus	<i>Spiranthes romanzoffiana</i>	hooded ladies'-tresses
<i>Pedicularis labradorica</i>	Labrador lousewort	-	-
Graminoid Layer			
<i>Calamagrostis canadensis</i>	bluejoint	<i>Carex limosa</i>	mud sedge
<i>Carex aquatilis</i>	water sedge	<i>Carex vaginata</i>	sheathed sedge
<i>Carex disperma</i>	two-seeded sedge	<i>Eriophorum vaginatum</i>	sheathed cotton grass
Bryophyte Layer			
<i>Aulacomnium palustre</i>	tufted moss	<i>Pleurozium schreberi</i>	Schreber's moss
<i>Cephalozia lunulifolia</i>	liverwort	<i>Pohlia nutans</i>	copper wire moss
<i>Cephaloziella rubella</i>	liverwort	<i>Polytrichum strictum</i>	slender hair-cap
<i>Dicranum polysetum</i>	wavy dicranum	<i>Rhizomnium gracile</i>	rhizomnium moss
<i>Dicranum undulatum</i>	wavy dicranum	<i>Sphagnum fuscum</i>	rusty peat moss
<i>Hamatocaulis vernicosus</i> (syn. <i>Drepanocladus vernicosus</i>)	brown moss	<i>Sphagnum russowii</i>	wide-tongued peat moss
<i>Meesia uliginosa</i>	meesia moss	<i>Sphagnum warnstorffii</i>	Warnstorff's peat moss
<i>Mylia anomala</i>	liverwort	<i>Tomentypnum nitens</i>	golden moss
Ground-dwelling and Epiphytic Lichens			
<i>Cladonia mitis</i>	green reindeer lichen	<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	fork lichen
<i>Cladonia rangiferina</i>	grey reindeer lichen	<i>Cladonia subulata</i>	antlered powderhorn
<i>Cladonia stygia</i>	black-footed reindeer lichen	<i>Cladonia sulphurina</i>	greater sulphur cup
<i>Cladonia borealis</i>	red pixie-cup	<i>Peltigera aphthosa</i>	studded leather lichen
<i>Cladonia botrytes</i>	wooden soldiers	<i>Peltigera leucophlebia</i>	ruffled freckle pelt
<i>Cladonia crispata</i>	organ-pipe lichen	<i>Peltigera rufescens</i>	Felt pelt
<i>Cladonia cristatella</i>	British soldiers	<i>Trapeliopsis granulosa</i>	mottled-disk lichen
<i>Cladonia deformis</i>	lesser sulphur-cup	<i>Umbilicaria torrefacta</i>	Punctured rock tripe
REGENERATING WETLAND - REGENERATING SWAMP SUBCLASS INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Picea mariana</i>	black spruce	<i>Betula papyrifera</i>	white birch
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Picea mariana</i>	black spruce
<i>Larix laricina</i>	tamarack	<i>Salix</i> species	willow species
Low Shrub Layer			
<i>Chamaedaphne calyculata</i>	leatherleaf	<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Kalmia polifolia</i>	northern laurel	<i>Rubus idaeus</i>	wild red raspberry
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccos</i>)	small bog cranberry	<i>Vaccinium vitis-idaea</i>	bog cranberry
Forb Layer			
<i>Equisetum arvense</i>	common horsetail	<i>Rubus chamaemorus</i>	cloudberry
Graminoid Layer			
<i>Carex disperma</i>	two-seeded sedge	<i>Eriophorum angustifolium</i>	tall cotton-grass
<i>Carex</i> species	sedge species	<i>Carex paupercula</i>	bog sedge
Bryophyte Layer			
<i>Pleurozium schreberi</i>	Schreber's moss	<i>Sphagnum fuscum</i>	rusty peat moss
<i>Sphagnum angustifolium</i>	peat moss	<i>Sphagnum</i> species	<i>Sphagnum</i> species
RECENT BURN INVENTORY			
Scientific Name	Common Name	Scientific Name	Common Name
Tree Layer			
<i>Betula papyrifera</i>	white birch	<i>Populus balsamifera</i>	balsam poplar
<i>Picea mariana</i>	black spruce	<i>Populus tremuloides</i>	trembling aspen
<i>Pinus banksiana</i>	jack pine	-	-
Tall Shrub Layer			
<i>Alnus viridis</i>	green alder	<i>Betula papyrifera</i>	white birch
Low Shrub Layer			
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder	<i>Shepherdia canadensis</i>	Canada buffaloberry
<i>Arctostaphylos uva-ursi</i>	bearberry	<i>Vaccinium myrtilloides</i>	blueberry
<i>Pinus banksiana</i>	jack pine	<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea	-	-

RECENT BURN INVENTORY (continued)			
Scientific Name	Common Name	Scientific Name	Common Name
Forb Layer			
<i>Cornus canadensis</i>	bunchberry	<i>Geocaulon lividum</i>	northern bastard toadflax
<i>Corydalis sempervirens</i>	pink corydalis	<i>Potentilla</i> species	cinquefoil species
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed	<i>Viola renifolia</i>	kidney-leaved violet
Graminoid Layer			
<i>Carex</i> species	sedge species	<i>Carex deflexa</i>	bent sedge
<i>Carex houghtoniana</i>	sand sedge	<i>Carex aenea</i>	silvery-flowered sedge
<i>Oryzopsis hymenoides</i>	Indian rice grass	<i>Carex siccata</i>	hay sedge
<i>Calamagrostis canadensis</i>	bluejoint	-	-
Bryophyte Layer			
<i>Dicranum polysetum</i>	wavy dicranum	<i>Polytrichum piliferum</i>	awned hair-cap
<i>Polytrichum juniperinum</i>	juniper hair-cap	-	-
Ground-dwelling and Epiphytic Lichens			
<i>Cladina mitis</i>	green reindeer lichen	-	-

Notes: Highlighted cells indicate those species tracked by SKCDC (2012 d, e, f)

Common names obtained from SKCDC (2012), Johnson et al. (1995) USDA NRCS (2012), and ACMIS (2012).

No species listed under COSEWIC (2012), SARA (2012), or *Wildlife Act* (1998) were observed during field programs.

ssp. = subspecies; syn. = synonym; var. = variety; cf. = confer meaning compare or consult; sensu lato = in the broad sense

Scientific Name	Common Name
Trees	
<i>Betula papyrifera</i>	white birch
<i>Larix laricina</i>	tamarack
<i>Picea glauca</i>	white spruce
<i>Picea mariana</i>	black spruce
<i>Pinus banksiana</i>	jack pine
<i>Populus balsamifera</i>	balsam poplar
<i>Populus tremuloides</i>	aspen
Shrubs and Subshrubs	
<i>Alnus incana</i> ssp. <i>tenuifolia</i> (syn. <i>A. rugosa</i>)	river alder
<i>Alnus incana</i>	gray alder
<i>Alnus viridis</i>	green alder
<i>Alnus viridis</i> ssp. <i>crispa</i>	mountain alder
<i>Amelanchier alnifolia</i>	saskatoon
<i>Andromeda polifolia</i>	bog rosemary
<i>Arctostaphylos uva-ursi</i>	bearberry
<i>Betula pumila</i>	dwarf birch
<i>Chamaedaphne calyculata</i>	leatherleaf
<i>Empetrum nigrum</i>	crowberry
<i>Juniperus communis</i>	ground juniper
<i>Kalmia polifolia</i>	northern laurel
<i>Linnaea borealis</i>	twinflower
<i>Myrica gale</i>	sweet gale
<i>Oxycoccus microcarpus</i> (syn. <i>Vaccinium oxycoccus</i>)	small bog cranberry
<i>Prunus pensylvanica</i>	pin cherry
<i>Prunus</i> species	plum species
<i>Rhododendron groenlandicum</i> (syn. <i>Ledum groenlandicum</i>)	Labrador tea
<i>Ribes glandulosum</i>	skunk currant
<i>Ribes hudsonianum</i>	northern black currant
<i>Ribes lacustre</i>	bristly black currant
<i>Rosa acicularis</i>	prickly rose
<i>Rubus idaeus</i>	wild red raspberry
<i>Salix bebbiana</i>	beaked willow
<i>Salix candida</i>	hoary willow
<i>Salix myrtillifolia</i>	myrtle-leaved willow
<i>Salix pedicellaris</i>	bog willow
<i>Salix planifolia</i>	flat-leaved willow
<i>Salix scouleriana</i>	Scouler's willow
<i>Salix serissima</i>	autumn willow
<i>Salix</i> species	willow species
<i>Shepherdia canadensis</i>	Canada buffaloberry
<i>Vaccinium myrtilloides</i>	blueberry
<i>Vaccinium uliginosum</i>	bog bilberry
<i>Vaccinium vitis-idaea</i>	bog cranberry
<i>Viburnum edule</i>	low-bush cranberry

Scientific Name	Common Name
Forbs, Ferns, and Fern Allies	
<i>Actaea rubra</i>	red and white baneberry
<i>Anemone</i> species	Anemone species
<i>Aralia nudicaulis</i>	wild sarsaparilla
<i>Aster</i> species	Aster species
<i>Calla palustris</i>	water arum
<i>Campanula rotundifolia</i>	harebell
<i>Chamerion angustifolium</i> ssp. <i>angustifolium</i> (syn. <i>Epilobium angustifolium</i>)	fireweed
<i>Cicuta bulbifera</i>	bulb-bearing water-hemlock
<i>Coptis trifolia</i>	goldthread
<i>Cornus canadensis</i>	bunchberry
<i>Corydalis sempervirens</i>	pink corydalis
<i>Cryptogramma acrostichoides</i>	parsley fern
<i>Cynoglossum</i> species	Cynoglossum species
<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	ground-fir
<i>Diphasiastrum complanatum</i> (syn. <i>Lycopodium complanatum</i>)	ground-cedar
<i>Drosera rotundifolia</i>	round-leaved sundew
<i>Dryopteris fragrans</i>	fragrant shield fern
<i>Equisetum arvense</i>	common horsetail
<i>Equisetum fluviatile</i>	swamp horsetail
<i>Equisetum hyemale</i>	scouring-rush
<i>Equisetum pratense</i>	meadow horsetail
<i>Equisetum scirpoides</i>	dwarf scouring-rush
<i>Equisetum</i> species	Equisetum species
<i>Equisetum sylvaticum</i>	woodland horsetail
<i>Geocaulon lividum</i>	northern bastard toadflax
<i>Geranium bicknellii</i>	Bicknell's geranium
<i>Goodyera repens</i>	lesser rattlesnake plantain
<i>Gymnocarpium dryopteris</i>	oak fern
<i>Gymnocarpium jessoense</i> ssp. <i>parvulum</i>	limestone oak fern
<i>Hieracium umbellatum</i>	narrow-leaved hawkweed
<i>Lemna minor</i>	common duckweed
<i>Lilium</i> species	lily species
<i>Lycopodium annotinum</i>	stiff club-moss
<i>Lycopodium clavatum</i>	running club-moss
<i>Lycopodium obscurum</i>	ground-pine
<i>Maianthemum canadense</i>	wild lily-of-the-valley
<i>Menyanthes trifoliata</i>	buck-bean
<i>Mitella nuda</i>	bishop's-cap
<i>Myriophyllum alterniflorum</i>	alternate-flowered water-milfoil
<i>Orthilia secunda</i> (syn. <i>Pyrola secunda</i>)	one-sided wintergreen
<i>Parnassia palustris</i>	northern grass-of-parnassus
<i>Pedicularis labradorica</i>	Labrador lousewort
<i>Petasites frigidus</i>	coltsfoot
<i>Petasites frigidus</i> var. <i>palmatus</i>	palmate-leaved coltsfoot
<i>Petasites frigidus</i> var. <i>sagittatus</i>	arrow-leaved coltsfoot
<i>Pinguicula villosa</i>	small butterwort

Scientific Name	Common Name
<i>Polygonum amphibium</i>	water smartweed
<i>Polypodium virginianum</i>	rock polypody
<i>Potentilla arguta</i>	white cinquefoil
<i>Potentilla pensylvanica</i>	prairie cinquefoil
<i>Potentilla palustris</i>	marsh cinquefoil
<i>Potentilla</i> species	cinquefoil species
<i>Potentilla tridentata</i>	three-toothed cinquefoil
<i>Pyrola asarifolia</i>	common pink wintergreen
<i>Pyrola</i> species	wintergreen species
<i>Pyrola uniflora</i> (syn. <i>Moneses uniflora</i>)	one-flowered wintergreen
<i>Ranunculus aquatilis</i>	large-leaved white water crowfoot
<i>Ranunculus gmelinii</i>	yellow water crowfoot
<i>Ranunculus lapponicus</i>	Lapland buttercup
<i>Ranunculus repens</i>	creeping buttercup
<i>Rubus arcticus</i> (syn. <i>R. acaulis</i>)	dwarf raspberry
<i>Rubus chamaemorus</i>	cloudberry
<i>Rubus pubescens</i>	dewberry
<i>Saxifraga tricuspidata</i>	three-toothed saxifrage
<i>Senecio</i> species	ragwort species
<i>Sium suave</i>	water parsnip
<i>Smilacina trifolia</i>	three-leaved Solomon's-seal
<i>Solidago</i> sp.	goldenrod species
<i>Solidago spathulata</i> var. <i>spathulata</i> (syn. <i>S. simplex</i> ssp. <i>simplex</i>)	mountain goldenrod
<i>Sparganium eurycarpum</i>	giant bur-reed
<i>Sparganium minimum</i> (syn. <i>Sparganium natans</i>)	slender bur-reed
<i>Spiranthes romanzoffiana</i>	hooded ladies'-tresses
<i>Spiranthes</i> species	ladies'-tresses species
<i>Trientalis borealis</i>	northern starflower
<i>Viola adunca</i>	early blue violet
<i>Viola renifolia</i>	kidney-leaved violet
<i>Viola</i> species	violet species
<i>Woodsia ilvensis</i>	rusty woodsia
<i>Woodsia scopulina</i>	mountain woodsia
<i>Woodsia</i> species	Woodsia species
Graminoids (sedges, grasses, and rushes)	
<i>Agrostis scabra</i>	rough hair grass
<i>Calamagrostis canadensis</i>	bluejoint
<i>Calamagrostis inexpansa</i>	northern reed grass
<i>Calamagrostis</i> species	reed grass species
<i>Carex aenea</i>	silvery-flowered sedge
<i>Carex aquatilis</i>	water sedge
<i>Carex brunnescens</i>	brownish sedge
<i>Carex canescens</i>	short sedge
<i>Carex deflexa</i>	bent sedge
<i>Carex disperma</i>	two-seeded sedge
<i>Carex gynocrates</i>	northern bog sedge
<i>Carex houghtoniana</i>	sand sedge

Scientific Name	Common Name
<i>Carex interior</i>	inland sedge
<i>Carex leptalea</i>	bristle-stalked sedge
<i>Carex limosa</i>	mud sedge
<i>Carex norvegica</i>	Norway sedge
<i>Carex oligosperma</i>	few-fruited sedge
<i>Carex parryana</i>	Parry's sedge
<i>Carex paupercula</i>	bog sedge
<i>Carex saxatilis</i> (syn. <i>Carex saxatilis</i> var. <i>rhomalea</i>)	Russet sedge
<i>Carex siccata</i>	hay sedge
<i>Carex</i> species	sedge species
<i>Carex tenuiflora</i>	thin-flowered sedge
<i>Carex umbellata</i>	umbellate sedge
<i>Carex utriculata</i>	small bottle sedge
<i>Carex vaginata</i>	sheathed sedge
<i>Deschampsia cespitosa</i>	tufted hair grass
<i>Eleocharis palustris</i>	creeping spike-rush
<i>Eriophorum angustifolium</i>	tall cotton-grass
<i>Eriophorum vaginatum</i>	sheathed cotton grass
<i>Festuca</i> species	Festuca species
<i>Glyceria borealis</i>	northern manna grass
<i>Juncus bufonius</i>	toad rush
<i>Juncus filiformis</i>	thread rush
<i>Juncus</i> species	rush species
<i>Juncus vaseyi</i>	big-head rush
<i>Leymus innovatus</i> (syn. <i>Elymus innovatus</i>)	hairy wild rye
<i>Oryzopsis asperifolia</i>	white-grained mountain rice grass
<i>Oryzopsis hymenoides</i>	Indian rice grass
<i>Oryzopsis pungens</i>	northern rice grass
<i>Oryzopsis</i> species	rice grass species
<i>Poa interior</i>	inland bluegrass
<i>Schizachne purpurascens</i>	purple oat grass
Bryophytes (mosses, liverworts, and hornworts)	
<i>Abietinella abietina</i> (syn. <i>Thuidium abietinum</i>)	wiry fern moss
<i>Amblystegium serpens</i>	Amblystegium moss
<i>Andreaea rupestris</i>	black rock moss
<i>Aulacomnium palustre</i>	tufted moss
<i>Aulacomnium turgidum</i>	turgid Aulacomnium moss
<i>Barbilophozia barbata</i>	liverwort
<i>Barbilophozia kunzeana</i>	liverwort
<i>Blepharostoma trichophyllum</i>	liverwort
<i>Brachythecium</i> cf. <i>mildeanum</i>	Brachythecium moss
<i>Brachythecium laetum</i> (syn. <i>Brachythecium oxycladon</i>)	Brachythecium moss
<i>Brachythecium salebrosum</i>	golden ragged feather moss
<i>Brachythecium</i> species	Brachythecium species
<i>Bryum</i> sensu lato species	thread moss species
<i>Calliergon cordifolium</i>	heart-leaved feather moss
<i>Calliergon giganteum</i>	giant water moss

Scientific Name	Common Name
<i>Campylium halleri</i>	Haller's campylium moss
<i>Cephalozia lunulifolia</i>	liverwort
<i>Cephaloziella rubella</i>	liverwort
<i>Ceratodon purpureus</i>	purple horn-toothed moss
<i>Climacium dendroides</i>	common tree moss
<i>Cynodontium strumiferum</i>	Cynodontium moss
<i>Dicranum fragilifolium</i>	cushion moss
<i>Dicranum fuscescens</i>	fuscous moss
<i>Dicranum polysetum</i>	wavy dicranum
<i>Dicranum species</i>	Dicranum moss
<i>Dicranum scoparium</i>	broom moss
<i>Dicranum undulatum</i>	wavy dicranum
<i>Drepanocladus aduncus</i>	brown moss
<i>Eurhynchiastrum pulchellum</i>	common beaked moss
<i>Flavoparmelia species</i>	Flavoparmelia species
<i>Hamatocaulis vernicosus</i> (syn. <i>Drepanocladus vernicosus</i>)	brown moss
<i>Hedwigia ciliata</i>	ciliate hedwigia moss
<i>Hylocomium splendens</i>	stair-step moss
<i>Hypnum cupressiforme</i>	cypress pigtail moss
<i>Hypnum vaucheri</i>	Vaucher's hypnum moss
<i>Jamesoniella autumnalis</i>	liverwort
<i>Jungermannia species</i>	liverwort
<i>Lophozia alpestris</i>	liverwort
<i>Lophocolea heterophylla</i>	liverwort
<i>Lophozia species</i>	Lophozia species
<i>Lophozia ventricosa</i>	liverwort
<i>Meesia uliginosa</i>	meesia moss
<i>Mylia anomala</i>	liverwort
<i>Oncophorus wahlenbergii</i>	mountain curved-back moss
<i>Paraleucobryum longifolium</i>	long-leaved fork moss
<i>Plagiomnium ellipticum</i>	elliptic plagiomnium moss
<i>Plagiothecium laetum</i>	plagiothecium moss
<i>Platygyrium repens</i>	Platygyrium moss
<i>Pleurozium schreberi</i>	Schreber's moss
<i>Pohlia cruda</i>	glauous thread moss
<i>Pohlia nutans</i>	copper wire moss
<i>Pohlia species</i>	Pohlia species
<i>Polytrichum juniperinum</i>	juniper hair-cap
<i>Polytrichastrum longisetum</i>	Slender hair-cap moss
<i>Polytrichum piliferum</i>	awned hair-cap
<i>Polytrichum species</i>	Polytrichum species
<i>Polytrichum strictum</i>	slender hair-cap
<i>Polytrichum swartzii</i>	Swartz's polytrichum moss
<i>Ptilidium ciliare</i>	liverwort
<i>Ptilium crista-castrensis</i>	knight's plume moss
<i>Ptilidium pulcherrimum</i>	liverwort
<i>Ptychostomum cyclophyllum</i>	Ptychostomum moss

Scientific Name	Common Name
<i>Ptychostomum pseudotriquetrum</i>	Ptychostomum moss
<i>Pylaisiella polyantha</i>	pylaisiella moss
<i>Rhizomnium gracile</i>	rhizomnium moss
<i>Sanionia uncinata</i> (syn. <i>Drepanocladus uncinatus</i>)	brown moss
<i>Sarmentypnum exannulatum</i>	Sarmentypnum moss
<i>Scapania paludicola</i>	liverwort
<i>Scapania</i> species	Scapania species
<i>Scorpidium cossonii</i>	Cosson's limprichtia moss
<i>Sphagnum angustifolium</i>	peat moss
<i>Sphagnum capillifolium</i>	acute-leaved peat moss
<i>Sphagnum contortum</i>	twisted bog moss
<i>Sphagnum fallax</i>	peat moss
<i>Sphagnum fuscum</i>	rusty peat moss
<i>Sphagnum magellanicum</i>	midway peat moss
<i>Sphagnum riparium</i>	shore-growing peat moss
<i>Sphagnum russowii</i>	wide-tongued peat moss
<i>Sphagnum warnstorffii</i>	Warnstorff's peat moss
<i>Splachnum luteum</i>	yellow collar moss
<i>Splachnum</i> species	Splachnum species
<i>Straminergon stramineum</i> (syn. <i>Calliergon stramineum</i>)	straw-coloured water moss
<i>Tetraplodon angustatus</i>	narrow-leaved splachnum
<i>Tomentypnum falcifolium</i>	golden moss
<i>Tomentypnum nitens</i>	golden moss
<i>Tritomaria exsectiformis</i>	liverwort
Ground-dwelling and Epiphytic Lichens	
<i>Agonimia</i> species	Agonimia lichen
<i>Arctoparmelia aleutica</i>	Aleutian rim lichen
<i>Arctoparmelia centrifuga</i>	concentric ring lichen
<i>Arctoparmelia separata</i>	rippled ring lichen
<i>Bryoria furcellata</i>	burred horsehair lichen
<i>Bryoria fuscescens</i>	speckled horsehair
<i>Bryoria glabra</i>	old man's beard
<i>Bryoria simplicior</i>	old man's beard
<i>Buellia punctata</i>	button lichen
<i>Candelariella lutella</i>	goldspeck lichen
<i>Cetraria ericetorum</i>	Iceland lichen
<i>Cetraria nivalis</i> (syn. <i>Flavocetraria nivalis</i>)	flattened snow lichen
<i>Cetraria sepincola</i>	Cetraria lichen
<i>Cetraria</i> species	Cetraria speices
<i>Cladina mitis</i>	green reindeer lichen
<i>Cladina rangiferina</i>	grey reindeer lichen
<i>Cladina stellaris</i>	northern reindeer lichen
<i>Cladina stygia</i>	black-footed reindeer lichen
<i>Cladonia amaurocraea</i>	quill lichen
<i>Cladonia borealis</i>	red pixie-cup
<i>Cladonia botrytes</i>	wooden soldiers
<i>Cladonia cenotea</i>	powdered funnel lichen

Scientific Name	Common Name
<i>Cladonia chlorophaea</i>	false pixie-cup
<i>Cladonia coccifera</i>	British soldier lichen
<i>Cladonia coniocraea</i>	cup lichen
<i>Cladonia cornuta</i>	bighorn cladonia
<i>Cladonia crispata</i>	organ-pipe lichen
<i>Cladonia cristatella</i>	British soldiers
<i>Cladonia cyanipes</i>	cup lichen
<i>Cladonia deformis</i>	lesser sulphur-cup
<i>Cladonia fimbriata</i>	trumpet lichen
<i>Cladonia furcata</i>	many-forked cladonia
<i>Cladonia gracilis</i> ssp. <i>gracilis</i>	smooth cladonia
<i>Cladonia gracilis</i> ssp. <i>turbinata</i>	brown-foot cladonia
<i>Cladonia grayi</i>	Cladonia lichen
<i>Cladonia macilenta</i>	lipstick powderhorn
<i>Cladonia phyllophora</i>	felt cladonia
<i>Cladonia pleurota</i>	red-fruited pixie-cup
<i>Cladonia pyxidata</i>	pebbled pixie-cup
<i>Cladonia rei</i>	wand lichen
<i>Cladonia subulata</i>	tall toothpick cladonia
<i>Cladonia sulphurina</i>	greater sulphur cup
<i>Cladonia uncialis</i>	thorn cladonia
<i>Evernia mesomorpha</i>	boreal oakmoss lichen
<i>Hypogymnia physodes</i>	monk's-hood lichen
<i>Immadophila ericetorum</i>	fairy puke
<i>Imshaugia aleurites</i>	salted starburst lichen
<i>Imshaugia placorodia</i>	American starburst lichen
<i>Lecanora hagenii</i>	Hagen's rim lichen
<i>Lecanora pulicaris</i>	rim lichen
<i>Lecanora subintricata</i>	rim lichen
<i>Lecanora subrugosa</i>	rim lichen
<i>Lecanora symmicta</i>	fused rim-lichen
<i>Lecidea leprarioides</i>	tile lichen
<i>Lecidea nylanderii</i>	Nylander's lecidea lichen
<i>Lepraria</i> species	dust lichen
<i>Melanelia hepatizon</i> (syn. <i>Cetraria hepatizon</i>)	rimmed camouflage lichen
<i>Melanelia septentrionalis</i>	northern camouflage lichen
<i>Melanelia stygia</i>	Alpine camouflage lichen
<i>Melanelia subaurifera</i>	abraded camouflage lichen
<i>Melanelia trabeculata</i>	camouflage lichen
<i>Melanohalea exasperatula</i>	lustrous brown lichen
<i>Nephroma resupinatum</i>	pimpled kidney lichen
<i>Ochrolechia androgyna</i>	powdery saucer lichen
<i>Parmelia fraudans</i>	shield lichen
<i>Parmelia sulcata</i>	hammered shield lichen
<i>Parmeliopsis ambigua</i>	green starburst lichen
<i>Parmeliopsis hyperopta</i>	gray starburst lichen
<i>Peltigera aphthosa</i>	studded leather lichen

Scientific Name	Common Name
<i>Peltigera leucophlebia</i>	ruffled freckle pelt
<i>Peltigera malacea</i>	veinless pelt
<i>Peltigera neopolydactyla</i>	carpet pelt
<i>Peltigera rufescens</i>	felt pelt
<i>Peltigera scabrosa</i>	rough pelt
<i>Peltigera species</i>	pelt lichen
<i>Phaeocalicium betulinum</i>	Phaeocalicium lichen
<i>Physcia adscendens</i>	hooded rosette lichen
<i>Physcia aipolia</i>	hoary rosette lichen
<i>Physcia alnophila</i>	rosette lichen
<i>Physcia stellaris</i>	star rosette lichen
<i>Physciella melanchra</i>	rosette lichen
<i>Placynthiella species</i>	Placynthiella species
<i>Ramalina dilacerata</i>	punctured ramalina
<i>Ramalina obtusata</i>	hooded ramalina
<i>Rinodina orculata</i>	pepper-spore lichen
<i>Rinodina septentrionalis</i>	pepper-spore lichen
<i>Rinodina species</i>	Rinodina species
<i>Scoliciosporum perpusillum</i>	Scoliciosporum lichen
<i>Stereocaulon paschale</i>	Easter lichen
<i>Stereocaulon species</i>	Stereocaulon species
<i>Stereocaulon tomentosum</i>	wooly foam lichen
<i>Strangospora moriformis</i>	Strangospora lichen
<i>Trapeliopsis granulosa</i>	mottled-disk lichen
<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen
<i>Tuckermannopsis orbata</i> (syn. <i>Cetraria orbata</i>)	variable wrinkle-lichen
<i>Umbilicaria deusta</i>	peppered rock tripe
<i>Umbilicaria hyperborea</i>	blistered rock tripe
<i>Umbilicaria species</i>	Umbilicaria species
<i>Umbilicaria torrefacta</i>	punctured rock tripe
<i>Usnea filipendula</i>	fishbone beard lichen
<i>Usnea fulvovireagens</i>	beard lichen
<i>Usnea glabrata</i>	old man's beard
<i>Usnea hirta</i>	shaggy beard lichen
<i>Usnea lapponica</i>	powdered beard lichen
<i>Usnea scabrata</i>	straw beard lichen
<i>Usnea subfloridana</i>	beard lichen
<i>Usnea substerilis</i>	beard lichen
<i>Vulpicida pinastri</i> (syn. <i>Tuckermannopsis pinastri</i>)	powdered sunshine lichen
<i>Xanthoparmelia species</i>	Xanthoparmelia species
<i>Xanthoria species</i>	Xanthoria species
<i>Xylographa soralifera</i>	Xylographa lichen

Notes: Highlighted cells indicate those species tracked by SKCDC (2012 d, e, f)

Common names obtained from SKCDC (2012), Johnson et al. (1995) USDA NRCS (2012), and ACMIS (2012).

No species listed under COSEWIC (2012), SARA (2012), or *Wildlife Act* (1998) were observed during field programs.

ssp. = subspecies; syn. = synonym; var. = variety; cf. = confer meaning compare or consult; sensu lato = in the broad sense

Common Name	Scientific Name	Provincial Ranking ^(a)	Preferred Habitat ^(b)	Potential for Occurrence
Trees and Shrubs				
Red Alpine bearberry	<i>Arctostaphylos rubra</i>	S3	Moist black spruce, muskeg wood often in calcareous places; mossy places in open coniferous woods and on peaty soils and rocky tundra	Moderate - suitable habitat likely present in the RSA
Yellow mountain-avens	<i>Dryas drummondii</i> var. <i>drummondii</i>	S1	Calcareous rock outcrops and calcareous gravelly flood plains	Low - suitable habitat may be present
Narrow-leaved Labrador tea	<i>Ledum palustre</i> ssp. <i>decumbens</i>	S2S3	Wet black spruce woods and treed bogs	High - suitable habitat present in the RSA
Western Mountain Ash	<i>Sorbus scopulina</i>	S2	Upper beach borders or shore wood and wooded bank slopes.	High - Observed at Tobey Point of Fir Island (Black Lake), 1981.
Forbs				
Wild chives	<i>Allium schoenoprasum</i> var. <i>sibiricum</i>	S2	Exposed rocky shores; moist places along river and lake shores, mainly on calcareous or basic rocks	Moderate - suitable habitat likely present in the RSA
Small-flowered anemone	<i>Anemone parviflora</i>	S1	Moist open mostly regrowth forests and boulder tundra fields	Low - suitable habitat may be present
Yellow anemone	<i>Anemone richardsonii</i>	S1	Moist woods and muskegs	Low - suitable habitat may be present
Spear-leaved arnica	<i>Arnica lonchophylla</i> ssp. <i>lonchophylla</i>	S2S3	On rocky or sandy shores and in open woods	Moderate - suitable habitat likely present in the RSA
Common moonwort	<i>Botrychium lunaria</i>	S1	Dry to moist woods, open woods, drying prairie sloughs and moist meadows.	High - Observed just outside of northwest of RSA, 1981. Preferred habitat present in RSA.
Fairy slipper	<i>Calypso bulbosa</i> var. <i>americana</i>	S3	Mesic usually coniferous forests.	Moderate - suitable habitat likely present in the RSA
Purple paintbrush	<i>Castilleja raupii</i>	S2	Lake upper beaches and moist forest-edge clearings	Low - suitable habitat may be present
Alpine chickweed	<i>Cerastium alpinum</i>	S1	Dry open granitic outcrops	Low - suitable habitat may be present
Beerling's chickweed	<i>Cerastium beerlingianum</i>	S1	Moist crevices on rocky shores	Low - suitable habitat may be present
Western prince's-pine	<i>Chimaphila umbellata</i> ssp. <i>occidentalis</i>	S2S3	Dry to fresh open pine or mixed woods	Moderate - suitable habitat likely present in the RSA
Ground-fir	<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	S2	Dry, sandy coniferous woods	Very High - observed during field programs
Ashy Whitlow-grass	<i>Draba cinerea</i>	S1	Dry soils on calcareous or granitic cliff and outcrops	Low - suitable habitat may be present
English sundew	<i>Drosera anglica</i>	S3	Inland pond fens and Sphagnum bogs in open areas.	High - preferred habitat present in the RSA
Male fern	<i>Dryopteris filix-mas</i>	S1	Dense woods and and talus slopes on limestone	Very low - suitable habitat not likely present
Arctic eyebright	<i>Euphrasia subarctica</i>	S1S2	Mesic open woods clearings, rocky shores and drier sedge-fen borders.	High - Observed along paths in coniferous forest in north west of RSA near Stony Rapids, 1961.
Limestone oak fern	<i>Gymnocarpium jessoense</i> ssp. <i>parvulum</i>	S2S3	Woods, on granitic slopes and outcrops	Very High - observed during field programs
Large-spored quillwort	<i>Isoetes macrospora</i>	S1	Submerged lake bottom aquatic.	High - Observed growing just outside of the western portion of the RSA in shallow water at boat dock for the Hudson Bay Store, on north side of River near Stony Rapids, 1963. Suitable habitat present in RSA.
Water lobelia	<i>Lobelia dormanna</i>	S2S3	Aquatic in shallow quiet water.	High - Observed 15 km west of the RSA, along the north shore of Hocking Lake partially submerged, 1981. Preferred habitat present in the RSA
Alternate-flowered water-milfoil	<i>Myriophyllum alterniflorum</i>	S1	Shallow lakes	Very High - observed during field programs
Alpine grass-of-parnassus	<i>Parnassia kotzebuei</i>	S1	Wet rocky lake shores.	High - Observed 10 km northwest of northwest corner of RSA. Suitable habitat present in the RSA.
Labrador lousewort	<i>Pedicularis labradorica</i>	S2	Open black spruce woods, treed bogs, regenerating burns, and lichen-tundra	Very High - observed during field programs
Long beech-fern	<i>Phegopteris connectilis</i>	S2	Wet woods and in soil on banks and shores or on moist rocky hillsides and ledges. Moist wooded streamsides.	High - Observed along Chipman River, Black Lake, 1987.
Hairy butterwort	<i>Pinguicula villosa</i>	S2S3	On sphagnum hummocks in treed bogs or muskegs.	Very High - observed during field programs. Historical record outside of the RSA in 1980.
Ribbon-leaf pondweed	<i>Potamogeton epihydrus</i>	S2S3	This rare aquatic is found mostly in the shallow quiet waters of lakes, ponds, slow streams and wet marshy fens.	Moderate - suitable habitat likely present in the RSA
Blunt-leaved pondweed	<i>Potamogeton obtusifolius</i>	S2	Submersed aquatic in shallow water of protected bays, ponds and quiet streams	Moderate - suitable habitat likely present in the RSA
Berchtold's pondweed	<i>Potamogeton pusillus</i> var. <i>tenuissimus</i>	S2	This is a submerged aquatic of shallow, quiet water of lakes, ponds, slow streams and sloughs.	Moderate - suitable habitat likely present in the RSA
Cut-leaved cinquefoil	<i>Potentilla multifida</i>	S2	Shore outcrops	Moderate - suitable habitat likely present in the RSA
Five-lobed cinquefoil	<i>Potentilla nivea</i> var. <i>pentaphylla</i>	S2	Dry sandy prairie and open pine woods	Low - suitable habitat may be present
Bird's-eye primrose	<i>Primula mistassinica</i>	S3	Moist edges of open bogs, treed bogs, fens and shores	High - suitable habitat present in the RSA

Common Name	Scientific Name	Provincial Ranking ^(a)	Preferred Habitat ^(b)	Potential for Occurrence
Yellow-rattle	<i>Rhinanthus minor</i>	S2S3	Sandy beaches, trails and roadsides, clearings usually bordering woods and open sandy shore woods	Moderate - suitable habitat likely present in the RSA
Floating bur-reed	<i>Sparganium fluctuans</i>	S2	This is an aquatic of slow streams and ponds, sloughs and shores with a fluctuating water level.	Moderate - suitable habitat likely present in the RSA
Northern bur-reed	<i>Sparganium hyperboreum</i>	S1	Emergent shallow water aquatics at sedge-marshy streamlet borders	Low - suitable habitat may be present
Knotted pearlwort	<i>Sagina nodosa</i> spp. <i>borealis</i>	S2	Wet sandy or rocky lake shores.	High - Observed within the northwest portion of the RSA, 1981.
Water awlwort	<i>Subularia aquatica</i> var. <i>americana</i>	S3	Shallow water at the margins of sandy or gravelly lakes and slow streams.	High - Observed in mud on the margin of a river with shallow water in the northwest of the RSA, 1963, and at the south shore of stony rapids, 1980.
Lake Huron tansy ^(c)	<i>Tanacetum bipinnatum</i> ssp. <i>huronense</i> (syn. <i>Tanacetum huronense</i> var. <i>floccosum</i>)	S2S3	Broad sandy beaches and beach terraces, moist depressions at the base of sheltered dune slopes.	High - Observed in RSA on a sandy beach, south exposure west shore of Black Lake, 1981, and on a sandy beach, north exposure, east shore of Black Lake, 1980.
Lesser bladderwort	<i>Utricularia minor</i>	S2S3	Shallow often calcareous pools, wet sedge fens and marshy shores	High - suitable habitat present in the RSA
Smooth woodsia	<i>Woodsia glabella</i>	S2	Moist crevices of calcareous cliffs and outcrops	High - suitable habitat present in the RSA
Oregon woodsia	<i>Woodsia oregana</i> ssp. <i>oregana</i>	S2	Granitic or calcareous cliffs, outcrops and rocky slopes	Moderate - suitable habitat likely present in the RSA
mountain woodsia	<i>Woodsia scopulina</i>	S1	Granitic or calcareous cliffs, outcrops, and rocky slopes	Very High - observed during field programs
Graminoids (sedges, grasses, and rushes)				
Purple reed-grass	<i>Calamagrostis purpurascens</i>	S2	Open rocky shores or gravelly slopes, cliffs and esker ridges	Moderate - suitable habitat likely present in the RSA
Glacier sedge	<i>Carex glacialis</i>	S1	Dry open granitic or calcareous outcrops or sand-gravel	Low - suitable habitat may be present
Few-flowered sedge	<i>Carex pauciflora</i>	S2	Along mossy shores of rocky creeks, inland pond fens, tree bogs, shoreline bogs and lake margins.	High - suitable habitat present in the RSA
Russet sedge	<i>Carex saxatilis</i> (syn. <i>Carex saxatilis</i> var. <i>rhomalea</i>)	S2	Marshy, peaty, sandy, or rocky shores	Very High - observed during field programs, and observed on a sandy beach, southern exposure west shore of Black Lake, 1980 and 1981.
Hairy panic-grass	<i>Dichanthelium acuminatum</i> var. <i>fasiciculatum</i>	S2	On bouldery till of large drumlin Associated with young Jack Pine, dry, sandy open woods and clearings and exposed rock outcrops	High - Observed on boulder till of large drumlin, regenerating jackpine south facing slope southeast of Stony Rapids, 1982.
Neat spike rush	<i>Eleocharis nitida</i>	S2	Open moist shores, pond edges, wet depression clearings, and poor fens.	High - Observed 2 miles south of Stony Rapids in roadside ditch, in the northwest portion of the RSA, 1961.
Sea lyme-grass	<i>Leymus mollis</i> ssp. <i>mollis</i>	S2	Sandy lake beaches and sand dunes.	High - Observed on a sandy beach, south exposure west shore of Black Lake and Black Lake "Sandy Point" on the east shore, 1981.
Many-flowered woodrush	<i>Luzula multiflora</i>	S2	Fields, meadows, open woods, ditches, and clearings	Low - suitable habitat may be present
Moor rush	<i>Juncus stygius</i> ssp. <i>americanus</i>	S1S2	Wet moss, bogs, and bog pools. As well as boggy lake shores and calcareous fens.	High - suitable habitat present in the RSA
Alpine bluegrass	<i>Poa alpina</i>	S1	Rock outcrops, boulder tundra and gravelly shores	Low - suitable habitat may be present
Haupt's alkali-grass	<i>Puccinellia distans</i> ssp. <i>hauptiana</i>	S2	Saline mud-flats in uranium mine tailings and open sandy disturbed sites	Very low - suitable habitat not likely present
Pale manna grass	<i>Torreyochloa pallida</i> var. <i>fernaldii</i>	S2	Wet sandy beaches and marshy or floating sedge-fen shores.	High - Observed in a swampy area in the north west of the RSA near Stony Rapids, 1960
Ground-dwelling and Epiphytic Lichens				
Concentric ring lichen	<i>Arctoparmelia centrifuga</i>	S2S3	not available	Very High - observed during field programs
Rippled ring lichen	<i>Arctoparmelia separata</i>	S1S2	not available	Very High - observed during field programs
Horsehair	<i>Bryoria furcellata</i>	S3	not available	Very High - observed during field programs
Speckled horsehair	<i>Bryoria fuscescens</i>	S3	not available	Very High - observed during field programs
Shiney horsehair lichen	<i>Bryoria glabra</i>	S1	not available	Very High - observed during field programs
Old man's beard	<i>Bryoria simplicior</i>	S3	not available	Very High - observed during field programs
Iceland lichen	<i>Cetraria ericetorum</i>	S3S4	not available	Very High - observed during field programs
Quill lichen	<i>Cladonia amaurocraea</i>	S2	not available	Very High - observed during field programs
Powdered funnel lichen	<i>Cladonia cenotea</i>	S3	not available	Very High - observed during field programs
Cup lichen	<i>Cladonia coniocraea</i>	S2	not available	Very High - observed during field programs
Organ-pipe lichen	<i>Cladonia crispata</i>	S3	not available	Very High - observed during field programs
British soldiers	<i>Cladonia cristatella</i>	S3	not available	Very High - observed during field programs

Common Name	Scientific Name	Provincial Ranking ^(a)	Preferred Habitat ^(b)	Potential for Occurrence
Cup lichen	<i>Cladonia cyanipes</i>	S3	not available	Very High - observed during field programs
Many-forked cladonia	<i>Cladonia furcata</i>	S1	not available	Very High - observed during field programs
Lipstick powderhorn	<i>Cladonia macilenta</i>	S2	not available	Very High - observed during field programs
Red-fruited pixie-cup	<i>Cladonia pleurota</i>	S2	not available	Very High - observed during field programs
Antlered powderhorn	<i>Cladonia subulata</i>	S2	not available	Very High - observed during field programs
Greater sulphur cup	<i>Cladonia sulphurina</i>	S2	not available	Very High - observed during field programs
Salted starburst lichen	<i>Imshaugia aleurites</i>	S2	not available	Very High - observed during field programs
American starburst lichen	<i>Imshaugia placorodia</i>	S1	not available	Very High - observed during field programs
Hagen's rim lichen	<i>Lecanora hagenii</i>	S2	not available	Very High - observed during field programs
Rim lichen	<i>Lecanora subintricata</i>	S1	not available	Very High - observed during field programs
Alpine camouflage lichen	<i>Melanelia stygia</i>	S1	not available	Very High - observed during field programs
Abraded camouflage lichen	<i>Melanelia subaurifera</i>	S2S3	not available	Very High - observed during field programs
Powdery saucer lichen	<i>Ochrolechia androgyna</i>	S1	not available	Very High - observed during field programs
Green starburst lichen	<i>Parmeliopsis ambigua</i>	S3	not available	Very High - observed during field programs
Gray starburst lichen	<i>Parmeliopsis hyperopta</i>	S3	not available	Very High - observed during field programs
Studded leather lichen	<i>Peltigera aphthosa</i>	S2S3	not available	Very High - observed during field programs
Veinless pelt	<i>Peltigera malacea</i>	S3	not available	Very High - observed during field programs
Rough pelt	<i>Peltigera scabrosa</i>	S2	not available	Very High - observed during field programs
Star rosette lichen	<i>Physcia stellaris</i>	S3S4	not available	Very High - observed during field programs
Punctured ramalina	<i>Ramalina dilacerata</i>	S3	not available	Very High - observed during field programs
Hooded ramalina	<i>Ramalina obtusata</i>	S3	not available	Very High - observed during field programs
Easter lichen	<i>Stereocaulon paschale</i>	S2	not available	Very High - observed during field programs
Strangospora lichen	<i>Strangospora moriformis</i>	S1	not available	Very High - observed during field programs
Fringed wrinkle-lichen	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	S3	not available	Very High - observed during field programs
Peppered rock tripe	<i>Umbilicaria deusta</i>	S2S3	not available	Very High - observed during field programs
Blistered rock tripe	<i>Umbilicaria hyperborea</i>	S2	not available	Very High - observed during field programs
Punctured rock tripe	<i>Umbilicaria torrefacta</i>	S1	not available	Very High - observed during field programs
Fishbone beard lichen	<i>Usnea filipendula</i>	S2	not available	Very High - observed during field programs
Beard lichen	<i>Usnea fulvovirens</i>	S1	not available	Very High - observed during field programs
Powdered beard lichen	<i>Usnea lapponica</i>	S3	not available	Very High - observed during field programs
Straw beard lichen	<i>Usnea scabrata</i>	S1	not available	Very High - observed during field programs
Beard lichen	<i>Usnea subfloridana</i>	S3S4	not available	Very High - observed during field programs

Notes: Common names obtained from SKCDC (2012), Johnson et al. (1995) USDA NRCS (2012), and ACMIS (2012).

No species listed under COSEWIC (2012), SARA (2012), or *Wildlife Act* (1998) were observed during field programs.

^(a) Saskatchewan Conservation Data Centre Tracked Species for Vascular Plants (SKCDC 2012d), Tracked Species for Non-Vascular Plants (SKCDC 2012e), and Tracked Species List for Lichens and Fungi (SKCDC 2012f), where:

S1 = extremely rare (5 or fewer occurrences in Saskatchewan, or very few remaining individuals);

S2 = rare (6 to 20 occurrences in Saskatchewan or few remaining individuals);

S3 = rare to uncommon (21 to 100 occurrences in Saskatchewan; may be rare and local throughout the province or may occur in a restricted provincial range; may be abundant in places);

S4 = common (more than 100 occurrences in Saskatchewan, generally widespread and abundant, may be rare in part of its range);

S5 = very common (more than 100 occurrences in Saskatchewan, widespread and abundant, may be rare in part of its range); and

T = rank for a subspecific taxon (superspecies, variety or population).

SH = Historically known from Saskatchewan, but not verified recently

? = Rank Uncertain

^(b) from Harms et al. (1992), Flora of North America (2012), Porslid and Cody (1980), and SKCDC (2012).

^(c) Listed as Special Concern under COSEWIC (2012), as Special Concern under Schedule 1 of SARA (2012b). This species is not identified as a provincial wild species at risk under the Wildlife Act (19 COSEWIC = Committee on the Status of Endangered Wildlife in Canada; SKCDC = Saskatchewan Conservation Data Centre; RSA = regional study area; LSA = local study area

Plot Number	Scientific Name	Common Name	UTM Coordinates (NAD 83, Zone 13V)		Habitat Observed/ Preferred Habitat	ELC Class Observed	Date Observed
			Easting	Northing			
Forbs							
EBP005	<i>Diphasiastrum sitchense</i> (syn. <i>Lycopodium sitchense</i>)	ground-fir	468768	6559278	Regenerating upland habitat/ Dry, sandy coniferous woods	Regenerating Jack Pine/Black Spruce	4-Jun-2012
EBP008			468746	6559027	Regenerating upland habitat/ Dry, sandy coniferous woods	Regenerating Mixedwood	6-Jun-2012
EAT019			453376	6544796	Jack pine upland habitat, Dry, sandy coniferous woods	Jack Pine	30-Jul-2012
EAT021			471474	6563780	Regenerating jackpine upland habitat/ Dry, sandy coniferous woods	Regenerating Jack Pine	1-Aug-2012
EBP007	<i>Gymnocarpium jessoense</i> ssp. <i>parvulum</i>	limestone oak fern	468786	6559449	Sparsely vegetated bedrock outcrop/ Woods, on granitic slopes and outcrops	Jack Pine	1-Aug-2012
EBP021	<i>Myriophyllum alterniflorum</i>	alternate-flowered water-milfoil	471191	6558449	Aquatic just off shore in Black Lake/ Shallow lakes	Riparian/open water	1-Aug-2012
EAV026	<i>Pedicularis labradorica</i>	Labrador lousewort	468192	6560821	Regerating poor fen/ Open black spruce woods, treed bogs, regenerating burns, and lichen-tundra	Regenerating Wetland (Fen)	10-Jun-2012
BAR017	<i>Pinguicula villosa</i>	hairy butterwort	469432	6558089	On sphagnum hummocks in treed bogs or muskegs/ Side of Sphagnum hummock on game trail in treed poor fen	Wetland (Fen)	23-Jul-2010
BAR007	<i>Woodsia scopulina</i>	mountain woodsia	471803	6560178	In crevices on a bedrock outcrop/ Granitic or calcareous cliffs, outcrops, and rocky slopes	Bedrock	22-Jul-2010
Graminoids							
EBP021	<i>Carex saxatilis</i> (syn. <i>Carex saxatilis</i> var. <i>rhomalea</i>)	Russet sedge	471191	6558449	Marshy, peaty, sandy, or rocky shores/ Riparian habitat next to Black Lake	Riparian	1-Aug-2012

Notes: Common names obtained from SKCDC (2012), Johnson et al. (1995) USDA NRCS (2012), and ACMIS (2012).

No species listed under COSEWIC (2012), SARA (2012), or *Wildlife Act* (1998) were observed during field programs.

UTM = Universal Transverse Mercator; NAD 83 = North American Datum 1983; ELC = Ecological Landscape Classification; ssp. = subspecies; syn. = synonym; var. = variety

Plot Number	Scientific Name	Common Name	(NAD 83, Zone)		ELC Map Unit Observed	Date Observed
			Easting	Northing		
BAR002	<i>Peltigera aphthosa</i>	studded leather lichen	468413	6558530	Riparian	21-Jul-2010
BAR024	<i>Peltigera aphthosa</i>	studded leather lichen	471080	6558356	Spruce	24-Jul-2010
BAR027	<i>Peltigera aphthosa</i>	studded leather lichen	471067	6558299	Mixedwood	24-Jul-2010
BAR028	<i>Peltigera aphthosa</i>	studded leather lichen	470819	6557769	Deciduous	24-Jul-2010
BAR029	<i>Peltigera aphthosa</i>	studded leather lichen	470713	6557746	Jack Pine	24-Jul-2010
EAE004	<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	469620	6556759	Bedrock	4-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Cladonia crispata</i>	organ-pipe lichen				
	<i>Cladonia furcata</i>	many-forked cladonia				
	<i>Cladonia pleurota</i>	red-fruited pixie-cup				
	<i>Imshaugia aleurites</i>	salted starburst lichen				
	<i>Melanelia stygia</i>	Alpine camouflage lichen				
	<i>Stereocaulon paschale</i>	Easter lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Umbilicaria hyperborea</i>	Blistered rock tripe				
EAE007	<i>Peltigera aphthosa</i>	studded leather lichen	470068	6556901	Mixedwood	3-Jun-2012
EAV002	<i>Bryoria fuscescens</i>	speckled horsehair	465994	6561661	Wetland (Fen)	2-Jun-2012
	<i>Lecanora hagenii</i>	Hagen's rim lichen				
	<i>Lecanora subintricata</i>	Rim lichen				
	<i>Ochrolechia androgyna</i>	powdery saucer lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV003	<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	467744	6557866	Jack Pine/ Black Spruce	2-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Cladonia crispata</i>	organ-pipe lichen				
	<i>Cladonia cristatella</i>	British soldiers				
	<i>Cladonia cyanipes</i>	cup lichen				
	<i>Lecanora subintricata</i>	Rim lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV004	<i>Bryoria fuscescens</i>	speckled horsehair	468780	6556865	Deciduous	2-Jun-2012
	<i>Cladonia cyanipes</i>	cup lichen				
	<i>Peltigera malacea</i>	veinless pelt				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV005	<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	455488	6574513	Deciduous	3-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Cetraria ericetorum</i>	Iceland lichen				
	<i>Lecanora subintricata</i>	Rim lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Strangospora moriformis</i>	Strangospora lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV006	<i>Peltigera aphthosa</i>	studded leather lichen	455911	6574451	Spruce	3-Jun-2012
EAV007	<i>Arctoparmelia centrifuga</i>	Concentric ring lichen	455921	6574501	Wetland (Bog)	3-Jun-2012
	<i>Arctoparmelia separata</i>	Rippled ring lichen				
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Melanelia stygia</i>	Alpine camouflage lichen				
	<i>Parmeliopsis ambigua</i>	green starburst lichen				
	<i>Stereocaulon paschale</i>	Easter lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Umbilicaria hyperborea</i>	Blistered rock tripe				
EAV009	<i>Bryoria fuscescens</i>	speckled horsehair	469054	6569429	Wetland (Fen)	5-Jun-2012
	<i>Bryoria glabra</i>	shiny horsehair lichen				
	<i>Parmeliopsis ambigua</i>	green starburst lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				

Plot Number	Scientific Name	Common Name	(NAD 83, Zone)		ELC Map Unit Observed	Date Observed
			Easting	Northing		
EAV010	<i>Bryoria fuscescens</i>	speckled horsehair	460998	6553377	Regenerating Mixedwood	5-Jun-2012
	<i>Bryoria simplicior</i>	horsehair lichen				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Cladonia crispata</i>	organ-pipe lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV011	<i>Bryoria fuscescens</i>	speckled horsehair	462139	6554083	Jack Pine/ Black Spruce	5-Jun-2012
	<i>Bryoria simplicior</i>	horsehair lichen				
	<i>Cladonia sulphurina</i>	greater sulphur cup				
	<i>Imshaugia placrodia</i>	American starburst lichen				
	<i>Lecanora hagenii</i>	Hagen's rim lichen				
	<i>Lecanora subintricata</i>	Rim lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV012	<i>Cladonia cristatella</i>	British soldiers	471049	6563052	Regenerating Mixedwood	6-Jun-2012
	<i>Cladonia sulphurina</i>	greater sulphur cup				
EAV014	<i>Cladonia amaurocraea</i>	Quill lichen	471104	6562975	Jack Pine	6-Jun-2012
	<i>Cladonia cristatella</i>	British soldiers				
	<i>Cladonia pleurota</i>	red-fruited pixie-cup				
	<i>Parmeliopsis ambigua</i>	green starburst lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Stereocaulon paschale</i>	Easter lichen				
EAV015	<i>Cladonia amaurocraea</i>	Quill lichen	471426	6564696	Bedrock	6-Jun-2012
	<i>Cladonia crispata</i>	organ-pipe lichen				
	<i>Cladonia cristatella</i>	British soldiers				
	<i>Stereocaulon paschale</i>	Easter lichen				
EAV016	<i>Bryoria fuscescens</i>	speckled horsehair	469471	6556689	Jack Pine/ Black Spruce	7-Jun-2012
	<i>Bryoria glabra</i>	shiny horsehair lichen				
	<i>Bryoria simplicior</i>	horsehair lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Peltigera aphthosa</i>	studded leather lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Usnea fulvovirens</i>	beard lichen				
	<i>Usnea scabrata</i>	straw beard lichen				
EAV017	<i>Cladonia amaurocraea</i>	Quill lichen	469248	6557069	Mixedwood	7-Jun-2012
	<i>Cladonia cenotea</i>	powdered funnel lichen				
	<i>Cladonia pleurota</i>	red-fruited pixie-cup				
	<i>Peltigera aphthosa</i>	studded leather lichen				
EAV018	<i>Bryoria furcellata</i>	burred horsehair lichen	469441	6556776	Mixedwood	7-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Cladonia sulphurina</i>	greater sulphur cup				
	<i>Peltigera aphthosa</i>	studded leather lichen				
	<i>Peltigera malacea</i>	veinless pelt				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Usnea lapponica</i>	powdered beard lichen				
EAV019	<i>Bryoria fuscescens</i>	speckled horsehair	463871	6556934	Wetland (Fen)	7-Jun-2012
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Peltigera malacea</i>	veinless pelt				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV020	<i>Bryoria furcellata</i>	burred horsehair lichen	468758	6556371	Spruce	8-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Peltigera scabrosa</i>	Rough pelt				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV021	<i>Peltigera aphthosa</i>	studded leather lichen	468734	6556277	Deciduous	8-Jun-2012
	<i>Peltigera malacea</i>	veinless pelt				
EAV022	<i>Bryoria furcellata</i>	burred horsehair lichen	468403	6555644	Mixedwood	8-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Bryoria glabra</i>	shiny horsehair lichen				
	<i>Cladonia amaurocraea</i>	Quill lichen				
	<i>Cladonia coniocraea</i>	cup lichen				
	<i>Imshaugia aleurites</i>	salted starburst lichen				
	<i>Peltigera malacea</i>	veinless pelt				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Usnea subfloridana</i>	beard lichen				

Plot Number	Scientific Name	Common Name	(NAD 83, Zone)		ELC Map Unit Observed	Date Observed
			Easting	Northing		
EAV023	<i>Bryoria furcellata</i>	burred horsehair lichen	467533	6556491	Jack Pine	8-Jun-2012
	<i>Bryoria fuscescens</i>	speckled horsehair				
	<i>Imshaugia aleurites</i>	salted starburst lichen				
	<i>Imshaugia placrodia</i>	American starburst lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
EAV024	<i>Cladonia cristatella</i>	British soldiers	467533	6556491	Regenerating Wetland (Bog)	8-Jun-2012
EAV025	<i>Bryoria fuscescens</i>	speckled horsehair	468347	6559447	Mixedwood	9-Jun-2012
	<i>Cladonia coniocraea</i>	cup lichen				
	<i>Ramalina obtusata</i>	hooded ramalina				
EAV026	<i>Cladonia crispata</i>	organ-pipe lichen	468192	6560821	Regenerating Wetland (Fen)	10-Jun-2012
	<i>Cladonia cristatella</i>	British soldiers				
	<i>Cladonia subulata</i>	antlered powderhorn				
	<i>Peltigera aphthosa</i>	studded leather lichen				
EAV027	<i>Bryoria fuscescens</i>	speckled horsehair	468215	6560652	Mixedwood	10-Jun-2012
	<i>Imshaugia aleurites</i>	salted starburst lichen				
	<i>Melanelia subaurifera</i>	abraded camouflage lichen				
	<i>Parmeliopsis ambigua</i>	green starburst lichen				
	<i>Parmeliopsis hyperopta</i>	gray starburst lichen				
	<i>Physcia stellaris</i>	star rosette lichen				
EAV028	<i>Cladonia cristatella</i>	British soldiers	468584	6560561	Regenerating Jack Pine	10-Jun-2012
	<i>Cladonia subulata</i>	antlered powderhorn				
EAV029	<i>Bryoria fuscescens</i>	speckled horsehair	469207	6557634	Wetland (Swamp)	10-Jun-2012
	<i>Peltigera aphthosa</i>	studded leather lichen				
	<i>Tuckermannopsis americana</i> (syn. <i>Cetraria halei</i> or <i>C. ciliaris</i>)	fringed wrinkle-lichen				
	<i>Usnea lapponica</i>	powdered beard lichen				
	<i>Usnea subfloridana</i>	beard lichen				
EAV030	<i>Bryoria fuscescens</i>	speckled horsehair	471148	6558495	Mixedwood	11-Jun-2012
	<i>Cladonia sulphurina</i>	greater sulphur cup				
EBP010	<i>Peltigera aphthosa</i>	studded leather lichen	468770	6558680	Mixedwood	30-Jul-2012
EBP012	<i>Peltigera aphthosa</i>	studded leather lichen	469405	6560390	Wetland (Swamp)	31-Jul-2012
EBP013	<i>Peltigera aphthosa</i>	studded leather lichen	469183	6560822	Wetland (Swamp)	31-Jul-2012
EBP018	<i>Peltigera aphthosa</i>	studded leather lichen	471153	6558543	Mixedwood	1-Aug-2012
EBV001	<i>Cladonia cristatella</i>	British soldiers	469224	6560528	Bedrock	31-Jul-2012
	<i>Cladonia pleurota</i>	red-fruited pixie-cup				
	<i>Cladonia subulata</i>	antlered powderhorn				
	<i>Umbilicaria deusta</i>	Peppered rock tripe				
EBV002	<i>Cladonia cristatella</i>	British soldiers	469180	6560715	Regenerating Mixedwood	31-Jul-2012
	<i>Cladonia macilenta</i>	lipstick powderhorn				
	<i>Cladonia subulata</i>	antlered powderhorn				
EBV003	<i>Cladonia cristatella</i>	British soldiers	468584	6560730	Regenerating Wetland (Fen)	31-Jul-2012
	<i>Peltigera aphthosa</i>	studded leather lichen				
	<i>Cladonia subulata</i>	antlered powderhorn				
	<i>Cladonia sulphurina</i>	greater sulphur cup				
	<i>Umbilicaria torrefacta</i>	Punctured rock tripe				

Notes: Common names obtained from SKCDC (2012), Johnson et al. (1995) USDA NRCS (2012), and ACMIS (2012).

No species listed under COSEWIC (2012), SARA (2012), or Wildlife Act (1998) were observed during field programs.

UTM = Universal Transverse Mercator; NAD 83 = North American Datum 1983; ELC = Ecological Landscape Classification; ssp. = subspecies; syn. = synonym; var. = variety

APPENDIX IV.3

Wildlife Data

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
30-May-12	13V	457817	6551436	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	2
30-May-12	13V	457817	6551436	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	3
30-May-12	13V	457817	6551436	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
30-May-12	13V	457817	6551436	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
30-May-12	13V	457817	6551436	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	2
30-May-12	13V	458958	6551932	Unknown gull	N/A	Jack Pine	1
30-May-12	13V	457789	6550981	Canada goose	<i>Branta canadensis</i>	Jack Pine	1
30-May-12	13V	456663	6550487	Ruffed grouse	<i>Bonasa umbellus</i>	Jack Pine	1
30-May-12	13V	460104	6552989	Least flycatcher	<i>Empidonax minimus</i>	Jack Pine	1
30-May-12	13V	458286	6551825	Red-eyed vireo	<i>Vireo olivaceus</i>	Jack Pine	1
30-May-12	13V	459424	6552806	Blue-headed vireo	<i>Vireo solitarius</i>	Jack Pine	1
30-May-12	13V	457577	6550773	Common raven	<i>Corvus corax</i>	Jack Pine	1
30-May-12	13V	458483	6551558	Common redpoll	<i>Acanthis flammea</i>	Jack Pine	3
30-May-12	13V	457122	6550871	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine	1
30-May-12	13V	458286	6551825	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine	2
30-May-12	13V	459862	6553220	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine	1
30-May-12	13V	460104	6552989	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine	1
30-May-12	13V	456663	6550487	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	2
30-May-12	13V	456892	6550677	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	457084	6550409	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	457122	6550871	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	2
30-May-12	13V	457362	6551057	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	2
30-May-12	13V	457577	6550773	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	457592	6551245	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	457789	6550981	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	458028	6551177	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	458256	6551379	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	458483	6551558	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	2
30-May-12	13V	458523	6552012	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	458730	6551758	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	459192	6552608	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	459424	6552806	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
30-May-12	13V	457084	6550409	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	3
30-May-12	13V	457577	6550773	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	457789	6550981	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	458028	6551177	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	3
30-May-12	13V	458256	6551379	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	458286	6551825	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	2
30-May-12	13V	458958	6551932	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	459183	6552150	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	459415	6552361	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	459638	6552556	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	459862	6553220	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
30-May-12	13V	458256	6551379	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine	1
30-May-12	13V	458483	6551558	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine	1
30-May-12	13V	459183	6552150	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine	1
30-May-12	13V	459415	6552361	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine	2
30-May-12	13V	459868	6552782	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine	1
30-May-12	13V	458750	6552202	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine	1
30-May-12	13V	456663	6550487	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	456892	6550677	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	457084	6550409	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	457122	6550871	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	457362	6551057	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	457577	6550773	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	457592	6551245	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	457789	6550981	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458028	6551177	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458256	6551379	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	458286	6551825	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458483	6551558	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458523	6552012	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458750	6552202	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	458958	6551932	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	458973	6552395	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	3
30-May-12	13V	459183	6552150	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	459192	6552608	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
30-May-12	13V	459638	6552556	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	459868	6552782	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	460104	6552989	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
30-May-12	13V	459862	6553220	Nashville warbler	<i>Oreothlypis ruficapilla</i>	Jack Pine	1
30-May-12	13V	459415	6552361	Orange-crowned warbler	<i>Oreothlypis celata</i>	Jack Pine	1
30-May-12	13V	456892	6550677	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	457362	6551057	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	457577	6550773	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	2

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
30-May-12	13V	457592	6551245	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	457789	6550981	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	458973	6552395	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	459424	6552806	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	459862	6553220	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
30-May-12	13V	456892	6550677	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	457084	6550409	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	457362	6551057	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	457592	6551245	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	457789	6550981	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	458483	6551558	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	458730	6551758	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	458958	6551932	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	458973	6552395	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	459192	6552608	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	459638	6552556	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine	1
30-May-12	13V	458523	6552012	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Jack Pine	1
30-May-12	13V	456663	6550487	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	456892	6550677	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
30-May-12	13V	457084	6550409	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	457122	6550871	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
30-May-12	13V	457362	6551057	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	457577	6550773	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	457592	6551245	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	458286	6551825	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
30-May-12	13V	458483	6551558	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	458730	6551758	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	458750	6552202	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	458958	6551932	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	3
30-May-12	13V	458973	6552395	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	459192	6552608	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
30-May-12	13V	459424	6552806	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	459638	6552556	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
30-May-12	13V	460104	6552989	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
30-May-12	13V	458066	6551629	Red-eyed vireo	<i>Vireo olivaceus</i>	Jack Pine/Black Spruce	1
30-May-12	13V	458066	6551629	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	1
30-May-12	13V	458066	6551629	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine/Black Spruce	1
30-May-12	13V	458066	6551629	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
30-May-12	13V	460539	6553378	Common loon	<i>Gavia immer</i>	Mixed Forest	1
30-May-12	13V	460539	6553378	Canada goose	<i>Branta canadensis</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Greater yellowlegs	<i>Tringa melanoleuca</i>	Mixed Forest	1
30-May-12	13V	460539	6553378	Least flycatcher	<i>Empidonax minimus</i>	Mixed Forest	2
30-May-12	13V	459652	6553017	Blue-headed vireo	<i>Vireo solitarius</i>	Mixed Forest	1
30-May-12	13V	460539	6553378	Blue-headed vireo	<i>Vireo solitarius</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Gray jay	<i>Perisoreus canadensis</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Ruby-crowned kinglet	<i>Regulus calendula</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	3
30-May-12	13V	459652	6553017	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	1
30-May-12	13V	460302	6553162	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	3
30-May-12	13V	460539	6553378	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	3
30-May-12	13V	457324	6550617	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	2
30-May-12	13V	460302	6553162	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Fox sparrow	<i>Passerella iliaca</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
30-May-12	13V	460302	6553162	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
30-May-12	13V	460539	6553378	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
30-May-12	13V	457324	6550617	Red crossbill	<i>Loxia curvirostra</i>	Mixed Forest	8
30-May-12	13V	456855	6550221	Gray jay	<i>Perisoreus canadensis</i>	Spruce	1
30-May-12	13V	456855	6550221	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
30-May-12	13V	456855	6550221	Hermit thrush	<i>Catharus guttatus</i>	Spruce	2
30-May-12	13V	456855	6550221	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
30-May-12	13V	456855	6550221	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
30-May-12	13V	456855	6550221	Red crossbill	<i>Loxia curvirostra</i>	Spruce	1
31-May-12	13V	468851	6558158	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	2
31-May-12	13V	468851	6558158	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
31-May-12	13V	468851	6558158	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
31-May-12	13V	468898	6556983	Unknown gull	N/A	Deciduous	1
31-May-12	13V	468572	6558044	Unknown passerine species	N/A	Deciduous	2
31-May-12	13V	468572	6558044	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	1
31-May-12	13V	468898	6556983	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	2
31-May-12	13V	468572	6558044	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
31-May-12	13V	468572	6558044	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
31-May-12	13V	468088	6559549	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
31-May-12	13V	468088	6559549	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
31-May-12	13V	468572	6558044	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	2
31-May-12	13V	468898	6556983	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
31-May-12	13V	468898	6556983	Yellow warbler	<i>Dendroica petechia</i>	Deciduous	1
31-May-12	13V	468572	6558044	Wilson's warbler	<i>Wilsonia pusilla</i>	Deciduous	1
31-May-12	13V	468088	6559549	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
31-May-12	13V	468572	6558044	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
31-May-12	13V	467537	6558998	Black-backed woodpecker	<i>Picoides arcticus</i>	Jack Pine	1
31-May-12	13V	467537	6558998	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
31-May-12	13V	467660	6559851	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
31-May-12	13V	468491	6557259	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine	1
31-May-12	13V	467466	6560446	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
31-May-12	13V	467505	6560129	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
31-May-12	13V	467660	6559851	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
31-May-12	13V	467702	6559293	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	1
31-May-12	13V	467726	6559548	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	2
31-May-12	13V	468491	6557259	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine	2
31-May-12	13V	467466	6560446	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine	1
31-May-12	13V	467505	6560129	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine	1
31-May-12	13V	467660	6559851	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine	1
31-May-12	13V	467466	6560446	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	3
31-May-12	13V	467505	6560129	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
31-May-12	13V	467537	6558998	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
31-May-12	13V	467660	6559851	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	1
31-May-12	13V	467702	6559293	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	3
31-May-12	13V	467726	6559548	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
31-May-12	13V	468491	6557259	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine	2
31-May-12	13V	467660	6559851	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine	1
31-May-12	13V	467466	6560446	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
31-May-12	13V	467660	6559851	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
31-May-12	13V	467702	6559293	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	2
31-May-12	13V	467726	6559548	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
31-May-12	13V	468491	6557259	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine	1
31-May-12	13V	467675	6558539	Black-backed woodpecker	<i>Picoides arcticus</i>	Jack Pine/Black Spruce	1
31-May-12	13V	467675	6558539	Blue-headed vireo	<i>Vireo solitarius</i>	Jack Pine/Black Spruce	1
31-May-12	13V	467675	6558539	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	1
31-May-12	13V	467675	6558539	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	1
31-May-12	13V	467675	6558539	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	2
31-May-12	13V	468481	6557865	Ring-billed gull	<i>Larus delawarensis</i>	Mixed Forest	1
31-May-12	13V	468475	6556971	Blue-headed vireo	<i>Vireo solitarius</i>	Mixed Forest	1
31-May-12	13V	468475	6556971	Ruby-crowned kinglet	<i>Regulus calendula</i>	Mixed Forest	2
31-May-12	13V	468475	6556971	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	2
31-May-12	13V	468475	6556971	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
31-May-12	13V	468481	6557865	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
31-May-12	13V	468496	6557558	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
31-May-12	13V	468475	6556971	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	2
31-May-12	13V	468481	6557865	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	1
31-May-12	13V	468496	6557558	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	1
31-May-12	13V	468475	6556971	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
31-May-12	13V	468481	6557865	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	2
31-May-12	13V	468496	6557558	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
31-May-12	13V	468861	6557556	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
31-May-12	13V	468862	6557277	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
31-May-12	13V	468862	6557277	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
31-May-12	13V	468862	6557277	Yellow warbler	<i>Dendroica petechia</i>	Recent Burn	1
31-May-12	13V	468861	6557556	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
31-May-12	13V	468862	6557277	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
31-May-12	13V	468861	6557556	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	1
31-May-12	13V	468862	6557277	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	2
31-May-12	13V	468861	6557556	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
31-May-12	13V	468862	6557277	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
31-May-12	13V	468049	6559253	Sharp-shinned hawk	<i>Accipiter striatus</i>	Regenerating Jack Pine	1
31-May-12	13V	467904	6558993	Northern flicker	<i>Colaptes auratus</i>	Regenerating Jack Pine	1
31-May-12	13V	468069	6558763	Northern flicker	<i>Colaptes auratus</i>	Regenerating Jack Pine	1
31-May-12	13V	467836	6560431	Blue-headed vireo	<i>Vireo solitarius</i>	Regenerating Jack Pine	1
31-May-12	13V	467876	6560144	Blue-headed vireo	<i>Vireo solitarius</i>	Regenerating Jack Pine	1
31-May-12	13V	467904	6558993	Ruby-crowned kinglet	<i>Regulus calendula</i>	Regenerating Jack Pine	1
31-May-12	13V	468049	6559253	American robin	<i>Turdus migratorius</i>	Regenerating Jack Pine	1
31-May-12	13V	467904	6558993	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
31-May-12	13V	468023	6559849	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
31-May-12	13V	468049	6559253	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
31-May-12	13V	468053	6558550	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
31-May-12	13V	468069	6558763	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
31-May-12	13V	468196	6558055	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	2
31-May-12	13V	468297	6558314	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	2
31-May-12	13V	467836	6560431	Blackpoll warbler	<i>Dendroica striata</i>	Regenerating Jack Pine	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
31-May-12	13V	467836	6560431	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	2
31-May-12	13V	467876	6560144	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
31-May-12	13V	467904	6558993	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	2
31-May-12	13V	467932	6558318	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
31-May-12	13V	468023	6559849	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	2
31-May-12	13V	468049	6559253	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
31-May-12	13V	468053	6558550	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	4
31-May-12	13V	468069	6558763	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
31-May-12	13V	467836	6560431	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	3
31-May-12	13V	467836	6560431	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	3
31-May-12	13V	467876	6560144	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	2
31-May-12	13V	467904	6558993	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	3
31-May-12	13V	467932	6558318	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	3
31-May-12	13V	468023	6559849	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	1
31-May-12	13V	468049	6559253	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	1
31-May-12	13V	468053	6558550	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	2
31-May-12	13V	468069	6558763	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	1
31-May-12	13V	468196	6558055	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	2
31-May-12	13V	468297	6558314	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	2
31-May-12	13V	468069	6558763	Yellow warbler	<i>Dendroica petechia</i>	Regenerating Jack Pine	1
31-May-12	13V	468297	6558314	Yellow warbler	<i>Dendroica petechia</i>	Regenerating Jack Pine	2
31-May-12	13V	467904	6558993	Northern waterthrush	<i>Parkesia noveboracensis</i>	Regenerating Jack Pine	1
31-May-12	13V	468049	6559253	Northern waterthrush	<i>Parkesia noveboracensis</i>	Regenerating Jack Pine	1
31-May-12	13V	468297	6558314	Northern waterthrush	<i>Parkesia noveboracensis</i>	Regenerating Jack Pine	1
31-May-12	13V	467876	6560144	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	2
31-May-12	13V	467904	6558993	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	1
31-May-12	13V	467932	6558318	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	1
31-May-12	13V	468023	6559849	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	3
31-May-12	13V	468069	6558763	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	1
31-May-12	13V	468297	6558314	Chipping sparrow	<i>Spizella passerina</i>	Regenerating Jack Pine	1
31-May-12	13V	467904	6558993	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	1
31-May-12	13V	468297	6558314	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	1
31-May-12	13V	467836	6560431	Dark-eyed junco	<i>Junco hyemalis</i>	Regenerating Jack Pine	1
31-May-12	13V	467932	6558318	Dark-eyed junco	<i>Junco hyemalis</i>	Regenerating Jack Pine	2
31-May-12	13V	468196	6558055	Dark-eyed junco	<i>Junco hyemalis</i>	Regenerating Jack Pine	2
31-May-12	13V	468842	6557860	Common redpoll	<i>Acanthis flammea</i>	Spruce	1
31-May-12	13V	467711	6558767	Gray jay	<i>Perisoreus canadensis</i>	Spruce	1
31-May-12	13V	467711	6558767	Boreal chickadee	<i>Parus hudsonica</i>	Spruce	1
31-May-12	13V	467711	6558767	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
31-May-12	13V	468842	6557860	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
31-May-12	13V	467711	6558767	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	3
31-May-12	13V	468842	6557860	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
31-May-12	13V	467711	6558767	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
31-May-12	13V	468842	6557860	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
31-May-12	13V	467711	6558767	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Spruce	1
4-Jun-12	13V	466880	6566510	Lesser yellowlegs	<i>Tringa flavipes</i>	Bog/Fen	1
4-Jun-12	13V	463756	6565380	Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	Bog/Fen	1
4-Jun-12	13V	464624	6565681	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	465153	6565900	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	466020	6566210	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	466296	6566295	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	466581	6566407	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	2
4-Jun-12	13V	466880	6566510	Blue-headed vireo	<i>Vireo solitarius</i>	Bog/Fen	1
4-Jun-12	13V	466581	6566407	Common redpoll	<i>Acanthis flammea</i>	Bog/Fen	1
4-Jun-12	13V	463354	6565554	Gray jay	<i>Perisoreus canadensis</i>	Bog/Fen	1
4-Jun-12	13V	463354	6565554	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	463756	6565380	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	463925	6565763	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	464046	6565488	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	464624	6565681	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
4-Jun-12	13V	463925	6565763	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	464624	6565681	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	464891	6565789	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	465153	6565900	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	465461	6565998	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	466020	6566210	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	466296	6566295	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	466581	6566407	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	2
4-Jun-12	13V	463354	6565554	Swainson's thrush	<i>Catharus ustulatus</i>	Bog/Fen	1
4-Jun-12	13V	463448	6565310	Swainson's thrush	<i>Catharus ustulatus</i>	Bog/Fen	1
4-Jun-12	13V	463756	6565380	Swainson's thrush	<i>Catharus ustulatus</i>	Bog/Fen	2

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
4-Jun-12	13V	464347	6565589	Swainson's thrush	<i>Catharus ustulatus</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Magnolia warbler	<i>Dendroica magnolia</i>	Bog/Fen	1
4-Jun-12	13V	463925	6565763	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	1
4-Jun-12	13V	465153	6565900	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
4-Jun-12	13V	465461	6565998	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
4-Jun-12	13V	466296	6566295	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	1
4-Jun-12	13V	466581	6566407	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
4-Jun-12	13V	463925	6565763	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	2
4-Jun-12	13V	464624	6565681	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
4-Jun-12	13V	465461	6565998	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
4-Jun-12	13V	466296	6566295	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	2
4-Jun-12	13V	466581	6566407	Orange-crowned warbler	<i>Oreothlypis celata</i>	Bog/Fen	1
4-Jun-12	13V	463354	6565554	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	2
4-Jun-12	13V	464891	6565789	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	3
4-Jun-12	13V	466020	6566210	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	2
4-Jun-12	13V	466296	6566295	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
4-Jun-12	13V	466581	6566407	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	2
4-Jun-12	13V	466880	6566510	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	3
4-Jun-12	13V	463354	6565554	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
4-Jun-12	13V	463756	6565380	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
4-Jun-12	13V	464046	6565488	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
4-Jun-12	13V	464891	6565789	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
4-Jun-12	13V	463354	6565554	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
4-Jun-12	13V	463756	6565380	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
4-Jun-12	13V	465461	6565998	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
4-Jun-12	13V	466020	6566210	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	2
4-Jun-12	13V	466296	6566295	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	2
4-Jun-12	13V	466581	6566407	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	2
4-Jun-12	13V	466020	6566210	Swamp sparrow	<i>Melospiza georgiana</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Swamp sparrow	<i>Melospiza georgiana</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
4-Jun-12	13V	463354	6565554	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	463448	6565310	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	464046	6565488	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	464624	6565681	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	465153	6565900	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	465461	6565998	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	465735	6566100	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	466020	6566210	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	466296	6566295	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	466880	6566510	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
4-Jun-12	13V	463211	6565171	Blue-headed vireo	<i>Vireo solitarius</i>	Deciduous	1
4-Jun-12	13V	464760	6566064	Blue-headed vireo	<i>Vireo solitarius</i>	Deciduous	1
4-Jun-12	13V	466729	6566779	Blue-headed vireo	<i>Vireo solitarius</i>	Deciduous	2
4-Jun-12	13V	463077	6565434	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	1
4-Jun-12	13V	463077	6565434	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
4-Jun-12	13V	464760	6566064	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
4-Jun-12	13V	466729	6566779	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
4-Jun-12	13V	463211	6565171	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
4-Jun-12	13V	464484	6565960	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
4-Jun-12	13V	464484	6565960	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
4-Jun-12	13V	464760	6566064	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
4-Jun-12	13V	463077	6565434	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
4-Jun-12	13V	463211	6565171	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
4-Jun-12	13V	464484	6565960	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
4-Jun-12	13V	464760	6566064	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
4-Jun-12	13V	466729	6566779	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	2
4-Jun-12	13V	464484	6565960	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
4-Jun-12	13V	463211	6565171	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
4-Jun-12	13V	464760	6566064	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
4-Jun-12	13V	462920	6565069	Blue-headed vireo	<i>Vireo solitarius</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	465887	6566489	Blue-headed vireo	<i>Vireo solitarius</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	466449	6566691	Blue-headed vireo	<i>Vireo solitarius</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	466449	6566691	Common redpoll	<i>Acanthis flammea</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	463631	6565666	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	462920	6565069	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	2
4-Jun-12	13V	465036	6566170	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	465887	6566489	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	463631	6565666	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	464202	6565861	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine/Black Spruce	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
4-Jun-12	13V	466449	6566691	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	463631	6565666	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	464202	6565861	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	465036	6566170	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	465324	6566269	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	2
4-Jun-12	13V	465887	6566489	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	466449	6566691	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	4
4-Jun-12	13V	463631	6565666	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	463631	6565666	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	464202	6565861	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine/Black Spruce	2
4-Jun-12	13V	464202	6565861	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	465324	6566269	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	2
4-Jun-12	13V	465887	6566489	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
4-Jun-12	13V	466170	6566577	Blue-headed vireo	<i>Vireo solitarius</i>	Mixed Forest	1
4-Jun-12	13V	465603	6566374	Gray jay	<i>Perisoreus canadensis</i>	Mixed Forest	1
4-Jun-12	13V	466170	6566577	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	2
4-Jun-12	13V	465603	6566374	Palm warbler	<i>Dendroica palmarum</i>	Mixed Forest	1
4-Jun-12	13V	466170	6566577	Palm warbler	<i>Dendroica palmarum</i>	Mixed Forest	2
4-Jun-12	13V	465603	6566374	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	1
4-Jun-12	13V	466170	6566577	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	1
4-Jun-12	13V	465603	6566374	Orange-crowned warbler	<i>Oreothlypis celata</i>	Mixed Forest	1
4-Jun-12	13V	466170	6566577	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
5-Jun-12	13V	471110	6572145	Mallard	<i>Anas platyrhynchos</i>	Bog/Fen	2
5-Jun-12	13V	473083	6573111	Lesser scaup	<i>Aythya affinis</i>	Bog/Fen	2
5-Jun-12	13V	473083	6573111	Bufflehead	<i>Bucephala albeola</i>	Bog/Fen	2
5-Jun-12	13V	471110	6572145	Wilson's snipe	<i>Gallinago delicata</i>	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Unknown shorebird	N/A	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Alder flycatcher	<i>Empidonax alnorum</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Least flycatcher	<i>Empidonax minimus</i>	Bog/Fen	1
5-Jun-12	13V	471110	6572145	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Swainson's thrush	<i>Catharus ustulatus</i>	Bog/Fen	2
5-Jun-12	13V	471813	6572666	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	2
5-Jun-12	13V	473083	6573111	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Yellow warbler	<i>Dendroica petechia</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Orange-crowned warbler	<i>Oreothlypis celata</i>	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Northern waterthrush	<i>Parkesia noveboracensis</i>	Bog/Fen	2
5-Jun-12	13V	472771	6572896	Northern waterthrush	<i>Parkesia noveboracensis</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Northern waterthrush	<i>Parkesia noveboracensis</i>	Bog/Fen	2
5-Jun-12	13V	473083	6573111	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	Fox sparrow	<i>Passerella iliaca</i>	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Vesper sparrow	<i>Pooecetes gramineus</i>	Bog/Fen	1
5-Jun-12	13V	471110	6572145	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	2
5-Jun-12	13V	471813	6572666	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Bog/Fen	1
5-Jun-12	13V	472771	6572896	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
5-Jun-12	13V	473083	6573111	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
5-Jun-12	13V	471813	6572666	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
5-Jun-12	13V	472325	6572974	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Least flycatcher	<i>Empidonax minimus</i>	Deciduous	2
5-Jun-12	13V	472065	6572814	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Deciduous	1
5-Jun-12	13V	472325	6572974	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	1
5-Jun-12	13V	472065	6572814	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
5-Jun-12	13V	472592	6573132	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
5-Jun-12	13V	472592	6573132	Bay-breasted warbler	<i>Setophaga castanea</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Blackpoll warbler	<i>Dendroica striata</i>	Deciduous	2
5-Jun-12	13V	472511	6572750	Blackpoll warbler	<i>Dendroica striata</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Magnolia warbler	<i>Dendroica magnolia</i>	Deciduous	1
5-Jun-12	13V	472065	6572814	Magnolia warbler	<i>Dendroica magnolia</i>	Deciduous	1
5-Jun-12	13V	472325	6572974	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
5-Jun-12	13V	472325	6572974	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
5-Jun-12	13V	472592	6573132	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	2

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
5-Jun-12	13V	472065	6572814	Orange-crowned warbler	<i>Oreothlypis celata</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Northern waterthrush	<i>Parkesia noveboracensis</i>	Deciduous	1
5-Jun-12	13V	472065	6572814	Northern waterthrush	<i>Parkesia noveboracensis</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Northern waterthrush	<i>Parkesia noveboracensis</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
5-Jun-12	13V	471470	6572134	Fox sparrow	<i>Passerella iliaca</i>	Deciduous	2
5-Jun-12	13V	472592	6573132	Vesper sparrow	<i>Pooecetes gramineus</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Deciduous	1
5-Jun-12	13V	472592	6573132	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Deciduous	2
5-Jun-12	13V	472325	6572974	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
5-Jun-12	13V	472065	6572814	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	2
5-Jun-12	13V	472325	6572974	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
5-Jun-12	13V	472511	6572750	Pine siskin	<i>Carduelis pinus</i>	Deciduous	1
5-Jun-12	13V	470453	6571517	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470536	6571906	Bay-breasted warbler	<i>Setophaga castanea</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470453	6571517	Palm warbler	<i>Dendroica palmarum</i>	Jack Pine/Black Spruce	2
5-Jun-12	13V	470015	6571618	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470453	6571517	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470536	6571906	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470536	6571906	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470453	6571517	Fox sparrow	<i>Passerella iliaca</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	470015	6571618	Swamp sparrow	<i>Melospiza georgiana</i>	Jack Pine/Black Spruce	1
5-Jun-12	13V	471223	6571987	Least flycatcher	<i>Empidonax minimus</i>	Mixed Forest	1
5-Jun-12	13V	472847	6573281	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Ruby-crowned kinglet	<i>Regulus calendula</i>	Mixed Forest	1
5-Jun-12	13V	471223	6571987	Ruby-crowned kinglet	<i>Regulus calendula</i>	Mixed Forest	1
5-Jun-12	13V	471561	6572524	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	1
5-Jun-12	13V	472847	6573281	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Swainson's thrush	<i>Catharus ustulatus</i>	Mixed Forest	2
5-Jun-12	13V	471223	6571987	Swainson's thrush	<i>Catharus ustulatus</i>	Mixed Forest	1
5-Jun-12	13V	471561	6572524	Bay-breasted warbler	<i>Setophaga castanea</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Blackpoll warbler	<i>Dendroica striata</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Magnolia warbler	<i>Dendroica magnolia</i>	Mixed Forest	1
5-Jun-12	13V	471223	6571987	Magnolia warbler	<i>Dendroica magnolia</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Palm warbler	<i>Dendroica palmarum</i>	Mixed Forest	2
5-Jun-12	13V	471223	6571987	Palm warbler	<i>Dendroica palmarum</i>	Mixed Forest	2
5-Jun-12	13V	471561	6572524	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
5-Jun-12	13V	472847	6573281	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
5-Jun-12	13V	471223	6571987	Tennessee warbler	<i>Oreothlypis peregrina</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Fox sparrow	<i>Passerella iliaca</i>	Mixed Forest	1
5-Jun-12	13V	471223	6571987	Fox sparrow	<i>Passerella iliaca</i>	Mixed Forest	1
5-Jun-12	13V	470949	6571819	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Mixed Forest	1
5-Jun-12	13V	472847	6573281	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Mixed Forest	1
5-Jun-12	13V	471561	6572524	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	2
5-Jun-12	13V	472847	6573281	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
5-Jun-12	13V	472271	6572569	Wilson's snipe	<i>Gallinago delicata</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Least flycatcher	<i>Empidonax minimus</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Least flycatcher	<i>Empidonax minimus</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Least flycatcher	<i>Empidonax minimus</i>	Spruce	1
5-Jun-12	13V	470785	6572062	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Blue-headed vireo	<i>Vireo solitarius</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Common redpoll	<i>Acanthis flammea</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Gray jay	<i>Perisoreus canadensis</i>	Spruce	2
5-Jun-12	13V	471305	6572366	Gray jay	<i>Perisoreus canadensis</i>	Spruce	2
5-Jun-12	13V	469845	6571525	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
5-Jun-12	13V	469991	6571215	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	470197	6571373	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
5-Jun-12	13V	470270	6571758	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	470712	6571644	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	470785	6572062	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
5-Jun-12	13V	470197	6571373	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	2
5-Jun-12	13V	470712	6571644	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	2
5-Jun-12	13V	471305	6572366	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	1
5-Jun-12	13V	469845	6571525	Bay-breasted warbler	<i>Setophaga castanea</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Blackpoll warbler	<i>Dendroica striata</i>	Spruce	1
5-Jun-12	13V	470197	6571373	Blackpoll warbler	<i>Dendroica striata</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Blackpoll warbler	<i>Dendroica striata</i>	Spruce	1
5-Jun-12	13V	469845	6571525	Magnolia warbler	<i>Dendroica magnolia</i>	Spruce	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
5-Jun-12	13V	471742	6572293	Magnolia warbler	<i>Dendroica magnolia</i>	Spruce	1
5-Jun-12	13V	470197	6571373	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
5-Jun-12	13V	470712	6571644	Palm warbler	<i>Dendroica palmarum</i>	Spruce	2
5-Jun-12	13V	471305	6572366	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
5-Jun-12	13V	472271	6572569	Palm warbler	<i>Dendroica palmarum</i>	Spruce	2
5-Jun-12	13V	469991	6571215	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	2
5-Jun-12	13V	470197	6571373	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
5-Jun-12	13V	470270	6571758	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
5-Jun-12	13V	470712	6571644	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
5-Jun-12	13V	470785	6572062	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	2
5-Jun-12	13V	472271	6572569	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	2
5-Jun-12	13V	469845	6571525	Orange-crowned warbler	<i>Oreothlypis celata</i>	Spruce	1
5-Jun-12	13V	470197	6571373	Orange-crowned warbler	<i>Oreothlypis celata</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Orange-crowned warbler	<i>Oreothlypis celata</i>	Spruce	1
5-Jun-12	13V	469845	6571525	Northern waterthrush	<i>Parkesia noveboracensis</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Northern waterthrush	<i>Parkesia noveboracensis</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
5-Jun-12	13V	470712	6571644	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
5-Jun-12	13V	469991	6571215	Fox sparrow	<i>Passerella iliaca</i>	Spruce	1
5-Jun-12	13V	470712	6571644	Fox sparrow	<i>Passerella iliaca</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Fox sparrow	<i>Passerella iliaca</i>	Spruce	1
5-Jun-12	13V	472017	6572429	Fox sparrow	<i>Passerella iliaca</i>	Spruce	2
5-Jun-12	13V	472271	6572569	Fox sparrow	<i>Passerella iliaca</i>	Spruce	2
5-Jun-12	13V	472017	6572429	Lincoln's sparrow	<i>Melospiza lincolni</i>	Spruce	1
5-Jun-12	13V	471305	6572366	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Spruce	1
5-Jun-12	13V	472271	6572569	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Spruce	1
5-Jun-12	13V	470270	6571758	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1
5-Jun-12	13V	471305	6572366	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1
5-Jun-12	13V	471742	6572293	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1
5-Jun-12	13V	470270	6571758	Red crossbill	<i>Loxia curvirostra</i>	Spruce	8
7-Jun-12	13V	475323	6547626	Gray jay	<i>Perisoreus canadensis</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475705	6546678	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475323	6547626	American robin	<i>Turdus migratorius</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475480	6546951	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	2
7-Jun-12	13V	475323	6547626	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	2
7-Jun-12	13V	475480	6546951	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475705	6546678	Orange-crowned warbler	<i>Oreothlypis celata</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475480	6546951	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475323	6547626	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475480	6546951	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	475705	6546678	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
7-Jun-12	13V	472942	6549894	Canada goose	<i>Branta canadensis</i>	Recent Burn	38
7-Jun-12	13V	473214	6550076	Canada goose	<i>Branta canadensis</i>	Recent Burn	1
7-Jun-12	13V	473369	6549378	Canada goose	<i>Branta canadensis</i>	Recent Burn	82
7-Jun-12	13V	474050	6549106	Canada goose	<i>Branta canadensis</i>	Recent Burn	2
7-Jun-12	13V	474889	6548117	Canada goose	<i>Branta canadensis</i>	Recent Burn	1
7-Jun-12	13V	473157	6549641	Unknown duck	N/A	Recent Burn	2
7-Jun-12	13V	474426	6548178	Spotted sandpiper	<i>Actitis macularia</i>	Recent Burn	1
7-Jun-12	13V	473157	6549641	Greater yellowlegs	<i>Tringa melanoleuca</i>	Recent Burn	1
7-Jun-12	13V	473616	6549576	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	475269	6547175	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	476380	6546391	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	476588	6546158	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	476800	6545889	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	477031	6545648	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
7-Jun-12	13V	473776	6548914	Northern flicker	<i>Colaptes auratus</i>	Recent Burn	1
7-Jun-12	13V	474426	6548178	Northern flicker	<i>Colaptes auratus</i>	Recent Burn	1
7-Jun-12	13V	474843	6547688	Northern flicker	<i>Colaptes auratus</i>	Recent Burn	1
7-Jun-12	13V	475905	6546448	Northern flicker	<i>Colaptes auratus</i>	Recent Burn	1
7-Jun-12	13V	477031	6545648	Olive-sided flycatcher	<i>Contopus cooperi</i>	Recent Burn	1
7-Jun-12	13V	473415	6549827	Common redpoll	<i>Acanthis flammea</i>	Recent Burn	1
7-Jun-12	13V	473616	6549576	Common redpoll	<i>Acanthis flammea</i>	Recent Burn	2
7-Jun-12	13V	476800	6545889	Common redpoll	<i>Acanthis flammea</i>	Recent Burn	1
7-Jun-12	13V	473998	6548672	Gray jay	<i>Perisoreus canadensis</i>	Recent Burn	1
7-Jun-12	13V	474684	6548367	Gray jay	<i>Perisoreus canadensis</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	Gray jay	<i>Perisoreus canadensis</i>	Recent Burn	1
7-Jun-12	13V	476176	6546630	Tree swallow	<i>Tachycineta bicolor</i>	Recent Burn	1
7-Jun-12	13V	475952	6546880	Ruby-crowned kinglet	<i>Regulus calendula</i>	Recent Burn	1
7-Jun-12	13V	473214	6550076	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	473776	6548914	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	474050	6549106	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	474258	6548852	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	474426	6548178	American robin	<i>Turdus migratorius</i>	Recent Burn	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
7-Jun-12	13V	474634	6547926	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	474843	6547688	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	475053	6547442	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	476176	6546630	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	476283	6546024	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	476588	6546158	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	477031	6545648	American robin	<i>Turdus migratorius</i>	Recent Burn	1
7-Jun-12	13V	472942	6549894	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473214	6550076	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
7-Jun-12	13V	473369	6549378	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473415	6549827	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473584	6549141	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473616	6549576	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473845	6549328	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	473998	6548672	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	474050	6549106	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
7-Jun-12	13V	475108	6547869	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	475269	6547175	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
7-Jun-12	13V	476380	6546391	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
7-Jun-12	13V	474258	6548852	Swainson's thrush	<i>Catharus ustulatus</i>	Recent Burn	1
7-Jun-12	13V	474476	6548609	Swainson's thrush	<i>Catharus ustulatus</i>	Recent Burn	1
7-Jun-12	13V	476176	6546630	Cedar waxwing	<i>Bombycilla cedrorum</i>	Recent Burn	1
7-Jun-12	13V	475905	6546448	Palm warbler	<i>Dendroica palmarum</i>	Recent Burn	1
7-Jun-12	13V	476106	6546198	Palm warbler	<i>Dendroica palmarum</i>	Recent Burn	1
7-Jun-12	13V	476528	6545700	Palm warbler	<i>Dendroica palmarum</i>	Recent Burn	1
7-Jun-12	13V	473369	6549378	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	473616	6549576	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	473845	6549328	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	474050	6549106	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	474198	6548422	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	474476	6548609	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	474843	6547688	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	475053	6547442	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	475108	6547869	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	475514	6547368	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	475905	6546448	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	2
7-Jun-12	13V	475952	6546880	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	476106	6546198	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	476283	6546024	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	476528	6545700	Yellow-rumped warbler	<i>Dendroica coronata</i>	Recent Burn	1
7-Jun-12	13V	473214	6550076	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	2
7-Jun-12	13V	473776	6548914	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	473998	6548672	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474050	6549106	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474198	6548422	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474258	6548852	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474476	6548609	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474634	6547926	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	2
7-Jun-12	13V	475053	6547442	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	475269	6547175	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	475744	6547129	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	475905	6546448	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	476176	6546630	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	476528	6545700	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	476588	6546158	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	477031	6545648	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
7-Jun-12	13V	474476	6548609	Fox sparrow	<i>Passerella iliaca</i>	Recent Burn	1
7-Jun-12	13V	474634	6547926	Fox sparrow	<i>Passerella iliaca</i>	Recent Burn	1
7-Jun-12	13V	474684	6548367	Fox sparrow	<i>Passerella iliaca</i>	Recent Burn	1
7-Jun-12	13V	474889	6548117	Fox sparrow	<i>Passerella iliaca</i>	Recent Burn	1
7-Jun-12	13V	475108	6547869	Fox sparrow	<i>Passerella iliaca</i>	Recent Burn	1
7-Jun-12	13V	476106	6546198	Savannah sparrow	<i>Passerculus sandwichensis</i>	Recent Burn	1
7-Jun-12	13V	476283	6546024	Savannah sparrow	<i>Passerculus sandwichensis</i>	Recent Burn	1
7-Jun-12	13V	476106	6546198	Song sparrow	<i>Melospiza melodia</i>	Recent Burn	1
7-Jun-12	13V	476106	6546198	White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	2
7-Jun-12	13V	476283	6546024	White-crowned sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	1
7-Jun-12	13V	472942	6549894	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	473369	6549378	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	473776	6548914	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	474198	6548422	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	474426	6548178	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
7-Jun-12	13V	474634	6547926	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	474684	6548367	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	474843	6547688	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
7-Jun-12	13V	475053	6547442	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	475108	6547869	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	475514	6547368	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	475952	6546880	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	476283	6546024	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
7-Jun-12	13V	476380	6546391	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
7-Jun-12	13V	476588	6546158	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
7-Jun-12	13V	476800	6545889	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
7-Jun-12	13V	477031	6545648	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
7-Jun-12	13V	473157	6549641	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	1
7-Jun-12	13V	473369	6549378	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	1
7-Jun-12	13V	473998	6548672	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	1
7-Jun-12	13V	475269	6547175	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	1
7-Jun-12	13V	475905	6546448	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	1
7-Jun-12	13V	476176	6546630	Red crossbill	<i>Loxia curvirostra</i>	Recent Burn	2
8-Jun-12	13V	456341	6574033	Mallard	<i>Anas platyrhynchos</i>	Deciduous	2
8-Jun-12	13V	456357	6573602	Bufflehead	<i>Bucephala albeola</i>	Deciduous	1
8-Jun-12	13V	458500	6571514	Merlin	<i>Falco columbarius</i>	Deciduous	2
8-Jun-12	13V	455711	6574229	Unknown shorebird	N/A	Deciduous	1
8-Jun-12	13V	455711	6574229	Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	Deciduous	1
8-Jun-12	13V	457033	6572974	Northern flicker	<i>Colaptes auratus</i>	Deciduous	1
8-Jun-12	13V	456341	6574033	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	2
8-Jun-12	13V	456357	6573602	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	2
8-Jun-12	13V	457233	6572788	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	2
8-Jun-12	13V	458568	6571896	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	1
8-Jun-12	13V	456557	6573820	Least flycatcher	<i>Empidonax minimus</i>	Deciduous	2
8-Jun-12	13V	455916	6574020	Red-eyed vireo	<i>Vireo olivaceus</i>	Deciduous	1
8-Jun-12	13V	456118	6574230	Red-eyed vireo	<i>Vireo olivaceus</i>	Deciduous	1
8-Jun-12	13V	456341	6574033	Red-eyed vireo	<i>Vireo olivaceus</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Red-eyed vireo	<i>Vireo olivaceus</i>	Deciduous	1
8-Jun-12	13V	456557	6573820	Red-eyed vireo	<i>Vireo olivaceus</i>	Deciduous	1
8-Jun-12	13V	458500	6571514	Common raven	<i>Corvus corax</i>	Deciduous	1
8-Jun-12	13V	456800	6573196	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
8-Jun-12	13V	458960	6571537	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
8-Jun-12	13V	458766	6571326	Swainson's thrush	<i>Catharus ustulatus</i>	Deciduous	1
8-Jun-12	13V	455711	6574229	Blackpoll warbler	<i>Dendroica striata</i>	Deciduous	1
8-Jun-12	13V	455711	6574229	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
8-Jun-12	13V	456118	6574230	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
8-Jun-12	13V	456557	6573820	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
8-Jun-12	13V	458766	6571326	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Yellow warbler	<i>Dendroica petechia</i>	Deciduous	1
8-Jun-12	13V	456118	6574230	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	456341	6574033	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	2
8-Jun-12	13V	456557	6573820	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	457033	6572974	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	457233	6572788	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	457641	6572756	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	458766	6571326	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	458960	6571537	Tennessee warbler	<i>Oreothlypis peregrina</i>	Deciduous	1
8-Jun-12	13V	456118	6574230	Orange-crowned warbler	<i>Oreothlypis celata</i>	Deciduous	1
8-Jun-12	13V	456557	6573820	Orange-crowned warbler	<i>Oreothlypis celata</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Northern waterthrush	<i>Parkesia noveboracensis</i>	Deciduous	1
8-Jun-12	13V	457233	6572788	Wilson's warbler	<i>Wilsonia pusilla</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
8-Jun-12	13V	456781	6573683	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
8-Jun-12	13V	457033	6572974	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
8-Jun-12	13V	457641	6572756	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Deciduous	1
8-Jun-12	13V	456781	6573683	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Deciduous	1
8-Jun-12	13V	457233	6572788	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Deciduous	1
8-Jun-12	13V	455916	6574020	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	2
8-Jun-12	13V	456118	6574230	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
8-Jun-12	13V	456341	6574033	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
8-Jun-12	13V	456357	6573602	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	2
8-Jun-12	13V	456800	6573196	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
8-Jun-12	13V	457233	6572788	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	2
8-Jun-12	13V	458500	6571514	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
8-Jun-12	13V	458960	6571537	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
8-Jun-12	13V	455916	6574020	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
8-Jun-12	13V	456800	6573196	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
8-Jun-12	13V	457033	6572974	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
8-Jun-12	13V	458766	6571326	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
8-Jun-12	13V	457853	6572585	Greater yellowlegs	<i>Tringa melanoleuca</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Lesser yellowlegs	<i>Tringa flavipes</i>	Recent Burn	1
8-Jun-12	13V	457462	6572570	Hairy woodpecker	<i>Picoides villosus</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Hairy woodpecker	<i>Picoides villosus</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
8-Jun-12	13V	458742	6571736	Black-backed woodpecker	<i>Picoides arcticus</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Alder flycatcher	<i>Empidonax alnorum</i>	Recent Burn	1
8-Jun-12	13V	456566	6573423	Alder flycatcher	<i>Empidonax alnorum</i>	Recent Burn	1
8-Jun-12	13V	458088	6572364	Alder flycatcher	<i>Empidonax alnorum</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Alder flycatcher	<i>Empidonax alnorum</i>	Recent Burn	2
8-Jun-12	13V	458742	6571736	Alder flycatcher	<i>Empidonax alnorum</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Red-eyed vireo	<i>Vireo olivaceus</i>	Recent Burn	1
8-Jun-12	13V	457853	6572585	Common raven	<i>Corvus corax</i>	Recent Burn	1
8-Jun-12	13V	458742	6571736	Common raven	<i>Corvus corax</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Winter wren	<i>Troglodytes troglodytes</i>	Recent Burn	1
8-Jun-12	13V	457866	6572160	American robin	<i>Turdus migratorius</i>	Recent Burn	1
8-Jun-12	13V	458076	6571960	American robin	<i>Turdus migratorius</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	American robin	<i>Turdus migratorius</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
8-Jun-12	13V	456566	6573423	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
8-Jun-12	13V	457462	6572570	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
8-Jun-12	13V	457866	6572160	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	2
8-Jun-12	13V	458076	6571960	Hermit thrush	<i>Catharus guttatus</i>	Recent Burn	1
8-Jun-12	13V	457640	6572367	Swainson's thrush	<i>Catharus ustulatus</i>	Recent Burn	1
8-Jun-12	13V	458088	6572364	Cedar waxwing	<i>Bombycilla cedrorum</i>	Recent Burn	1
8-Jun-12	13V	456566	6573423	Palm warbler	<i>Dendroica palmarum</i>	Recent Burn	2
8-Jun-12	13V	458076	6571960	Palm warbler	<i>Dendroica palmarum</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Tennessee warbler	<i>Oreothlypis peregrina</i>	Recent Burn	1
8-Jun-12	13V	458088	6572364	Tennessee warbler	<i>Oreothlypis peregrina</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
8-Jun-12	13V	456566	6573423	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	2
8-Jun-12	13V	457640	6572367	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
8-Jun-12	13V	458076	6571960	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	1
8-Jun-12	13V	458088	6572364	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	2
8-Jun-12	13V	458742	6571736	Chipping sparrow	<i>Spizella passerina</i>	Recent Burn	2
8-Jun-12	13V	456155	6573804	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Recent Burn	1
8-Jun-12	13V	457462	6572570	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Recent Burn	1
8-Jun-12	13V	458742	6571736	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	Swamp sparrow	<i>Melospiza georgiana</i>	Recent Burn	1
8-Jun-12	13V	456155	6573804	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	2
8-Jun-12	13V	456566	6573423	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	2
8-Jun-12	13V	457640	6572367	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	1
8-Jun-12	13V	457866	6572160	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	1
8-Jun-12	13V	458088	6572364	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	1
8-Jun-12	13V	458286	6572125	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Recent Burn	2
8-Jun-12	13V	457462	6572570	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
8-Jun-12	13V	457640	6572367	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
8-Jun-12	13V	457853	6572585	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	1
8-Jun-12	13V	457866	6572160	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
8-Jun-12	13V	458742	6571736	Dark-eyed junco	<i>Junco hyemalis</i>	Recent Burn	2
8-Jun-12	13V	455931	6574458	Gray jay	<i>Perisoreus canadensis</i>	Spruce	1
8-Jun-12	13V	458297	6571746	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
8-Jun-12	13V	455931	6574458	Tennessee warbler	<i>Oreothlypis peregrina</i>	Spruce	1
8-Jun-12	13V	458297	6571746	Lincoln's sparrow	<i>Melospiza lincolnii</i>	Spruce	1
8-Jun-12	13V	458297	6571746	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Spruce	1
8-Jun-12	13V	455931	6574458	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1
9-Jun-12	13V	468926	6559937	Northern flicker	<i>Colaptes auratus</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Alder flycatcher	<i>Empidonax alnorum</i>	Bog/Fen	2
9-Jun-12	13V	468820	6560842	Alder flycatcher	<i>Empidonax alnorum</i>	Bog/Fen	1
9-Jun-12	13V	468926	6559937	Alder flycatcher	<i>Empidonax alnorum</i>	Bog/Fen	1
9-Jun-12	13V	468820	6560842	Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	Bog/Fen	1
9-Jun-12	13V	468820	6560842	Red-eyed vireo	<i>Vireo olivaceus</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Boreal chickadee	<i>Parus hudsonica</i>	Bog/Fen	1
9-Jun-12	13V	468668	6559237	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	2
9-Jun-12	13V	468926	6559937	Ruby-crowned kinglet	<i>Regulus calendula</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
9-Jun-12	13V	468820	6560842	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
9-Jun-12	13V	468926	6559937	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	2
9-Jun-12	13V	469336	6559030	Hermit thrush	<i>Catharus guttatus</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
9-Jun-12	13V	468668	6559237	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
9-Jun-12	13V	468753	6560559	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2
9-Jun-12	13V	468820	6560842	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	2

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
9-Jun-12	13V	469336	6559030	Palm warbler	<i>Dendroica palmarum</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
9-Jun-12	13V	468668	6559237	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
9-Jun-12	13V	468820	6560842	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
9-Jun-12	13V	468926	6559937	Yellow-rumped warbler	<i>Dendroica coronata</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Yellow warbler	<i>Dendroica petechia</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	American redstart	<i>Setophaga ruticilla</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	2
9-Jun-12	13V	468820	6560842	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	1
9-Jun-12	13V	468856	6561107	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	0
9-Jun-12	13V	468926	6559937	Tennessee warbler	<i>Oreothlypis peregrina</i>	Bog/Fen	1
9-Jun-12	13V	468503	6558994	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
9-Jun-12	13V	468668	6559237	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
9-Jun-12	13V	469336	6559030	Chipping sparrow	<i>Spizella passerina</i>	Bog/Fen	1
9-Jun-12	13V	468753	6560559	Swamp sparrow	<i>Melospiza georgiana</i>	Bog/Fen	1
9-Jun-12	13V	468668	6559237	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
9-Jun-12	13V	468856	6561107	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
9-Jun-12	13V	468926	6559937	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Bog/Fen	1
9-Jun-12	13V	468668	6559237	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
9-Jun-12	13V	468856	6561107	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
9-Jun-12	13V	468926	6559937	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	1
9-Jun-12	13V	469336	6559030	Dark-eyed junco	<i>Junco hyemalis</i>	Bog/Fen	2
9-Jun-12	13V	468439	6560435	Osprey	<i>Pandion haliaetus</i>	Deciduous	1
9-Jun-12	13V	468439	6560435	Alder flycatcher	<i>Empidonax alnorum</i>	Deciduous	1
9-Jun-12	13V	469483	6558755	Ruby-crowned kinglet	<i>Regulus calendula</i>	Deciduous	1
9-Jun-12	13V	469483	6558755	Hermit thrush	<i>Catharus guttatus</i>	Deciduous	1
9-Jun-12	13V	468439	6560435	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
9-Jun-12	13V	469483	6558755	Palm warbler	<i>Dendroica palmarum</i>	Deciduous	1
9-Jun-12	13V	468439	6560435	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	1
9-Jun-12	13V	468481	6560117	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	2
9-Jun-12	13V	469483	6558755	Yellow-rumped warbler	<i>Dendroica coronata</i>	Deciduous	2
9-Jun-12	13V	469483	6558755	Chipping sparrow	<i>Spizella passerina</i>	Deciduous	1
9-Jun-12	13V	468439	6560435	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Deciduous	1
9-Jun-12	13V	468439	6560435	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	2
9-Jun-12	13V	468481	6560117	Dark-eyed junco	<i>Junco hyemalis</i>	Deciduous	1
9-Jun-12	13V	469896	6557316	Unknown gull	N/A	Jack Pine/Black Spruce	3
9-Jun-12	13V	469082	6558766	Alder flycatcher	<i>Empidonax alnorum</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469831	6557629	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469848	6558241	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469894	6557003	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	2
9-Jun-12	13V	469896	6557316	Ruby-crowned kinglet	<i>Regulus calendula</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469896	6557316	Hermit thrush	<i>Catharus guttatus</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469831	6557629	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469850	6558532	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine/Black Spruce	2
9-Jun-12	13V	469896	6557316	Swainson's thrush	<i>Catharus ustulatus</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469082	6558766	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469831	6557629	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469838	6557921	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469848	6558241	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469850	6558532	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469894	6557003	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469896	6557316	Yellow-rumped warbler	<i>Dendroica coronata</i>	Jack Pine/Black Spruce	3
9-Jun-12	13V	469082	6558766	Tennessee warbler	<i>Oreothlypis peregrina</i>	Jack Pine/Black Spruce	2
9-Jun-12	13V	469848	6558241	Tennessee warbler	<i>Oreothlypis peregrina</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469850	6558532	Tennessee warbler	<i>Oreothlypis peregrina</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469082	6558766	Orange-crowned warbler	<i>Oreothlypis celata</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469838	6557921	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469894	6557003	Chipping sparrow	<i>Spizella passerina</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469082	6558766	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469082	6558766	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	2
9-Jun-12	13V	469894	6557003	Dark-eyed junco	<i>Junco hyemalis</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	469896	6557316	Red crossbill	<i>Loxia curvirostra</i>	Jack Pine/Black Spruce	1
9-Jun-12	13V	468701	6559540	Ruby-crowned kinglet	<i>Regulus calendula</i>	Mixed Forest	1
9-Jun-12	13V	468681	6558751	Hermit thrush	<i>Catharus guttatus</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	Swainson's thrush	<i>Catharus ustulatus</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	Palm warbler	<i>Dendroica palmarum</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	Yellow-rumped warbler	<i>Dendroica coronata</i>	Mixed Forest	2
9-Jun-12	13V	468681	6558751	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	Chipping sparrow	<i>Spizella passerina</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Mixed Forest	1
9-Jun-12	13V	468701	6559540	Dark-eyed junco	<i>Junco hyemalis</i>	Mixed Forest	1
9-Jun-12	13V	468636	6559844	Canada goose	<i>Branta canadensis</i>	Regenerating Jack Pine	8

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)				
9-Jun-12	13V	468636	6559844	Alder flycatcher	<i>Empidonax alnorum</i>	Regenerating Jack Pine	2
9-Jun-12	13V	468795	6560251	Alder flycatcher	<i>Empidonax alnorum</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469099	6559377	Alder flycatcher	<i>Empidonax alnorum</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Tree swallow	<i>Tachycineta bicolor</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469010	6559686	Ruby-crowned kinglet	<i>Regulus calendula</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	Ruby-crowned kinglet	<i>Regulus calendula</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468795	6560251	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	Hermit thrush	<i>Catharus guttatus</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469010	6559686	Swainson's thrush	<i>Catharus ustulatus</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469099	6559377	Swainson's thrush	<i>Catharus ustulatus</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	2
9-Jun-12	13V	468795	6560251	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	3
9-Jun-12	13V	469010	6559686	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469099	6559377	Palm warbler	<i>Dendroica palmarum</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468795	6560251	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	3
9-Jun-12	13V	469010	6559686	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	2
9-Jun-12	13V	469067	6559084	Yellow-rumped warbler	<i>Dendroica coronata</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468795	6560251	American redstart	<i>Setophaga ruticilla</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Tennessee warbler	<i>Oreothlypis peregrina</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468795	6560251	Tennessee warbler	<i>Oreothlypis peregrina</i>	Regenerating Jack Pine	2
9-Jun-12	13V	469010	6559686	Tennessee warbler	<i>Oreothlypis peregrina</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468636	6559844	Lincoln's sparrow	<i>Melospiza lincolni</i>	Regenerating Jack Pine	1
9-Jun-12	13V	468795	6560251	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469010	6559686	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	2
9-Jun-12	13V	469099	6559377	White-throated sparrow	<i>Zonotrichia leucophrys</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	Dark-eyed junco	<i>Junco hyemalis</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469099	6559377	Dark-eyed junco	<i>Junco hyemalis</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469067	6559084	Red crossbill	<i>Loxia curvirostra</i>	Regenerating Jack Pine	1
9-Jun-12	13V	469463	6557558	Unknown gull	N/A	Spruce	1
9-Jun-12	13V	469460	6557862	Bonaparte's gull	<i>Chroicocephalus philadelphia</i>	Spruce	1
9-Jun-12	13V	469438	6556954	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
9-Jun-12	13V	469460	6557256	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
9-Jun-12	13V	469463	6557558	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	2
9-Jun-12	13V	469469	6558153	Ruby-crowned kinglet	<i>Regulus calendula</i>	Spruce	1
9-Jun-12	13V	469460	6557862	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
9-Jun-12	13V	469460	6557256	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
9-Jun-12	13V	469469	6558153	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
9-Jun-12	13V	469480	6558458	Hermit thrush	<i>Catharus guttatus</i>	Spruce	1
9-Jun-12	13V	469463	6557558	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	1
9-Jun-12	13V	469480	6558458	Swainson's thrush	<i>Catharus ustulatus</i>	Spruce	2
9-Jun-12	13V	469438	6556954	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
9-Jun-12	13V	469460	6557862	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
9-Jun-12	13V	469480	6558458	Palm warbler	<i>Dendroica palmarum</i>	Spruce	1
9-Jun-12	13V	469438	6556954	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
9-Jun-12	13V	469460	6557862	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
9-Jun-12	13V	469460	6557256	Yellow-rumped warbler	<i>Dendroica coronata</i>	Spruce	1
9-Jun-12	13V	469460	6557862	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
9-Jun-12	13V	469480	6558458	Chipping sparrow	<i>Spizella passerina</i>	Spruce	1
9-Jun-12	13V	469438	6556954	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1
9-Jun-12	13V	469463	6557558	Dark-eyed junco	<i>Junco hyemalis</i>	Spruce	1

^(a) Determined from the Ecological Landscape Classification, see Section 5.3.1

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator; N/A = not applicable

Sampling Date	UTM Coordinates (NAD 83)			Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals/ Observations
	Zone	Easting (m)	Northing (m)				
28-May-10	13V	465745	6562162	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
2-Jun-10	13V	478383	6562724	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
28-May-12	13V	467614	6561425	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	465586	6562450	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	3
1-Jun-12	13V	467688	6563768	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	457759	6568348	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	468581	6565645	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	469218	6564566	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	482963	6571134	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	2
19-Jul-12	13V	468034	6560505	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
19-Jul-12	13V	467859	6561719	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
19-Jul-12	13V	467730	6564058	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	464897	6562784	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
1-Jun-12	13V	465149	6562285	Bald eagle	<i>Haliaeetus leucocephalus</i>	Wetland	1
19-Jul-12	13V	467622	6571352	Horned grebe	<i>Podiceps auritus</i>	Wetland	1 female, 2 young
7-Jun-12	13V	477031	6545648	Olive-sided flycatcher	<i>Contopus cooperi</i>	Wood	1
1-Jun-12	13V	467586	6562450	Sandhill crane	<i>Grus canadensis</i>	Wetland	1
1-Jun-12	13V	463716	6570247	Sandhill crane	<i>Grus canadensis</i>	Wetland	3
1-Jun-12	13V	484017	6573011	Sandhill crane	<i>Grus canadensis</i>	Wetland	1
1-Jun-12	13V	484309	6573213	Sandhill crane	<i>Grus canadensis</i>	Wetland	1
1-Jun-12	13V	484095	6572799	Sandhill crane	<i>Grus canadensis</i>	Wetland	1
6-Jun-12	13V	474445	6552411	Swan species	<i>Cygnus species</i>	Wetland	3
18-Feb-12	13V	469425	6562381	Wolverine	<i>Gulo gulo</i>	Wood	Tracks (1)
18-Feb-12	13V	468905	6562554	Wolverine	<i>Gulo gulo</i>	Wood	Tracks (2)
18-Feb-12	13V	468976	6562984	Wolverine	<i>Gulo gulo</i>	Wood	Tracks (1)

^(a) Determined from the Ecological Landscape Classification (Section 5.3.1)

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Calling Index ^(a)
	Zone	Easting (m)	Northing (m)			
28-May-12	13V	466086	6561654	Boreal chorus frog	<i>Pseudacris maculata</i>	1
28-May-12	13V	466533	6561650	Boreal chorus frog	<i>Pseudacris maculata</i>	1
28-May-12	13V	467061	6561538	Boreal chorus frog	<i>Pseudacris maculata</i>	2
28-May-12	13V	467225	6561245	Boreal chorus frog	<i>Pseudacris maculata</i>	3
2-Jun-12	13V	475170	6563408	Boreal chorus frog	<i>Pseudacris maculata</i>	3
2-Jun-12	13V	474673	6563479	Boreal chorus frog	<i>Pseudacris maculata</i>	2
2-Jun-12	13V	474326	6563126	Boreal chorus frog	<i>Pseudacris maculata</i>	3
2-Jun-12	13V	474034	6562729	Boreal chorus frog	<i>Pseudacris maculata</i>	3
2-Jun-12	13V	473754	6562337	Boreal chorus frog	<i>Pseudacris maculata</i>	3
2-Jun-12	13V	473494	6561871	Boreal chorus frog	<i>Pseudacris maculata</i>	1
2-Jun-12	13V	473026	6561279	Boreal chorus frog	<i>Pseudacris maculata</i>	1
13-Jun-12	13V	470768	6557577	Boreal chorus frog	<i>Pseudacris maculata</i>	2
13-Jun-12	13V	470571	6557110	Boreal chorus frog	<i>Pseudacris maculata</i>	1
13-Jun-12	13V	470315	6556655	Boreal chorus frog	<i>Pseudacris maculata</i>	1
28-May-12	13V	466086	6561654	Wood frog	<i>Rana sylvatica</i>	1
28-May-12	13V	466533	6561650	Wood frog	<i>Rana sylvatica</i>	2
28-May-12	13V	467061	6561538	Wood frog	<i>Rana sylvatica</i>	2
28-May-12	13V	467225	6561245	Wood frog	<i>Rana sylvatica</i>	1
2-Jun-12	13V	472382	6560478	Wood frog	<i>Rana sylvatica</i>	1
2-Jun-12	13V	471739	6551481	Wood frog	<i>Rana sylvatica</i>	1
2-Jun-12	13V	471514	6558991	Wood frog	<i>Rana sylvatica</i>	1
2-Jun-12	13V	471262	6558556	Wood frog	<i>Rana sylvatica</i>	1
13-Jun-12	13V	470571	6557110	Wood frog	<i>Rana sylvatica</i>	1

^(a) Calling Index 1 = Individuals can be counted; no overlapping calls; Calling Index 2 = Calls distinguishable; some simultaneous calling; Calling Index 3 = Full chorus; calls continuous and overlapping (Timmermands et al. 2008)

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator

Sampling Date	Transect Number^(a)	Common Name	Scientific Name	Habitat Type^(b)	Number of Tracks^(c)
12-Jan-12	1	Mink	<i>Neovison vison</i>	Jack Pine	2
12-Jan-12	1	Mink	<i>Neovison vison</i>	Jack Pine	1
12-Jan-12	3	Mink	<i>Neovison vison</i>	Regenerating	1
18-Feb-12	3	Mink	<i>Neovison vison</i>	Bog/Fen	1
18-Feb-12	1	Mink	<i>Neovison vison</i>	Jack Pine	1
18-Feb-12	3	Mink	<i>Neovison vison</i>	Jack Pine	1
18-Feb-12	1	Muskrat	<i>Ondatra zibethicus</i>	Jack Pine	3
18-Feb-12	3	Mink	<i>Neovison vison</i>	Open Water	1

^(a) For locations of winter track count survey transects refer to [figure 5.2-2](#)

^(b) Determined from the Ecological Landscape Classification ([Section 5.2.6](#))

^(c) Value is determined by sum of individual tracks (value of 1), trails (value of 3), and networks (value of 5) ([Section 5.2.6](#)).

Sampling Date	UTM Coordinate (NAD 83)			Common Name	Scientific Name	Survey Type	Observation Type	Number of Individuals/ Observations
	Zone	Easting (m)	Northing (m)					
28-May-10	13V	465745	6562162	Bald eagle	<i>Haliaeetus leucocephalus</i>	Spring Fish Spawning	On nest	1
2-Jun-10	13V	478383	6562724	Bald eagle	<i>Haliaeetus leucocephalus</i>	Spring Fish Spawning	Visual (perched)	1
28-May-12	13V	467614	6561425	Bald eagle	<i>Haliaeetus leucocephalus</i>	Amphibian call survey	Visual (flying)	1
1-Jun-12	13V	467586	6562450	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	3
1-Jun-12	13V	467688	6563768	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	1
1-Jun-12	13V	465149	6562285	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	1
1-Jun-12	13V	464897	6562784	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	1
1-Jun-12	13V	469218	6564566	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	1
1-Jun-12	13V	482963	6571134	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird breeding aerial survey	Visual (flying)	2
19-Jul-12	13V	468034	6560505	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird productivity aerial survey	Visual (flying)	1
19-Jul-12	13V	467859	6561719	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird productivity aerial survey	Visual (flying)	1
19-Jul-12	13V	467730	6564058	Bald eagle	<i>Haliaeetus leucocephalus</i>	Waterbird productivity aerial survey	Visual (flying)	1
1-Jun-12	13V	469466	6567604	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Dam	1
1-Jun-12	13V	470842	6569310	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Dam	1
1-Jun-12	13V	468866	6564610	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge and dam	1 of each
1-Jun-12	13V	472682	6569244	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Dam	1
1-Jun-12	13V	474036	6569207	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge and dam	1 of each
1-Jun-12	13V	471525	6570277	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Dam	1
1-Jun-12	13V	468945	6570316	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge	2
1-Jun-12	13V	464017	6570802	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge	1
1-Jun-12	13V	475020	6572331	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge	1
1-Jun-12	13V	465996	6574373	Beaver	<i>Castor canadensis</i>	Waterbird breeding aerial survey	Lodge and dam	1 of each
3-Jun-10	13V	N/C	N/C	Black bear	<i>Ursus americanus</i>	Spring Fish Spawning	Scat	N/A
3-Jun-10	13V	N/C	N/C	Black bear	<i>Ursus americanus</i>	Spring Fish Spawning	Eaten white sucker and pike remains	N/A
1-Jun-12	13V	468711	6556459	Black bear	<i>Ursus americanus</i>	Waterbird breeding aerial survey	Visual (standing)	1
19-Feb-12	13V	480449	6553657	Black-backed woodpecker	<i>Picoides arcticus</i>	Winter Track Counts	Visual (flying)	1
30-May-12	13V	459869	6552782	Marten	<i>Martes americana</i>	Upland breeding bird survey	Visual (running)	1
1-Jun-12	13V	485125	6575707	Moose	<i>Alces alces</i>	Waterbird breeding aerial survey	Visual (standing)	1
1-Jun-12	13V	476051	6573244	Moose	<i>Alces alces</i>	Waterbird breeding aerial survey	Visual (standing)	1
31-May-10	13V	470692	6557440	Osprey	<i>Pandion haliaetus</i>	Spring Fish Spawning	On nest	1
10-Jun-12	13V	467466	6560446	Osprey	<i>Pandion haliaetus</i>	Waterbird breeding aerial survey	Visual (flying)	1
28-May-12	13V	467226	6561247	River otter	<i>Lontra canadensis</i>	Amphibian call survey	Visual (swimming)	1
30-May-12	13V	460539	6553378	Sharp-shinned hawk	<i>Accipiter striatus</i>	Upland breeding bird survey	Visual (flying)	1
3-Jun-10	13V	N/C	N/C	Wolf	<i>Canis lupus</i>	Spring Fish Spawning	Scat	N/A
21-Feb-12	13V	458488	6567652	Wolf	<i>Canis lupus</i>	Winter Fish Telemetry	Visual (standing)	3

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator; N/C = not collected; N/A = not applicable

**Table IV.3-6: Carnivore and Furbearer Species Track Observations
Made During Winter Track Count Surveys, 2012**

Sampling Date	Transect Number ^(a)	Common Name	Scientific Name	Habitat Type ^(b)	Number of Tracks
7-Jan-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
7-Jan-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
7-Jan-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	3
7-Jan-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	6
7-Jan-12	6	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
7-Jan-12	6	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	12
7-Jan-12	6	Vole species	<i>Arvicolinae</i> species	Jack Pine	1
7-Jan-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
7-Jan-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
7-Jan-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	2
7-Jan-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Recent Burn	2
7-Jan-12	6	Snowshoe hare	<i>Lepus americanus</i>	Spruce	77
7-Jan-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	5
9-Jan-12	7	Red fox	<i>Vulpes vulpes</i>	Bog/Fen	1
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	2
9-Jan-12	7	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
9-Jan-12	7	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
9-Jan-12	7	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	10
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	17
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	20
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	33
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	55
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	135
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	214
9-Jan-12	7	Vole species	<i>Arvicolinae</i> species	Jack Pine	1
9-Jan-12	7	Vole species	<i>Arvicolinae</i> species	Jack Pine	1
9-Jan-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
9-Jan-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	4
9-Jan-12	7	Mouse species	<i>Murinae</i> species	Jack Pine/Black Spruce	7
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	8
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	16
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Spruce	10
9-Jan-12	7	Snowshoe hare	<i>Lepus americanus</i>	Spruce	16
9-Jan-12	9	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	3
9-Jan-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	92
9-Jan-12	9	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	4
10-Jan-12	9	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	8
10-Jan-12	9	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	14
10-Jan-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	89
10-Jan-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	242
10-Jan-12	9	Vole species	<i>Arvicolinae</i> species	Jack Pine	1
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	2
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	16
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	17
11-Jan-12	5	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	2
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	136
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	137
11-Jan-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	165
11-Jan-12	5	Vole species	<i>Arvicolinae</i> species	Spruce	1
11-Jan-12	5	Vole species	<i>Arvicolinae</i> species	Spruce	1
11-Jan-12	5	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	1
11-Jan-12	5	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	3
12-Jan-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
12-Jan-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
12-Jan-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
12-Jan-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
12-Jan-12	1	Red fox	<i>Vulpes vulpes</i>	Jack Pine	2
12-Jan-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	43
12-Jan-12	1	Vole species	<i>Arvicolinae</i> species	Jack Pine	2
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	2
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	2
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	5
12-Jan-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Regenerating	1
12-Jan-12	1	Red fox	<i>Vulpes vulpes</i>	Regenerating	1
12-Jan-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Regenerating	3
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	2
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	10
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	16
12-Jan-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	26
12-Jan-12	1	Vole species	<i>Arvicolinae</i> species	Regenerating	1
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Regenerating	1
12-Jan-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Regenerating	3
12-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Bog/Fen	3
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	15
12-Jan-12	3	Lynx	<i>Lynx lynx</i>	Jack Pine	1

**Table IV.3-6: Carnivore and Furbearer Species Track Observations
Made During Winter Track Count Surveys, 2012**

Sampling Date	Transect Number ^(a)	Common Name	Scientific Name	Habitat Type ^(b)	Number of Tracks
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	11
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	31
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	34
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	102
12-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Spruce	65
13-Jan-12	3	Lynx	<i>Lynx lynx</i>	Bog/Fen	1
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	2
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	4
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	24
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	25
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	34
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	39
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	51
13-Jan-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	2
13-Jan-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	2
13-Jan-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	2
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	1
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	2
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	3
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	3
13-Jan-12	3	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	1
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	7
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	8
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	8
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	24
13-Jan-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	131
13-Jan-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	1
13-Jan-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Open Water	3
13-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
13-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	1
13-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	2
13-Jan-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	1
13-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	47
13-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	87
13-Jan-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	1
13-Jan-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	3
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	8
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Deciduous	2
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	5
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	9
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	44
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	78
14-Jan-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Deciduous	1
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	2
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	5
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	11
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	3
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	11
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	26
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	82
14-Jan-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	3
14-Jan-12	4	Wolf	<i>Canis lupus</i>	Open Water	1
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	1
14-Jan-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	2
14-Jan-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Spruce	5
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Spruce	5
14-Jan-12	4	Snowshoe hare	<i>Lepus americanus</i>	Spruce	48
16-Jan-12	2	Snowshoe hare	<i>Lepus americanus</i>	Recent Burn	12
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	33
16-Jan-12	10	Vole species	<i>Arvicolinae</i> species	Jack Pine	4
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	6
16-Jan-12	10	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Recent Burn	1
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Recent Burn	1
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Recent Burn	6
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Recent Burn	40
16-Jan-12	10	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	1
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Spruce	7
16-Jan-12	10	Snowshoe hare	<i>Lepus americanus</i>	Spruce	19
16-Jan-12	10	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	1
16-Feb-12	6	Lynx	<i>Lynx lynx</i>	Jack Pine	1
16-Feb-12	6	Lynx	<i>Lynx lynx</i>	Jack Pine	2
16-Feb-12	6	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	2
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	5
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	6
16-Feb-12	6	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
16-Feb-12	6	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	11
16-Feb-12	6	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	18
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	1
16-Feb-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	1

**Table IV.3-6: Carnivore and Furbearer Species Track Observations
Made During Winter Track Count Surveys, 2012**

Sampling Date	Transect Number ^(a)	Common Name	Scientific Name	Habitat Type ^(b)	Number of Tracks
16-Feb-12	6	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Recent Burn	4
16-Feb-12	6	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
16-Feb-12	6	Snowshoe hare	<i>Lepus americanus</i>	Spruce	86
16-Feb-12	6	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	1
16-Feb-12	7	Red fox	<i>Vulpes vulpes</i>	Bog/Fen	1
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	2
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	4
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	11
16-Feb-12	7	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
16-Feb-12	7	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
16-Feb-12	7	Lynx	<i>Lynx lynx</i>	Jack Pine	1
16-Feb-12	7	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	19
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	23
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	40
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	51
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	54
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	75
16-Feb-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
16-Feb-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
16-Feb-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
16-Feb-12	7	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine/Black Spruce	1
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	20
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	34
16-Feb-12	7	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	2
16-Feb-12	7	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	2
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
16-Feb-12	7	Snowshoe hare	<i>Lepus americanus</i>	Spruce	34
17-Feb-12	5	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
17-Feb-12	5	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	5
17-Feb-12	5	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	2
17-Feb-12	5	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	3
17-Feb-12	5	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	5
17-Feb-12	5	Red fox	<i>Vulpes vulpes</i>	Spruce	1
17-Feb-12	5	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Spruce	1
17-Feb-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	14
17-Feb-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	15
17-Feb-12	5	Snowshoe hare	<i>Lepus americanus</i>	Spruce	18
17-Feb-12	5	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	3
17-Feb-12	5	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	3
17-Feb-12	9	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
17-Feb-12	9	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	3
17-Feb-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	9
17-Feb-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	23
17-Feb-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	115
17-Feb-12	9	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
17-Feb-12	9	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	11
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Deciduous	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	2
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	5
18-Feb-12	1	Red fox	<i>Vulpes vulpes</i>	Jack Pine	1
18-Feb-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
18-Feb-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	2
18-Feb-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	4
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	14
18-Feb-12	1	Vole species	<i>Arvicolinae</i> species	Jack Pine	1
18-Feb-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
18-Feb-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
18-Feb-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	3
18-Feb-12	1	Wolverine	<i>Gulo gulo</i>	Jack Pine	1
18-Feb-12	1	Wolverine	<i>Gulo gulo</i>	Jack Pine	1
18-Feb-12	1	Wolverine	<i>Gulo gulo</i>	Jack Pine	2
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Regenerating	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Regenerating	2
18-Feb-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Regenerating	1
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	2
18-Feb-12	1	Snowshoe hare	<i>Lepus americanus</i>	Regenerating	5
18-Feb-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Regenerating	1
18-Feb-12	1	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	1
18-Feb-12	1	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Spruce	1
18-Feb-12	1	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	2
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	1
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	4
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Bog/Fen	6
18-Feb-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
18-Feb-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Jack Pine	1
18-Feb-12	3	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	1
18-Feb-12	3	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine	5
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	1

Table IV.3-6: Carnivore and Furbearer Species Track Observations Made During Winter Track Count Surveys, 2012

Sampling Date	Transect Number ^(a)	Common Name	Scientific Name	Habitat Type ^(b)	Number of Tracks
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	2
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	3
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	4
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	6
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	6
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	7
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine	9
18-Feb-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
18-Feb-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine	1
18-Feb-12	3	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	2
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	3
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	4
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	9
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	13
18-Feb-12	3	Vole species	<i>Arvicolinae</i> species	Jack Pine/Black Spruce	1
18-Feb-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	1
18-Feb-12	3	Snowshoe hare	<i>Lepus americanus</i>	Spruce	30
19-Feb-12	2	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Recent Burn	4
19-Feb-12	2	Red fox	<i>Vulpes vulpes</i>	Recent Burn	1
19-Feb-12	2	Snowshoe hare	<i>Lepus americanus</i>	Recent Burn	71
19-Feb-12	2	Vole species	<i>Arvicolinae</i> species	Recent Burn	3
19-Feb-12	2	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Recent Burn	1
19-Feb-12	4	Vole species	<i>Arvicolinae</i> species	Bog/Fen	1
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Bog/Fen	10
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Deciduous	2
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Deciduous	3
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	8
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Deciduous	14
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Deciduous	1
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Deciduous	1
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Deciduous	1
19-Feb-12	4	Vole species	<i>Arvicolinae</i> species	Jack Pine	2
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	2
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Jack Pine/Black Spruce	4
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	1
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	1
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	2
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	11
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Jack Pine/Black Spruce	20
19-Feb-12	4	Vole species	<i>Arvicolinae</i> species	Jack Pine/Black Spruce	2
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	2
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	6
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Jack Pine/Black Spruce	6
19-Feb-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Open Water	2
19-Feb-12	4	Fisher/American marten	<i>Martes pennanti</i> or <i>M. americana</i>	Spruce	3
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Spruce	1
19-Feb-12	4	Red squirrel	<i>Tamiasciurus hudsonicus</i>	Spruce	4
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Spruce	1
19-Feb-12	4	Snowshoe hare	<i>Lepus americanus</i>	Spruce	29
19-Feb-12	4	Vole species	<i>Arvicolinae</i> species	Spruce	2
19-Feb-12	4	Weasel species	<i>Mustela erminea</i> or <i>M. nivalis</i>	Spruce	1

^(a) For locations of winter track count survey transects refer to [Figure 5.2-2](#)

^(b) Determined from the Ecological Landscape Classification ([Section 5.2.6](#))

^(c) Value is determined by sum of individual tracks (value of 1), trails (value of 3), and networks (value of 5) ([Section 5.2.6](#)).

Sampling Date	Transect Number^(a)	Common Name	Scientific Name	Habitat Type^(b)	Number of Tracks^(c)
14-Jan-12	4	Moose	<i>Alces alces</i>	Deciduous	1
14-Jan-12	4	Moose	<i>Alces alces</i>	Deciduous	1
14-Jan-12	4	Moose	<i>Alces alces</i>	Jack Pine/Black Spruce	1
14-Jan-12	4	Moose	<i>Alces alces</i>	Spruce	1
14-Jan-12	4	Moose	<i>Alces alces</i>	Spruce	1
14-Jan-12	4	Moose	<i>Alces alces</i>	Spruce	3
14-Jan-12	4	Moose	<i>Alces alces</i>	Jack Pine/Black Spruce	6
14-Jan-12	4	Moose	<i>Alces alces</i>	Jack Pine	9
10-Jan-12	9	Moose	<i>Alces alces</i>	Jack Pine	1

^(a) For locations of winter track count survey transects refer to [figure 5.2-2](#)

^(b) Determined from the Ecological Landscape Classification ([Section 5.2.6](#))

^(c) Value is determined by sum of individual tracks (value of 1), trails (value of 3), and networks (value of 5) ([Section 5.2.6](#)).

**Table IV.3-8: Ungulate Observations Made
During Ungulate Aerial Surveys, 2012**

Sampling Date	UTM Coordinates (NAD 83)			Transect Number	Common Name	Scientific Name	Habitat Type ^(a)	Number of Individuals
	Zone	Easting (m)	Northing (m)					
15-Jan-12	13V	466004	6570747	4	Moose	<i>Alces alces</i>	Bog/Fen	1
15-Jan-12	13V	469900	6561573	5	Moose	<i>Alces alces</i>	Mixed Wood	1
15-Jan-12	13V	473623	6568271	6	Moose	<i>Alces alces</i>	Mixed Wood	2
15-Jan-12	13V	473774	6571888	6	Moose	<i>Alces alces</i>	Mixed Wood	2
15-Jan-12	13V	472771	6574586	Off-transect	Moose	<i>Alces alces</i>	Jack Pine/Black Spruce	1
15-Jan-12	13V	480571	6574623	Off-transect	Moose	<i>Alces alces</i>	Jack Pine	3
20-Feb-12	13V	454716	6555182	2	Moose	<i>Alces alces</i>	Jack Pine/Black Spruce	1
20-Feb-12	13V	462527	6574282	3	Moose	<i>Alces alces</i>	Deciduous	2
20-Feb-12	13V	465873	6573725	4	Moose	<i>Alces alces</i>	Riparian	1
20-Feb-12	13V	477615	6572522	7	Moose	<i>Alces alces</i>	Riparian	1
20-Feb-12	13V	481234	6571748	8	Moose	<i>Alces alces</i>	Riparian	2

^(a) Determined from the Ecological Landscape Classification ([Section 5.2.6](#))

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator

Table IV.3-9: Long-term Adjusted^(a) Trends in the Boreal Softwood Shield and Canada (1966-2010) (Sauer et al. 2012) for Upland Breeding Bird Species Observed in the RSA, 2012.

Common Name	Scientific Name	Adjusted Trend ^(b) (%)	Adjusted Trends ^(c) (%)
Ruffed grouse	<i>Bonasa umbellus</i>	1.4	0.3
Spruce grouse	<i>Falcipectes canadensis</i>	N/A	N/A
Sharp-tailed grouse	<i>Tympanuchus phasianellus</i>	N/A	-1.1
Rock ptarmigan	<i>Lagopus muta</i>	N/A	N/A
Willow ptarmigan	<i>Lagopus lagopus</i>	N/A	N/A
Spotted sandpiper	<i>Actitis macularia</i>	-1.3	-1.8
Wilson's snipe	<i>Gallinago delicata</i>	0.7	0.1
Greater yellowlegs	<i>Tringa melanoleuca</i>	N/A	2.4
Lesser yellowlegs	<i>Tringa flavipes</i>	N/A	-4.4
Hairy woodpecker	<i>Picoides villosus</i>	1.0	1.7
Yellow-bellied sapsucker	<i>Sphyrapicus varius</i>	-0.3	0.4
Black-backed woodpecker	<i>Picoides arcticus</i>	1.4	0.8
Northern flicker	<i>Colaptes auratus</i>	-0.7	-0.7
Alder flycatcher	<i>Empidonax alnorum</i>	-0.5	-1.4
Least flycatcher	<i>Empidonax minimus</i>	-1.0	-1.7
Yellow-bellied flycatcher	<i>Empidonax flaviventris</i>	2.2	1.8
Olive-sided flycatcher	<i>Contopus cooperi</i>	-3.7	-3.8
Red-eyed vireo	<i>Vireo olivaceus</i>	1.2	0.9
Blue-headed vireo	<i>Vireo solitarius</i>	2.5	3.0
Gray jay	<i>Perisoreus canadensis</i>	0.4	-0.4
Tree swallow	<i>Tachycineta bicolor</i>	-1.7	-1.8
Boreal chickadee	<i>Parus hudsonica</i>	1.1	0.6
Winter wren	<i>Troglodytes troglodytes</i>	1.8	1.2
Ruby-crowned kinglet	<i>Regulus calendula</i>	0.4	0.1
American robin	<i>Turdus migratorius</i>	0.5	0.1
Hermit thrush	<i>Catharus guttatus</i>	0.6	1.0
Swainson's thrush	<i>Catharus ustulatus</i>	-0.4	-0.8
Cedar waxwing	<i>Bombycilla cedrorum</i>	-0.5	-0.1
Bay-breasted warbler	<i>Setophaga castanea</i>	1.1	-0.2
Blackpoll warbler	<i>Dendroica striata</i>	-0.9	-1.2
Magnolia warbler	<i>Dendroica magnolia</i>	1.4	0.1
Palm warbler	<i>Dendroica palmarum</i>	-2.3	-2.0
Yellow-rumped warbler	<i>Dendroica coronata</i>	0.2	-0.2
Yellow warbler	<i>Dendroica petechia</i>	-1.1	-0.7
American redstart	<i>Setophaga ruticilla</i>	0.4	-0.1
Nashville warbler	<i>Oreothlypis ruficapilla</i>	-0.4	0.1
Tennessee warbler	<i>Oreothlypis peregrina</i>	-0.4	-0.5
Orange-crowned warbler	<i>Oreothlypis celata</i>	N/A	0.7
Northern waterthrush	<i>Parkesia noveboracensis</i>	1.5	0.7
Wilson's warbler	<i>Wilsonia pusilla</i>	-2.2	-2.2
Chipping sparrow	<i>Spizella passerina</i>	-1.2	-0.6
Fox sparrow	<i>Passerella iliaca</i>	2.3	0.6
Savannah sparrow	<i>Passerculus sandwichensis</i>	-2.0	-1.1
Vesper sparrow	<i>Pooecetes gramineus</i>	-1.6	-0.5
Lincoln's sparrow	<i>Melospiza lincolni</i>	-1.8	-1.5
Song sparrow	<i>Melospiza melodia</i>	-2.3	-0.9
Swamp sparrow	<i>Melospiza georgiana</i>	0	0.5
White-crowned sparrow	<i>Zonotrichia leucophrys</i>	N/A	0.2
White-throated sparrow	<i>Zonotrichia leucophrys</i>	-0.3	-0.3
Dark-eyed junco	<i>Junco hyemalis</i>	-1.2	-1.4
Pine siskin	<i>Carduelis pinus</i>	-1.9	-3.1
Red crossbill	<i>Loxia curvirostra</i>	N/A	-0.2
Common redpoll	<i>Acanthis flammea</i>	N/A	N/A

Notes: Values in bold are significant (P < 0.05)

^(a) The adjusted estimates take into account the relative precision of the estimated trends and provide a better ranking of change for the species relative to other species in the group.

^(b) Long-term adjusted trend for the Boreal Softwood Shield Region

^(c) Long-term adjusted trend for all of Canada

% = percent; N/A = not applicable

Sampling Date	Transect Number ^(a)	Common Name	Scientific Name	Habitat Type ^(b)	Number of Tracks ^(c)
7-Jan-12	6	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
7-Jan-12	6	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	8
7-Jan-12	6	Ptarmigan species	<i>Lagopus</i> species	Recent Burn	2
9-Jan-12	9	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	2
10-Jan-12	9	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	2
10-Jan-12	9	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	10
11-Jan-12	5	Ptarmigan species	<i>Lagopus</i> species	Spruce	6
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Bog/Fen	1
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Bog/Fen	4
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Deciduous	63
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	5
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	6
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	8
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	12
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	13
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Open Water	5
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Regenerating	4
12-Jan-12	1	Ptarmigan species	<i>Lagopus</i> species	Regenerating	8
12-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Bog/Fen	2
12-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
13-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Bog/Fen	19
13-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	18
13-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	5
13-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	8
13-Jan-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	17
13-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	2
13-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	31
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Bog/Fen	15
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	1
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	7
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	30
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	38
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	20
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	21
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	29
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Spruce	2
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Spruce	11
14-Jan-12	4	Ptarmigan species	<i>Lagopus</i> species	Spruce	16
16-Jan-12	2	Ptarmigan species	<i>Lagopus</i> species	Recent Burn	7
16-Jan-12	10	Ptarmigan species	<i>Lagopus</i> species	Recent Burn	1
16-Jan-12	10	Ptarmigan species	<i>Lagopus</i> species	Spruce	5
16-Feb-12	6	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
16-Feb-12	6	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	6
16-Feb-12	6	Ptarmigan species	<i>Lagopus</i> species	Recent Burn	2
17-Feb-12	5	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Spruce	13
17-Feb-12	5	Ptarmigan species	<i>Lagopus</i> species	Spruce	1
17-Feb-12	9	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	11
18-Feb-12	1	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine	1
18-Feb-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
18-Feb-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
18-Feb-12	1	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	2
18-Feb-12	1	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Regenerating	6
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Bog/Fen	3
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Bog/Fen	9
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine	1
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine	2
18-Feb-12	3	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	9
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine/Black Spruce	1
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine/Black Spruce	2
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine/Black Spruce	5
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Jack Pine/Black Spruce	20
18-Feb-12	3	Grouse species	<i>Falciennis canadensis</i> , <i>Bonasa umbellus</i> , or <i>Tympanuchus phasianellus</i>	Open Water	1
19-Feb-12	2	Ptarmigan species	<i>Lagopus</i> species	Recent Burn	16
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	1
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	3
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	3
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Deciduous	17
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine	1
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	10
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Jack Pine/Black Spruce	18
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Spruce	5
19-Feb-12	4	Ptarmigan species	<i>Lagopus</i> species	Spruce	8

^(a) For locations of winter track count survey transects refer to Figure 5.2-7

^(b) Determined from the Ecological Landscape Classification (Section 5.2.6)

^(c) Value is determined by sum of individual tracks (value of 1), trails (value of 3), and networks (value of 5) (Section 5.2.6).

Table IV.3-11: Waterfowl Breeding Population Estimates (in thousands) for Northern Saskatchewan, Northern Manitoba, and Western Ontario (2010) (Zimpfer et al. 2012)

Common Name	Scientific Name	2012	2011	Change from 2011		LTA	Change from LTA	
				%	P		%	P
Mallard	<i>Anas platyrhynchos</i>	1,039	828	25	0.277	1,127	-8	0.608
Gadwall	<i>Anas strepera</i>	31	33	-6	0.829	26	17	0.489
American wigeon	<i>Anas americana</i>	130	126	3	0.912	238	-45	<0.001
Green-winged teal	<i>Anas crecca</i>	136	126	7	0.752	203	-33	0.003
Blue-winged teal	<i>Anas discors</i>	51	31	66	0.333	245	-79	<0.001
Northern pintail	<i>Anas acuta</i>	16	10	59	0.481	38	-58	0.006
Northern shoveler	<i>Anas clypeata</i>	11	7	61	0.457	40	-72	<0.001
Redhead	<i>Aythya americana</i>	19	17	17	0.710	26	-26	0.217
Canvasback	<i>Aythya valisineria</i>	27	31	-12	0.734	53	-49	0.005
Scaup sp.	<i>Aythya marila</i> or <i>A. affinis</i>	338	367	-8	0.666	565	-40	<0.001
Total		2,754	2,439	13	0.181	3,490	-21	<0.001

Notes: P values in bold are significant (P < 0.05)

LTA = long-term average (1955-2010); % = percent; P = P value; < = less than

**Table IV.3-12: Long-term Adjusted(a) Trends in the Boreal Softwood Shield and Canada (1966-2010)
(Sauer et al. 2012) for Waterbird Species Observed in the RSA, 2012.**

Common Name	Scientific Name	Adjusted Trend ^(b) (%)	Adjusted Trend ^(c) (%)
Common loon	<i>Gavia immer</i>	0.7	0.8
Horned grebe	<i>Podiceps auritus</i>	N/A	-2.4
Canada goose	<i>Branta canadensis</i>	7.3	8.4
Mallard	<i>Anas platyrhynchos</i>	2.2	-0.8
American wigeon	<i>Anas americana</i>	N/A	-3.9
Northern shoveler	<i>Anas clypeata</i>	N/A	1.1
Blue-winged teal	<i>Anas discors</i>	N/A	-0.4
Green-winged teal	<i>Anas crecca</i>	N/A	0.1
Ring-necked duck	<i>Aythya collaris</i>	1.1	1.1
Common goldeneye	<i>Bucephala clangula</i>	1.0	0.8
Bufflehead	<i>Bucephala albeola</i>	N/A	2.3
Surf scoter	<i>Melanitta perspicillata</i>	N/A	N/A
White-winged scoter	<i>Melanitta deglandi</i>	N/A	N/A
Common merganser	<i>Mergus merganser</i>	-2.0	-1.3
Red-breasted merganser	<i>Mergus serrator</i>	N/A	-0.7
Sandhill crane	<i>Grus canadensis</i>	2.3	3.9

Notes: Values in bold are significant (P < 0.05)

^(a) The adjusted estimates take into account the relative precision of the estimated trends, and provide a better ranking of change for the species relative to other species in the group.

^(b) Long term adjusted trend for the Boreal Softwood Shield Region

^(c) Long term adjusted trend of Canada.

% = percent; N/A = not applicable

Sampling Date	UTM Coordinate (NAD 83)			Transect Number ^(a)	Common Name	Scientific Name	Number of Adults	Number of Young
	Zone	Easting (m)	Northing (m)					
1-Jun-12	13V	466147	6561789	Fond du Lake River	Unknown duck species	N/A	1	0
1-Jun-12	13V	465149	6562285	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	464897	6562784	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	467633	6564833	Fond du Lake River	Unknown merganser species	N/A	3	0
1-Jun-12	13V	467324	6561588	Fond du Lake River	Unknown merganser species	N/A	8	0
1-Jun-12	13V	467690	6564838	Fond du Lake River	Unknown merganser species	N/A	4	0
1-Jun-12	13V	466854	6564436	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	466084	6563293	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	465828	6563120	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	465435	6562970	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	465767	6561947	Fond du Lake River	Unknown merganser species	N/A	3	0
1-Jun-12	13V	466846	6561694	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	457001	6568390	Fond du Lake River	American wigeon	<i>Anas americana</i>	1	0
1-Jun-12	13V	458307	6567440	Fond du Lake River	American wigeon	<i>Anas americana</i>	2	0
1-Jun-12	13V	459805	6567365	Fond du Lake River	American wigeon	<i>Anas americana</i>	2	0
1-Jun-12	13V	460105	6567359	Fond du Lake River	American wigeon	<i>Anas americana</i>	1	0
1-Jun-12	13V	460368	6567116	Fond du Lake River	American wigeon	<i>Anas americana</i>	1	0
1-Jun-12	13V	468884	6566188	Fond du Lake River	Blue-winged teal	<i>Anas discors</i>	1	0
1-Jun-12	13V	462877	6567592	Fond du Lake River	Bufflehead	<i>Bucephala albeola</i>	1	0
1-Jun-12	13V	468849	6565253	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	461745	6567507	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	460673	6567653	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	458004	6569636	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	457025	6569689	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	458519	6567375	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	460534	6566945	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	5	0
1-Jun-12	13V	462428	6567235	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	464353	6567644	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	461941	6567513	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	20	0
1-Jun-12	13V	461341	6567489	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	15	0
1-Jun-12	13V	460858	6567559	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	459900	6567918	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	12	0
1-Jun-12	13V	459003	6567887	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	458719	6568163	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	458631	6568374	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	4	0
1-Jun-12	13V	458631	6568374	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	20	0
1-Jun-12	13V	458533	6569010	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	10	0
1-Jun-12	13V	458533	6569010	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	10	0
1-Jun-12	13V	458493	6569505	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	19	0
1-Jun-12	13V	458001	6569612	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	5	0
1-Jun-12	13V	455701	6568727	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	456659	6568361	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	8	0
1-Jun-12	13V	457491	6568344	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	457958	6568129	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	7	0
1-Jun-12	13V	457990	6567880	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	458307	6567440	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	4	0
1-Jun-12	13V	460368	6567116	Fond du Lake River	Mallard	<i>Anas platyrhynchos</i>	6	0
1-Jun-12	13V	466692	6567546	Fond du Lake River	Northern shoveler	<i>Anas clypeata</i>	2	0
1-Jun-12	13V	467586	6562450	Fond du Lake River	Sandhill crane	<i>Grus canadensis</i>	1	0
1-Jun-12	13V	462634	6567209	Fond du Lake River	Surf scoter	<i>Melanitta perspicillata</i>	17	0
1-Jun-12	13V	459238	6567887	Fond du Lake River	Unknown duck species	N/A	4	0
1-Jun-12	13V	456053	6568264	Fond du Lake River	Unknown duck species	N/A	5	0
1-Jun-12	13V	461623	6566955	Fond du Lake River	Unknown duck species	N/A	2	0
1-Jun-12	13V	463007	6567622	Fond du Lake River	Unknown duck species	N/A	3	0
1-Jun-12	13V	459158	6567315	Fond du Lake River	Unknown duck species	N/A	2	0
1-Jun-12	13V	459819	6567388	Fond du Lake River	Unknown duck species	N/A	1	0
1-Jun-12	13V	462230	6567543	Fond du Lake River	Unknown duck species	N/A	7	0
1-Jun-12	13V	468137	6560509	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	468518	6558495	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	468931	6565502	Fond du Lake River	Unknown gull species	N/A	7	0
1-Jun-12	13V	466979	6567512	Fond du Lake River	Unknown gull species	N/A	2	0
1-Jun-12	13V	458001	6569612	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	456809	6569680	Fond du Lake River	Unknown gull species	N/A	1	0
1-Jun-12	13V	468360	6559102	Fond du Lake River	Unknown merganser species	N/A	4	0
1-Jun-12	13V	468923	6567022	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	465121	6567854	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	457457	6569643	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	468548	6558597	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	469130	6558074	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	468445	6559249	Fond du Lake River	Unknown merganser species	N/A	24	0
1-Jun-12	13V	467575	6562344	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	468787	6564864	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	468147	6567244	Fond du Lake River	Unknown merganser species	N/A	4	0
1-Jun-12	13V	466979	6567512	Fond du Lake River	Unknown merganser species	N/A	3	0
1-Jun-12	13V	463858	6567638	Fond du Lake River	Unknown merganser species	N/A	1	0

Sampling Date	UTM Coordinate (NAD 83)			Transect Number ^(a)	Common Name	Scientific Name	Number of Adults	Number of Young
	Zone	Easting (m)	Northing (m)					
1-Jun-12	13V	460858	6567559	Fond du Lake River	Unknown merganser species	N/A	4	0
1-Jun-12	13V	458001	6569612	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	456809	6569680	Fond du Lake River	Unknown merganser species	N/A	4	0
1-Jun-12	13V	455859	6568333	Fond du Lake River	Unknown merganser species	N/A	10	0
1-Jun-12	13V	456659	6568361	Fond du Lake River	Unknown merganser species	N/A	2	0
1-Jun-12	13V	457491	6568344	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	457990	6567880	Fond du Lake River	Unknown merganser species	N/A	1	0
1-Jun-12	13V	458307	6567440	Fond du Lake River	Unknown merganser species	N/A	3	0
1-Jun-12	13V	462634	6567209	Fond du Lake River	Unknown merganser species	N/A	10	0
1-Jun-12	13V	465080	6567775	Fond du Lake River	Unknown shorebird species	N/A	3	0
1-Jun-12	13V	459207	6567307	Fond du Lake River	White-winged scoter	<i>Melanitta deglandi</i>	20	0
1-Jun-12	13V	468647	6555726	Black Lake	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	470567	6557199	Black Lake	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	470280	6556606	Black Lake	Unknown merganser species	N/A	2	0
1-Jun-12	13V	470567	6557199	Black Lake	Unknown merganser species	N/A	2	0
1-Jun-12	13V	474036	6569207	Northeastern RSA-4	Canada goose	<i>Branta canadensis</i>	2	0
1-Jun-12	13V	478718	6569102	Northeastern RSA-4	Canada goose	<i>Branta canadensis</i>	2	0
1-Jun-12	13V	477872	6569117	Northeastern RSA-4	Unknown merganser species	N/A	2	0
1-Jun-12	13V	472682	6569244	Northeastern RSA-4	Unknown shorebird species	N/A	1	0
1-Jun-12	13V	468945	6570316	Northeastern RSA-5	Blue-winged teal	<i>Anas discors</i>	2	0
1-Jun-12	13V	472208	6570255	Northeastern RSA-5	Bufflehead	<i>Bucephala albeola</i>	1	0
1-Jun-12	13V	468997	6570332	Northeastern RSA-5	Bufflehead	<i>Bucephala albeola</i>	1	0
1-Jun-12	13V	468997	6570332	Northeastern RSA-5	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	473000	6570249	Northeastern RSA-5	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	463716	6570247	Northeastern RSA-5	Sandhill crane	<i>Grus canadensis</i>	3	0
1-Jun-12	13V	468997	6570332	Northeastern RSA-5	Unknown duck species	N/A	2	0
1-Jun-12	13V	473749	6570214	Northeastern RSA-5	Unknown duck species	N/A	1	0
1-Jun-12	13V	475184	6570220	Northeastern RSA-5	Unknown gull species	N/A	1	0
1-Jun-12	13V	472735	6570249	Northeastern RSA-5	Unknown merganser species	N/A	2	0
1-Jun-12	13V	471202	6570269	Northeastern RSA-5	Unknown merganser species	N/A	4	0
1-Jun-12	13V	470803	6570296	Northeastern RSA-5	Unknown merganser species	N/A	3	0
1-Jun-12	13V	468997	6570332	Northeastern RSA-5	Unknown merganser species	N/A	3	0
1-Jun-12	13V	467085	6570321	Northeastern RSA-5	Unknown merganser species	N/A	1	0
1-Jun-12	13V	478059	6570237	Northeastern RSA-5	Unknown merganser species	N/A	2	0
1-Jun-12	13V	472999	6571203	Northeastern RSA-6	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	470789	6571323	Northeastern RSA-6	Unknown duck species	N/A	1	0
1-Jun-12	13V	482963	6571134	Northeastern RSA-6	Unknown duck species	N/A	8	0
1-Jun-12	13V	472999	6571203	Northeastern RSA-6	Unknown gull species	N/A	2	0
1-Jun-12	13V	483607	6572012	Northeastern RSA-6	Unknown gull species	N/A	1	0
1-Jun-12	13V	470789	6571323	Northeastern RSA-6	Unknown gull species	N/A	1	0
1-Jun-12	13V	477546	6571089	Northeastern RSA-6	Unknown merganser species	N/A	1	0
1-Jun-12	13V	469634	6571353	Northeastern RSA-6	Unknown merganser species	N/A	3	0
1-Jun-12	13V	470789	6571323	Northeastern RSA-6	Unknown merganser species	N/A	2	0
1-Jun-12	13V	482963	6571134	Northeastern RSA-6	Unknown merganser species	N/A	6	0
1-Jun-12	13V	472644	6572304	Northeastern RSA-7	Bufflehead	<i>Bucephala albeola</i>	3	0
1-Jun-12	13V	478217	6572335	Northeastern RSA-7	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	476577	6572356	Northeastern RSA-7	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	474344	6572339	Northeastern RSA-7	Mallard	<i>Anas platyrhynchos</i>	3	0
1-Jun-12	13V	471018	6572190	Northeastern RSA-7	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	476148	6572351	Northeastern RSA-7	Unknown duck species	N/A	1	0
1-Jun-12	13V	472204	6572243	Northeastern RSA-7	Unknown duck species	N/A	1	0
1-Jun-12	13V	470569	6572863	Northeastern RSA-7	Unknown gull species	N/A	1	0
1-Jun-12	13V	481413	6572283	Northeastern RSA-7	Unknown merganser species	N/A	4	0
1-Jun-12	13V	480971	6572307	Northeastern RSA-7	Unknown merganser species	N/A	1	0
1-Jun-12	13V	476148	6572351	Northeastern RSA-7	Unknown merganser species	N/A	4	0
1-Jun-12	13V	470542	6572726	Northeastern RSA-7	Unknown merganser species	N/A	1	0
1-Jun-12	13V	472534	6573495	Northeastern RSA-8	Mallard	<i>Anas platyrhynchos</i>	2	0
1-Jun-12	13V	472540	6573492	Northeastern RSA-8	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	484017	6573011	Northeastern RSA-8	Sandhill crane	<i>Grus canadensis</i>	1	0
1-Jun-12	13V	484309	6573213	Northeastern RSA-8	Sandhill crane	<i>Grus canadensis</i>	1	0
1-Jun-12	13V	484095	6572799	Northeastern RSA-8	Sandhill crane	<i>Grus canadensis</i>	1	0
1-Jun-12	13V	478822	6573107	Northeastern RSA-8	Unknown gull species	N/A	1	0
1-Jun-12	13V	482310	6572984	Northeastern RSA-8	Unknown gull species	N/A	1	0
1-Jun-12	13V	482678	6572992	Northeastern RSA-8	Unknown gull species	N/A	1	0
1-Jun-12	13V	484414	6573601	Northeastern RSA-8	Unknown merganser species	N/A	1	0
1-Jun-12	13V	483012	6571648	Northeastern RSA-8	Unknown merganser species	N/A	2	0
1-Jun-12	13V	476884	6574313	Northeastern RSA-9	Bufflehead	<i>Bucephala albeola</i>	2	0
1-Jun-12	13V	475390	6574321	Northeastern RSA-9	Bufflehead	<i>Bucephala albeola</i>	1	0
1-Jun-12	13V	471201	6574361	Northeastern RSA-9	Canada goose	<i>Branta canadensis</i>	3	0
1-Jun-12	13V	476916	6574327	Northeastern RSA-9	Mallard	<i>Anas platyrhynchos</i>	1	0
1-Jun-12	13V	473251	6574380	Northeastern RSA-9	Unknown duck species	N/A	1	0
1-Jun-12	13V	472868	6574385	Northeastern RSA-9	Unknown merganser species	N/A	2	0
1-Jun-12	13V	472776	6574384	Northeastern RSA-9	Unknown merganser species	N/A	2	0
1-Jun-12	13V	472105	6574379	Northeastern RSA-9	Unknown merganser species	N/A	2	0
1-Jun-12	13V	465341	6575004	Northeastern RSA-9	Unknown merganser species	N/A	1	0
1-Jun-12	13V	485037	6574700	Northeastern RSA-9	Unknown merganser species	N/A	3	0

Sampling Date	UTM Coordinate (NAD 83)			Transect Number ^(a)	Common Name	Scientific Name	Number of Adults	Number of Young
	Zone	Easting (m)	Northing (m)					
1-Jun-12	13V	483289	6571980	Northeastern RSA-9	White-winged scoter	<i>Melanitta deglandi</i>	2	0
19-Jul-12	13V	467077	6561592	Northeastern RSA-1	American wigeon	<i>Anas americana</i>	1	0
19-Jul-12	13V	464849	6562573	Northeastern RSA-1	Mallard	<i>Anas platyrhynchos</i>	1	4
19-Jul-12	13V	467077	6561592	Northeastern RSA-1	Mallard	<i>Anas platyrhynchos</i>	3	0
19-Jul-12	13V	467649	6561652	Northeastern RSA-1	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	14	0
19-Jul-12	13V	456225	6568246	Northeastern RSA-2	American wigeon	<i>Anas americana</i>	2	3
19-Jul-12	13V	458053	6568006	Northeastern RSA-2	American wigeon	<i>Anas americana</i>	2	0
19-Jul-12	13V	458044	6567663	Northeastern RSA-2	American wigeon	<i>Anas americana</i>	3	0
19-Jul-12	13V	460632	6566971	Northeastern RSA-2	American wigeon	<i>Anas americana</i>	1	0
19-Jul-12	13V	454122	6569699	Northeastern RSA-2	Bufflehead	<i>Bucephala albeola</i>	6	0
19-Jul-12	13V	455958	6568109	Northeastern RSA-2	Bufflehead	<i>Bucephala albeola</i>	1	0
19-Jul-12	13V	464601	6567536	Northeastern RSA-2	Common goldeneye	<i>Bucephala clangula</i>	1	0
19-Jul-12	13V	454122	6569699	Northeastern RSA-2	Common goldeneye	<i>Bucephala clangula</i>	1	0
19-Jul-12	13V	456093	6568215	Northeastern RSA-2	Common goldeneye	<i>Bucephala clangula</i>	1	4
19-Jul-12	13V	469132	6558482	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	6	0
19-Jul-12	13V	468422	6559343	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	1	0
19-Jul-12	13V	468075	6560311	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	3	0
19-Jul-12	13V	468955	6565956	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	24	0
19-Jul-12	13V	468149	6567289	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	1	0
19-Jul-12	13V	468038	6567235	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	4	0
19-Jul-12	13V	467337	6567170	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	2	0
19-Jul-12	13V	467058	6567542	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	1	0
19-Jul-12	13V	466479	6567377	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	4	0
19-Jul-12	13V	466640	6568285	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	2	0
19-Jul-12	13V	454122	6569699	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	8	0
19-Jul-12	13V	458899	6567320	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	1	0
19-Jul-12	13V	462486	6567386	Northeastern RSA-2	Common merganser	<i>Mergus merganser</i>	2	0
19-Jul-12	13V	468310	6567113	Northeastern RSA-2	Green-winged teal	<i>Anas crecca</i>	4	0
19-Jul-12	13V	456225	6568246	Northeastern RSA-2	Green-winged teal	<i>Anas crecca</i>	1	0
19-Jul-12	13V	461946	6567104	Northeastern RSA-2	Green-winged teal	<i>Anas crecca</i>	1	0
19-Jul-12	13V	454889	6569513	Northeastern RSA-2	Mallard	<i>Anas platyrhynchos</i>	1	0
19-Jul-12	13V	458053	6568006	Northeastern RSA-2	Mallard	<i>Anas platyrhynchos</i>	3	0
19-Jul-12	13V	460073	6567364	Northeastern RSA-2	Mallard	<i>Anas platyrhynchos</i>	1	0
19-Jul-12	13V	462593	6567444	Northeastern RSA-2	Mallard	<i>Anas platyrhynchos</i>	3	0
19-Jul-12	13V	456304	6568276	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	8	0
19-Jul-12	13V	458556	6567359	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	1	6
19-Jul-12	13V	459095	6567289	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	1	9
19-Jul-12	13V	460073	6567364	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	1	4
19-Jul-12	13V	458872	6567899	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	4	0
19-Jul-12	13V	462932	6567429	Northeastern RSA-2	Scaup species	<i>Aythya marila</i> or <i>A. affinis</i>	2	0
19-Jul-12	13V	461192	6567436	Northeastern RSA-2	Unknown duck species	N/A	2	0
19-Jul-12	13V	459346	6567346	Northeastern RSA-2	Unknown duck species	N/A	4	0
19-Jul-12	13V	468824	6558404	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	468416	6559604	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	468034	6560505	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	460411	6567594	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	457171	6569587	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	456954	6569626	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	456266	6569666	Northeastern RSA-2	Unknown gull species	N/A	1	0
19-Jul-12	13V	456858	6568531	Northeastern RSA-2	Unknown gull species	N/A	3	0
19-Jul-12	13V	458364	6569167	Northeastern RSA-2	Unknown species	N/A	1	0
19-Jul-12	13V	459785	6567482	Northeastern RSA-2	Unknown species	N/A	1	0
19-Jul-12	13V	464587	6567568	Northeastern RSA-2	Unknown species	N/A	3	0
19-Jul-12	13V	454122	6569699	Northeastern RSA-2	Unknown tern species	N/A	24	0
19-Jul-12	13V	470458	6557002	Northeastern RSA-3	Unknown gull species	N/A	1	0
19-Jul-12	13V	470909	6557767	Northeastern RSA-3	Unknown gull species	N/A	1	0
19-Jul-12	13V	471186	6558326	Northeastern RSA-3	Unknown gull species	N/A	1	0
19-Jul-12	13V	474747	6563532	Northeastern RSA-3	Unknown gull species	N/A	1	0
19-Jul-12	13V	473742	6568962	Northeastern RSA-4	Bufflehead	<i>Bucephala albeola</i>	1	2
19-Jul-12	13V	478773	6569250	Northeastern RSA-4	Unknown duck species	N/A	2	0
19-Jul-12	13V	477734	6569132	Northeastern RSA-4	Unknown duck species	N/A	2	0
19-Jul-12	13V	468868	6570481	Northeastern RSA-5	American wigeon	<i>Anas americana</i>	1	4
19-Jul-12	13V	472166	6570371	Northeastern RSA-5	American wigeon	<i>Anas americana</i>	1	7
19-Jul-12	13V	474721	6570305	Northeastern RSA-5	Common goldeneye	<i>Bucephala clangula</i>	1	4
19-Jul-12	13V	468763	6570211	Northeastern RSA-5	Green-winged teal	<i>Anas crecca</i>	2	0
19-Jul-12	13V	474721	6570305	Northeastern RSA-5	Green-winged teal	<i>Anas crecca</i>	1	6
19-Jul-12	13V	468868	6570481	Northeastern RSA-5	Unknown duck species	N/A	2	0
19-Jul-12	13V	473826	6570199	Northeastern RSA-5	Unknown species	N/A	1	0
19-Jul-12	13V	467622	6571352	Northeastern RSA-6	Horned grebe	<i>Podiceps auritus</i>	1	2
19-Jul-12	13V	473077	6570947	Northeastern RSA-6	Unknown duck species	N/A	1	0
19-Jul-12	13V	472552	6572241	Northeastern RSA-7	Unknown duck species	N/A	1	1
19-Jul-12	13V	482417	6573363	Northeastern RSA-8	Unknown duck species	N/A	1	7
19-Jul-12	13V	477583	6574217	Northeastern RSA-9	Unknown duck species	N/A	1	0

^(a) For locations of waterbird aerial survey transects refer to Figure 5.2-5

m = metres; NAD = North American Datum; UTM = Universal Transverse Mercator; N/A = not applicable

Common Name	Scientific Name	Adjusted Trend ^(b) (%)	Adjusted Trend ^(c) (%)
Sharp-shinned hawk	<i>Accipiter striatus</i>	0.8	1.4
Northern goshawk	<i>Accipiter gentilis</i>	N/A	0.3
Bald eagle	<i>Haliaeetus leucocephalus</i>	N/A	4.2
Broad-winged hawk	<i>Buteo platypterus</i>	2.5	1.6
Red-tailed hawk	<i>Buteo jamaicensis</i>	1.0	0.9
Merlin	<i>Falco columbarius</i>	2.8	2.8
American kestrel	<i>Falco sparverius</i>	-3.6	-2.4
Peregrine falcon	<i>Falco peregrinus</i>	N/A	1.1
Northern harrier	<i>Circus cyaneus</i>	1.1	-2.0
Great horned owl	<i>Bubo virginianus</i>	N/A	-2.1
Barred owl	<i>Strix varia</i>	N/A	0.6
Short-eared owl	<i>Asio flammeus</i>	N/A	-3.0
Osprey	<i>Pandion haliaetus</i>	N/A	1.6

Notes: Values in bold are significant ($P < 0.05$)

^(a) The adjusted estimates take into account the relative precision of the estimated trends, and provide a better ranking of change for the species relative to other species in the group.

^(b) Long term adjusted trend for the Boreal Softwood Shield Region

^(c) Long term adjusted trend for Canada.

% = percent; N/A = not available