

**SPRING SURVEY OF CARIBOU IN THE VICINITY OF SCHEFFERVILLE
MAY 2009**

Prepared for:

NEW MILLENNIUM CAPITAL CORP. AND LABRADOR IRON MINES LIMITED

FINAL REPORT – WITHOUT PREJUDICE

Natalie D'Astous, Groupe Hémisphères
Perry Trimper, Jacques Whitford Stantec Limited

November 2009

EXECUTIVE SUMMARY

During May 2009, Labrador Iron Mines Limited and New Millennium Capital Corp. partnered to complete an aerial survey for caribou in consultation with the Newfoundland and Labrador Wildlife Division. Both companies are undergoing environmental reviews for mining projects located in the vicinity of Schefferville, Quebec. Working under the regulatory direction of the Provincial Wildlife Division in Newfoundland and Labrador and the ministère des Ressources naturelles et de la Faune du Québec, consultants for these proponents (i.e., Jacques Whitford Stantec Limited (JWSL) and Groupe Hémisphères (GH), respectively) worked together to assess the presence/absence of sedentary caribou in the area surrounding these proposed iron ore developments. The survey was a requirement of the Newfoundland and Labrador environmental assessment process.

Prior to field investigations, a literature search was conducted to identify a Study Area of 50 km in radius centred on each proposed development. Letters explaining the objectives and other aspects of the survey were sent to the leaders of the local First Nations concerned, namely the Innu Nation, Innu Takuaikan Uashat mak Mani-Utenam, the Naskapi Nation of Kawawachikamach and the Nation Innu Matimekush-Lac John. Given the presence of staging waterfowl, a portion of Attikamagen and Petitsikapau Lakes was avoided to reduce potential effects on the goose hunting activities being conducted at the time, at the request of these leaders. The necessary provincial approvals, scientific permits and a federal Animal Care Certificate were obtained before the start of the survey.

The survey was completed between May 4-8, 2009 using an Astar 350BA helicopter at an altitude of approximately 100 m (AGL) and average speed between 160 and 200 km/hr. Flight lines were 4 km apart, with transects oriented in a NW/SE direction consistent with the orientation of topographic features. Three observers (two staff from the Newfoundland and Labrador Wildlife Division and a senior biologist with JWSL) plus the pilot (also a senior biologist with GH) searched an area of approximately 250 m either side of the aircraft. When fresh tracks were encountered, the helicopter would veer off transect to locate any caribou. All observations of caribou, tracks, land use and other relevant information, such as weather and start and end times of each transect, were recorded by the navigator. In addition, sightings or sign of wildlife were also noted. A total of 31.1 hrs was flown, including ferry time from Wabush, Labrador.

Three confirmed sightings of caribou, totalling 7 individuals, were observed. All of these sightings were at least 24 km from the ore bodies associated with either project. One sighting was of a dead female that appeared to have recently been killed by a lone wolf. A second group comprised four individuals (including one adult female accompanied by a calf, another female and a yearling male). The Study Team captured the lone female with a net gun and applied an Argos GPS collar and numbered ear tag on the animal. The remaining caribou observed were two males (a yearling and a two-year-old) that were not pursued for capture. Morphological measurements were recorded from the collared female and from the remains of the dead female. A sample of ear dermis from both of these animals was also taken with a punch and frozen for genetic analysis and comparison to genetic reference samples by Dr. Steeve Côté at the Université Laval in Quebec City.

Based on currently available data, the ecotype affiliation of the six live (and one dead) caribou observed is inconclusive. Although the migratory George River caribou herd was not recorded as migrating through this area during the winter of 2008-2009, the physical measurements of the animals handled suggest they were of the migratory ecotype. Additional data was anticipated to result from the deployment of satellite collars on captured caribou, but, despite being tested by the Wildlife Division before the survey, the satellite system of the deployed collar has not yet emitted a signal, and it appears that this unit has malfunctioned. At the time of writing, additional information/insight is anticipated from the genetic analyses (scheduled for early 2010) and improved reporting functioning of the telemetered female that might provide additional insight as to the ecotype of these caribou. Despite the outstanding questions, current information (i.e., this survey and informant interviews) has confirmed that the density of caribou in the vicinity of the proposed developments is usually low in late winter/early spring, as demonstrated by the results of the intensive nature of the survey, the large area covered, and the excellent tracking conditions during this effort.

Note that copies of this executive summary will be provided to First Nations in the region.

Table of Contents

EXECUTIVE SUMMARY	i
1.0 CONTEXT	2
1.1 Objectives	3
2.0 METHODOLOGY	3
2.1 Field Preparation.....	3
2.2 Field Techniques.....	4
3.0 RESULTS	5
3.1 Observations of Caribou.....	5
3.2 Caribou Measurements.....	7
3.3 Movement of Telemetered Caribou.....	8
3.4 Observations of Other Wildlife.....	8
4.0 DISCUSSION	13
5.0 CONCLUSIONS.....	16
6.0 REFERENCES	17
6.1 Personal Communications.....	17
6.2 Literature Cited.....	17

List of Appendices

- Appendix A Photographs From May 2009 Survey
- Appendix B Age Determination of Caribou Jaw collected near Schefferville,
May 2009

List of Figures

Figure 3.1 Observations of Caribou and Sign during May 2009 Survey	6
Figure 3.2 Observations of Other Wildlife and Sign during May 2009 Survey – Southeast Section.....	9
Figure 3.3 Observations of Other Wildlife and Sign during May 2009 Survey – Northwest Section	10
Figure 3.4 Observations of Land Use Activity during May 2009 Survey – Southeast Section.....	11
Figure 3.5 Observations of Land Use Activity during May 2009 Survey – Northwest Section	12

List of Tables

Table 3.1	Morphological measurements of two adult female caribou near Schefferville, May 2009.....	8
Table 4.1	Morphological measurements of adult female caribou from seven herds and three ecotypes from the Québec-Labrador Peninsula (from Couturier et al. Submitted).....	14
Table 4.2	Recent hind foot length (cm, mean \pm SE) of adult female George River Herd caribou (source: Caribou Ungava Project, Université Laval, Joëlle Taillon)	14

STUDY TEAM

Project Manager

Linda Wrong
Paul F. Wilkinson

Labrador Iron Mines Limited
New Millennium Capital Corp.

Research, Writing and Analysis

Perry Trimper
Natalie D'Astous

Jacques Whitford Stantec Limited
Consulting Biologist, Groupe Hémisphères

Survey Team

Perry Trimper - navigator and observer
John Neville¹ - observer and net-gunner
Kirsten Miller² - observer
Natalie D'Astous - helicopter pilot (Canadian Helicopters Limited)

Figures and Maps

Carolyn Pelley

Jacques Whitford Stantec Limited

Text Reviewers

John Neville

¹Wildlife Biologist, Government of Newfoundland and Labrador

Kirsten Miller

²Ecosystem Management Ecologist, Government of Newfoundland and Labrador

1.0 CONTEXT

New Millennium Capital Corp. (NML) and Labrador Iron Mines Limited (LIM) are engaged in separate environmental assessment processes of proposed iron ore mines in western Labrador, in the case of LIM, and in western Labrador and Québec, in the case of NML, near Schefferville, Québec. This area of the Ungava Peninsula includes a part of the range of the large George River Caribou Herd (GRCH), a migratory ecotype, that was estimated at approximately 296,000 individuals (post-calving estimate) (Couturier et al. 2004). When this herd migrates through the Schefferville area, hunting provides important quantities of country food for local residents and contributes to employment in outfitting camps. However, satellite telemetry (MRNF 2009) and observations from local residents (R. McKenzie, pers. comm.) confirmed the GRCH did not migrate near this area during the fall and winter of 2008-2009.

The other form of caribou that was historically known to occur in this region is the forest-ecotype or sedentary caribou. These animals were referred to as the McPhadyen Caribou Herd (Bergerud et al. 2008, St-Martin 1987, Phillips 1982). Sedentary caribou are classified as an endangered species in Canada and in Labrador (COSEWIC 2001, Newfoundland and Labrador Endangered Species Act). The Government of Newfoundland and Labrador (GNL) is concerned that forest-ecotype (sedentary) caribou may exist in the vicinity of both of these projects and has requested this issue be included as part of the environmental assessment.

A study of the McPhadyen Herd and another sedentary herd located to the south, the Lac Joseph Herd, was conducted between May, 1984, and October, 1986 (Saint-Martin 1987). Seven female caribou from the McPhadyen Herd were radio-collared by the Newfoundland and Labrador Wildlife Division in April, 1984. The approximate range of the McPhadyen Herd (as defined by a polygon surrounding the outermost locations of seven radio-collared caribou) suggested that the range extended north of Schefferville. However, the small sample size of collared caribou did not permit an adequate description of population dynamics (Saint-Martin 1987). The researchers noted the following at the time regarding the McPhadyen Herd: the animals were present at low density; some animals travelled towards the area north of the McPhadyen River in winter, followed by a return movement in late winter and spring; travel rates increased as fall and spring approached; groups of up to 33 and 46 animals were observed in fall and late winter respectively; groups of up to four animals were widely dispersed during the calving period; and individual females did not show marked fidelity toward specific calving grounds.

To complete the requirements of the Newfoundland and Labrador environmental assessment process, both NML and LIM were requested to perform a spring survey of their respective properties to assess the presence/absence of sedentary caribou. If such animals were located, satellite telemetry collars were to be attached to adult female caribou, and certain body measurements were to be taken. In addition, the consulting team received an offer from Université Laval to carry out genetic testing on any caribou accessed during the survey. This offer was accepted by the GNL Wildlife Division as a supplemental and voluntary component of the program. It was anticipated that some combination of the foregoing would permit a determination whether the animals in question belonged to the migratory or the sedentary ecotype. This affiliation identification would then be used for the selection, design and implementation of appropriate mitigation and monitoring strategies.

Both proponents have a common interest in documenting whether sedentary caribou are present in the vicinity of their proposed iron ore developments. The survey areas accepted by the GNL Wildlife Division were found to overlap. NML and LIM therefore agreed to collaborate and to share the resources and expenses required to carry out the program in collaboration with the Wildlife Division of Newfoundland and Labrador and with the approval of Québec's ministère des Ressources naturelles et de la Faune.

1.1 Objectives

The main objective of the study was to determine if sedentary caribou are present within an area surrounding the iron ore mining project sites of LIM and NML immediately prior to the calving season. If caribou were observed, adult females would be captured and equipped with satellite telemetry collars provided and tested by the GNL Wildlife Division. Other information is important to identify the ecotype: location of calving ground; habitat use; and site fidelity. Such information can be acquired only if females are collared. Satellite telemetry has been demonstrated to provide an effective indication of caribou movements and distribution for monitoring purposes and implementation of improved mitigation measures (Trimper and Chubbs 2003).

2.0 METHODOLOGY

2.1 Field Preparation

To define the size of the Study Area the Study Team considered the size of the seasonal ranges of sedentary caribou reported in the literature. The distance covered by sedentary caribou between summer and winter ranges can attain 80 km, but it is more often reported as between 10 and 40 km (Edwards and Ritcey 1959, Fuller and Keith 1981, Paré and Huot 1985, Cummings and Beange 1987, Edmonds 1988, Seip 1992, Cichowski 1993, Paré and Brassard 1994). Therefore, a conservative radius of 50 km centred on each proposed development was approved by GNL Wildlife to represent the Study Area.

Given the overlap of the range of the GRCH with the Study Area and the difficulty of distinguishing this ecotype from the sedentary ecotype, should they be present, during the survey, the Study Team contacted the responsible provincial departments in Labrador and Québec to determine the location of the migratory ecotype immediately prior to the start of the survey. Based on the display of satellite collars from the GRCH on the MRNF and the GNL websites, and through communications with the nearby Naskapi and Innu communities, the information indicated that most of the GRCH did not pass through the Study Area during the winter of 2008-2009. Note that no telemetry collars are known to be currently attached to sedentary caribou, if present, in this area.

Before the start of the survey, letters prepared by NML and LIM explaining its objectives were sent to the leaders of the First Nations concerned, namely the Innu Nation, Innu Takuaikan Uashat mak Mani-Utenam (ITUM), the Naskapi Nation of Kawawachikamach (NNK) and the Nation Innu Matimekush-Lac John (NIMLJ). Moreover, members of the Study Team met with representatives of the local band councils (i.e., Sylvain Vollant (NIMLJ), Jimmy James Einish (NNK)) to further explain the objectives and to identify whether the planned survey lines would pass near goose-hunting areas. At the request of these leaders a portion of Attikamagen and Petitsikapau Lakes was avoided to reduce potential effects on goose-hunting activities. The

Study Team indicated that a report summarizing the results of the survey would be provided (in English and French) to the ITUM, the NNK, the NIMLJ and the Innu Nation, but the exact location of caribou observations within the survey area would be kept confidential.

The necessary provincial approvals, scientific permits and a federal Animal Care Certificate were obtained before the start of the survey.

2.2 Field Techniques

At the beginning of the survey, a health and safety checklist of all hazards and actions for their management was completed and discussed amongst all participants on the Study Team. Issues related to safety were also reviewed and discussed each morning using a 'last minute risk assessment'. Various scenarios related to capture techniques were rehearsed in advance and in the field prior to application.

The survey was completed during 4-8 May 2009, in an Astar 350BA helicopter at an altitude of approximately 100 m (AGL) and average speed of 160 to 200 km/hr depending on conditions and habitats. Flight lines were spaced every 4 km with transects oriented in a NW/SE direction consistent with the landscape topography. Flights ceased if there was precipitation or other factors (e.g., extensive shadows) that reduced visibility. Portions (in total 1,234 km² or <10 percent of the 12,900 km²) of the Study Area were not surveyed due to poor weather conditions at the time and to avoid areas of intensive goose hunting. Where fresh tracks were encountered, the helicopter would veer off transect to locate any caribou. All observations of caribou, tracks, land use and other relevant information, such as weather and start and end times of each transect, were recorded by the navigator. A total of 31.1 hrs was flown, including ferry from Wabush, Labrador.

The relatively late arrival of spring conditions made it possible to take advantage of persistent snow cover and ice conditions for tracking (Appendix A, Photo 1). Locations where tracks had been observed or suspected previously were further investigated during the final day of the survey. Particular attention was placed on areas of higher elevation, where the depth of snow was less and conditions were more suitable for caribou.

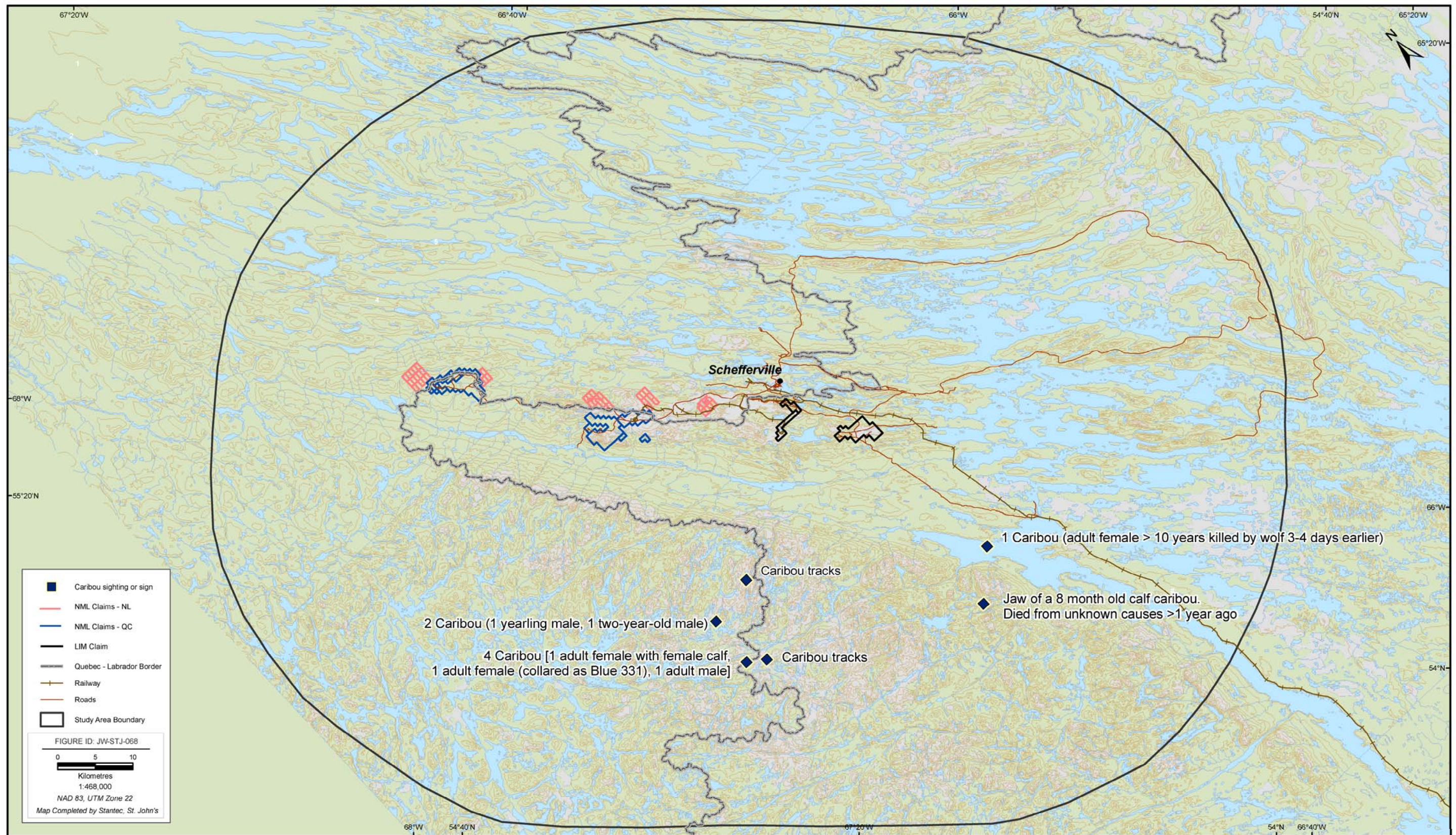
If caribou were encountered, the helicopter flew low to estimate the age and confirm the sex of each animal. When an adult female caribou was observed, the Study Team attempted to capture it with a net gun (Coda 308 with a 17' net). An Argos GPS collar and numbered ear tag were placed on the animal, with the following morphological measurements recorded: body length, heart girth and hind foot length. The animal's age was estimated on the basis of tooth wear. Moreover, a sample of ear dermis was taken with a punch and frozen for genetic analysis and comparison to on file genetic reference samples (to be completed by Dr. Steeve Côté, Université Laval, Québec).

3.0 RESULTS

3.1 Observations of Caribou

Complete snow cover provided excellent tracking conditions during the five-day aerial survey (Appendix A, Photo 1). Approximately 29 hrs of helicopter effort searched an estimated area of 11,670 km² and confirmed three sightings of caribou totalling 7 individuals. One other location of confirmed caribou tracks that could be conclusively separated from these sightings was identified (Figure 3.1).

Figure 3.1 Observations of Caribou and Sign during May 2009 Survey



The first sighting was of a female caribou that had recently been killed by a lone wolf (*Canis lupus*) (based on tracks) at Menihek Lake on 5 May (Appendix A - Photo 2, Figure 3.1). This location is approximately 28 km south of Schefferville [24 km from the nearest ore body of LIM (Redmond) and 48 km from the nearest ore body of NML (Timmins 3N)]. Tracks indicated the lone caribou had been pursued (in a southerly direction) by the wolf from a black spruce (*Picea mariana*) stand approximately 2 km to the north on to the ice. Various signs indicated the death of the estimated 10+ year old female caribou had occurred recently (less than 2 or 3 days). Examination of marrow in the femur indicated that the animal had been in good physical condition. A skin sample was retained for genetic analysis. An adult Bald Eagle (*Haliaeetus leucocephalus*) was feeding on the carcass when encountered by the Study Team. This location was revisited and searched further on 8 May. No other sign of caribou or wolf were noted in this area.

On 6 May, tracks were encountered approximately 35 km southwest of Schefferville [approximately 32 km from the nearest LIM property (Redmond) and 32 km from the nearest property of NML (Redmond 5)]. The Study Team followed these tracks over higher elevation for approximately 2 km before encountering a group of four caribou (i.e., one adult female accompanied by a calf, another female and a yearling male) (Appendix A, Photo 3, Figure 3.1). These animals appeared to have been moving in a northwesterly direction and were following the higher terrain features, apparently to take advantage of better snow conditions for travel. After returning to Schefferville for fuel and to prepare equipment, the Study Team later captured the lone adult female identified as Blue 331 (Appendix A, Photo 4). Upon release of this animal, an attempt was made to capture the second female, but the group was cohesive and it was difficult to separate the other individuals from Blue 331, so the effort was aborted. This location was revisited on 8 May, at which time the Study Team relocated tracks moving in a northwest direction, but was unable to relocate the animals.

On 8 May, the final group of caribou encountered consisted of two males (a yearling and a two-year-old) that were located on hills approximately 25 km west of Schefferville [29 km from the nearest ore body on the LIM property (Redmond) and 29 km from the nearest property of NML (Timmins 3N)]. There was no obvious pattern to their movement.

Note that during a rest break on 6 May, the Study Team found a jaw from a calf caribou aged at eight months (Appendix B), but the sample was too old for genetic analysis (J. Taillon, pers. comm.). This location was on the top of a prominent hill, west of Menihek Lake and 30 km south of Schefferville.

3.2 Caribou Measurements

There were two opportunities to collect morphological data on caribou. Standard measurements (Couturier et al., Submitted) were recorded for the captured female (Blue 331) west of Schefferville and the dead female (partial measurements only due to the condition of the carcass) encountered on Menihek Lake (Table 3.1).

Table 3.1 Morphological measurements of two adult female caribou near Schefferville, May 2009

	Estimated age	Hind foot length	Heart girth	Body length
Dead female	≥10 years	56.5 cm	-	-
Blue 331	3 -4 years	56.0 cm	118.0 cm	192.0 cm

3.3 Movement of Telemetered Caribou

As of the time of writing, a signal has not been received from the Argos satellite collar. Conversations between the GNL and the supplier of the collar (i.e., Telonics) suggest the inability to transmit may be caused by a process called passivation, where a stored collar develops a corrosion layer that may block signal transmission. It is hoped that the corrosion may wear to the point that transmission will occur normally. The VHF beacon was tested and confirmed by the GNL (who provided the collar) to be functioning normally prior to deployment (J. Neville, pers. comm.).

3.4 Observations of Other Wildlife

Moose (*Alces alces*) and sign were concentrated in the southeast portion of the Study Area, where one adult male and four other separate locations of tracks were observed (Figures 3.2 and 3.3). Black bear (*Ursus americanus*) and tracks were common, with four sightings of live animals and at least ten sightings of tracks throughout the Study Area. Wolf tracks were observed only twice [in association with the recently killed caribou located at Menihek Lake (Section 3.1)] and in the southeastern portion of the Study Area (Figure 3.2). Canada Goose (*Branta canadensis*) were migrating through the area in large numbers. Flocks of 10-100 were often observed flying north or loafing on ice or *ashkui* (an Innu term that refers to areas of permanent or temporary open water during winter). Over the course of the survey, other migratory avifauna [e.g., American Robin (*Turdus migratorius*), Common Snipe (*Capella gallinago*)] began to appear in Schefferville and increased in abundance in the subsequent days.

Figure 3.2 Observations of Other Wildlife and Sign during May 2009 Survey – Southeast Section

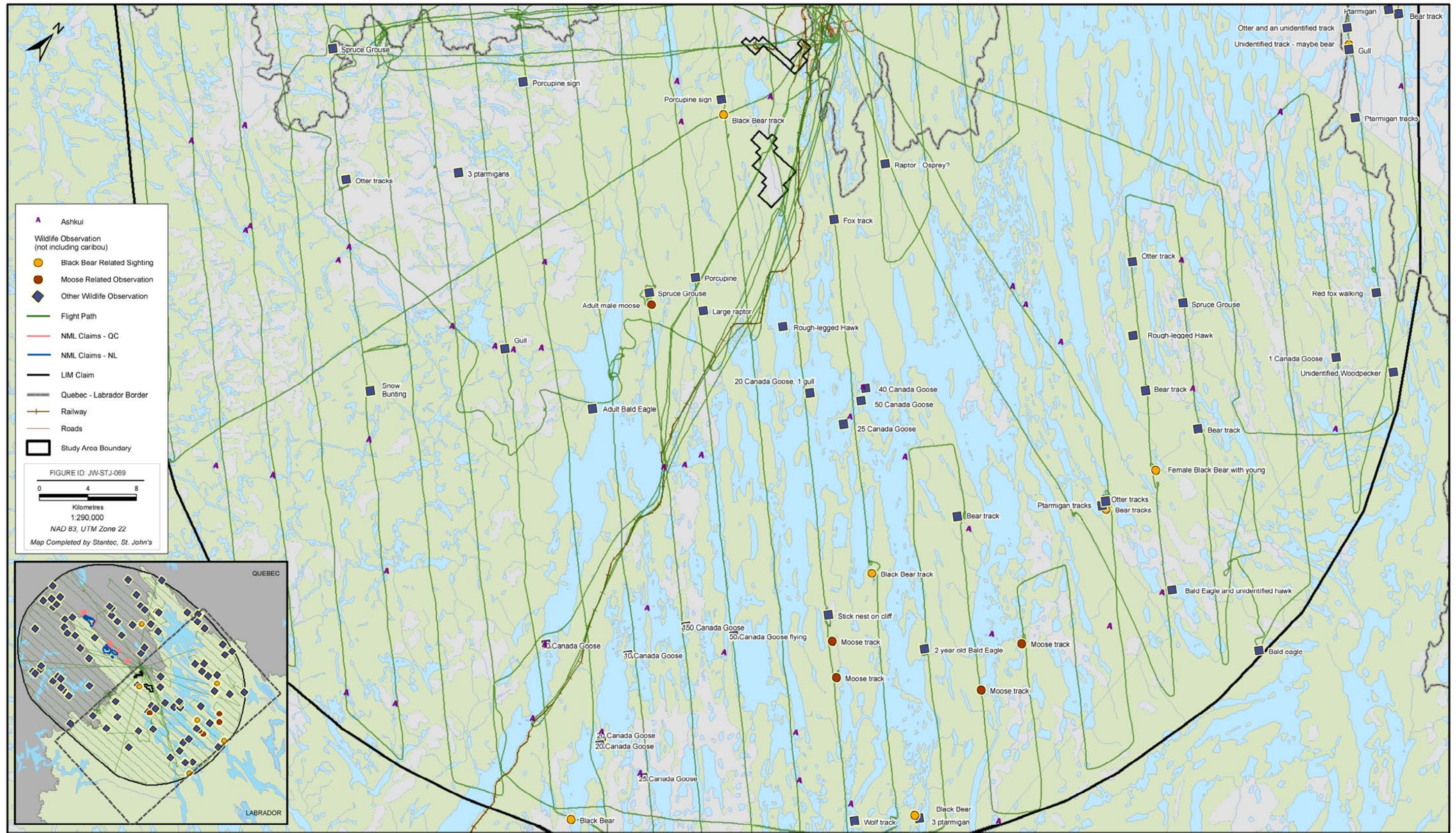


Figure 3.3 Observations of Other Wildlife and Sign during May 2009 Survey – Northwest Section

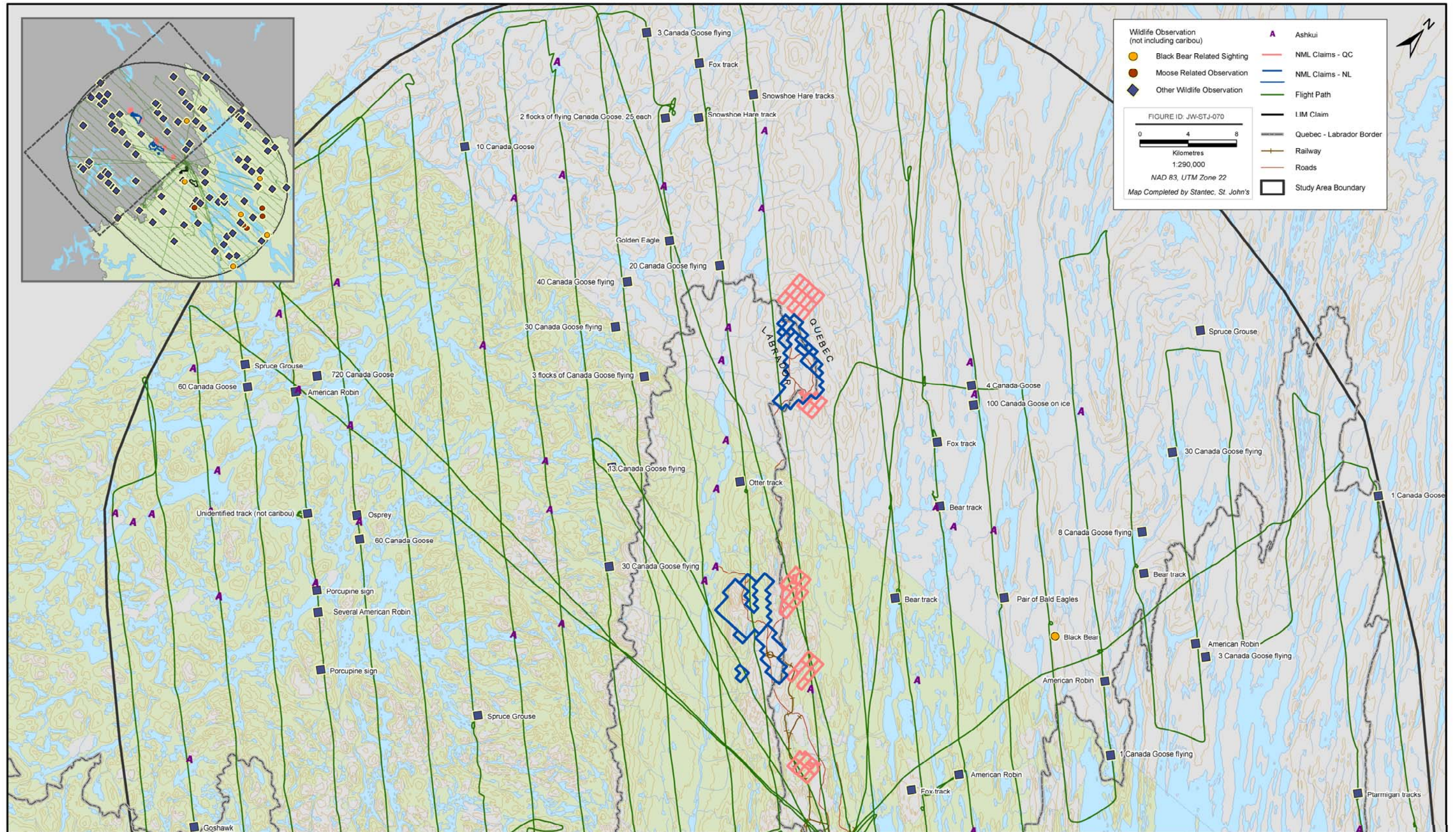


Figure 3.4 Observations of Land Use Activity during May 2009 Survey – Southeast Section

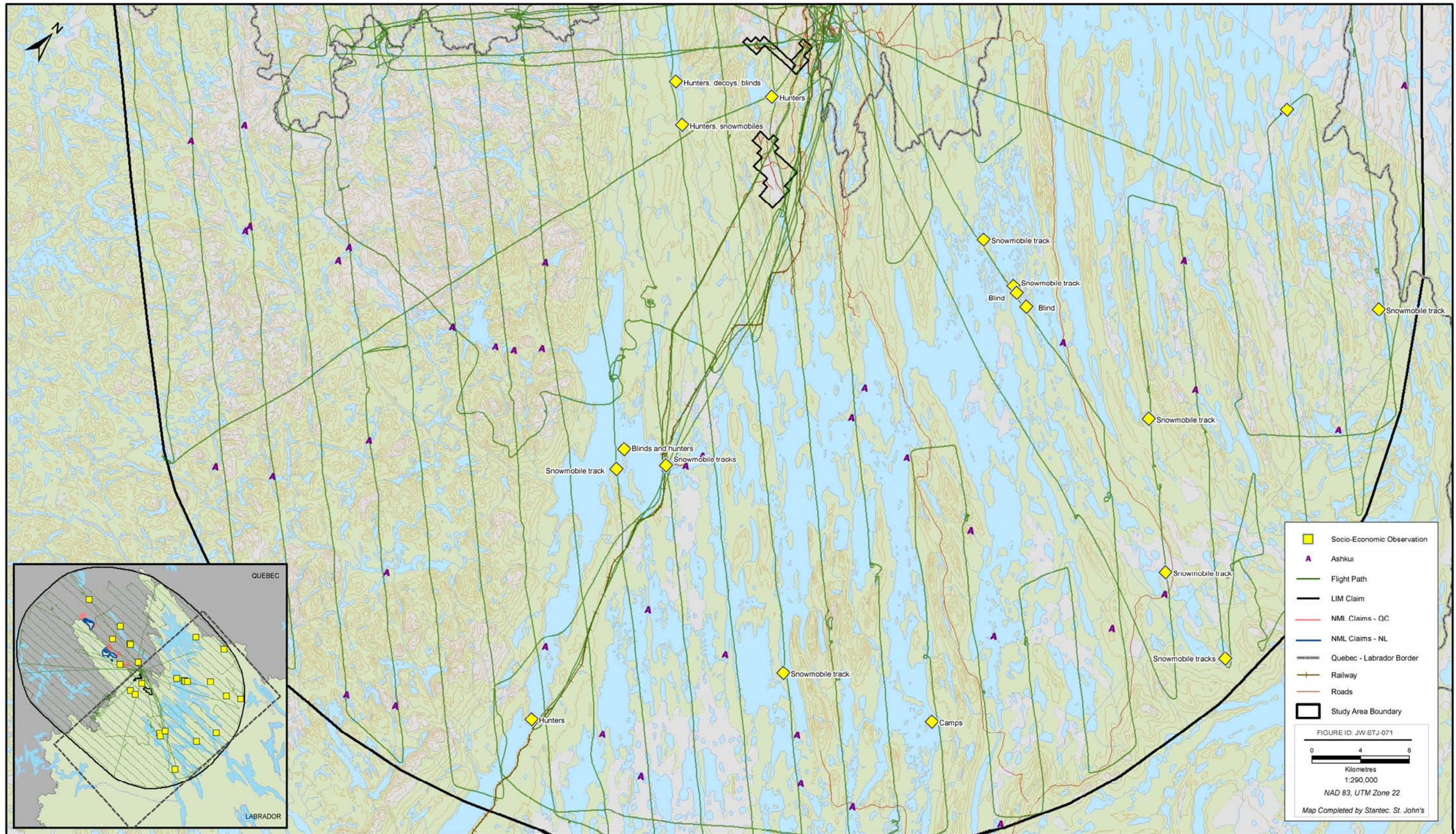


Figure 3.5 Observations of Land Use Activity during May 2009 Survey – Northwest Section



Land use activity was extensive throughout the eastern and southern portions of the Study Area. There was a particular concentration of activity in the vicinity of Attikamagen and Petitsikapau lakes, where evidence of hunting for geese (e.g., decoys, blinds, snowmobiles) was noted in association with *ashkui* (Figures 3.4 and 3.5).

4.0 DISCUSSION

The caribou of the Ungava region are classified as woodland caribou *Rangifer tarandus caribou* (Bergerud et al. 2008). There are three ecotypes in this region: the migratory (represented by the George River or Leaf River Herds for example), the mountain (represented by the Torngat Mountains Herd) and sedentary caribou (e.g., Lac Joseph or Red Wine Herds). The sedentary ecotype of interest for this study is in difficulty in most parts of North America. Predation, hunting and habitat modifications have frequently been suggested as the main causes to explain the decline of sedentary caribou (Schaefer et al. 2001, Sorenson et al. 2008). Situations where caribou become concentrated in residual habitat patches favour the establishment of alternative prey such as moose, which results in increased predators and/or extends their seasonal presence in an area. Increased access to areas used by caribou often results in increased poaching. Finally, habitat fragmentation by human activities, particularly forest cutting, concentrates caribou and increases their vulnerability to hunting and predation (Courtois 2003, Chubbs and Schaefer 1997, Schaefer et al. 2001, Bergerud et al. 2008). While the survey confirmed that the number and density of caribou in the Study Area at this time of year are low, the challenge is to determine the ecotype affiliation of the few caribou observed during May 2009.

Distribution and Movement

Female caribou have two distinct distribution patterns for reducing predation risk. In the first, the cows can be widely dispersed in the spring (space-out), thereby increasing the search effort for wolves and bears during this sensitive period. In the second pattern, the cows can move away from the distribution of predators (space-away) (Bergerud et al. 2008). Space-out behaviour is typical of the sedentary ecotype; Space-away behaviour, including migration to calving grounds on the tundra, is typical of the migratory ecotype (Schaefer et al. 2000, Bergman et al. 2000, Adams et al. 1995 a, b, Bergerud and Page 1987).

The caribou observed during the survey were using the hills to the west and southwest of Schefferville. Based on their tracks, the group of four caribou was moving in a northwesterly direction, while the two male caribou had been occupying a relatively small area for at least several days. If the female caribou were affiliated with the GRCH, they should have been much further north at the calving grounds, although not all females arrive at the calving grounds before dropping their calves. Males of the migratory ecotype do not follow females to the calving grounds.

Physical Measurements

According to Couturier et al. (Submitted) the morphological measurements indicate that the two caribou measured (Table 3.1) belong to the migratory ecotype (Table 4.1). The variable that presents the most differentiation between ecotypes is hind foot length. The two samples

collected, 56.0 and 56.5 cm, are closer to the recorded values for migratory caribou than to those of sedentary caribou. The morphology of the caribou associated with the various herds appears to be changing, however, according to demographics and habitat quality (Dr. Steeve Côté, pers. comm., May 15, 2009).

Table 4.1 Morphological measurements of adult female caribou from seven herds and three ecotypes from the Québec-Labrador Peninsula (from Couturier et al. Submitted)

Ecotype	Herd	Study period	Hind foot length ^a	Heart girth ^a	Body length ^a
Migratory	George (n = 344)	1983-2002	55.6 ± 0.1 ^a	114.0 ± 0.4 ^a	186.6 ± 0.5 ^a
	Feuilles (n = 104)	2002-2002	55.6 ± 0.2 ^a	108.6 ± 0.6 ^b	184.2 ± 0.9 ^a
Mountain	Torngat (n = 14)	2001	53.6 ± 0.2 ^b	122.4 ± 0.6 ^c	200.3 ± 2.1 ^b
Sedentary	Red Wine (n = 42)	1993-2002	60.6 ± 0.4 ^{cd}	124.2 ± 1.2 ^c	209.2 ± 1.8 ^c
	Lac Jos (n = 38)	1998-2002	61.6 ± 0.3 ^c	117.3 ± 0.9 ^{ac}	205.6 ± 1.1 ^{bc}
	Jamésie (n = 24)	2003-2004	61.5 ± 0.3 ^c	119.9 ± 1.5 ^c	200.9 ± 2.3 ^b
	Mealy (n = 27)	2002-2005	59.6 ± 0.6 ^d	123.5 ± 0.9 ^c	208.1 ± 1.2 ^{bc}

^a Indicates values with the same letter did not differ significantly (Tukey post-hoc comparisons)

A review of more recent data on the hind foot length of migratory caribou (Table 4.2) suggests that it cannot be used to discriminate between ecotypes with certainty. It appears that the hind foot length of caribou from the GRCH is below the values obtained subsequently. Still, from an examination of the minimum and maximum values (Table 4.2), which are not available for Table 4.1, the variability between individuals seems considerable. More recent data (2007-2009) for Jamésie caribou (sedentary ecotype) show values that range from 58.5 cm to 66.0 cm for 11 adult females (more than three years old) and are greater than those measured in this survey (MRNF unpublished, Chibougamau). The female caribou (Blue 331) captured on 6 May 2009 and the female found dead on 4 May 2009 appear to have morphology consistent with the migratory ecotype such as the GRCH.

Table 4.2 Recent hind foot length (cm, mean ± SE) of adult female George River Herd caribou (source: Caribou Ungava Project, Université Laval, Joëlle Taillon)

Study period	Hind foot length	N	Min/max
2007	54.8 ± 0.4	38	52 cm/58 cm
2008	55.0 ± 0.5	30	51 cm/61 cm

Traditional Environmental Knowledge

The Naskapi and the Innu in the region have always depended on caribou economically and culturally, as well as from philosophical and religious standpoints (Clément Mai 2009; Weiler 2006). The migratory ecotype of caribou is the main source of this dependence. There are two annual migrations and routes recognized by the Innu (Clément Mai 2009):

“The first main route is as follows. The caribou arrive from the George River and pass through the region from east to west (actually from the north-east to the south-west). In the past, that movement could begin as early as August 15, but it is usually observed in the fall, from September to November depending on the year. Caribou are present for about three to four weeks. Some of the caribou coming from the George River branch off into the sector and move further south towards the Smallwood Reservoir. Others overwinter in the region of Fermont, returning to cross the Study Area in April-May. Another Innu speaks of two waves in the fall from George River: the first wave occurs in September, and these caribou stay for three weeks about 30 miles north of the area; the second wave follows in November, lasting for about one week, and they move on to Schefferville. They stay within a group, when passing through.

The second main migration route follows the opposite direction. Caribou come from Caniapiscau at the same time, from August 15 until November, depending on the year and the experience of each informant. These caribou migrate from west to east (in fact from the south-west to the north-east). They cross the Howells River in the Study Area over a period of one month. Some of them branch off, returning north by La Militière Lake.

There are other variations, such as migrating from the north (via Greenbush) in the fall. Yet another informant indicated the following migration corridor: from the George River at Kuujuaq to Caniapiscau and returning towards the George River.

Lastly, a spring migration is also indicated above. It usually occurs in April-May. According to some, the caribou can come from the south (Fermont, Esker). According to others, they came from the George River. In the former case, it is said that the caribou pass through only for one week, heading towards Champdoré Lake. In the latter case, the caribou follow a chain of hills, returning northward by lakes Ishkueu-shakaikan (Squaw Lake) and Pishishueu-shakaikan (Vacher Lake)”.

According to Clément (Mai 2009), some of the Matimekush-Lac John Innu do not know the sedentary caribou. Others, however, recognize the existence of two caribou ecotypes. Some Innu see no morphological differences between the two ecotypes, except for the different habitats that they use. Others make a distinction based on morphological features, attributing to the sedentary caribou a stouter body and smaller antlers, as compared to the migratory caribou (Clément Mai 2009). The flesh of the sedentary caribou is said to taste better than that of the migratory caribou, because the former ecotype is more sedentary and is suggested to have a higher fat content. Those Innu who recognize the existence of the sedentary caribou (*minashkuat-atik* in Innu aimun) say that it is extremely rare in, if not totally absent from, the region (Clément Mai 2009). Most observations of sedentary caribou have been made outside the Schefferville area, south of Wabush or in the Cabana Lake area (70 miles south of Matimekush). One Elder interviewed by Clément (Mai 2009) asserted, however, that females of the sedentary caribou ecotype sometimes calve in the vicinity of lac Annabel (approximately 15 km north of NML’s project).

According to Weiler (2006), several, mostly older, hunters harvest caribou also on the plateau west of the Howells Valley throughout the winter. This region is reported to be a wintering area

for smaller groups of caribou, and an important hunting area when caribou are scarce elsewhere (Clément Mai 2009). Informants identified that caribou from the Caniapiscau, Opiscoteo and McPhadyen Herds generally remained within 100 km around Caniapiscau and Delorme lakes when they were observed. Calving areas for these caribou would be south and southwest of Caniapiscau/Delorme lakes and north and northeast of Lake Clairambault (Weiler 2006).

Summary

Given their behaviour at the time of capture (small groups) and their location, for they were present in the wintering area identified by Naskapi informants, it is uncertain as to the ecotype affiliation of the caribou observed. The morphological (i.e., hind foot) measurements indicate that the two caribou measured have dimensions similar to those of migratory caribou including the recent measurements presented in Table 4.2.

The scientific community classifies sedentary caribou in different herds. However, dispersion of animals from these herds makes it difficult to differentiate between herds. The genetic analyses should assist in determining whether the caribou observed are sedentary or migratory. However, at the time of writing, the genetic analysis will not be available until next year and it is also not known if a reference sample for the type of caribou sampled is on file. Outstanding information not available for this report will be issued under separate cover upon receipt.

According to acquired Native knowledge (Weiler 2006) and information from Saint-Martin (1987) and Bergerud et al. (2008), the increasing presence of moose in the southern portion of the Study Area (Clément Mai 2009) and the many observations of bear in the eastern portion, the area that presents the best potential for caribou occupying the area (seasonally or permanently) is the western portion of the Study Area. Caribou will spatially segregate themselves from predators and alternate prey such as moose (Stuart-Smith et al. 1997, McCutchen 2007). Only approximately one third of the Study Area offers an area of potentially lower density of predators and moose. This area, situated in the west and northwest portion of the Study Area, offers relatively better potential for winter habitat for caribou with mountains with less snow and more available food. Portions of the Study Area with numerous lakes and bogs would present a good potential for calving grounds but the increased density of moose and predators seriously threatens the survival of females and calves.

5.0 CONCLUSIONS

The ecotype affiliation of the six live (and one dead) caribou observed during the May 2009 survey in the vicinity of Schefferville is currently uncertain. While the GRCH was not recorded to migrate through this area during the winter of 2008-2009 and was reported to be concentrated to the north during this survey (as evidenced by the regular reporting of satellite collared caribou), it is possible the observed animals are affiliated with the migratory ecotype based on physical measurements and interviews with local Innu, who doubt whether sedentary caribou remain.

If the caribou observed during this survey are sedentary caribou, they will continue to be subjected to limiting adverse factors such as the presence of moose in the southern portion (which encourages the presence of wolves) and black bear in more than half of the Study Area; and accessibility to hunting from local communities. Comments by local Innu indicate that sedentary caribou were present formerly.

Genetic analyses and hopefully the improved reporting functioning of the single female that was captured and collared in May will provided additional insight. Regardless, the density of caribou is low, as demonstrated by the results of the intensive nature of the survey, the large area covered and the excellent tracking conditions.

6.0 REFERENCES

6.1 Personal Communications

- R. Mckenzie Resident Hunter, Schefferville, PQ
- Dr. Steeve Côté Université Laval, QC
- J. Taillon Doctoral Candidate, Université Laval, PQ

6.2 Literature Cited

- Adams, L.G., B.W. Dale and L.D. Mech. 1995a. Wolf predation on caribou calves in Denali National Park, Alaska. *In Ecology and conservation of wolves in a changing world*, eds. L.N. Carbyn, S.H. Fritts and D.R. Seip, 245-260. Edmonton: Circumpolar Institute Press.
- Adams, L.G., F.G. Singer and B.W. Dale. 1995b. Caribou calf mortality in Denali National Park, Alaska. *Journal of Wildlife Management* 59: 584-594.
- Bergerud, A.T. and R.E. Page. 1987. Displacement and dispersion of parturient caribou as calving tactics. *Canadian Journal of Zoology* 65: 1,597-1,606.
- Bergerud, A.T., S.N. Luttich and L. Camps. 2008. *The Return of Caribou to Ungava*. McGill-Queen's Native and Northern Series 50. McGill-Queen's University Press, Montreal, PQ.
- Bergman, C.M., J. A. Schaefer and S.N. Luttich. 2000. Caribou movement as a correlated random walk. *Oecologia* 123: 364-374.
- Boulet, M., S. Couturier, S. Côté, R. Otto and L. Bernatchez. 2007. Integrative use of spatial, genetic, and demographic analyses for investigating genetic connectivity between migratory, montane, and sedentary caribou herds. *Molecular Ecology* 16: 4,223-4,240.
- Chubbs, T.E. and J.A. Schaefer. 1997. Population growth of moose, *Alces alces*, in Labrador. *Canadian Field-Naturalist* 111: 238-242.
- Cichowski, D.B. 1993. Seasonal movements, habitat use, and winter feeding ecology of Woodland caribou in west-central British Columbia. Victoria, British Columbia, Ministry of Forest, Land Management Report n° 79. 54 p.
- Clément, D. Mai 2009. Unofficial Translation. Innu Use of the Territory and Knowledge of its Resources. Final Report. New Millennium Capital Corp. 110 pages + appendices.

- Courtois, R. 2003. La conservation du caribou forestier dans un contexte de perte d'habitat et de fragmentation du milieu. Thèse présentée à l'université du Québec à Rimouski comme exigence partielle du programme de doctorat en sciences de l'environnement. 350 p.
- Couturier, S., R.D. Otto, S.D. Côté, G. Luther and S.P. Mahoney. Submitted. Body size variations in caribou ecotypes and relationship with demography. *Journal of Wildlife Management* 00: 00-00.
- COSEWIC. 2001. Canadian species at risk. May 2001. Committee on the Status of Endangered Wildlife in Canada Available at http://www.cosewic.gc.ca/eng/sct1/index_e.cfm.
- Cumming, H.G. and D.B. Beange. 1987. Dispersion and movements of woodland caribou near Lake Nipigon, Ontario. *Journal of Wildlife Management* 51: 69-79.
- Edmonds, E. J. 1988. Population status, distribution and movements of woodland caribou in west-central Alberta. *Canadian Journal of Zoology* 66: 817-826.
- Edwards, R.Y. and R.W. Ritcey. 1959. Migrations of caribou in a mountainous area in Wells Gray Park, British Columbia. *Canadian Field-Naturalist* 73: 21-25.
- Fuller, T.K. and L.B. Keith. 1981. Woodland caribou population dynamics in northeastern Alberta. *Journal of Wildlife Management* 49: 197-213.
- McCutchen, N.A. 2007. Factors affecting Caribou survival in northern Alberta: the role of wolves, moose and linear features. M. Sc. Thesis. University of Alberta, Edmonton, AB.
- MRNF (Ministère des Ressources naturelles et de la Faune). 2009. Telemetry maps of Caribou Migrations. Available at <http://www.mrnf.gouv.qc.ca/english/wildlife/maps-caribou/>. Consulted on 27 October 2009.
- Newfoundland and Labrador Endangered Species Act, SNL2001 Chapter E-10.1. no date. Available at http://www.env.gov.nl.ca/env/wildlife/wildlife_at_risk.htm. Consulted on 15 February, 2008.
- Paré, M. and J. Huot. 1985. Seasonal movements of female caribou of the Caniapiscau region, Quebec. Proceedings of the Second North American Caribou Workshop, Val Morin, Quebec, 17-20 October 1984, Montreal, Center for Northern Studies and Research, McGill Subarctic Paper no 40, p.47-55.
- Paré, M. and C. Brassard. 1994. Écologie et plan de protection de la population de caribous de Val-d'Or, Rouyn-Noranda. Ministère de l'Environnement et de la Faune, 56 p.+ annexes.
- Phillips, F. 1982. Late Winter 1981 Distribution of McPhadyen River Caribou. Newfoundland and Labrador Wildlife Division. Project No. 4204.
- Saint-Martin, Guy. 1987. The Ecology of the East-Central Quebec and Western Labrador Caribou Population as it Relates to a Proposed Road Development. A thesis presented to the University of Waterloo.

- Schaefer, J.A., A.M. Veitch, F.H. Harrington, W.K. Brown, J.B. Theberge and S.N. Luttich. 2000. Site fidelity of female caribou at multiple spatial scales. *Landscape Ecology* 15: 731-779.
- Schaefer, J.A., A.M. Veitch, F.H. Harrington, W.K. Brown, J.B. Theberge and S.N. Luttich. 2001. Fuzzy structure and spatial dynamics of a declining woodland caribou population. *Oecologia* 126: 507-514.
- Seip, D.R. 1992. Factors limiting woodland caribou populations and their interrelationships with wolves and moose in southeastern British Columbia. *Canadian Journal of Zoology* 70: 1,494-1,503.
- Sorensen, T., P.D. McLoughlin, D. Hervieux, E. Dzus, J. Nolan, B. Wynes and S. Boutin. 2008. Determining sustainable levels of cumulative effects for boreal caribou. *Journal of Wildlife Management* 72: 900-905.
- Stuart-Smith, A.K., C.J. Bradshaw, S. Boutin, D.M. Hebert and A.B. Rippin. 1997. Woodland caribou relative to landscape patterns in northeastern Alberta. *Journal of Wildlife Management* 61: 622-633.
- Trimper, P.G. and T.E. Chubbs. 2003. Effectiveness of spatial mitigation for the George River Caribou Herd within the military training area of Labrador and Québec. *Rangifer, Special Issue* 14: 65-72.
- Weiler, M. 2006. Naskapi Land Use Survey. Preliminary & Summarized results. Lagmag Environmental Assessment 4 p.

APPENDIX A

Photographs From May 2009 Survey

Photo 1 **Snow and ice conditions in the vicinity of Schefferville, 5 May 2009**



Photo 2 Female caribou estimated at 10+ years, killed recently by single wolf at Menihek Lake, 28 km south of Schefferville, 5 May 2009



Photo 3 Four caribou [one adult female accompanied by a calf, another adult female (later captured as Blue #331) and a yearling male], 35 km southwest of Schefferville, 6 May 2009



Photo 4

J. Neville and P. Trimper attach ARGOS collar to adult female caribou (Blue #331), 35 km southwest of Schefferville, 6 May 2009



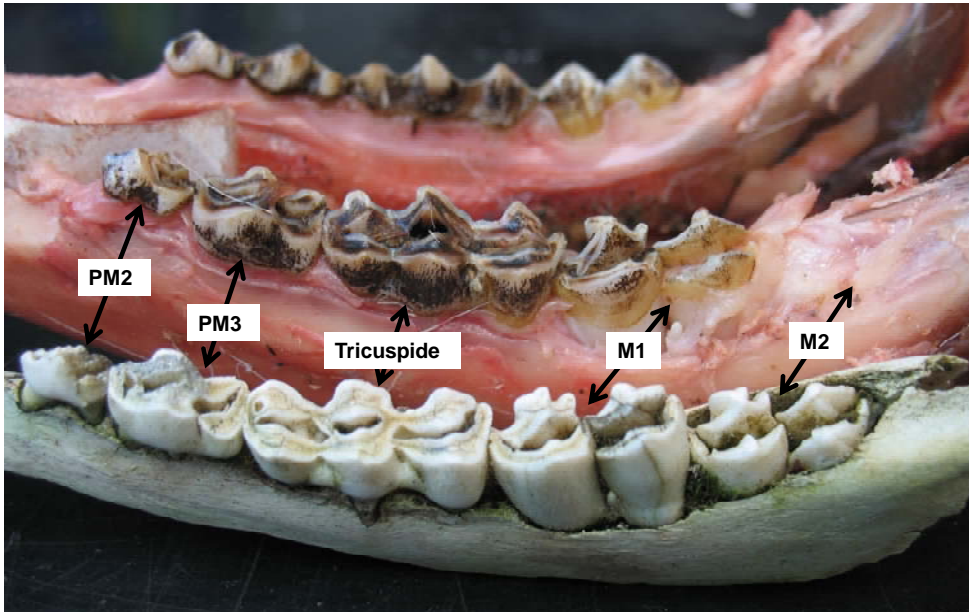
APPENDIX B

Age Determination of Caribou Jaw collected near Schefferville,
May 2009

Source: Joëlle Taillon D. candidate at Université Laval

Comparaison avec mâchoire de faon femelle récoltée le 12-02-2009 (faon abattu lors de la chasse d'hiver 2008-2009).
Ce faon provenait du troupeau de la Rivière aux Feuilles. En 2008, la date moyenne de mise base pour le Feuilles est estimée autour du 10 juin. Donc, ce faon avait autour de 8 mois d'âge lorsqu'il a été abattu et il était sur l'aire d'hivernage de la Rivière aux Feuilles

PM=Pré-molaire et M=Molaire. Comme nous en avons discuté, l'individu dont vous avez trouvé la mâchoire est jeune puisque la tricuspide est encore présente (sera remplacée par PM4 à l'âge adulte). La M1 vient d'émerger et la M2 est entrain d'émerger. Elle est encore dans l'os et entourée de gencive pour le faon femelle d'âge connu. La M3 n'a pas encore émergée. Ainsi, l'individu que vous avez trouvé avait un peu plus de 8 mois d'âge.



Comparaison avec mâchoire de faon que vous avez trouvé avec la mâchoire d'un yearling (1.5an). On remarque que la M2 est totalement émergée et que la M3 est sous la gencive mais commence à paraître. Les dents sont aussi plus usées chez le yearling.

