WINTER MAMMAL SURVEY OF PROPOSED MINE AND POTENTIAL SKI HILL LOCATIONS LABRADOR CITY, NEWFOUNDLAND AND LABRADOR

Submitted to:

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April 2012

Project No.: TF1216577.2000

Executive Summary

Winter mammal track surveys were conducted from 03 to 06 April, 2012 in order to determine the presence and relative abundance of mammal species (primarily furbearers) utilizing the Wabush 3 and CEP3 mine site properties as well as two potential new ski hill locations in the Labrador City area. As well, information on winter bird use in the study area was recorded during the track surveys. Most of the study area is densely vegetated, and provides terrestrial habitats potentially favorable to a number of mammal species, including two species at risk with the potential to occur in the area, woodland caribou and wolverine.

Prior to conducting the surveys, a desktop review was conducted to obtain existing information on presence of furbearers and other mammals in western Labrador. A total of eighteen mammal species were reported. However, there was little information specific to the Labrador City area.

Surveys were conducted on snowshoes in all habitat types, with particular focus on forested areas and areas within 1 km of open water bodies. Signs of mammal presence were identified to the species level, where possible, and georeferenced. Birds observed in the survey area were identified by sight, sound or sign (tracks or scat).

The Wabush 3 and WR-Ski study areas, which were the two largest and most remote sites, provided the greatest diversity and numbers of mammal observations. In contrast, no mammal activity was seen at the CEP3 property. Evidence was recorded for thirteen mammal species in total, including two types of small mammal (rodent or insectivore) tracks that could not be positively identified to the species level. No mammalian species at risk were observed during the surveys. A total of nine overwintering bird species, none considered to be at risk, were seen and/or heard during the surveys.

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LIST OF ACRONYMS

AMEC	AMEC Environment & Infrastructure, a division of AMEC Americas Limited
CEP3	Concentrate Expansion Project – 3rd phase
COSEWIC	Committee on the Status of Endangered Wildlife in Canada
EIS	Environmental Impact Statement
ESA	*Endangered Species Act*
IOC	Iron Ore Company of Canada
NLDEC	Newfoundland and Labrador Department of Environment and Conservation
SARA	*Species at Risk Act*

1.0 INTRODUCTION

AMEC Environment & Infrastructure, a division of AMEC Americas Limited (AMEC), was retained by Iron Ore Company of Canada (IOC) to conduct winter surveys for mammal species in the proposed mine and concentrator site as well as two potential ski hill locations in Labrador City, NL (Figure 2.1). This report discusses the methodologies and field activities, and presents findings for the field surveys conducted between April 03 and 06, 2012.

This document includes the following sections:

- Section 1 Introduction;
- Section 2 Background and Scope;
- Section 3 Review of Existing Information;
- Section 4 Study Methods;
- Section 5 Results;
- Section 6 Summary and Discussion;
- Section 7 References; and
- Appendices

2.0 BACKGROUND AND SCOPE

IOC is proposing to develop two separate and distinct projects within its western Labrador operations - the construction of a new concentrator facility (CEP3) and development of a new open pit mine (Wabush 3). The development of Wabush 3 may interfere with the operation of the local ski hill and, in order to mitigate this potential impact, IOC is investigating two potential areas for relocation of the ski hill. Figure 2.1 illustrates the proposed mine, concentrator and potential ski hill locations as provided by IOC.

With the exception of the CEP3 site (Figure 2.1), most of the study area is densely vegetated and provides terrestrial habitats favorable to a number of flora and fauna species, including species at risk. The project is likely to have direct and indirect effects on terrestrial and species through deforestation and loss of habitat.

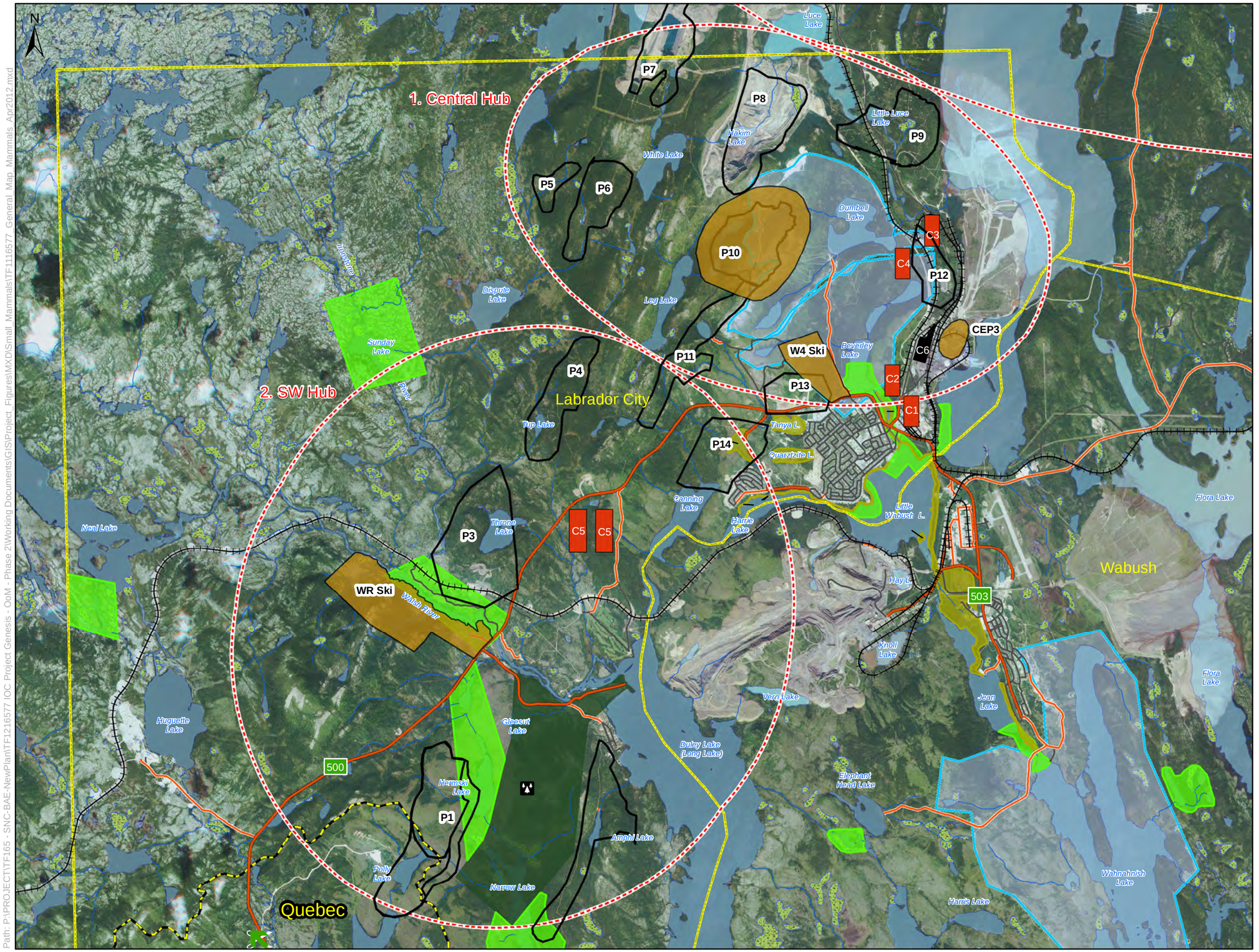
Species at risk and their habitats are protected by legislation at both the federal level (*Species At Risk Act*, or *SARA*) and provincially (Newfoundland and Labrador's *Endangered Species Act*, or *ESA*). Data on presence and distribution across the study area are necessary to adequately evaluate the potential effects of the project on mammalian species at risk. In addition to the regulatory drivers for designated species at risk, the economic, cultural and scientific importance of furbearers and other mammal species to the local community must be considered.

The limited available information on these species in the study area needs to be supplemented with focused field surveys in order to adequately assess the potential effects of the project. The objectives of the surveys are:

- to determine the presence of species at risk within the study area;
- to identify essential habitats of species at risk; and
- to acquire data to permit evaluation of the Projects' potential effects on furbearers and other mammals.

The development of the surveys was based on a review of previous survey work and existing data for the project area, to determine the additional information required to comply with Federal and Provincial government policies and legislation.

The scope of work for this project included a review of existing information on mammal species use of the study area, identification of the general habitat types located within the study area based on available aerial photography, and completion of field surveys for wintering terrestrial fauna. Wintertime surveys consisted of area searches for signs (e.g., tracks, scat, forage areas, dens) of furbearers and other larger mammals, including wolverine. Incidental observations of wintering bird species were also recorded.



Project Component

- Existing Concentrator Location
- Potential Concentrator Locations
- Mine
- 2012 Survey Areas

Geographical/Sensitive Components

- Quebec / Newfoundland and Labrador Border
- Boundary Municipality
- Road, Hard Surface
- Road, loose or Stabilized Surface
- Unclassified Street
- Railway Line
- Hydrology
- Wetland
- Conservation Zone (Municipal Plan)
- Habitat Management Unit
- Duley Lake Provincial Park Reserve
- Protected Watershed

Potential Concentrator Locations

C1 - South of Plant
C2 - Beverly Lake Hill
C3 - Mill Basin North
C4 - Beverly North
C5 - Route 500 Fork
C6 - Existing Concentrator

ID	Mine Name
P1	Polly Lake
P2***	Duley
P3	Knight South
P4	Knight
P5	Squid
P6	White Lake
P7	Humphrey South
P8	Luce
P9	Wabush 6
P10	Wabush 3
P11	Wabush 1
P12***	Mill Basin
P13***	Wabush 4
P14***	Canning

*** Likely not to be developed.

0 1.5 3 Kilometres

Consultant: amec
Client: RioTinto

Title: **Winter Furbearer Survey Areas, April 2012**

Figure Number	Project Manager	Project Number
Figure 2.1	B. Power	TF1216577

Date	Description	Drawn	Verified
Apr 2012		J.Abbott	B.Power

Path: P:\PROJECT\TF165 - SNC-BAE-NewPlan\TF1216577 IOC Project Genesis - OoM - Phase 2\Working Documents\GIS\Project Figures\MXD\Small Mammals\TF1116577 General Map Mammals Apr2012.mxd

3.0 REVIEW OF EXISTING INFORMATION

Prior to conducting the winter surveys, a desktop review was conducted for existing information on presence of furbearers and other mammals in western Labrador, including species at risk. Little site-specific information exists on furbearers and small mammals in the study area. In winter of 2001, winter mammal surveys were conducted around waterbodies on the IOC Labrador City property including Wabush, Luce, Carol, Stevens, Lorraine and Little Beverly Lakes (JWEL, 2001a). Evidence (e.g., tracks, scat) of red fox (*Vulpes vulpes*) and snowshoe hare (*Lepus americanus*) were commonly observed. Tracks of red squirrel (*Tamiasciurus hudsonicus*), moose (*Alces alces*), wolf (*Canis lupus*), marten (*Martes americana*), mink (*Mustela vison*) and river otter (*Lontra canadensis*) were also observed. Unidentified small mammal tracks were seen in one location during the survey; the authors state that it was likely a Southern or Gapper's red-backed vole (*Myodes* [formerly *Clethrionomys*] *gapperi*). Mammal activity was found to be highest around areas of open water. River otter, moose, muskrat (*Ondatra zibethicus*) and beaver (*Castor canadensis*) were observed during waterfowl surveys conducted in some of the same watersheds in summer and fall of 2000 (JWEL, 2000; 2001b). In addition, AMEC personnel observed a juvenile porcupine (*Erethizon dorsatum*) in the study area during field investigations conducted in 2011 (AMEC, personal observation).

Additional information on mammal populations in the western Labrador region was provided in an environmental impact statement (EIS) for a project near Schefferville, Quebec, located approximately 200 km north of Labrador City, (Labrador Iron Mines (LIM), 2009). In addition to many of the above-mentioned species, the following furbearers and small mammals were reported: black bear (*Ursus americanus*), weasel or ermine (*Mustela erminea*), and lynx (*Lynx lynx*). An unidentified jumping mouse was trapped near Schefferville, possibly a meadow jumping mouse, a species which has elsewhere been reported in Labrador (Rodrigues, 2010). An EIS for the Voisey's Bay project states that the least weasel (*Mustela nivalis*) reportedly occurs in southern Labrador (Inco, 1997).

Three mammal species at risk occur in Labrador. The eastern population of wolverine (*Gulo gulo*), considered endangered under Newfoundland and Labrador *ESA*, *SARA* and the federal Committee on the Status of Endangered Wildlife in Canada (COSEWIC), is believed to range through much of Labrador. No confirmed sightings have been reported in Labrador or Quebec in the past 25 years (NLDEC, 2011a). Wolverines have extremely large home ranges, and are very sparsely populated throughout their range. The woodland caribou (*Rangifer tarandus caribou*) is a provincially listed species at risk (*ESA*: Threatened) with potential to occur in the study area; aerial surveys for large mammals including caribou were conducted in the winter of 2012 (IOC personnel, personal communication). The polar bear (*Ursus maritimus*) is considered to be at risk, both federally (*SARA* and COSEWIC: Special concern) and provincially (*ESA*: Vulnerable); however, this species is found in coastal habitats, primarily on sea ice (NLDEC, 2011b), and so is considered highly unlikely to occur in the study area.

4.0 STUDY METHODS

Prior to the field surveys, aerial photography for each of the study areas was consulted in order

to identify different habitat types. In particular, efforts were made to identify suitable habitat for target species at risk, namely, wolverine. Wolverine employ a variety of habitats; however, the preferred characteristics of home ranges are believed to include high food availability, minimal human disturbance, varied habitats, and presence of large predators such as wolves which provide carrion (typically large animals such as caribou) on which wolverine feed (Fortin et al., 2005).

Surveys were conducted on snowshoes in all habitat types, with particular focus on forested areas and areas within 1 km of open water bodies. Survey transects extended over as much of each site as possible, although some areas could not be covered due to steep topography or, in the case of CEP3, safety concerns from on-site activity. Surveys were only conducted in appropriate weather conditions (i.e., no appreciable precipitation during or immediately before the survey), and there was ample snow cover in the survey area.

Signs of mammal presence including (but not limited to) tracks, scat, browse signs, dens, scrapes, skeletal remains, sightings and vocalizations of individuals were identified to the species level, where possible, and georeferenced. Birds observed in the survey area were identified by sight or sound or sign (tracks or scat), and observations were noted.

5.0 RESULTS

The following subsections provide a summary of the findings of the surveys conducted in each of the four survey areas from 03 April to 06 April 2012. A list of mammal species observed in the study area, along with a brief life history discussion for each, is provided in Appendix A. Representative photographs of mammal signs (scat and tracks) are provided in Appendix B.

5.1 WABUSH 3 MINE SITE

The Wabush 3 mine site property, or P10 on Figure 2.1, is located north of Labrador City, slightly overlapping the existing ski hill to the east. Dense coniferous forest covers much of the study area, with open habitat with sparse conifer and alder in the northwest and barrens-type habitat on the higher elevation areas in the southeast and the north. The more open areas of the site are subject to heavy recreational use, as evidenced by the abundance of snowmobile trails, human footprints, and the presence of the ski hill and associated lift structures. An unpaved road runs through the middle of the property in a north-south direction, although a locked gate restricts vehicle access beyond approximately 600 m from the southern edge of the property. At the time of the survey, there was no open water on the property; however, aerial photographs and mapping for the area show two small ponds in the western part of the site which appear to be connected to each other by a watercourse, and another watercourse to the northeast.

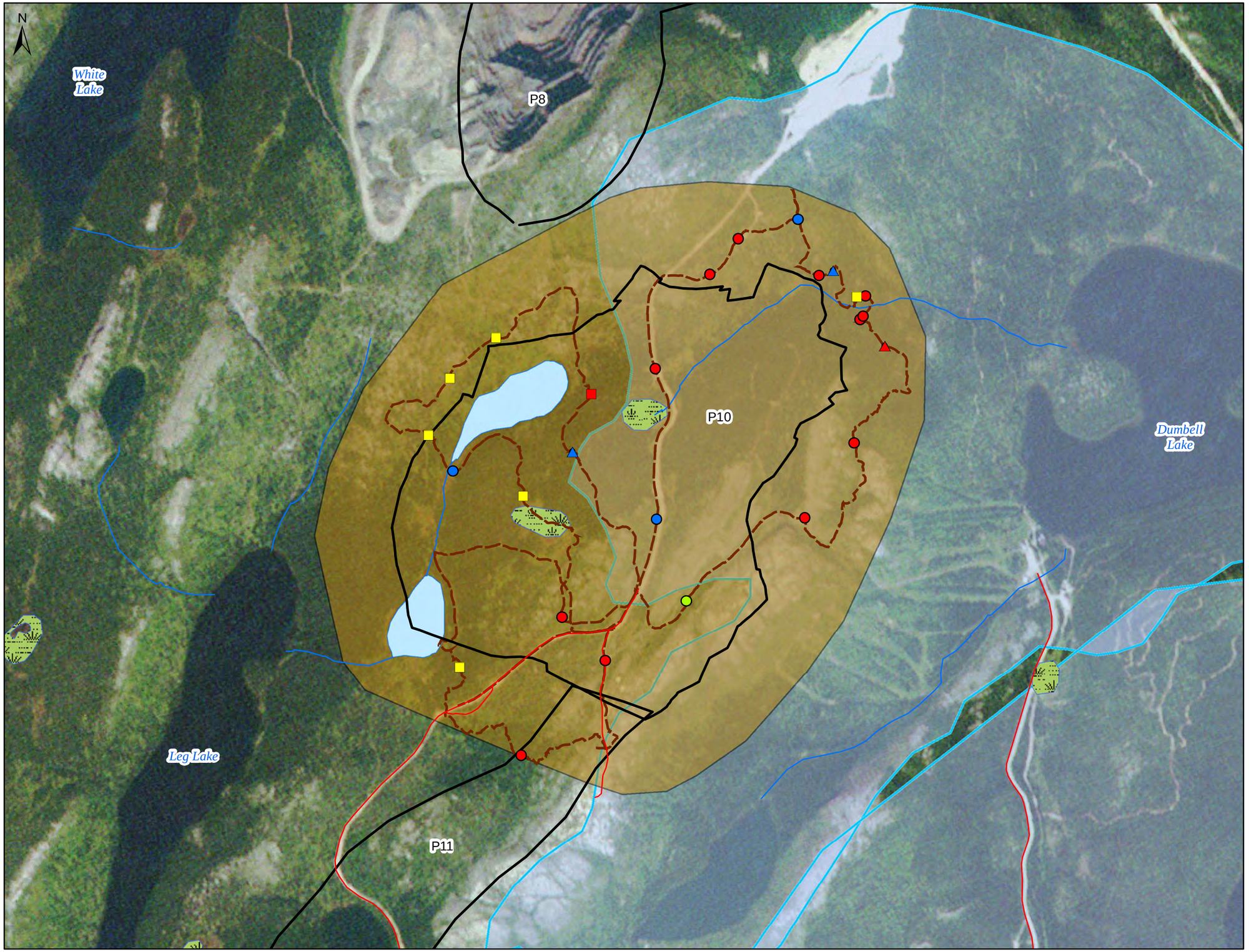
The Wabush 3 property was surveyed on 05 and 06 April, 2012. Weather conditions at the time were overcast with light flurries, and moderate winds. A total distance of 14.8 km was surveyed on foot over the two days. The route surveyed and the locations of mammal observations are shown on Figure 5.1.

5.1.1 Mammal species observed

Signs (i.e., tracks and scat) of red fox and, to a lesser extent, wolf were encountered frequently in the study area, in both open and forested habitats (Figure 5.1). An intermediate-sized canid track on the site was inferred to be from a domestic dog, based on its meandering course and proximity to human footprints. Short-tailed weasel was seen primarily in coniferous forest in the west of the study area, and porcupine sign (evidence of browsing on trees) was seen in two separate locations. Marten tracks were observed at a single location in dense forest. A landing mark from a northern flying squirrel (*Glaucomys sabrinus*) was seen on a trail at the west of the study area. Individual observations of snowshoe hare and squirrel signs were not recorded, as they were very abundant in forested habitat. Although tracks of red squirrel and northern flying squirrel are difficult to distinguish in the absence of the latter's distinctive landing mark, based on relative abundance of the two species it is likely that the majority of the squirrel tracks were red squirrel.

5.1.2 Bird species observed

Spruce Grouse (*Falcipennis canadensis*) and their tracks were fairly commonly observed in forest habitat, and Willow Ptarmigan (*Lagopus lagopus*) tracks were seen in open areas. A flock of about 30 Snow Buntings (*Plectrophenax nivalis*) were seen near the crest of the ski hill. Pine Grosbeaks (*Pinicola enucleator*) were seen and heard in the study area on a couple of occasions, and Common Raven (*Corvus corax*), Boreal Chickadee (*Poecile hudsonicus*) and Grey Jay (*Perisoreus canadensis*) were also observed.



Project Components

- Marten
- Short-tailed Weasel
- Porcupine
- Northern Flying Squirrel
- Red Fox
- Wolf
- Domestic Dog
- Track Survey
- Mine
- 2012 Survey Area

Geographical/Sensitive Components

- Highway
- Other Roads
- Railway
- Hydrology
- Conservation Zone (Municipal Plan)
- Habitat Management Unit
- Duley Lake Provincial Park Reserve
- Protected Watershed
- Wetland

Sources :

- AMEC Field Data, Collected March 2012
- SNC Lavalin
- IOC (Images RapidEye, resolution 5m, September 2010
- Natural Resources Canada, NTS 1:50,000 Topographic Maps

0 0.3 0.6 Kilometres

Consultant	Title
amec	**Mammal Track Survey of Wabush 3 Mine Site**
Client: RioTinto	

Figure Number	Project Manager	Project Number
Figure 5.1	**B. Power**	**TF1216577**

Date	Description	Drawn	Verified
April 2012		J.Abbott	B.Power

5.2 CEP3 SITE

CEP3 is a brownfield site located near the existing concentrator facility. The vast majority of the site has been heavily modified by human activity. Due to safety considerations and access restrictions, surveys were confined to an area along an unpaved site road in the north of the property, and the area from the site road southward to the rail tracks was scanned using binoculars to increase survey coverage as much as possible. The area is mostly open, flat terrain, with small patches of coniferous forest and some shrubs. There was no open water on the property at the time of the survey, although aerial photographs for the site show two areas of open water that appear to be impacted by concentrator activities on the north and south ends of the study area. The larger of the two areas is known as Beaver Bay. These areas had been used for settling and recovery of iron ore fines from sections of the processing plants.

The CEP3 property was surveyed on 03 April. Weather conditions at the time were partly sunny with light winds. A total distance of 1.3 km was surveyed on foot; the route surveyed is shown on Figure 5.2.

5.2.1 Mammal species observed

No evidence of mammal activity was observed in the CEP3 study area.

5.2.2 Bird species observed

Spruce Grouse tracks and scat were observed in the study area. Small (sparrow-sized) bird tracks were seen in the snow under a patch of conifer. Canada Goose (*Branta canadensis*) scat from the previous summer was observed near the ponded area at the north end of the site.

5.3 W4-SKI PROPOSED SKI HILL SITE

The W4-Ski proposed ski hill location is located north of Labrador City and just south of the present ski hill. Dense coniferous forest covers much of the study area, with open barrens-type habitat on the higher elevations of the northwest portion of the property. A cleared power transmission corridor crosses the site in an east-west direction near the northern border. At the time of the survey, there was no open water on the property. Aerial photographs and mapping for the area show two watercourses in the study area, both flowing into Beverly Lake; one is located near the southeastern corner of the property, and the other near the northern boundary.

The W4-Ski potential ski hill location was surveyed on 03 April. Weather conditions at the time of the survey were partly sunny day with light winds. A total distance of 5.0 km was surveyed on foot; the survey route and the locations of mammal observations are shown on Figure 5.3.
There is evidence of recreational use on the property, including snowmobiling and cross-country skiing. There is also trapping activity in the study area; rabbit snares and tree-mounted traps were observed in two separate locations.

Project Components

- Railway
- Mine
- Survey Track
- 2012 Survey Area

Geographical/Sensitive Components

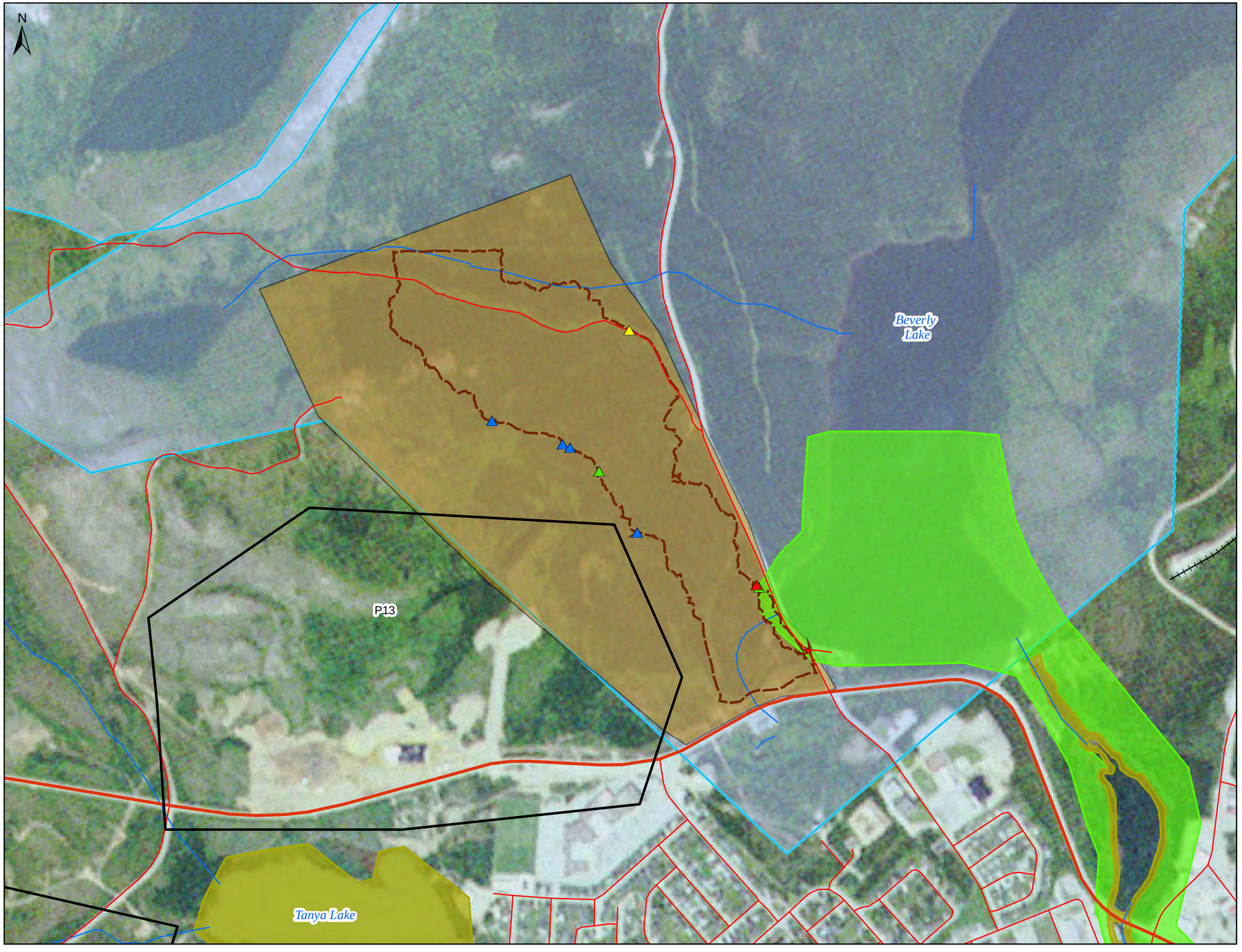
- Highway
- Other Roads
- Railway
- Hydrology
- Conservation Zone (Municipal Plan)
- Habitat Management Unit
- Duley Lake Provincial Park Reserve
- Protected Watershed

Sources :

- AMEC Field Data, Collected March 2012
- SNC Lavalin
- IOC (Images RapidEye, resolution 5m, September 2010
- Natural Resources Canada, NTS 1:50,000 Topographic Maps

0 0.25 0.5 Kilometres

Consultant: amec		Title: **Mammal Track Survey of CEP 3**	
Client: RioTinto			
Figure Number: **Figure 5.3**		Project Manager: **B. Power**	Project Number: **TF1216577**
April 2012		J.Abbott	B.Power
Date	Description	Drawn	Verified



Project Components

- Northern Flying Squirrel
- Porcupine
- Small Mammal (Shrew)
- Small Mammal (Vole)
- Survey Track
- Mine
- 2012 Survey Area

Geographical/Sensitive Components

- Highway
- Other Roads
- Railway
- Hydrology
- Conservation Zone (Municipal Plan)
- Habitat Management Unit
- Duley Lake Provincial Park Reserve
- Protected Watershed
- Wetland

Sources :

- AMEC Field Data, Collected March 2012
- SNC Lavalin
- IOC (Images RapidEye, resolution 5m, September 2010
- Natural Resources Canada, NTS 1:50,000 Topographic Maps

0 0.2 0.4 Kilometres

Consultant: amec		Title: **Mammal Track Survey of W4 Ski Potential Ski Hill Site**	
Client: RioTinto			
Figure Number: **Figure 5.3**		Project Manager: **B. Power**	Project Number: **TF1216577**
April 2012		J.Abbott	B.Power
Date	Description	Drawn	Verified

5.3.1 Mammal species observed

Signs of snowshoe hare and red squirrel were abundant in forested habitat in the study area. Porcupine sign (evidence of browsing on trees) was seen in dense coniferous forest in four locations, and the carcass of a northern flying squirrel was found in a steel trap suspended from a tree near the southeastern edge of the property. Two distinct types of small mammal tracks were seen in the study area. The track pattern and dimensions suggest that the smaller tracks observed in three locations were made by shrews; based on habitat and reported distribution (Burt and Grossenheider, 1980), likely masked shrew (*Sorex cinereus*) or pygmy shrew (*Sorex hoyi*). A larger set of tracks observed in one location are likely from a species of vole, either eastern heather vole (*Phenacomys ungava*) or southern red-backed vole (*Myodes gapperi*).

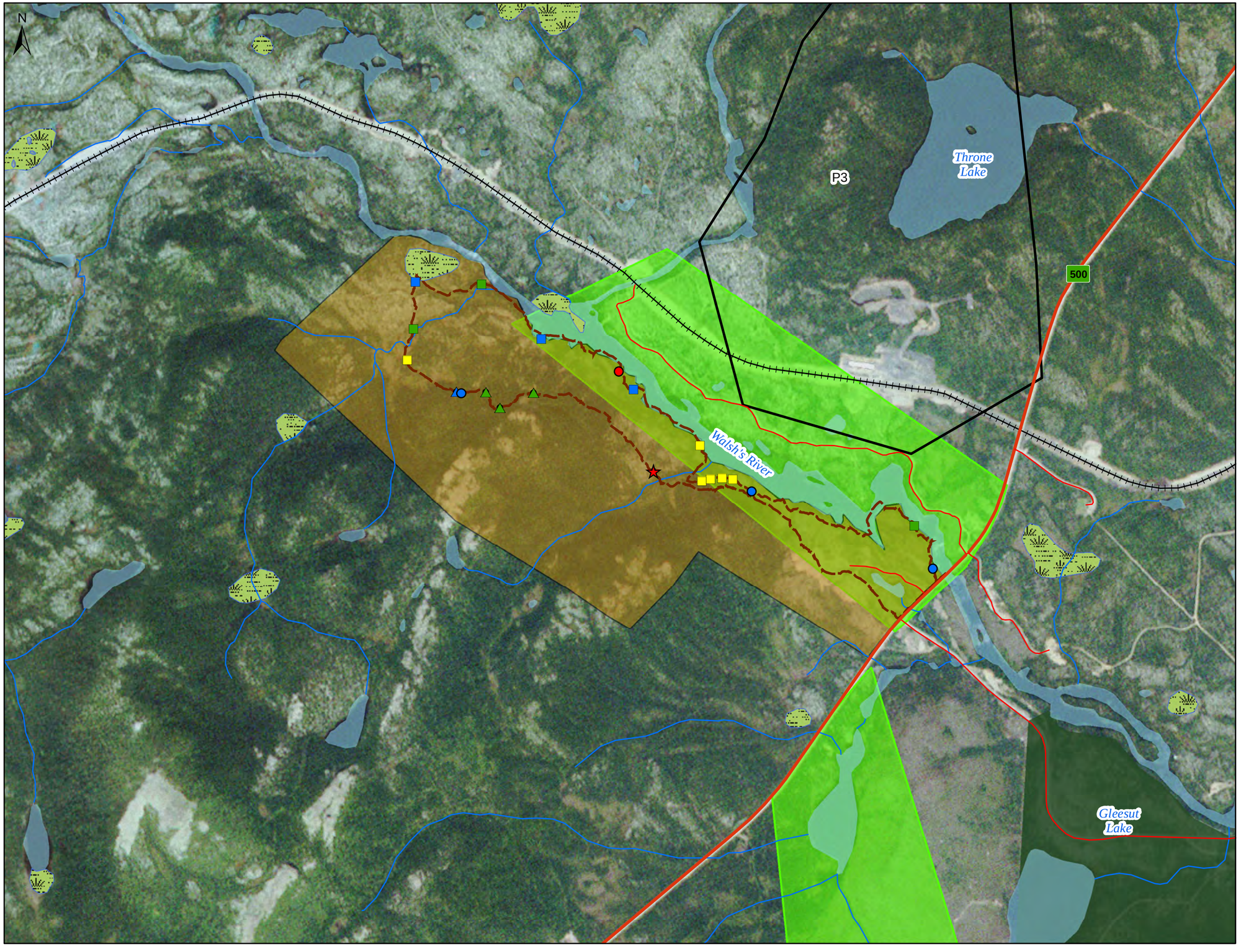
5.3.2 Bird species observed

Spruce Grouse, Pine Grosbeak and Common Raven seen and heard on more than one occasion during the survey. Common Redpoll (*Carduelis flammea*), American Goldfinch (*Carduelis tristis*), Boreal Chickadee and Grey Jay were also observed.

5.4 WR-SKI PROPOSED SKI HILL SITE

The WR-Ski potential ski hill location is located approximately 5 km southwest of Labrador City. The study area is bordered to the north by Walsh River, and there are two steep hills at the southern part of the property. Dense coniferous forest covers much of the area, with some open habitat in the west, and an open rock quarry at the eastern end close to Highway 500. Active snowmobile tracks were observed on the site, and there are a number of cabins along the northern bank of Walsh River. At the time of the survey, there was no open water on the property and only a small section of open water on Walsh River near the highway. Aerial photographs and mapping for the area show two tributaries to Walsh River crossing the site, and a small waterbody near the southeast of the site.

The WR-Ski potential ski hill location was surveyed on 04 April. Weather conditions at the time were mostly overcast with moderate winds. A total distance of 9.2 km was surveyed on foot; the route surveyed and the locations of mammal observations are shown on Figure 5.4.



Project Components

- Mink
- River Otter
- Short-tailed Weasel
- Porcupine
- Small Mammal (Shrew)
- Red Fox
- Wolf
- Moose
- Survey Track
- Mine
- 2012 Survey Area

Geographical/Sensitive Landmarks

- Highway
- Other Roads
- Railway
- Hydrology
- Conservation Zone (Municipal Plan)
- Habitat Management Unit
- Duley Lake Provincial Park Reserve
- Protected Watershed
- Wetland

Sources :

- AMEC Field Data, Collected March 2012
- IOC (Images RapidEye, resolution 5m, September 2010
- Natural Resources Canada, NTS 1:50,000 Topographic Maps

0 0.45 0.9 Kilometres

Consultant: amec

Client: RioTinto

Title: **Mammal Track Survey of WR-Ski Potential Ski Hill Site**

Figure Number	Project Manager	Project Number
Figure 5.4	**B. Power**	**TF1216577**

Date	Description	Drawn	Verified
April 2012		J.Abbott	B.Power

5.4.1 Mammal species observed

Wolf tracks and scat were encountered in the study area, in both open and forested habitats (Figure 5.4). Fox tracks were also observed on the site in lesser numbers. Short-tailed weasel tracks were commonly encountered, and mink tracks and scat were also seen, primarily in coniferous forest near the bank of Walsh River. River otter tracks and slides were seen on Walsh River and at two locations along a tributary of the river to the west. Evidence of porcupine browsing, which did not appear recent, was noted at one location. Very recent tracks and scat of moose, heading in a westerly direction, was seen near the tributary to the south of the property. Small mammal tracks, likely those of a shrew, were seen in three locations in forested habitat on the higher elevations near the north end of the property. Tracks, scat, vocalizations and sightings of snowshoe hare and red squirrel were very abundant in forested habitat.

5.4.2 Bird species observed

Spruce Grouse and Willow Ptarmigan tracks and scat were seen, the former in forested areas, and the latter in both forests and open areas. Pine Grosbeak, Grey Jay, Boreal Chickadee were seen and heard in the forests of the study area, and Common Raven was observed in both open and forested habitat.

6.0 SUMMARY AND DISCUSSION

Evidence was observed in the study area for thirteen mammal species, including two types of small mammal tracks that could not be positively identified to the species level. A small mammal trapping program, which will allow identification of small rodents and insectivores to species level, is scheduled for late summer or early fall of 2012. A list of species observed, along with the relative abundance of each, is shown in Table 6.1. One species, the northern flying squirrel, had not been reported in previous studies for the Labrador City area that had been reviewed prior to the field program; however, the study area is within their reported range (Burt and Grossenheider, 1980).

Table 6.1: Relative Abundance of Mammal Species at Survey Areas

Species	Relative Observed Abundance (# sightings/km surveyed)				
	Wabush 3	CEP3	W4-Ski	WR-Ski	Total
Red fox *Vulpes vulpes*	0.81	0	0	0.11	0.43
Wolf *Canis lupus*	0.20	0	0	0.33	0.20
Snowshoe hare *Lepus americanus*	>5 [1]	0	>5 [1]	>5 [1]	>5 [1]
Marten *Martes americana*	0.07	0	0	0	0.03
Mink *Mustela vison*	0	0	0	0.33	0.10
River otter *Lontra canadensis*	0	0	0	0.33	0.10
Short-tailed weasel *Mustela erminea*	0.41	0	0	0.66	0.40
Red squirrel *Tamiasciurus hudsonicus*	>5 [1]	0	>5 [1]	>5 [1]	>5 [1]
Northern flying squirrel *Glaucomys sabrinus*	0.07	0	0.2	0	0.07
Porcupine *Erethizon dorsatum*	0.14	0	0.8	0.11	0.23
Unidentified small mammal (likely shrew)	0	0	0.4	0.33	0.16
Unidentified small mammal (likely vole)	0	0	0.2	0	0.03
Moose *Alces alces*	0	0	0	0.11	0.03

Note: 1. Red squirrel and snowshoe hare sign was abundant on the site; individual sightings were not recorded.

No mammalian species at risk were observed during the surveys. It should be noted that negative survey results do not definitively prove the absence of wolverine in the survey area; it is possible that individuals were in the study area but were not detected. As previously stated, wolverines have extremely large territories, and are very sparsely populated. Parts of the WR-Ski study area may provide suitable wolverine habitat, with minimal human disturbance and available sources of carrion (presence of both large predators and large prey animals, namely wolves and moose).

Few wintering bird species were seen or heard in the four study areas, and no avian species at risk were observed. Common Raven, Pine Grosbeak, Boreal Chickadee, Spruce Grouse and Grey Jay were the most commonly observed species. Common Redpoll, American Goldfinch, Snow Bunting and Willow Ptarmigan were also observed in one or more site. Old Canada Goose droppings were observed at CEP3, presumably from the previous summer.

7.0 REFERENCES

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APPENDIX A

MAMMAL SPECIES OBSERVED IN THE STUDY AREA

Further information on the mammal species found during the surveys is provided below. Information was obtained from Halfpenny (1986), Gibson and Bondrup-Neilsen (2008), Sheldon and Eder (2000) and Burt and Grossenheider (1980).

Canidae

The dog family, Canidae, is represented by two species in the wild in western Labrador, as well as the domestic dog.

Red fox (*Vulpes vulpes*) tends to be found in open woodlands, clearings, and brushy areas, and frequently occur near human settlement. They are fairly solitary animals, and may range more than five kilometres from their den in search of food. Their diet consists of fruit and berries, small birds and mammals, and insects.

Wolf (*Canis lupus*) is a large canid, typically found in forests and tundra in the northern part of the continent. They are bolder than other canines, but do not tend to be found in close association with human settlements. Wolves often travel in packs, and use scent posts and howling to communicate territory boundaries. They are most active in the night, and feed on a variety of prey items, including large animals such as moose and caribou.

Mustelidae

Four members of the mustelid or weasel family were found to occur in the study area. A fifth species, the wolverine, was not found during the surveys; however, as it is a species at risk (*ESA* and *SARA*: Endangered) with potential to occur in the study area, information on the species is presented here. In general, mustelids are fierce predators and may even take down prey larger than themselves, although the wolverine tends to be more of a scavenger.

Short-tailed weasel (*Mustela erminea*) is a small member of the mustelid family which is typically found in brushy or wooded areas, often close to water. A light brown colour in the summer months, weasels become white with a black tail tip in winter. The weasel will prey on small mammals, birds, and other small creatures, and is primarily a ground-dweller, often pursuing prey in the subnivean space (the space between the ground and the snow cover) in the wintertime.

Marten (*Martes americana*) is a fairly large mustelid found in coniferous and mixed forests, usually old-growth, but also in young forests. It is generally a tree-dweller, but spends a considerable amount of its time on the ground. It is a solitary animal, preying on tree squirrels, voles and mice.

Mink (*Mustela vison*) is slightly smaller than a marten, and like the weasel and marten, has a long, slender body. It is rarely found far from water, and is an excellent swimmer, primarily feeding on fish and other aquatic animals.

River otter (*Lontra canadensis*) is a large mustelid, often a meter or more in total length. It has a long and slender body, and webbed feet. It is typically found in larger streams and lakes. Like the mink, it spends much of its time in water, and is capable of swimming long distances and pursuing prey underwater. They are fairly sociable, and in snow and mud, otters will slide on their belly in a playful manner.

Wolverine (*Gulo gulo*) is the largest member of the mustelid family, found in a variety of habitats where human disturbance is low and availability of food is high. Their home territories are very large, and the distribution of individuals is extremely scattered throughout their range. They are primarily scavengers of large animals (e.g., caribou and moose), and are extremely powerful; crushed large bones in carrion can be as telling a sign of wolverine presence as tracks.

Leporidae

Only one member of the rabbit and hare family, the snowshoe hare, occurs in the study area.

Snowshoe hare (*Lepus americanus*) is widespread in northern regions. Their fur is brownish in the summer and turns white during the snowy months. They are herbivores, feeding mainly on twigs and bark, and are usually found in shrubby thickets and forests. Many predators feed on snowshoe hares, including lynx, fox, wolf and raptors.

Rodentia

Three members of the rodent order were identified during the surveys. Tracks of a small mammal that were found at one location appeared to be from a vole, identification to the species level is not possible.

Red squirrel (*Tamiasciurus hudsonicus*) is common in coniferous and mixed forests. They are active year round, and distinctive in appearance and sound. Red squirrels are solitary and territorial. They feed on seeds, nuts, tree buds and other plant matter, and will store evergreen cones for winter in caches known as middens. Chief predators of the red squirrel include raptors, weasels and marten.

Northern flying squirrel (*Glaucomys sabrinus*) is a nocturnal resident of coniferous forests; flying squirrels sleep in hollow trees in the daytime and are therefore rarely seen. They glide from tree to tree for long distances, up to 45 metres, by stretching the loose skin between their legs. Flying squirrels feed on nuts, seeds, berries and mushrooms, as well as insects, small birds and mammals. Martens, weasels and owls will prey on the flying squirrel.

Porcupine (*Erethizon dorsatum*) is most active at night, but may be seen in the daytime, often in trees. They may be colonial in winter, but are solitary in summer. Porcupines feed on buds, small twigs, and inner bark of trees; chewed bark (or “browse”) on trees is a common sign of porcupine presence. Because of their protective quills, few predators will attack porcupines.

Voles are members of the family Crecetidae, which also includes mice and lemmings. They resemble mice and are similar in size, but tend to have stouter bodies, smaller eyes and ears, and shorter tails. Voles are herbivores, produce castings of undigested vegetation, and tend to have well-defined latrines where scat accumulates. In the winter, they tend to be found in the subnivean space, and will construct large nests of grass under the snow. Four species of voles are known to occur in western Labrador, including the eastern heather vole (*Phenacomys ungava*), southern (or Gapper’s) red-backed vole (*Myodes gapperi*), meadow vole (*Microtus pennsylvanicus*) and rock vole (*Microtus chrotorrhinus*). The vole tracks observed in the study area were found in coniferous forest, which is preferred habitat for the eastern heather vole and southern red-backed vole. Voles are hunted by many species, including weasels, mink, foxes, and raptors.

Soricidae

Shrews are represented in Western Labrador by four species: the masked shrew (Sorex cinereus), pygmy shrew (*Sorex hoyi*), arctic shrew (*Sorex arcticus*) and northern water shrew (*Sorex palustris*). Species cannot be distinguished by tracks alone, but habitat cues can provide clues to identification. Masked and pygmy shrews tend to occur in forested habitat, while arctic shrews are found in more open and shrubby areas; northern water shrews, as the name suggests, are found near streams and lakes, and can swim for long distances. Shrews are among the smallest of all mammals, have an extremely high metabolic rate and eat frequently. To save energy, they will readily enter a state of torpor. In the winter, shrews live and forage in the subnivean space where they are sheltered and insulated from temperature extremes, venturing to the surface only occasionally.

Cervidae

A single member of the deer family, the moose, was found in the April 2012 surveys.

Moose (*Alces alces*) is a large and ungainly-looking member of the deer family, generally found in forests and in or near water. Moose are herbivorous, browsing on woody plants, twigs and bark in the winter, and on aquatic plants in summer. Wolves will prey on moose, particularly sick and vulnerable individuals.

APPENDIX B

PHOTOGRAPHS

Photo 1. Wolf track.

Photo 2. Red fox track.

Photo 3. Short-tailed weasel track.

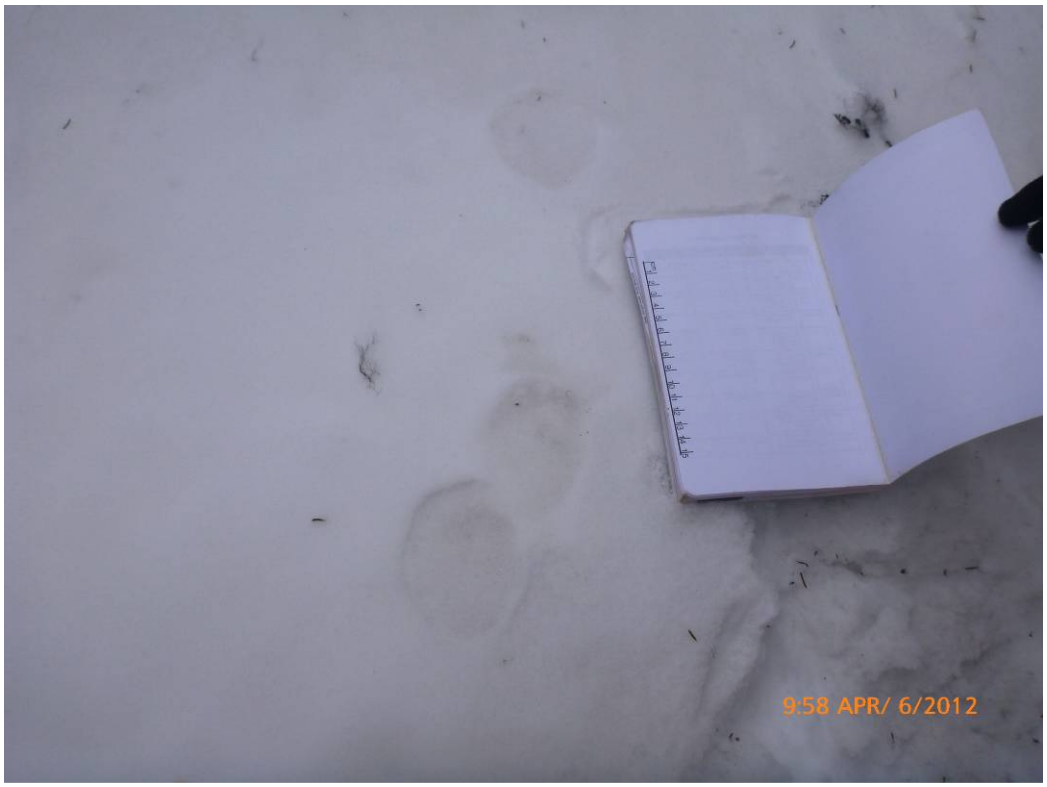

Photo 4. Marten track.

Photo 5. Mink scat.

Photo 6. River otter slide.

Photo 7. Snowshoe hare track.

Photo 8. Red squirrel track.

Photo 9. Flying squirrel carcass found in trap.

Photo 10. Porcupine browse.

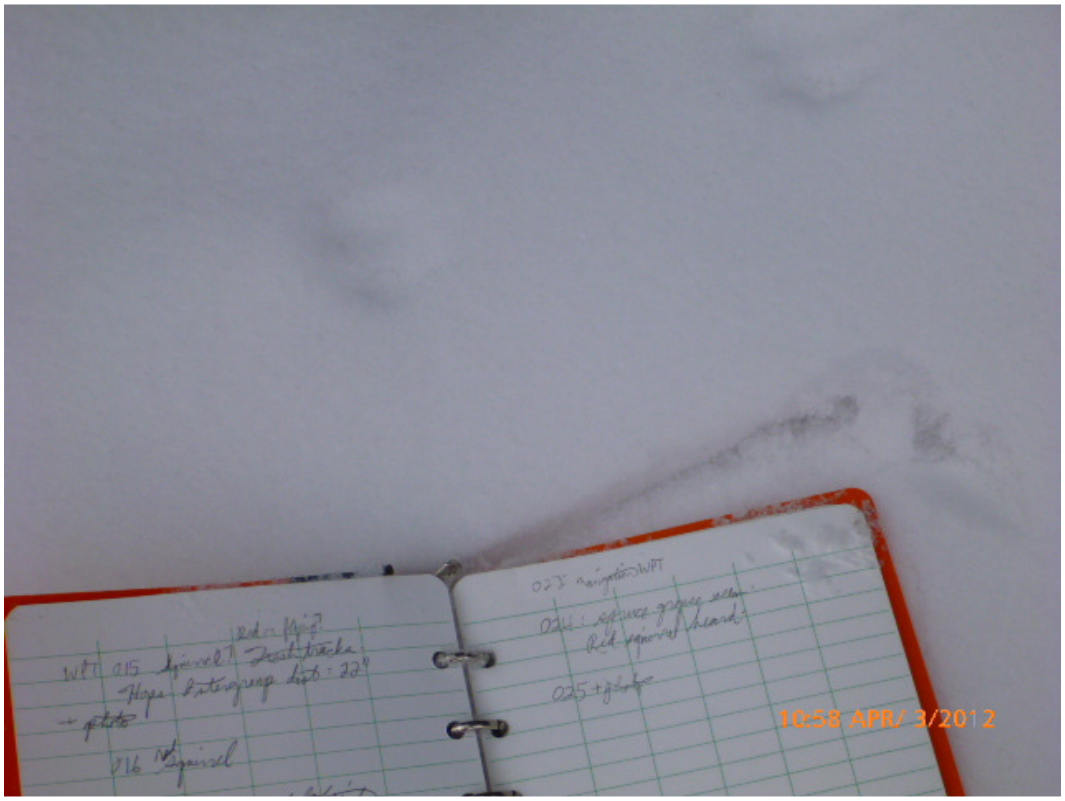

Photo 11. Small mammal tracks (likely vole)

Photo 12. Small mammal tracks (likely shrew)

Photo 13. Moose track and scat.