


APPENDIX Y

Mammal and Herpetofauna Baseline Study



Joyce Lake Direct Shipping Iron Ore Project



**Mammal and Herpetofauna
Baseline Study**

121-18002-00

November 2013





Joyce Lake Direct Shipping Iron Ore Project

Mammal and Herpetofauna Baseline Study

Final Version

A handwritten signature in blue ink, appearing to read "Martin Larose", written over a horizontal line.

Martin Larose, Project Director

EXECUTIVE SUMMARY

Reference to be cited:

GENIVAR. 2013. Joyce Lake Direct Shipping Iron Ore Project. Mammal and Herpetofauna Baseline Study. Report prepared for Labec Century Iron Ore. 49 p. + 1 Appendix

Labec Century Iron Ore (Labec Century; the Proponent), a subsidiary of Century Iron Mines Corporation (TSX:FER), is proposing to develop an iron mine in western Labrador, approximately 20 kilometres northeast of the Town of Schefferville, Québec. The Joyce Lake Direct Shipping Iron Ore Project (the Project) lies on a peninsula of land in Attikamagen Lake and all physical elements of the Project lie within Labrador. The mine will produce up to two million tonnes (Mt) of product per year. The ore will be transported to the existing rail line owned by Tshuëtin Rail Transportation Inc. for transportation to the Port of Sept-Îles.

The Project will require approval from the Government of Newfoundland and Labrador and is subject to environmental assessment (EA) under the Newfoundland and Labrador *Environmental Protection Act* (NL EPA) and associated Environmental Assessment Regulations. Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) the Project is a Designated Project pursuant to Section 15(a) Regulations Designating Physical Activities and will require federal EA.

A list of 45 species of mammals and amphibians may occur in the Study Area associated with the Project, based on available literature and on other information, from a variety of sources, as well as observations made in the field in 2012.

Caribou (*Rangifer tarandus caribou*) associated with the George River Herd is an important large mammal species occurring in the Study Area, given their traditional role as a subsistence species and the recently documented population decline. The Regional Study Area (RSA) is primarily used by caribou during winter, although their abundance near the RSA is variable from year to year, particularly in recent years of population decline. Moose (*Alces alces*) and American Black Bear (*Ursus americanus*) were also confirmed in the RSA, but are believed to occur at low densities. Black bear, however, are locally common in areas of human habituation (e.g., camps, dump sites).

A total of 17 furbearer species could potentially occur in the Study Area. The wolverine, a species at risk, is unlikely to be present. Available literature on the presence of furbearer species and their harvest by Naskapi people suggests that the American marten (*Martes americana*) is probably the main species of interest in the Study Area.

Fourteen small mammal species could occur in the Study Area. The red-backed vole (*Myodes gapperi*) is probably the most abundant. The little brown bat (*Myotis lucifugus*) and northern long-eared bat (*Myotis septentrionalis*) are the only bat species likely to occur in the Study Area; these species were designated endangered by COSEWIC following an emergency assessment on February 3, 2012.

Nine amphibian species could potentially be found in the Study Area. Only two of these species (mink frog and wood frog) were detected incidentally during the 2012 field program.

PRODUCTION TEAM

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1 INTRODUCTION

Labec Century Iron Ore (Labec Century; the Proponent), a subsidiary of Century Iron Mines Corporation (TSX:FER), is proposing to develop an iron mine in western Labrador, approximately 20 kilometres (km) northeast of the Town of Schefferville, Québec. The Joyce Lake Direct Shipping Iron Ore (DSO) Project (the Project) lies on a peninsula of land in Attikamagen Lake and all physical elements of the Project lie within Labrador (Figure 1).

The mine will produce up to two million tonnes (Mt) of product per year. The ore will be transported to the existing rail owned by Tshiuetin Rail Transportation Inc., and further onto the Québec North Shore and Labrador Railway (QNS&L) for transportation to the Port of Sept-Îles.

The Project will require approval from the Government of Newfoundland and Labrador and is subject to environmental assessment (EA) under the Newfoundland and Labrador *Environmental Protection Act* (NL EPA) and associated Environmental Assessment Regulations. Under the *Canadian Environmental Assessment Act, 2012* (CEAA 2012) the Project is a Designated Project pursuant to Section 15(a) Regulations Designating Physical Activities and will require federal EA.

1.1 Project Overview

The Joyce Lake mining prospect lies in an undeveloped area adjacent to the small Joyce Lake waterbody on a peninsula within Attikamagen Lake, in an area with a number of interconnecting large lakes. The prospect can be reached from the mainland by crossing a relatively narrow stretch of water, called Iron Arm. Currently, the prospect is accessed from Schefferville either directly by helicopter or by ground via an existing road to Iron Arm and then by helicopter to Joyce Lake.

The Project consists of mining a high grade deposit of hematite iron in western Labrador, approximately 20 km northeast of Schefferville, as shown in Figure 1. The physical works for the proposed Joyce Lake Project subject to assessment are located wholly in Labrador. The mine area lies within two map-staked licences (309 claims) covering 12,665 hectares (ha).

The physical elements of the Project include the Joyce Lake mining area, options for conveyance across Iron Arm (ice bridge, barge), a beneficiation plant on the mainland, a new haul road to connect to a new rail loop by Astray Lake, access roads, and an accommodation camp. Power for the Project will be provided by diesel generators using fuel stored mainly at the beneficiation plant, with smaller tanks at other locations where power is required. Other physical elements of the Project include stockpiles for overburden, waste rock, and ore (pre- and post-processing), water supply systems, settling ponds with water treatment, domestic waste water treatment, drainage ditches, explosives storage, a hazardous materials storage and management area, an accommodation camp, and ancillary buildings (e.g., offices, workshops, warehouse/storage areas, worker facilities, mobile equipment storage). All structures will be constructed so that they can be moved from the site and re-used elsewhere when no longer required for this Project.

The Project's estimated annual production of iron ore is provided in Table 1, and is based on current exploration information. The current estimated target production is 2 Mt/yr of ore. The first four years of operation would focus on production of DSO which has a high iron content (~60 % iron), with stockpiling of lower grade ore (<60 % iron) that will be beneficiated in Phase II to bring it up to the desired commercial grade.

Table 1: Estimated Annual Production of Iron Ore in Phase I and Phase II for the Joyce Lake Project

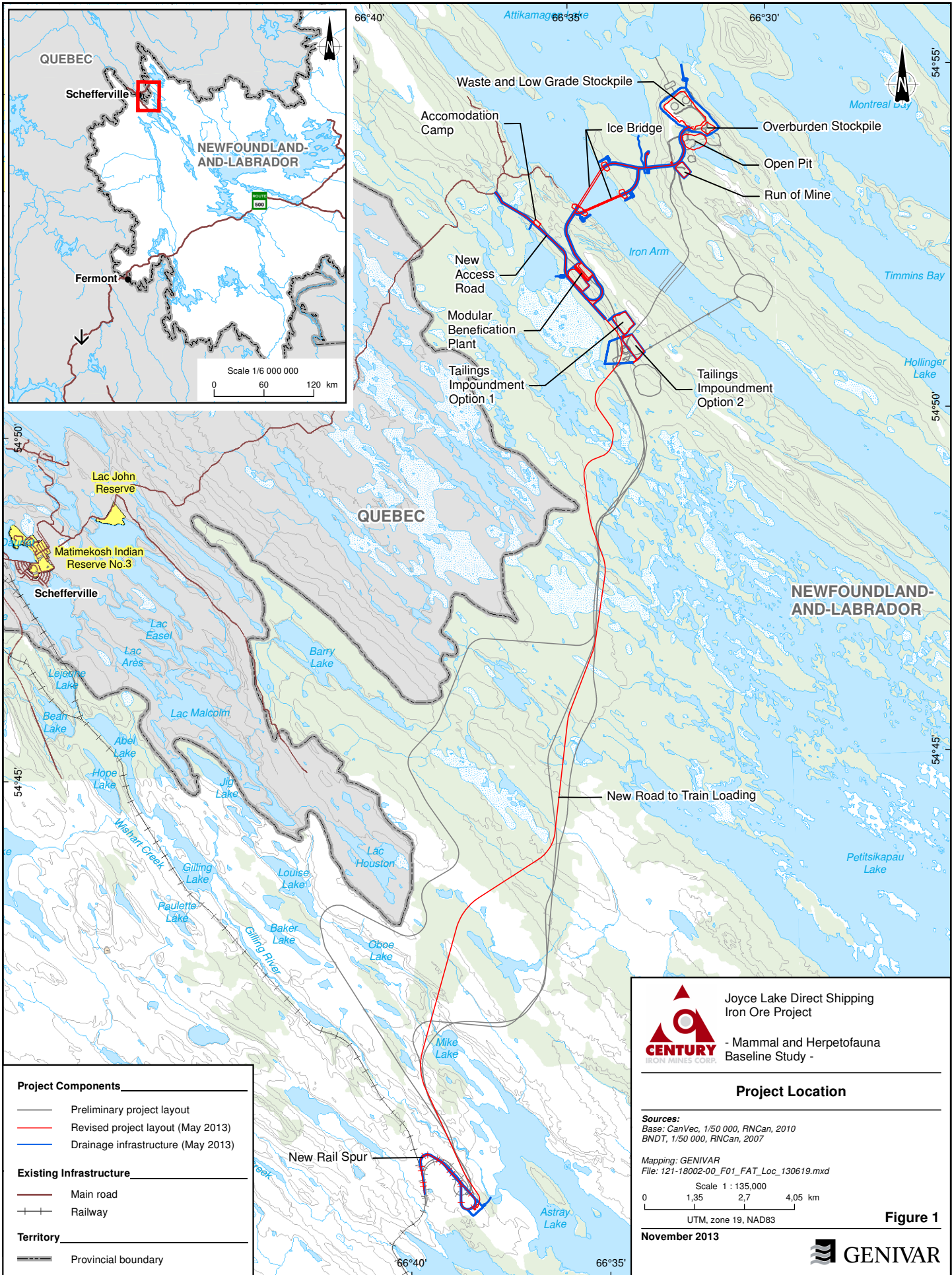
Product	Unit	Estimated Production by Year							
		2014	2015	2016	2017	2018	2019	2020	2021
Phase I Ore (DSO; 60% Fe)	tonne	-	999,000	1,987,000	1,986,000	1,987,000	TBD ¹	TBD ¹	TBD ¹
Phase II Ore (55% Fe)	tonne	-	-	-	-	-	TBD ¹	TBD ¹	TBD ¹
Waste Rock Low Grade	tonne	949,000	11,584,000	15,662,000	5,375,000	140,000	TBD ¹	TBD ¹	TBD ¹

¹ TBD: To be determined.

Phase I construction would begin upon release from EA and with receipt of the relevant permits. For Phase I, mining activities will occur throughout the year. From April to November standard mining activities will occur and ore will be stockpiled. During the winter season, the mining activities will include moving the stockpiled ore by truck from the mine site to the beneficiation plant using the ice bridge to cross Iron Arm. After beneficiation, the ore products will be hauled by truck over the new road to the new rail yard. At the present time, it is anticipated that Phase I will include four years of production (2015 to 2018), followed by three years of Phase II production. Construction of additional infrastructure for Phase II will begin during the last half of Phase I production. The total life-of-mine is anticipated to be up to seven years, but this timeframe may be adjusted as exploration proceeds.

Extraction of the resource will be by open pit and construction of this pit will require dewatering of Joyce Lake. The mining operation will consist of removing ore from the single open pit using drilling and blasting, a hydraulic excavator and haul trucks. In Phase I, mining equipment and supplies will be brought to the mine site by barge over Attikamagen Lake during the ice free season and over an ice bridge in the winter. The pre-stripping of overburden at the open pit will start during the summer, with waste rock and low grade ore being stockpiled outside the pit limits.

Beneficiation in Phase I of the Project will consist of a dry circuit with two crushing and two screening steps necessitating no water addition, allowing operation in cold weather. In Phase I, the beneficiation plant will be operated 250 days per year (during the warmer months). Only high grade ore will be processed during Phase I generating two different products: lump ore and sinter feed. During Phase I, the plant will not produce any tailings.



Project Components

- Preliminary project layout
- Revised project layout (May 2013)
- Drainage infrastructure (May 2013)

Existing Infrastructure

- Main road
- Railway

Territory

- Provincial boundary



Joyce Lake Direct Shipping Iron Ore Project

- Mammal and Herpetofauna Baseline Study -

Project Location

Sources:
 Base: CanVec, 1/50 000, RINCan, 2010
 BNDT, 1/50 000, RINCan, 2007

Mapping: GENIVAR
 File: 121-18002-00_F01_FAT_Loc_130619.mxd

Scale 1 : 135,000
 0 1,35 2,7 4,05 km

UTM, zone 19, NAD83

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Figure 1



For Phase II, a wet circuit will be added which will require the use of fresh water and may include an iron content upgrading process. For Phase II, the beneficiation plant will be operated approximately 200 days per year (during the warmer months). Processing details for Phase II have not yet been determined and are being studied in parallel with information obtained during exploration activities.

For both phases, the final product will be hauled by truck from the beneficiation plant to the rail yard, a distance of approximately 28 km along a new haul road. At the rail yard, the product will be loaded onto rail cars on a new 6 km rail loop that will connect to the existing Tshiuetin Rail. The product will be taken south to Sept-Îles, Québec, where it will be stockpiled on Port Authority land prior to shipping to market.

1.2 Organization of this Baseline Study

The remainder of this Mammal and Herpetofauna Baseline Study outlines the scope, methodology, and results of the baseline program, and is presented in six sections, as follows:

- Section 1: Introduction;
- Section 2: Objectives and Rationale;
- Section 3: Methods;
- Section 4: Discussion;
- Section 5: Summary and Closure;
- Section 6: References.

2 OBJECTIVES AND RATIONALE

In Newfoundland and Labrador, wildlife protection is governed through the *Wildlife Act*, applied in conjunction with the *Labrador Inuit Land Claims Agreement Act*, and with the Department of Environment and Conservation responsible for managing the province's wildlife resources. Section 7.1(a) of the *Wildlife Act* prohibits the hunting, taking or killing of wildlife whether in particular places or at particular times and seasons or by particular methods except under licence or permit. In addition, Section 7.1(j) prevents the disturbance of wildlife in reserved areas, in wildlife parks or in other specified places.

Species at risk are protected under federal and provincial legislation, regulations, policies and guidelines. The federal and provincial legislation applicable to the Project includes the *Species at Risk Act* (SARA) of Canada and the *Endangered Species Act* (ESA) of Newfoundland and Labrador. The federal SARA provides protection to species at the national level to prevent extinction and extirpation, facilitate the recovery of endangered and threatened species, and to promote the management of other species to prevent them from becoming at risk in the future. The Newfoundland and Labrador ESA provides protection for species considered to be endangered, threatened, or vulnerable, and their critical habitats, within the province.

The Mammal and Herpetofauna Baseline Study main objectives were to complete a review of existing literature and observations collected from previous and current studies in the vicinity of the Project to:

- determine the presence of species at risk or species of conservation concern within the Study Area, describe their habitat;
- describe the wildlife present or potentially present within the Study Area;
- identify the type of habitats frequented by wildlife species present or potentially present within the Study Area, and identify areas of concentrations such as breeding, denning and/or wintering areas.

For the purpose of this report, furbearers are defined as all roughly medium sized fur-bearing animals, including those that are managed as such by the province of Newfoundland and Labrador, excluding small mammals (i.e., moles, shrews, small rodents), chiropterans (bats) and large mammals (i.e., moose, bears, caribou).

3 METHODS

3.1 Description of the Study Area

Project Development Area

The Project Development Area (PDA) is the most basic and immediate area of the Project. The PDA is limited to the anticipated area of physical disturbance associated with the construction or operation of the Project. For this Project, the mine area lies within two map-staked licences (309 claims) covering 12,665 ha. The PDA includes the mining area, conveyances across Iron Arm, a beneficiation plant on the mainland, a new haul road, access roads, an accommodation camp, and a rail spur near the existing railroad (Figure 1).

Study Area

The Local Study Area, hereby simply referred to as the Study Area, is the maximum area within which Project-related environmental effects can be predicted or measured with a reasonable degree of accuracy and confidence. It includes the PDA and any adjacent areas where Project-related environmental effects may reasonably be expected to occur. The Mammal and Herpetofauna Baseline Study Area is shown on Figure 2 and includes all infrastructure located on Joyce Lake peninsula as well as the conveyance across Iron Arm, the beneficiation plant, the accommodation camp, access roads, the haul road, and a rail yard, with a 1-km buffer on either sides of the project components.

The Regional Study Area (RSA) includes the Study Area and the surrounding area to provide a regional context for understanding wildlife and its habitat that could potentially interact with the Project. The RSA was defined to describe large mammal species and their habitats. The RSA extends approximately 25 km around a central point from the physical components of the Project (Figure 2).

3.2 Literature Review and Field Observation

3.2.1 Literature Review

A review of available literature was carried out to determine the wildlife species present or likely to be present within the Study Area, both Local and Regional. Information concerning large mammals, furbearers, small mammals, chiropterans, and herpetofauna was searched in existing documents, including scientific journals, government reports, and available studies conducted in the Schefferville area. In addition, electronic databases were also consulted: the Atlantic Canada Conservation Data Centre (ACCDC) and the *Centre de données sur le patrimoine naturel du Québec* (CDPNQ). The Wildlife Division of the Newfoundland and Labrador Department of Environment and Conservation (NL DOEC) and Québec's *Ministère du Développement durable, de l'Environnement, de la Faune et des*

*Parcs*¹ (MDDEFP) were consulted to obtain information concerning large mammal and furbearer harvests as well as caribou collar data. In order to identify and document species at risk and of conservation concern, the following sources of information were also consulted:

- *Species at Risk Act* (SARA);
- Committee on the Status of Endangered Wildlife in Canada (COSEWIC);
- Newfoundland and Labrador *Endangered Species Act*;
- Newfoundland and Labrador Species Status Advisory Committee (SSAC);
- Newfoundland and Labrador Department of Environment and Conservation – Wildlife General Status of Wildlife Ranks;
- Québec *Loi sur les espèces menacées ou vulnérables* (LEMVQ).

3.2.2 Field Observation

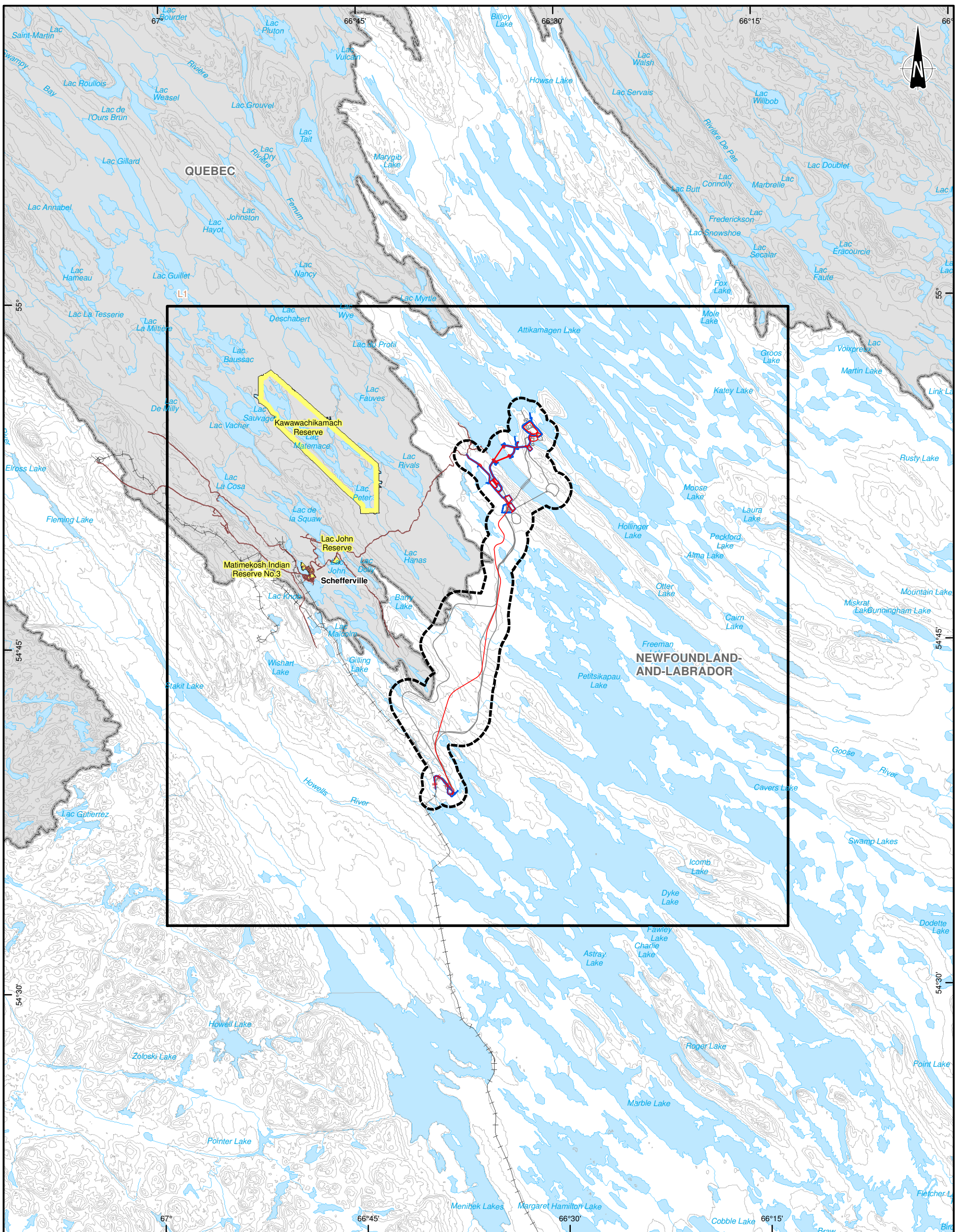
While directed studies were not conducted for the Mammal and Herpetofauna Baseline Study, all wildlife sightings or evidence of their presence were recorded during the other field surveys conducted in support of the Project during the summer of 2012. These observations are provided in this report as complementary information to the literature review.

3.2.3 Photo-Interpretation of Caribou Tracks

A photo-interpretation of caribou tracks based on high resolution 3D imagery was undertaken in order to document the various travel corridors used by the George River Herd in the Study Area. When numerous parallel tracks were observed at a given location, an estimation of the network size was given as follows:

- small (1 to 5 paths);
- medium (6 to 10 paths);
- large (more than 10 paths).

¹ Formerly the wildlife division of the *Ministère des Ressources naturelles et de la Faune* (MRNF).



Project Components

- Study area (local)
- Regional study area
- Preliminary project layout
- Revised project layout (May 2013)
- Drainage infrastructure (May 2013)

Existing Infrastructure

- Main road
- Railway

Territory

- Provincial boundary

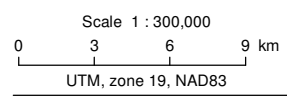


Joyce Lake Direct Shipping Iron Ore Project
 - Mammal and Herpetofauna
 Baseline Study -

Local and Regional Study Areas

Sources :
 Base: BDTA, 1/250 000, MRN Québec, 2002
 CanVec, 1/50 000, RNCAN, 2007

Mapping: GENIVAR
 File: 121-18002-00_F02_FAT_ZE_130619.mxd



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Figure 2

4 DISCUSSION

4.1 Large Mammals

4.1.1 Caribou

4.1.1.1 Literature Review

In Canada, scientists have devised an empirical classification of caribou based on the behaviour of the various groups, particularly as it relates to anti-predator strategies; these groups being island, mountain, migratory, and sedentary ecotypes (Edmonds, 1988; Mallory and Hillis, 1998 *In* NML, 2009). The migratory and the sedentary ecotypes, also known as woodland caribou, are found in Labrador.

The migratory ecotype found in Labrador is the George River (GR) Herd, which migrates between forest and tundra in Québec and Labrador. The GR Herd's annual range includes tundra, forest-tundra and boreal forest habitat, and encompasses most of northern Québec and Labrador between 50°N and 60°N latitude from the Labrador Sea to Hudson Bay (Messier *et al.*, 1988). The RSA falls within the documented wintering range of the GR Herd. The wintering range of the GR Herd is unpredictable in regards to site fidelity, but the herd aggregates each June on traditional calving grounds, which are located approximately 200 km to the northeast of the RSA (Schmelzer and Otto, 2003). The Leaf River (LR) Herd occupies northern Québec only, but their fall and winter ranges have often overlapped with those of the GR Herd (Crête *et al.*, 1990).

There are four sedentary ecotype populations recognized in Labrador, collectively considered as Threatened by the NL ESA: the Lac Joseph (LJ) Herd located south of the RSA, as well as the Red Wine Mountain (RWM) Herd, the Joir River (JR) Herd and the Mealy Mountain (MM) Herd located much further east. Historically, the McPhayden Herd has been reported in the Schefferville area, but this sedentary population has declined or disappeared since the 1960s (Bergerud *et al.*, 2008; LIM, 2009). The McPhayden Herd could have been associated with the Lac Joseph population (Environment Canada, 2008). Southwest of Schefferville, another historic sedentary herd was reported near the Caniapiscou Reservoir, the Caniapiscou Herd (CH). Historically, this herd did not range to the Schefferville area, which was the case of the McPhayden herd (Brown *et al.*, 1986; Bergerud *et al.*, 2008). A technical opinion on the presence of sedentary caribou in the Schefferville area is presented in Appendix A.

George River Herd

The George River Herd is the only caribou population likely to be found within the Project's RSA (Couturier *et al.*, 2004). Historical records suggest that this herd has undergone at least three cycles of scarcity and overabundance in the last 200 years (Low, 1896; Elton, 1942 *In* Couturier *et al.*, 2004; Bergerud *et al.*, 2008) as it was revealed by tree scars dendrochronological analyses (Morneau and Payette, 2000). Trends in the size and distribution of the GR Herd have been relatively well described based on monitoring and studies (Trimper and Chubbs, 2003; Couturier *et*

al., 2004; Couturier *et al.*, 2009; Bergerud *et al.*, 2008; Gunn *et al.*, 2011). Prior to the late 19th century, caribou were observed in large numbers throughout northern Québec, with the first period of scarcity occurring between 1890 and 1910, and remained low until the first half of the 20th century. The population began to expand in the 1950s and grew from approximately 5,000 caribou in 1958 to a peak of approximately 776,000 ± 104,000 (90% CI) in 1993. In the early 1990s, the annual range of the GR Herd covered more than 700,000 km² and extended to the Fermont area (Couturier *et al.*, 2004; Figure 3). During this period of peak abundance the summer habitat degraded, which may have initiated the decline to about 385,000 ± 108,000 individuals in 2001, followed by a further decline to 74,100 ± 12,600, based on the 2010 post-calving photocensus (Gunn *et al.* 2011). The trend in abundance revealed by the aerial photographic counts is also supported by trends in lichen abundance (Boudreau and Payette 2004a; Boudreau and Payette 2004b). The most recent survey conducted by the governments of Newfoundland and Labrador and Québec in July 2012 estimated the herd at 27,600 (MRNF and Government of Newfoundland and Labrador, unpublished data).

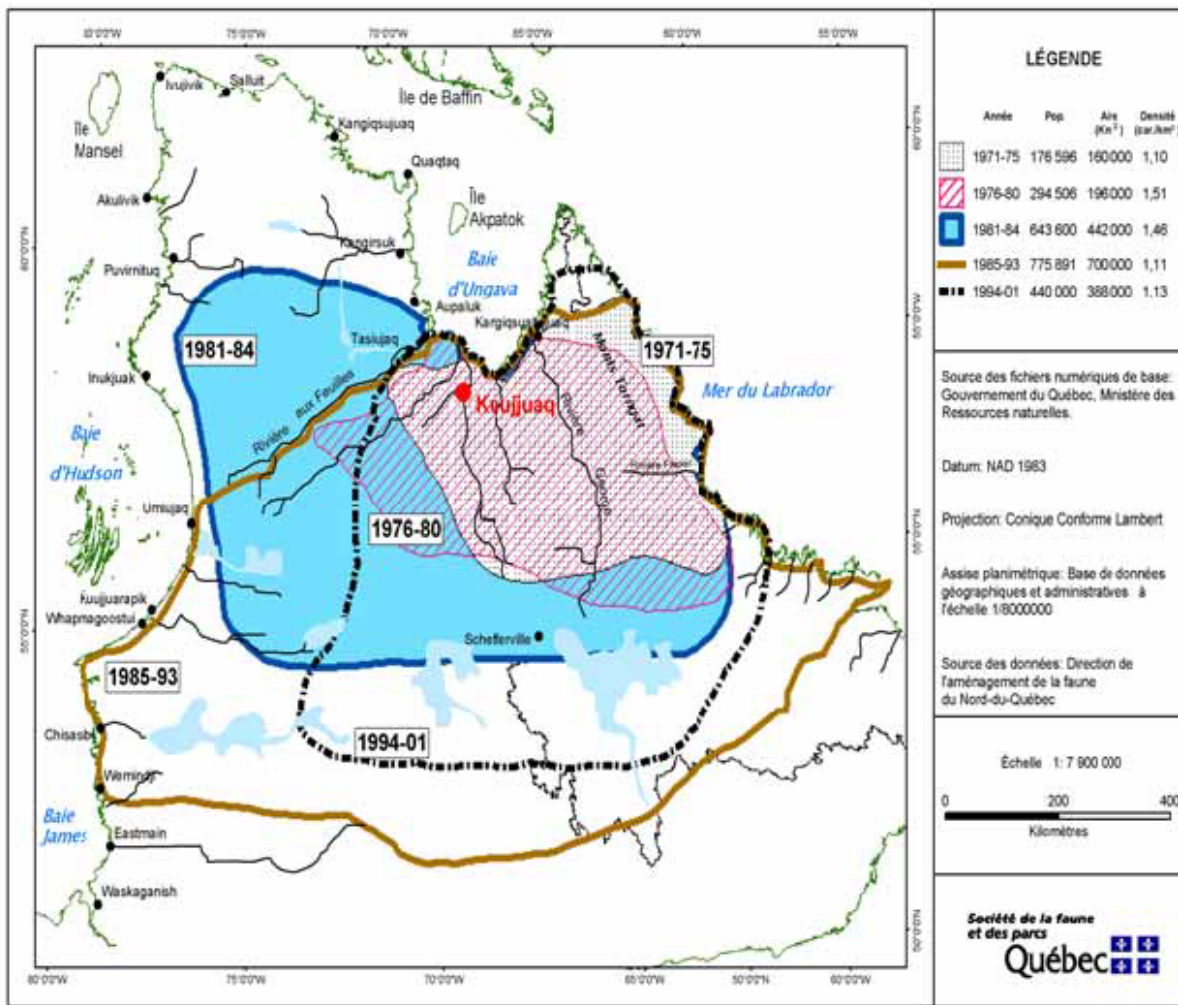


Figure 3: Temporal Fluctuations in the Distribution of the George River Caribou Herd from 1971 to 2001 (Source: Jean and Lamontagne, 2004)

The seasonal distribution of the GR Herd is dictated by food resources availability. In the RSA, caribou sightings occur mainly during the winter season, though relatively uncommon. However, the Schefferville region to a larger extent could be frequented from mid-July to mid-May (fall migration, rutting period, pre-winter migration, winter range and spring migration) based on the migration patterns defined by Jean and Lamontagne (2004) from 1991-2002 collar data. Those patterns were observed during a peak in abundance however. During winters with low snow cover, caribou from the GR Herd tend to stay above the tree line in order to decrease predation risk and increase foraging capabilities (Bergerud and Luttich, 2003). Fidelity to wintering areas is low and inter-annual variation in occupied areas may allow for maintenance of adequate foraging grounds (Schmelzer and Otto, 2003). During two consecutive winters, the mean distance between telemetric locations for an adult female ranged from 400 to 450 km (Schaefer *et al.*, 2000). The Study Area includes approximately 4,456 ha (27% of the Study Area surface area) of suitable foraging habitat for caribou, which are composed of lichen shrub barrens and open spruce-lichen forest. These habitats are relatively common in the Mid Subarctic Forest and the High Subarctic Tundra ecoregions. Other areas found in the Study Area such as highly, moderately and slightly weathered rock barrens (2,319 ha; 14%), present patches of lichen and offer potential caribou foraging habitats.

Figure 4 shows the winter distribution of satellite-collared individuals within the RSA from 2002 to 2012. It was not possible to obtain information on the number of collared caribou that frequented the RSA during that period. Most of the sightings for that period were located east of the RSA. The closest caribou location to Schefferville was recorded on November 17, 2007 near Barry Lake, 7 km east of the town. Caribou locations were also observed near the Joyce Lake peninsula at the end of November 2005. More recently, a collar was active east of the RSA from the end of November to mid-December (2011-11-28 to 2011-12-15). This caribou came from the north near McNeil Lake and moved southward to Godefroy Lake. Then, it moved northward from Marion Lake to Doublet Lake (Figure 4). The path is suggesting that caribou have avoided the Attikamagen Lake. In August 2011, a female was present south of Marion Lake. Nevertheless, the vast majority of locations were from November to April which mainly corresponds to the periods of pre-winter migration, wintering and spring migration.

In 2009, an aerial survey was conducted within an approximate 50-km radius of Schefferville. During this survey, only seven caribous were found and the closest sightings were found more than 20 km southwest of Schefferville (D'Astous and Trimper, 2009; 2010).

The annual distribution area of the GR Herd decreased simultaneously with the decline of the population. In 2009, the GR herd was mostly located east of the Schefferville area (Gauthier Schampaert and Théau, 2010). If the population increases to a size similar to that observed in the 1990's, the Study Area would likely be frequented by the GR Herd, particularly since this species tends to use ungrazed winter habitats from year to year (Schmelzer and Otto, 2003).

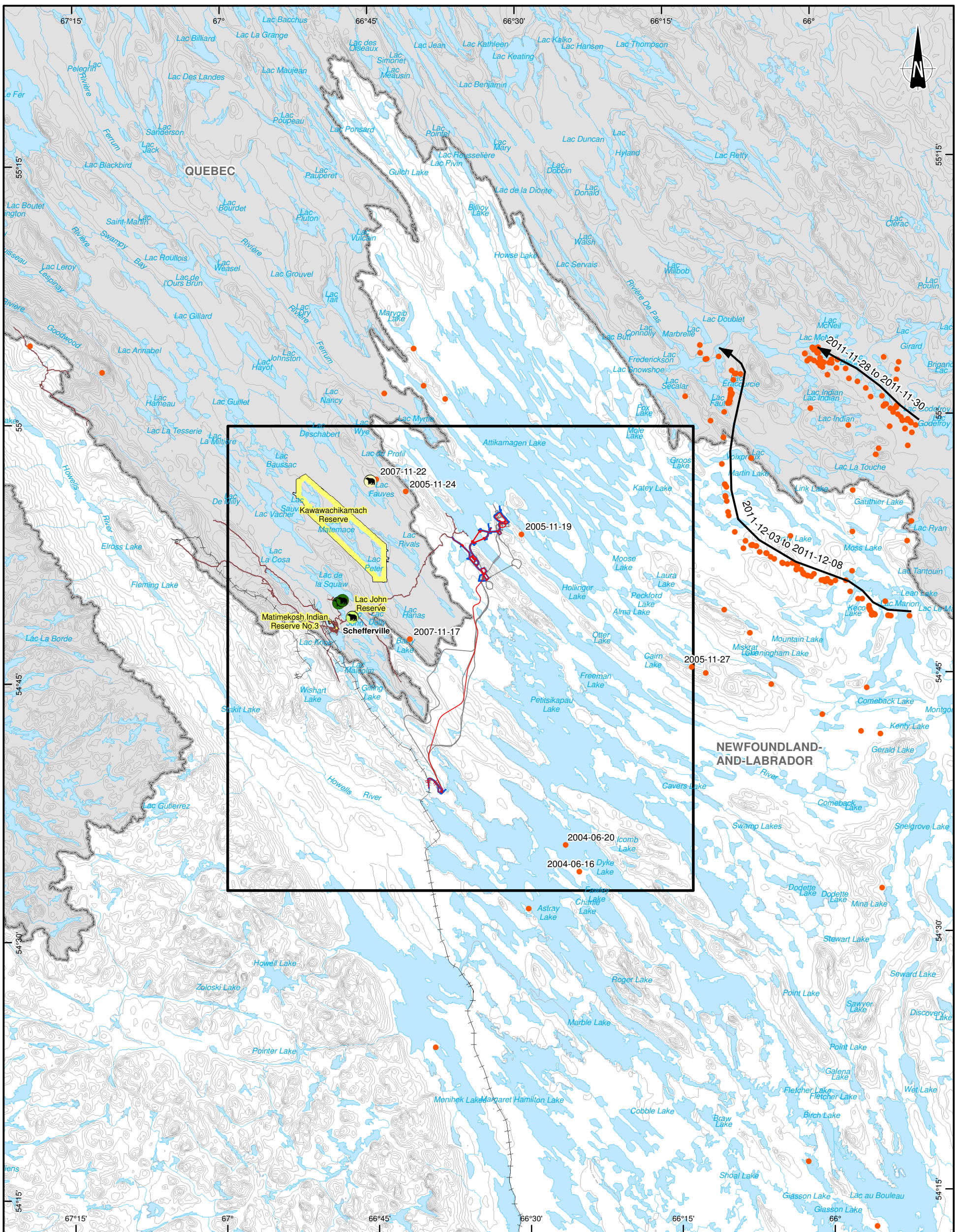
Both the Newfoundland and Labrador and the Québec governments closed the 2012-2013 hunting season for the GR Herd until the state of the population is judged healthy enough to sustain harvesting. The provincial authorities from Newfoundland

and Labrador and Québec are working together to monitor the situation and are consulting aboriginal leaders on the situation.

4.1.1.2 Photo-Interpretation of Caribou Tracks

A photo-interpretation of caribou tracks was conducted within the Study Area. Tracks were mostly observed in peatlands, which seem to hold the imprints of caribou for longer periods than lichen. A network of 2,192 georeferenced lines was established (Figure 5). The vast majority of these lines were characterized as small networks (1,583) comprising 1 to 5 roughly parallel caribou tracks, 511 were judged to be of medium size (6 to 10 tracks) and 98 were indicative of large passages (> 10 tracks).

Nearly 50% of the tracks were oriented on the ENE – WSW axis and another 40% of the tracks were oriented ESE-WNW. These two main alignments of tracks, almost perpendicular, can be observed on Figure 6. This is consistent with the general knowledge of the GR herd migration pattern to travel in a general East-West axis because of the particular orientation of the tree line (Lamontagne and Jean, 2004).



Project Components

- Regional study area
 - Preliminary project layout
 - Revised project layout (May 2013)
 - Drainage infrastructure (May 2013)
- Existing Infrastructure**
- Main road
 - Railway
- Territory**
- Provincial boundary

Migratory Caribou

- Collar locations (2002 to 2012)
 - Path
- Black Bear Harvest Location (2007 to 2011)**
- 2008
 - 2009
 - 2011

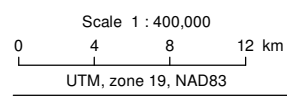


Joyce Lake Direct Shipping Iron Ore Project
 - Mammal and Herpetofauna
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**Caribou Collar Locations and
 Black Bear Harvested in Québec**

Sources :
 Base: BDTA, 1/250 000, MRN Québec, 2002
 CanVec, 1/50 000, RNCAN, 2007

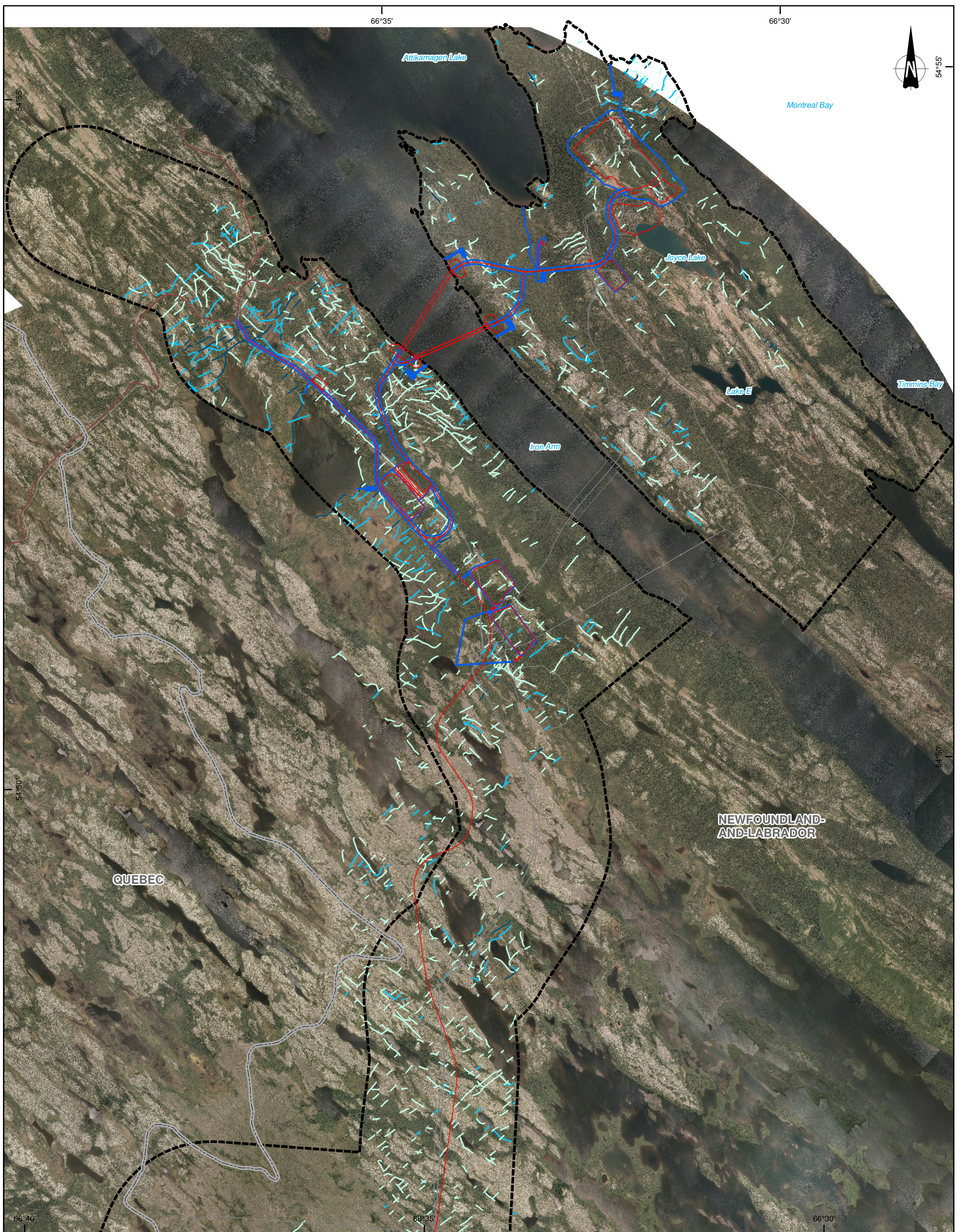
Mapping: GENIVAR
 File: 121-18002-00_F04_FAT_collier_et_abattage_130619.mxd



November 2013



Figure 4



- Project Components**
- Local study area
 - Preliminary project layout
 - Revised project layout (May 2013)
 - Drainage infrastructure (May 2013)
- Existing Infrastructure**
- Main road
 - Railway
- Territory**
- Provincial boundary

- Caribou**
- Tracks Size*
- Small
 - Medium
 - Large



Joyce Lake Direct Shipping Iron Ore Project
 - Mammal and Herpetofauna
 Baseline Study -

Photo-Interpretation of Caribou Tracks

Sources :
 Base: BDTA, 1/250 000, MRN Québec, 2002
 CanVec, 1/50 000, RNCAN, 2007

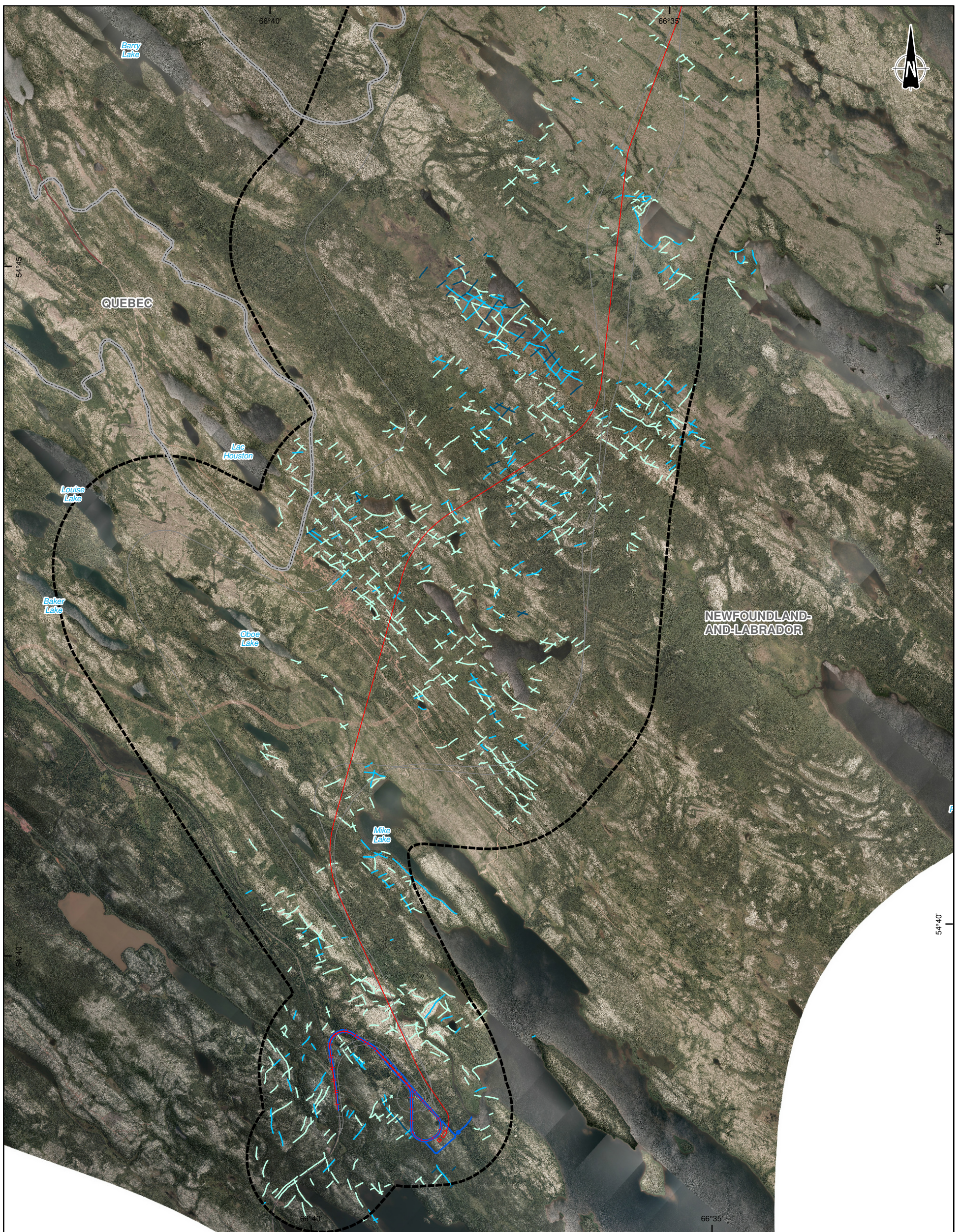
Mapping: GENIVAR
 File: 121-18002-00_F05_FAT_caribou_tracks_130619.mxd

Scale 1 : 50,000
 0 500 1 000 1 500 m
 UTM, zone 19, NAD83

Figure 5a

November 2013





- Project Components**
- Local study area
 - Preliminary project layout
 - Revised project layout (May 2013)
 - Drainage infrastructure (May 2013)
- Existing Infrastructure**
- Main road
 - Railway
- Territory**
- Provincial boundary

- Caribou**
- Tracks Size*
- Small
 - Medium
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Joyce Lake Direct Shipping Iron Ore Project
 - Mammal and Herpetofauna
 Baseline Study -

Photo-Interpretation of Caribou Tracks

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Mapping: GENIVAR
 File: 121-18002-00_F05_FAT_caribou_tracks_130619.mxd

Scale 1 : 50,000
 0 500 1 000 1 500 m
 UTM, zone 19, NAD83

Figure 5b

November 2013



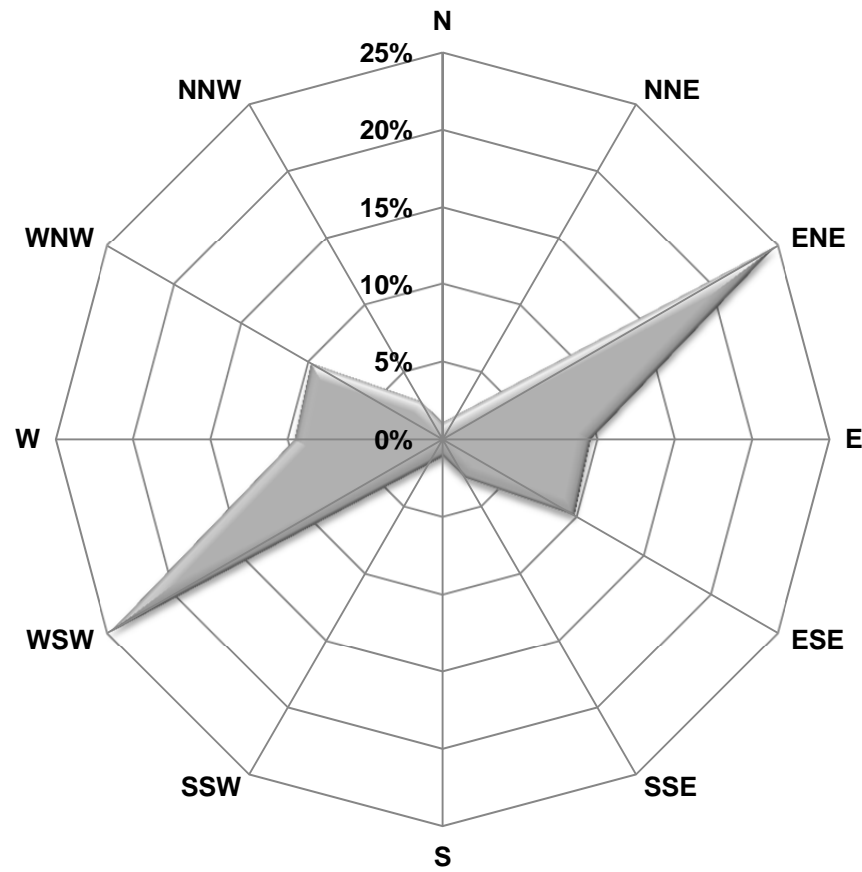


Figure 6: Orientation of Caribou Tracks Obtained from Photo-Interpretation

4.1.2 Moose

Moose (*Alces alces*) are relatively new to Labrador, with the first reports of this species in western Labrador coming in 1949 from natural colonization of nearby populations in Québec (Jung *et al.*, 2009). Moose are generally found in mixed coniferous and deciduous forests, particularly in balsam fir and white or yellow birch stands, which are not commonly found in Labrador. They make use of various stages of forest succession, and benefit from forestry practices (Courtois, 1993; Prescott and Richard, 1996; Stassinu Stantec, 2012a). Clearings and burnt-over areas are used as well. They require abundant food, mainly deciduous species (Samson *et al.*, 2002). Moose feed and find protection from heat and insects in wetlands and around waterbodies (Prescott and Richard, 1996). In winter, moose gather in small groups in mixed wooded areas where food is abundant and snow cover is thinner. In Labrador, such winter habitats are mainly found in major river valleys (CPET and WAE, 2000; Jacques Whitford, 1997). Snow cover is typically high in Labrador, well over the threshold of 70 cm over which movements can be impeded, which has a negative influence on winter survival rates, effectively limiting population (Jung *et al.*, 2009). Moose may range more widely in summer and fall in Labrador, to wetlands and higher elevations as early as late April (Minaskuat Inc., 2009a).

The size of the home range is directly linked to the heterogeneity of the forest stands (Courtois *et al.*, 2002 *In* NML, 2009), and home range size can vary from around 20 to hundreds of square kilometres. In the case of moose fitted with GPS collars in the Churchill River valley (n=3), home ranges spanned from 25 to 331 km² (Minaskuat Inc., 2009a). In the RSA, heterogeneity of wooded areas is low, it can thus be expected that home range size is large, and consequently, population density is low, which is confirmed by Trimper *et al.* (1996) and Jones (2008) in central Labrador and northeastern Québec.

Indeed, the Innu of Matimekush-Lac John report that moose are present in very low numbers, and sightings are rare. The species is therefore of limited importance for subsistence hunting (Clément, 2009). Caribou surveys inside the RSA in the Schefferville area have produced incidental observations of moose, more specifically the presence of an adult male and four tracks south of Schefferville in spring 2009, two tracks and one adult female in spring 2010 but no signs of presence in winter (D'Astous and Trimper, 2009). It is possible that moose retreat south of the RSA in winter, possibly due to the scarcity of dense cover and adjacent quality winter browse areas (NML, 2009).

Moose were again confirmed present in the RSA during the summer aerial (helicopter) surveys conducted for the Joyce Lake Project in 2012, when one female and her fawn were observed. In addition, some suspected moose trails were observed in the Study Area through photo-interpretation.

Moose density in the Project area is suspected to be low. Aerial strip transect counts over central Labrador and adjacent Québec led to very low estimates of 1.6-3.0 moose per 100 km² (Jung *et al.*, 2009). Aerial block-based surveys conducted in the winter of 2008 in the Smallwood Reservoir area and near Goose Bay yielded densities of 0.019 and 0.047 moose/km², respectively (Jones, 2008). Where moose are confirmed to occur in Labrador, densities are usually less than 0.1/km², with a

range varying between 0.013 and 0.168/km² (CPET and WAE, 2000; Trimper *et al.*, 1996). In the RSA, moose hunting is prohibited. In western Labrador, hunting is allowed in only one Moose Management Area (MMA 48), which is located approximately 150 km south from the RSA, and only one licence is authorized annually in this MMA. In Québec, moose hunting is prohibited in the area around Schefferville, which is part of hunting zone 23.

Given the absence of a major river valley, limited amount of deciduous forest in the RSA and the high proportion of open areas (mainly fens and rock barrens), the potential for moose habitat is relatively low. Stassinu Stantec (2012a) list mature hardwood/mixed forest, post-fire coniferous regeneration and shrub swamp as primary habitat in the Wabush area. Potential moose habitat within the Study Area includes birch forests (1.8 ha), shrubland (not present in Wabush area, but rich in broadleaved browse; 699 ha) and post-fire coniferous regeneration (1,758 ha), which represent together a total of 2,459 ha (or 15% of the surface occupied by the Study Area). However, much of the post-fire conifer regeneration in the Study Area appears to lie upon a heavily burnt or otherwise naturally poor soil with little broadleaved regeneration, which is in contrast poor habitat for moose. Wetlands such as riparian fens, shrub swamps, ponds and temporary ponds represent 463 ha, accounting for 2.9% of the Study Area surface area.

4.1.3 Black Bear

The RSA is located near Québec's hunting Zone 23, which ends at the Québec – Labrador border, within which black bear (*Ursus americanus*) density was estimated to be 0.10 bear/10 km² in 2005 (Lamontagne *et al.*, 2006). This zone covers a large territory encompassing the northernmost section of the province. From 2002 to 2011, 26 bears were harvested annually on average in Zone 23, including reserves, and the data indicate that most bears are harvested near outfitters facilities. Bear trapping in Québec's Furbearer Management Unit 96, encompassing the Schefferville area, is reserved for aboriginal communities. The locations where black bear were harvested in Québec within the RSA from 2007 to 2011 are shown in Figure 4 (MDDEFP, 2012). No precise harvest data was available for Labrador. Elsewhere within the RSA, black bears have been found commonly on Labrador Iron Mines property south of Schefferville and are readily found at the municipal landfill (LIM, 2009; Clément, 2009). In addition, four bears and at least ten tracks were spotted in the RSA south of Schefferville May 2009 (D'Astous and Trimper, 2009).

The presence of black bear was confirmed in the Study Area during 2012 surveys, with records of black bear trails and feces, as well as a single specimen seen. In addition, Labec Century employees reported black bears near the Iron Arm accommodation camp, also in 2012.

The black bear is a forest-dwelling animal, but barrens and river habitats are also important during the summer and fall seasons (Prescott and Richard, 1996). Bears can be found in open areas, but tend to avoid recent burns (Jacques Whitford, 1997). Their diet consists mainly of plants, fruits, berries, green leaves and tubers, but they also feed on small mammals, dead animals, insects, and domestic waste when contact with human populations occurs, which can lead to security issues (Minaskuat Inc., 2009b; LIM, 2009). The black bear's home range covers an area

ranging from a few square kilometres to well over 1,000 km², depending on sex (smaller in females), type of environment and imprint by human activity (Leblanc and Huot, 2000; Minaskuat Inc., 2009b). In central Labrador, telemetry studies have indicated that black bears settle into dens during late October to mid-November, when temperatures drop markedly, and emerge from mid-April to early May (Minaskuat Inc., 2009b). Bears on the central coast of Labrador begin denning at the same dates as the inland populations, but emerge later on average (Chaulk *et al.*, 2005).

Black bears are considered widespread across the province (NL DOEC, 2012a). In Labrador, there is no information on bear densities in or near the RSA. Black bear densities near Voisey's Bay range from 0.45 to 0.52 bears/km² in forested areas to 0.05 bears/km² in non-forested regions (VBNC, 1997; Chaulk *et al.*, 2005). There is no trap line registered in western Labrador.

Habitat use in the lower Churchill River valley was characterized by monitoring 6 bears fitted with GPS collars (Minaskuat Inc., 2009b). All tracked bears denned in coniferous forests. From May to July, most bears spent their time between dense and open coniferous forests, and to a lesser extent, sparse coniferous forest and low shrubland. From August to October however, two of four bears for which data was available for all months spent more than 50% of their time in exposed land, which corresponds to the habitat and timing of small fruit availability, an important part of the species' diet. These exposed lands include burns older than 2 years. According to the vegetation types used to describe plant communities in the Study Area, exposed land accounts for all types of barrens and post-fire conifer regeneration, which occupy a combined 17.1% of all land cover. While dense coniferous forest was the most used habitat type for a majority of bears, this is also the most frequent naturally occurring habitat in the lower Churchill River Valley. Some bears preferred open habitat types more than others, while some stuck to forested habitat despite there being a strong bog component in their home range (Minaskuat Inc., 2009b). All peatland types occurring in the Study Area combine for a rather low 6.2% of all land cover.

4.2 Furbearers

Based on distributions presented in Banfield (1977) and Prescott and Richard (1996), there are 17 furbearer species that could potentially be found in the Study Area (Table 2). Only one furbearer species is designated at risk, the wolverine (*Gulo gulo*), with an endangered status both in Labrador and Canada.

According to traditional knowledge presented in NML (2009), red foxes (*Vulpes vulpes*), red squirrels (*Tamiasciurus hudsonicus*) and porcupines (*Erethizon dorsatum*) can be found almost everywhere in the Schefferville region, and snowshoe hare (*Lepus americanus*) can be found in large numbers. In addition, the presence of many species was confirmed in the Schefferville area: grey wolf (*Canis lupus*), woodchuck (*Marmota monax*), northern river otter (*Lontra canadensis*), mink (*Mustela vison*), American marten (*Martes americana*) beaver (*Castor canadensis*), ermine (*Mustela erminea*), muskrat (*Ondatra zibethicus*), northern flying squirrel (*Glaucomys sabrinus*) and Canada lynx (*Lynx canadensis*) (NML, 2009). Least weasel (*Mustela nivalis*) is not confirmed to occur in the area according to published literature, but several Innu of Matimekush-Lac John recognise the existence of two

species of weasel in the area, one smaller than the other (Clément, 2009). The Study Area is located south of the ranges of Arctic hare (*Lepus arcticus*) and Arctic fox (*Alopex lagopus*), which are found in the tundra, both lowland and alpine (Novak *et al.*, 1987). The latter species is accidental in Matimekush-Lac John (NML, 2009). Fisher (*Martes pennanti*) is absent from the Schefferville region based on current knowledge, as their preferred habitat is deciduous forests, which are scarce and discontinuously distributed in the region. The fisher is considered accidental in Labrador (NL DOEC, 2012a). In addition, a single coyote (*Canis latrans*) sighting was confirmed in central Labrador (NL DOEC, 2012a), and it is possible that this opportunistic habitat generalist may stray to the Study Area in the future, owing to the species' rapid expansion.

Four species of furbearers were confirmed to be present in the Study Area during the field surveys in 2012: beaver (one specimen observed in Lake E; photo-interpretation of the Study Area for caribou allowed to identify one beaver dam and hut in the lower half of the haul road part of the Study Area, confirmed to be active in the field), snowshoe hare (feces), red fox and grey wolf (feces and tracks).

There is no data available concerning furbearer population densities in the vicinity of the Project. However, Table 3 provides information concerning the furbearers harvested by the Naskapi from 1989 until 1993 (Tecsult Foresterie Inc., 2000 *In* NML, 2009). Data originates from a broad area, including higher altitudes to the north where Arctic fox and Arctic hare occur. Numbers reported are mainly from trapping. Most harvesting activities took place in the Howell's River valley. Some harvesting has been reported from the Study Area, notably porcupine hunting on the mainland and beaver trapping in the Attikamagen Lake area across from Iron Arm (Weiler, 2009 *In* NML, 2009). Species trapped in recent years in western Labrador (and managed by the NL DOEC) include beaver, muskrat, otter, mink, red fox, Canada lynx (*Lynx canadensis*), wolf, weasel (probably includes both ermine and least weasel), red squirrel and marten (NL DOEC, 2012a).

Table 2: List of Furbearers Potentially Occurring in the Study Area

Common English Name	Scientific Name	Habitat Description/Feeding Preference	Potential Habitat and Status in Study Area	LEMVQ	NatureServe /AC CDC Ranking	Labrador General Status (2000)
Red squirrel	<i>Tamiasciurus hudsonicus</i>	Coniferous, mixed or deciduous forests; feeds mainly on cones in the boreal forest.	Common in spruce forests and forested wetlands. Likely most abundant furbearer.		G5/N5/S5	Secure
Northern flying squirrel	<i>Glaucomys sabrinus</i>	Coniferous and mixed forests; feeds on pine, spruce and fir cones, mushrooms and arboreal lichens.	Likely uncommon in spruce forests and forested wetlands.		G5/N5/S5	Secure
Woodchuck	<i>Marmota monax</i>	Variable: fields, boulder-covered rugged terrain, open forest, well-drained rocky slopes. Feed mostly on herbaceous plants, but also shrub twigs and insects.	Probably uncommon in rock barrens, post-fire conifer regeneration.		G5/N5/S5	Secure
Snowshoe hare	<i>Lepus americanus</i>	Dense stands of young conifers: regeneration, copses, brushes, along watercourses. Feeds on grass and broad-leaved plants in the summer and browses on buds, twigs and bark in winter.	Common in peak years in closed spruce-moss forest, shrubland and shrub swamp.		G5/N5/S5	Secure
Porcupine	<i>Erethizon dorsatum</i>	Mature forest, stands of conifers, rocky slopes and talus deposits. Feeds on the inner bark of many trees in winter and willow and alder buds or leaves and twigs in summer.	Common in recent decades in Schefferville area. Spruce forests and shrubland.		G5/N5/S5	Secure
Muskrat	<i>Ondatra zibethicus</i>	Bogs, ponds, rivers, streams and lakes. Feeds on leaves and stems of various aquatic plants; occasionally on molluscs, frogs or salamanders.	Uncommon; at the edge of its range. All large peatlands, ponds and rivers.		G5/N5/S5	Secure
Beaver	<i>Castor canadensis</i>	Slow moving streams, ponds, lakes and rivers. Mostly in forested areas but also in tundra near deepwater sources surrounded by deciduous trees. Feeds on leaves, bark and twigs. Preferred food is maple, poplar, aspen, white birch, alder, and pond lilies.	Uncommon due to the absence of trembling aspen, but confirmed present. Rivers and ponds in spruce-moss forest, especially near birch forest.		G5/N5/S5	Secure

Table 2: List of Furbearers Potentially Occurring in the Study Area (continued)

Common English Name	Scientific Name	Habitat Description/Feeding Preference	Potential Habitat and Status in Study Area	LEMVQ	NatureServe /AC CDC Ranking	Labrador General Status (2000)
Grey wolf	<i>Canis lupus</i>	Common in Western Labrador; mostly associated with migratory caribou. The availability of prey is more important than the type of habitat. Feeds on beavers and small mammals during the summer and mainly cervidae during the winter.	Uncommon and nomadic; could be absent when migratory caribou are not moving through Study Area, but presence confirmed in summer.		G4/N4/S4	Secure
Red fox	<i>Vulpes vulpes</i>	Wide variety of habitat and common in populated regions. Feeds mainly on small mammals, insects, birds, fruit, seeds and carrion.	Likely fairly common throughout.		G5/N5/S5	Secure
American marten	<i>Martes americana</i>	Large coniferous forest. Prefers thick shady woods with a dense canopy. Denning and nesting sites in hollow trees, stumps, logs, and rock crevices. Feeds mostly on small mammals.	Fairly common but local in closed spruce-moss forest; less frequent in other spruce forest types.		G5/N5/S5	Secure
Least weasel	<i>Mustela nivalis</i>	Tundra or conifer forests in the northern part of its range but prefers open areas such as wet meadows, swamps, and stream banks. Feeds on small mammals.	Rare to uncommon. Abundance unclear in region due to similarity with ermine. Riparian fen, shrub swamp.	LDTV	G5/N5/S2?	Undetermined
Ermine	<i>Mustela erminea</i>	Wide variety of habitats. Feeds mainly on hares, small mammals and birds.	Fairly common to uncommon in forested and wetland areas.		G5/N5/S5	Secure
Mink	<i>Mustela vison</i>	Forests, shrub-covered banks of watercourses and lakes. Feeds on small fish, invertebrates and frogs, as well as birds, small mammals, muskrats and hares.	Likely uncommon in spruce forests, shrub swamp and ponds.		G5/N5/S5	Secure
Otter	<i>Lontra canadensis</i>	Prefers the shores of deep, clear water lakes, rivers, and marshes. Feeds on fry and small fish, but also invertebrates, frogs and aquatic insects.	Rare to uncommon in ponds, open water and adjacent shrub swamp and riparian fens.		G5/N5/S5	Secure

Table 2: List of Furbearers Potentially Occurring in the Study Area (continued)

Common English Name	Scientific Name	Habitat Description/Feeding Preference	Potential Habitat and Status in Study Area	LEMVQ	NatureServe /AC CDC Ranking	Labrador General Status (2000)
Wolverine	<i>Gulo gulo</i>	Found in boreal forest, forested tundra and arctic tundra. Not linked to a specific habitat, but to prey availability. Opportunistic: feeds on a high variety of food and is mostly a scavenger in winter. Caribou is considered an important source of food (remains left by wolves).	Probably absent due to technical extirpation. If present, dependant on caribou and wolf.	T	G4/N3N4/S1	At Risk
Canada lynx	<i>Lynx canadensis</i>	Boreal forest, but also swamp areas and in brush. Prefers old growth boreal forest with dense undercover; also regenerating forest after a fire. May be found in tundra when food is rare.	Rare or absent due to isolation of many forest tracts, but confirmed in RSA. Linked to snowshoe hare abundance. Spruce-moss forest, shrubland and shrub swamp.		G5/N5/S4	Secure

Sources: Banfield (1977); Prescott and Richard (1996); Clément (2009); LIM (2009); NML (2009); Nalcor (2011); ACCDC (2013); NL DOEC (2012a); D'Astous and Trimper (2010).

Legend: E: endangered, T: threatened, V: vulnerable, SC: special concern, LDTV: likely to be designated threatened or vulnerable, C3: low priority candidate species, G: global rank, N: national rank, S: sub-national rank (Labrador), 1?: extremely rare -- ? denotes rank uncertainty, 2: rare, 3: uncommon or range restricted, 4: usually widespread and fairly common 5: abundant and secure, NA: not applicable – not definitively known to occur in Labrador.

Table 3: Number of Specimens per Species of Mammals Harvested by Naskapi Hunters from 1989 to 1993

Common English Name	Total Number	Common English Name	Total Number
American beaver	17	Grey wolf	21
American marten	698	Muskrat	139
American mink	172	Porcupine	9
Arctic fox	25	Otter	62
Arctic hare	25	Red fox	412
Weasel	31	Snowshoe hare	337

Source: Teccult Foresterie Inc. (2000 *In NML*, 2009).

4.3 Small Mammals

There are 14 small mammal species that could potentially be found in the Schefferville area according to Brunet and Duhamel (July 2005 *In NML*, 2009), Desrosiers *et al.* (2002), Rodrigues (2011) and Fortin *et al.* (2004b). Table 4 presents these species with a brief description of their preferred habitat. Based on the NL Small Mammal Monitoring, the southern red-backed vole (*Myodes gapperi*) seems to be common in Labrador, and was also the most abundant species found during the 2007, 2008, 2009 and 2010 surveys. Diversity is low, with the only other species of small mammal found in northern and western Labrador being deer mouse (*Peromyscus maniculatus*), masked shrew (*Sorex cinereus*), meadow vole (*Microtus pennsylvanicus*; noticeable peak in populations in 2008), eastern heather vole (*Phenacomys ungava*) and northern bog lemming (*Synaptomys borealis*; Rodrigues, 2008; 2009; 2011).

The Environmental Impact Statement for the Elross Lake Area Iron Ore Mine contained a review of the observations by Brunet and Duhamel (December 2005 *In NML*, 2009). During this survey, the southern red-backed vole was the most abundant small mammal found. According to Brunet and Duhamel (December 2005 *In NML*, 2009) the eastern heather vole was the second most abundant small mammal in the Schefferville area. Additionally, masked shrew, northern bog lemming and meadow jumping mouse (*Zapus hudsonius*) were recorded in densities far lesser than southern red-backed vole (V. Millien pers. comm., *vide* K. Rashleigh). The Innu of Matimekush-Lac John are also familiar with the star-nosed mole (*Condylura cristata*; Clément, 2009). The southern bog lemming (*Synaptomys cooperi*) has also been recorded in riparian and bog habitats between latitudes 52°N and 53°N in western Québec (Fortin *et al.*, 2004b), and has not been confirmed further north, and may be related to the paucity of research in this region. According to Brunet and Duhamel (December 2005 *In NML*, 2009), small mammal population densities were low and significant inter-annual variations in population size were noted.

Table 4: List of Small Mammals Potentially Occurring in the Study Area

Common English Name	Scientific Name	Habitat Description	Potential Habitat and Status in Study Area	LEMVQ	NatureServe/AC CDC Ranking	Labrador General Status (2000)
Southern red-backed vole	<i>Myodes gapperi</i>	Coniferous or deciduous forests, bushes in the vicinity of a source of water.	Common in spruce-moss forest, forested wetlands and shrub swamp. Most abundant small mammal.		G5/N5/S5	Secure
Rock vole	<i>Microtus chrotorhinus</i>	Near a source of water. Wet talus, between moss-covered rocks, base of cliffs, rocky outcrops in mixed or coniferous forests.	Probably absent. Lichen-shrub barrens, small rock barrens among spruce-moss forest.	LDTV	G4/N4/S1	Sensitive
Meadow vole	<i>Microtus pennsylvanicus</i>	Wet areas and grassland near ponds, lakes and watercourses. Simon <i>et al.</i> (1998) observed a high abundance of meadow vole in fens located in western Labrador.	Possibly common in cycle peaks. Northern ribbed and horizontal fens, riparian fen, flat bog.		G5/N5/S5	Secure
Eastern heather vole	<i>Phenacomys ungava</i>	Various habitats. Bushes and meadows with moss.	Common in spruce-moss forest, shrubland, shrub swamp, riparian fen, lichen-shrub barrens and rock barrens.		G5/N5/S5	Secure
Deer mouse	<i>Peromyscus maniculatus</i>	Coniferous, mixed, or deciduous forests and fields. Dense vegetation, dry well-drained soil.	Probably does not occur so far north. Closed spruce-moss and shrubland.		G5/N5/S5	Secure
Northern bog lemming	<i>Synaptomys borealis</i>	Sphagnum fens, wet coniferous forests, subalpine grassland and tundra.	Uncommon in forested wetlands, northern ribbed and horizontal fens and rock barrens.		G4/N4/S4	Secure
Southern bog lemming	<i>Synaptomys cooperi</i>	Sphagnum and ericaceous bogs, herbaceous marshes, and wet mixed forest surrounding these habitats.	Probably absent from region. Spruce-moss forest, forested wetlands, riparian fen.	LDTV	G5/N4/SNA	-
Labrador collared lemming	<i>Dicrostonyx hudsonius</i>	Dry land and lichen-covered ground in tundra.	Probably absent due to lack of alpine tundra. Weathered rock barrens.		G4/N4/S4	Secure

Table 4: List of Small Mammals Potentially Occurring in the Study Area (continued)

Common English Name	Scientific Name	Habitat Description	Potential Habitat and Status in Study Area	LEMVQ	NatureServe/AC CDC Ranking	Labrador General Status (2000)
Meadow jumping mouse	<i>Zapus hudsonius</i>	Wet meadows, bushes, herbaceous stream banks, wetlands, and alders and willow groves.	Uncommon in shrub swamp, shrubland and riparian fen.		G5/N5/S5	Secure
Woodland jumping mouse	<i>Napaeozapus insignis</i>	Near watercourses in deciduous, mixed or coniferous forests.	Probably absent. Closed spruce-moss forest and shrub swamp.		G5/N5/S1?	Undetermined
Masked shrew	<i>Sorex cinereus</i>	Mature forests (coniferous, mixed or deciduous), marshes, peatlands and bushes.	Common in spruce-moss forest, shrubland, forested wetlands, flat bog, riparian, northern ribbed and horizontal fens.		G5/N5/S5	Secure
Pygmy shrew	<i>Sorex hoyi</i>	Various habitats close to water.	Rare in shrub swamp, fens and bogs.		G5/N5/S1?	Undetermined
Water shrew	<i>Sorex palustris</i>	Mature coniferous or mixed forests near watercourses, marshes and peatlands.	Probably absent. Spruce-moss forest, forested wetlands and shrub swamp.		G5/N5/S1?	Undetermined
Star-nosed mole	<i>Condylura cristata</i>	Forest, fields and marshes, but prefers lake shoreline, streams, wetlands.	Likely uncommon in shrub swamp and riparian fen.		G5/N5/S4	Secure

Sources: Desrosiers *et al.*, (2002); Brunet and Duhamel (July 2005 *In* NML, 2009); Rodrigues (2011); Fortin *et al.* (2004b); Nalcor (2011); AC CDC (2013); NL DOEC (2012a).

Legend: LDTV: likely to be designated threatened or vulnerable, G: global rank, N: national rank, S: sub-national rank (Labrador), 1?: extremely rare -- ? denotes rank uncertainty, 2: rare, 3: uncommon or range restricted, 4: usually widespread and fairly common 5: abundant and secure, NA: not applicable – not definitively known to occur in Labrador.

An overview of the relative abundance of small mammals between the 52nd and 54th parallels of latitude in Québec and Labrador is provided in Table 5, based on studies conducted in the Labrador City area (Simon *et al.*, 1998), in eastern Labrador (Simon *et al.*, 2002) and in the vicinity of the La Grande 3 Reservoir in James Bay (Crête *et al.* 1995, 1997). According to these studies, the southern red-backed vole is the most abundant species, followed by the meadow vole, the masked shrew and the eastern heather vole. Such results should be interpreted with caution as small mammal abundance is highly variable annually. A four-year abundance cycle seems to be observed in southern red-backed vole (Cheveau, 2003; Cheveau *et al.*, 2004).

Table 5: Mean Relative Abundance (captures/100 trap-nights) of Small Mammal Species Captured in Four Selected Studies

Reference:	Simon <i>et al.</i> (1998) ²	Simon <i>et al.</i> (2002) ³	Crête <i>et al.</i> (1995) ⁴	Crête <i>et al.</i> (1997) ⁵
Coordinates:	52°57'N, 67°42'W	53°20'N, 60°25'W	53°30'N, 75°30'W	53°30'N, 75°30'W
Trapping Effort ¹ :	8,065	9,600	Not determined	8,640
Species				
Southern red-backed vole	1.70	5.73	0.63	11.29
Meadow vole	0.31	5.15	0.02	0.33
Eastern heather vole	0.18	0.22	0.16	0.21
Deer mouse	-	-	0.80	-
Northern bog lemming	-	0.21	0.01	0.06
Meadow jumping mouse	-	0.02	0.08	0.01
Masked shrew	0.20	0.86	1.00	0.48
Pygmy shrew	-	0.02	0.04	-

¹ Number of trap-nights.

² Peatlands, succession after forest fires (3, 20, 40, 110, 130, 150 years after).

³ Succession after forest fires (4, 14 and 27 years), succession after clear cutting (4, 14, 27 years).

⁴ Burns, shrubs, young and mature forest.

⁵ Natural islands found within lakes, new island within reservoirs.

4.4 Chiropterans

Three species of bats have been confirmed to date in Newfoundland and two in Labrador, the little brown bat (*Myotis lucifugus*), and more recently, the northern long-eared bat (*Myotis septentrionalis*) from the lower Churchill River valley (NL DOEC, 2012b; T. Parr pers. comm.). Bat calls were recorded in the Howell's River catchment, northwest of the Study Area, in 2005. Calls could not be assigned to a particular species, though one was assigned to the genus *Myotis* (NML, 2009). In addition, bats have been reported by Innu as close as Hope Lake, roughly 4 km to the closest point in the Study Area (Clément, 2009). Bat density in the area over a two-year period (2005 and 2006) was estimated to be very low (Envirotel 3000 inc. *In* NML, 2009).

The little brown bat is the most widespread bat in Canada and is found in a variety of habitats, from arid grasslands to humid coastal forests (COSEWIC, 2012b). Summer roosts are in tree cavities, rock crevices, caves and under the bark of trees as well as building and other man-made structures. This species typically hibernates

in caves and abandoned mines (Nargosen and Brigham, 1993 *In* NML, 2009). Research suggests that the availability of roost sites may be an important limiting factor in the presence of all bat species of eastern Canada. While no such studies were conducted in the Mid Subarctic Forest, fieldwork in mixed boreal forest in Ontario found that tall old-growth conifers are used as roosting sites (Jung *et al.*, 1999). In coastal New-Brunswick, male little brown bats were most present in areas of mature coniferous forest and open water. Female little brown bats preferred buildings, while both sexes of northern long-eared bat preferred to roost in forest interior. All bats were found to forage most over lakes and least over closed forest canopy (Broders *et al.*, 2006). In the particular case of the northern long-eared bat, roost selection in females in a single season depended upon breeding phenology relative to lactation. Lactating females preferred a high and relatively open canopy with low tree density, a habitat structure present in the Study Area in the form of older open spruce-lichen forests (Garroway and Broders, 2008).

Given the information on distribution and habitat preferences listed above, both *Myotis* species are possible in the Study Area in low numbers, though the little brown bat is the more likely of the two based on current knowledge on distribution.

The silver-haired bat (*Lasionycteris noctivagans*) is one of three migratory bat species found in Québec, and possibly in Labrador. During summer, this species occupies mostly wooded areas, where it hunts flying insects along lakes and ponds (Prescott and Richard, 1996). In fall, silver-haired bats gather together and migrate towards wintering habitats in the United States (MRN, 2001). This species occurs in suitable habitat throughout most North America, ranging from southeastern Alaska across the southern half of Canada (Kunz, 1982). In Québec, the northernmost areas where this species was confirmed to occur are Chibougamau and St-Félicien (MRN, 2001), which are located in the mixed-wood boreal forest several hundred kilometres southwest of the Study Area. The probability of observing the silver-haired bat within the Study Area is considered very low. The two remaining migratory bat species, hoary bat (*Lasiurus cinereus*) and eastern red bat (*Lasiurus borealis*) have been found to the lower north shore in Québec in mature coniferous forests. While hoary has not been found north of 50°30'N, red bat has been found to be not uncommon along the Natashquan River valley, up to 80 km south of the Labrador border (Maisonneuve *et al.*, 2006). Despite their potential to range widely due to their migratory habits, neither species has been detected in Labrador. Their probability of occurrence in the Study Area is considered to be low.

4.5 Herpetofauna

According to NL DOEC (2012c), seven amphibian species are present in Labrador: the northern two-lined salamander (*Eurycea bislineata*), the blue-spotted salamander (*Ambystoma laterale*), the American toad (*Anaxyrus americanus*), the mink frog (*Lithobates septentrionalis*), the wood frog (*Lithobates sylvatica*), the northern leopard frog (*Lithobates pipiens*) and the spring peeper (*Pseudacris crucifer*). All but the leopard frog are on the COSEWIC's Species Specialist Subcommittees' Candidate Lists for an eventual assessment of their status (Table 6). According to Desroches and Rodrigue (2004), American toad and mink frog are the most common species in northern Québec and Labrador, while wood frog is the most widely distributed amphibian both in Québec and in North America. Spring peeper is also commonly found in Québec and in the Maritimes. Only small,

isolated two-lined and blue-spotted salamander populations are known to exist in Labrador, and neither has been observed by the Innu of Matimekush-Lac John (Clément, 2009). Brief descriptions of habitat and status of herpetile species of potential occurrence in the Study Area are provided in Table 6.

Incidental observations of mink frog (1) and wood frog (1) were recorded in the Study Area during field surveys in support of the Project in 2012. Few herpetofauna inventories have taken place in northern regions, muddying the picture of known and potential range limits and abundance of species at high latitudes (Brunet and Duhamel, July 2005 *In* NML, 2009). Dedicated surveys conducted in the Schefferville area have confirmed the presence of American toad, mink frog, wood frog, spring peeper and an additional species, the green frog (*Lithobates clamitans*), was found (Brunet and Duhamel, July 2005, December 2005 and Brunet *et al.*, 2008 *In* NML, 2009). The observation of a green frog is however questionable since this species is usually not found that far north and adults can be confused with mink frog. This species is not known to the Innu of Matimekush-Lac John, who are however familiar with American toad and mink frog among others (Clément, 2009). Wood frog and spring peeper were encountered in all four areas sampled in the Howell's River valley (NML, 2009), but the latter always outnumbered the former. American toad of the subarctic subspecies *copei* was found only at one station. No salamanders or snakes have been reported as of yet from the Schefferville area. Fortin *et al.* (2012) report that wood frog was the most frequently encountered species in the Otish Mountains plateau of Québec (roughly 400 km southwest of the Study Area) with a frequency of detection of 37% among 30 sampled stations. American toad (30%), spring peeper (23%) and mink frog (20%) followed suit. Two-lined salamander was the only species of its family to be recorded more than twice (20% frequency).

Wood frog, American toad and two-lined salamander were found in the Wabush and Labrador City area during an amphibian survey conducted in 2012 (Stassinu Stantec, 2012b). In this area, wood frog was the predominant species found (both adults and tadpoles). One two-lined salamander observation was confirmed in the Lower Churchill River Valley. Surveys found the presence of the American toad, northern leopard frog, mink frog, wood frog and spring peeper in decreasing order of abundance (Minaskuat, 2008).

An additional species, the spotted salamander (*Ambystoma maculatum*), was found above the 51st parallel in the Otish Mountains plateau, currently the northernmost known record (Fortin *et al.*, 2012). This species was also found in alpine ponds at and above the treeline (> 1275 m) in the high Appalachian peaks of New Hampshire, as well as American toad, wood frog and spring peeper (Jones and Smyers, 2010). This suggests that the spotted salamander is resistant to cold climates and can inhabit boreal and subarctic ecotypes, and thus could conceivably be found in Labrador.

There are no records of garter snakes (*Thamnophis sirtalis*) near Schefferville or at all in Labrador, though they have been found in Newfoundland (NL DOEC, 2012c). This species has been found in the southern half of the Otish Mountains plateau and as far north as the 54th parallel in western Québec, but its apparent absence further east could be due to cooler summers (AARQ, 2013; Fortin *et al.*, 2012).

Table 6: List of Amphibian Species Potentially Occurring in the Study Area

Common English Name	Scientific Name	Habitat Description	Potential habitat and status in Study Area	COSEWIC	NatureServe/ AC CDC Ranking	Labrador General Status (2000)
Northern two-lined salamander	<i>Eurycea bislineata</i>	Small, rocky woodland streams, and near lakeshores.	Rare to uncommon in rocky streams in open spruce-lichen forest, rock barrens, post-fire conifer regeneration.	Low Priority Candidate	G5/N5/S5	Secure
Blue-spotted salamander	<i>Ambystoma laterale</i>	Coniferous and deciduous forests, beneath logs, rocks, leaf litter or in burrows. Ponds are vital during summer for reproduction.	Very rare or absent. Temporary ponds and streams among spruce-moss forest and forested wetlands.	Low Priority Candidate	G5/N5/S4	Secure
Spotted salamander	<i>Ambystoma maculatum</i>	Much like blue-spotted salamander. Found in bogs in northern part of range.	Probably absent. Ponds among flat bog, horizontal fen, as well as spruce-moss forest and forested wetlands.	Mid Priority Candidate	G5/N5/SNA	-
American toad	<i>Anaxyrus americanus copei</i>	Commonly found in forests, seasonal wetlands, swamps and backwaters in rivers and bogs.	Uncommon to fairly common. Adults and juveniles range to all wooded areas. Breeding in peatland, ponds and small lakes (including with fish), streams in riparian fen.	Low Priority Candidate	G5/N5/S5	Secure
Mink frog	<i>Lithobates septentrionalis</i>	Predominantly aquatic, living among vegetation in ponds, swamps and streams surrounded by wooded areas. Requires water that does not freeze in winter.	Confirmed present, but likely uncommon. Permanent ponds and small lakes (eutrophic) without fish among spruce forest.	Mid Priority Candidate	G5/N5/S5	Secure
Wood frog	<i>Lithobates sylvatica</i>	Woodland species requiring wooded swamps and ponds for reproduction.	Confirmed present; uncommon to fairly common. Wide variety of habitats, both upland and bog, in vicinity of ponds, shrub swamp.	Low Priority Candidate	G5/N5/S4	Secure
Northern leopard frog	<i>Lithobates pipiens</i>	Marshes near lakes and rivers, ponds, bogs, fields.	Probably absent at these latitudes. Shrub swamp, eutrophic ponds, bogs and fens.	Not at Risk	G5/N5/S3S4	Sensitive

Table 6: List of Amphibian Species Potentially Occurring in the Study Area (continued)

Common English Name	Scientific Name	Habitat Description	Potential habitat and status in Study Area	COSEWIC	NatureServe/ AC CDC Ranking	Labrador General Status (2000)
Spring peeper	<i>Pseudacris crucifer</i>	Wooded areas in or near flooded ponds, swamps, and bogs.	Likely uncommon in ponds surrounded by forest, shrub swamp and forested wetlands.	Low Priority Candidate	G5/N5/S1S2	Undetermined
Green frog	<i>Lithobates clamitans</i>	Aquatic environments such as lakes, marshes, bogs.	Probably absent. Permanent ponds and stagnant water in shrub swamp and forested bogs.	Low Priority Candidate	G5/N5/SNA	-

Sources: AARQ (2013); Bider and Matte (1996), Desroches and Rodrigue (2004), Fortin *et al.* (2012), Jones and Smyers (2010), Minaskuat (2008), NML (2009), Stassinu Stantec (2012b), AC CDC (2013); NL DOEC (2012c).

Legend: G: global rank, N: national rank, S: sub-national rank (Labrador), 1?: extremely rare -- ? denotes rank uncertainty, 2: rare, 3: uncommon or range restricted, 4: usually widespread and fairly common, 5: abundant and secure, NA: not applicable – not definitively known to occur in Labrador.

4.6 Species at Risk

The wolverine is designated “Endangered” in Labrador under the NL ESA (NL DOEC, 2012d) and federally under the SARA (COSEWIC, 2012a; Government of Canada, 2012). It is the only furbearer species in Labrador possessing a legal at-risk status. Its presence in the RSA is unlikely given that there have been no confirmed records in Labrador since the 1950s (NL DOEC, 2012d) and there have been only a few unconfirmed records of dubious origin from Québec (S. Guérin, pers. comm.). In the past, wolverine was common throughout Labrador and Quebec, particularly up until the late 1800s (Fortin *et al.*, 2005; MRN, 2010). The last confirmed record of a wolverine in the region (Muskrat Falls in Central Labrador) was in 1955 (Knox, 1994). There have been potential sightings since this date. However, there is not sufficient proof to believe that the species still occurs in the province (Nalcor Energy, 2011). A Wolverine Recovery Team has established a National Recovery Plan for Wolverine (Eastern Population), tasked with the goal of establishing a self-sustaining population of wolverines in Quebec and Labrador.

In February 2012, the little brown bat and northern long-eared bat were designated “Endangered” in Canada by the COSEWIC (2012a), due to rapid declines and high mortality in hibernacula related to white-nose syndrome (WNS). The government of Newfoundland and Labrador has not yet listed these species under their Endangered Species Act. The predicted rates of decline suggest that these species could be functionally extirpated (< 1% of the population remaining) in the near future. The northward spread of the fungus *Geomyces destructans* causing white-nose syndrome is indeed rapid (200-400 km/yr), but could be limited by low temperatures in hibernacula in high boreal and subarctic climates (COSEWIC, 2012b; Frick *et al.*, 2010; Verant *et al.*, 2012). Mortality linked to WNS has been confirmed in the boreal forest as far north as the regions of Abitibi in 2010-2011 and Saguenay-Lac-Saint-Jean in 2011-2012 (COSEWIC, 2012b; MRN, 2013). Individuals of either one of these two species were recorded in the Howell’s River catchment near the proposed Elross Lake project as well as to the south of Schefferville inside the RSA; their presence in the Study Area is possible (NML, 2009; Clément, 2009).

According to the Atlantic Canada Conservation Data Centre database, there is no existing record of any wildlife species at risk or of conservation concern within the Study Area (A. Durocher, pers. comm., 2012).

5 SUMMARY AND CLOSURE

A total of 45 species of mammals and amphibians may occur in the Study Area associated with the Project, based on available literature and on other information, from a variety of sources, as well as observations made in the field in 2012.

Caribou associated with the George River Herd are an important large mammal species occurring in the Study Area, given their traditional role as a subsistence species and the recently documented population decline. The RSA is primarily used by caribou during winter, although their abundance near the RSA is variable from year to year, particularly in recent years of population decline. Moose and American black bear were also confirmed in the RSA, but are believed to occur at low densities. Black bear, however, are locally common in areas of human habituation (e.g., camps, dump sites).

A total of 17 furbearer species could potentially occur in the Study Area. The wolverine, a species at risk, is unlikely to be present. Available literature on the presence of furbearer species and their harvest by Naskapi people suggests that the American marten is probably the main species of interest in the Study Area.

Fourteen small mammal species could occur in the Study Area. The red-backed vole is probably the most abundant. The little brown bat and northern long-eared bat are the only bat species likely to occur in the Study Area; these species were designated endangered by COSEWIC following an emergency assessment on February 3, 2012.

Nine amphibian species could potentially be found in the Study Area. Only two of these species (mink frog and wood frog) were detected incidentally during the 2012 field program.

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***Appendix A:
Technical Opinion Concerning the Potential
Presence of Woodland Caribou in the Joyce
Lake DSO Project Study Area***

TECHNICAL OPINION

TO: Dana Feltham, Stassinu Stantec
Perry Trimper, Stassinu Stantec

FROM: Alain Chabot, GENIVAR

COPY: Martin Larose, GENIVAR
Annie Bérubé, GENIVAR

DATE: February 20, 2013

SUBJECT: Technical Opinion Concerning the Potential Presence of Woodland
Caribou in the Joyce Lake DSO Project Study Area

O./REF.: 121-18002-00

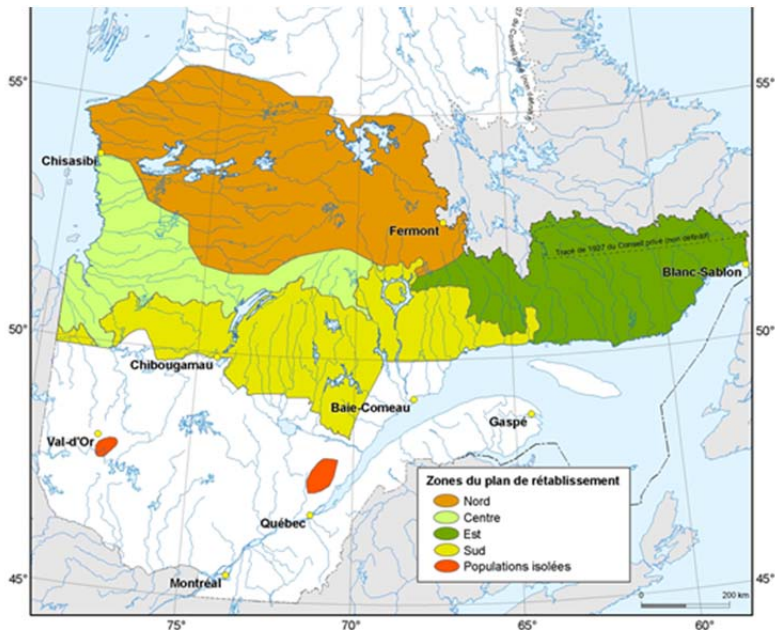
This technical opinion was produced to provide precisions regarding the probability of occurrence of woodland caribou within the Joyce Lake DSO Project Study Area. The special attention given to this species is related to its conservation status. Woodland caribou was listed as threatened in Canada in pursuance of the *Species at Risk Act* (SARA) in June 2003. It was listed as vulnerable in February 2005 in Québec in pursuance of the *Loi sur les espèces menacées et vulnérables* (LEMVQ) (Decree 75-2005). In the province of Newfoundland and Labrador, woodland caribou was listed under the *Endangered Species Act* as a threatened species in July 2002.

It is important to distinguish the sedentary woodland caribou ecotype from the migratory caribou ecotype, such as the George River Herd, which is likely to be found within the Study Area. COSEWIC adopted a national consensus concerning caribou designatable units (DUs) in Canada. The distinction is clearly established between the woodland ecotype and the migratory ecotype, which is found more to the north. Therefore, among the 12 caribou designatable units in Canada, Québec comprises a large part of the designatable unit No. 6: boreal caribou (COSEWIC, 2011). Boreal caribou is known as woodland caribou at the provincial level. This recent revision of the federal caribou conservation strategy provided a new distinct status to Eastern Migratory caribou (DU No. 4), which include the George River Herd (GRH) and the Leaf River Herd (LRH).

Québec and Newfoundland and Labrador have their own laws in regards to species at risk and these governments have recovery measures for species of conservation concern such as the woodland caribou. At the provincial level, Québec and Newfoundland and Labrador are responsible and must develop and implement a provincial recovery plan for woodland caribou. Both provinces have a recovery team composed of public employees and independent experts who advise the governments on actions to undertake to ensure the persistence and recovery of woodland caribou populations.

In Québec, the woodland caribou recovery team delineated, based on scientific information, an application zone of the recovery plan, which was divided into five sectors: Northern, Central, Southern, Eastern and Isolated Populations, which present distinct concerns and issues. **Joyce Lake DSO Project Study Area is located outside the application zone of the Québec woodland caribou recovery plan.**

The Northern Sector is nearest to the Joyce Lake DSO Project Study Area, and has a density that varies between 0.4 to 0.14 caribou/100km² from south to north. This Sector is characterized by the seasonal presence of migratory caribou during winter, when populations reach very high numbers. The overlap between woodland caribou and migratory caribou distribution areas would be less important for the GRH compared to the LRH, especially with the current low abundance of the GRH.



Ref. : ÉQUIPE DE RÉTABLISSEMENT DU CARIBOU FORESTIER DU QUÉBEC. 2012. *Plan de rétablissement du caribou forestier (Rangifer tarandus) au Québec — 2012-2019*. Ministère des Ressources naturelles et de la Faune, Faune Québec, Direction de l'expertise sur la faune et des habitats. Preliminary version.

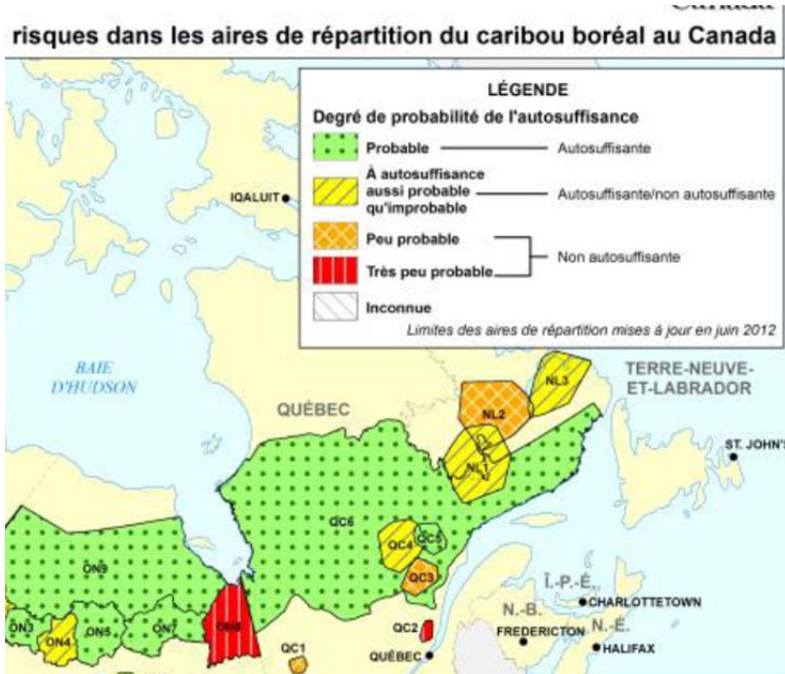
Within the application zone where the areas of distribution overlap, it is difficult to determine to which ecotype a caribou belongs to in the field. Morphometric data does not allow differentiation of ecotypes beyond all doubt. Therefore, for small groups of caribou found where both ecotypes overlap, only telemetric monitoring of movements may confirm the woodland or migratory ecotype. The woodland caribou, more sedentary, will occupy the zone of overlap year-round while the GRH migratory caribou will be found in this zone only during fall and winter.

The federal government is responsible for the implementation the *Species at Risk Act* (SARA). A panel of experts from Environment Canada published in 2008 an exhaustive scientific review for the identification of woodland caribou critical habitats in Canada. In this review, boreal caribou critical habitat is described as “the resources and environmental conditions required for the persistence of local populations of boreal caribou throughout their current distribution in Canada” (Environment Canada, 2008, p. ii). In the recovery plan, Environment Canada applied a probabilistic approach to assessing the adequacy of the current range conditions to support a self-sustaining woodland caribou population.

This approach relies on the assessment of three lines of evidence: the percentage of total disturbance, local population growth and local population size. Thus, a population judged self-sufficient will be stable or increasing, have a size above the critical threshold and have a low to moderate disturbance level within the distribution area it occupies.

At the federal level, boreal (woodland) caribou distribution area is delineated based on existing information provided by provincial and territorial authorities. In Labrador, the ranges occupied by

three boreal (woodland) caribou populations are identified as critical habitat in the federal recovery plan: NL-1 (Lac Joseph), NL-2 (Red Wine Mountains), NL-3 (Mealy Mountains). Among these populations, only the Red Wine Mountain Herd was determined to have a low self-sustaining probability while for the other two populations the study concludes that the current conditions in the area allow the maintenance of self-sustaining populations. **The Joyce Lake DSO Project Study Area is located far enough from the range of woodland caribou populations to assume that if caribou are found within the Study Area, these are George River Herd migratory caribou.**



Ref.: ENVIRONNEMENT CANADA. 2012. Programme de rétablissement du caribou des bois (*Rangifer tarandus caribou*), population boréale, au Canada. Série de Programmes de rétablissement de la Loi sur les espèces en péril, Environnement Canada, Ottawa. Xii + 152 p

In conclusion, Joyce Lake DSO Project Study Area is located outside the application zones of the provincial woodland caribou recovery plan, which correspond to critical habitats identified by the government of Canada for the conservation of this ecotype. Therefore, it can be assumed that the only caribou likely to be found within the Joyce Lake DSO Project Study Area based on the current scientific information is the George River Herd migratory caribou.



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