

WILDLIFE INFOMETRICS INC.

INFORMATION NOTE

**Monitoring the Distribution of
Radio-collared Caribou and Wolves in
North-central British Columbia**

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ABSTRACT

Radio-collared caribou (*Rangifer tarandus caribou*) and wolves (*Canis lupus*) within the Wolverine and Chase caribou herd areas were relocated on 12 occasions from May 11, 2007 to March 28, 2008 for the purposes of tracking their general spatial positions and to confirm their status as either dead or alive. In total, the telemetry crews collected 443 relocations and located 20 mortalities (7 caribou, 9 moose (*Alces alces*), 3 wolves, and 1 still unknown) for subsequent investigation on a related FIA Forest Science Program project (Y082065). In general, distribution of caribou was not different from that observed in previous monitoring projects although, caribou in the Chase herd area continued using low-elevation winter range in and around Carina-Tomias Lakes most of the winter instead of moving to high-elevation winter range. In February, field crew caught and replaced radio-collars on 2 caribou and established new collars for the first time on 25 caribou and 8 wolves. The animals that did not previously have collars were from 4 new wolf packs and possibly 1 new group of caribou apparently unknown to us in recent years. The total number of active radio-collars at year end was 53 caribou and 8 wolves.

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INTRODUCTION

Background

Woodland caribou (*Rangifer tarandus caribou*) in north-central British Columbia (BC) have been regularly monitored to determine habitat selection and to develop population estimates for the herds occupying that area (Giguere and McNay 2007, Rankin and McNay 2007). The purpose for monitoring caribou in the same general area was to establish the fate (i.e., alive or dead) of collared animals in the Chase and Wolverine caribou herds as part of a larger FIA Forest Science Program Project Y082065 entitled “*The use of adaptive management to mitigate risk of predation for woodland caribou in north-central British Columbia*”. Wolves (*Canis lupus*) were also monitored to establish pack boundaries, determine pack size, and locate kill sites.

The larger project was to provide a comparison of two management and one control treatments subjected to three different caribou herds in north-central BC. The first treatment implemented was an increased moose (*Alces alces*) harvest within the Parsnip herd area south of Mackenzie where current moose population levels have historically supported a large wolf population. The Parsnip study is managed by the Ministry of Environment. The second treatment implemented was the direct removal of wolves through regulated trapping in the Chase herd area. The removal of wolves was intended to lessen the direct impact of wolf predation on caribou. The Wolverine herd area received no treatment and therefore acts as the experimental control area. All mortalities to radio-collared animals within the study areas are being investigated to determine the cause of death. In order to establish how caribou populations are responding to the treatments, caribou population surveys (Giguere and McNay 2007) are completed in each study area during late winter and spring and fall calving surveys are completed to determine recruitment.

Monitoring and Capture Objectives

As part of this larger project, my objectives here were to:

1. deploy enough VHF collars on caribou to effectively monitor the Chase and Wolverine caribou herds;
2. deploy enough VHF and GPS collars on wolves to successfully determine pack boundaries, pack size and locate kill sites; and
3. monitor deployed collar status and location through aerial fixed-wing radio telemetry.

STUDY AREAS

Monitoring of radio-collared animals and animal captures occurred within the Wolverine and Chase study areas (Figure 1), which are essentially the recovery planning areas (RPAs) for the two herds as described by Heard and Vagt (1998). The Wolverine herd derived its name from the Wolverine Range, a long range of mountains running north-south located on the east end of the study area. The Chase herd was named after Chase Mountain, which is centrally located within the Chase study area.

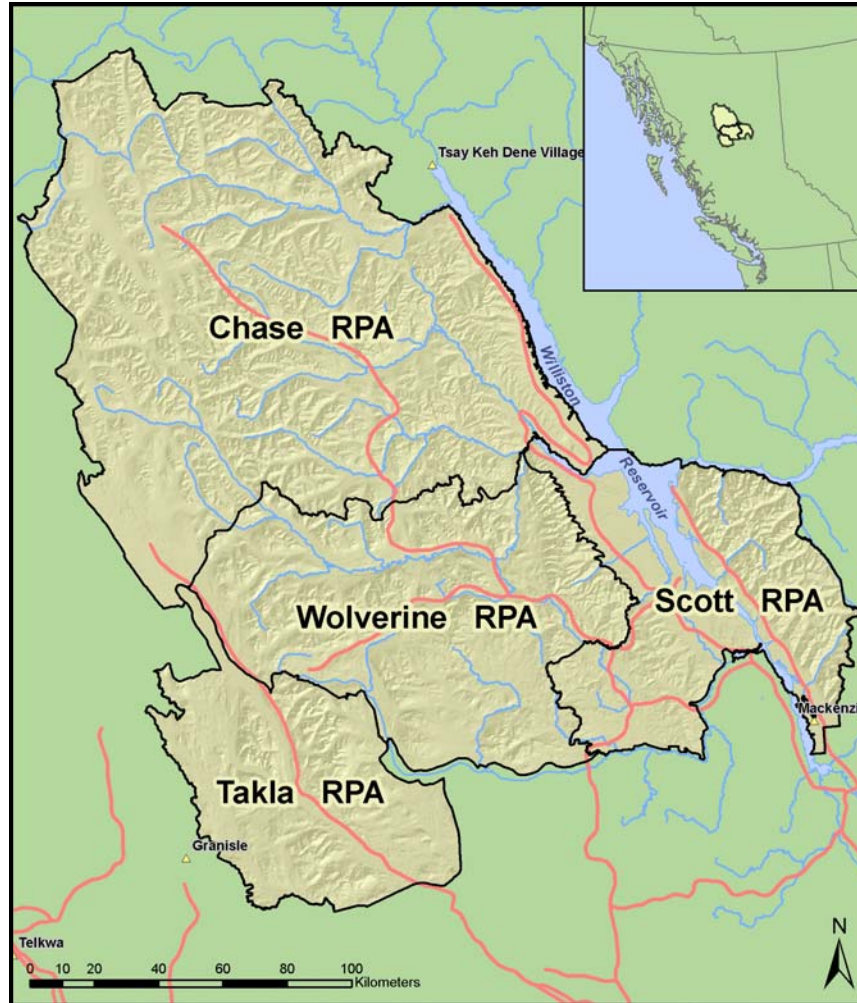


Figure 1. Location of recovery plan areas (RPA) for herds (Wolverine, Chase, Takla, and Scott) of threatened woodland caribou in north central British Columbia.

Wolverine

The Wolverine RPA is 844,313 ha, ranging in elevation from 676 to 2134m in rolling high-elevation foothills, and includes four major watersheds of the Omineca, Manson, Klawli, and Germansen Rivers. It is roughly bounded in the north by the headwaters of Goat, Nina, and Big Creeks, in the west by Takla, Tsayta, and Indata lakes, in the south by Tchentlo, and Chuchi lakes, and in the east by Sylvester and Gaffney creeks and the eastern slopes of the Wolverine Mountain Range. At low- to mid-elevations, the area is dominated by a Boreal White and Black Spruce subzone (BWBSdk1), two of the Sub-Boreal Spruce subzones (SBSmk1 and SBSmk2 variants), and an Engelman Spruce-SubAlpine Fir subzone (ESSFmv3) dominates the mid- to high-elevations. The Alpine Tundra (AT) prevails above tree line. Extensive areas within the study area have been managed for production of timber. Regulated hunting of mature bull caribou occurs in the northern half of the Wolverine study area for 12 weeks beginning every August 15th. Regulated hunting was

discontinued in the southern portion of the Wolverine area prior to 1981. Hunting by aboriginal people is permitted in the entire study area.

Chase

The Chase RPA is 1,733,039 ha situated in steep mountainous terrain ranging in elevation from 671 to 2466m, and has three major watersheds including the Ingenika, Osilinka, and Mesilinka Rivers. It is roughly bounded in the north by the most northerly portion of the Finlay River, in the west by Thutade, Sustut and Driftwood rivers, in the south by Ominicetla Creek, back end of Osilinka River, headwater of Wasi and Flegez creeks, and in the east by the Williston Reservoir. At low- to mid-elevations, the area is dominated by the BWBSdk1 and SBSmk2 biogeoclimatic variants, and at mid- to high-elevations the ESSF Omineca variant (ESSFmv3) predominates. The Alpine Tundra (At) prevails above the tree line. Regulated hunting of mature bull caribou occurs in the Chase study area for 12 weeks beginning every August 15th. Hunting by aboriginal people is permitted throughout the entire study area.

METHODS

Monitoring

Monitoring of radio collared caribou was completed through aerial radio telemetry using a Cessna 185 single engine fix-winged aircraft. All telemetry was performed between May 11, 2007 and March 28, 2008. The Cessna 185 was fitted with two directional-wing antennas and one non-directional, pod antenna mounted on the belly of the aircraft. Signals emitted from a collared animal were heard in the form of VHF (very high frequency) pulse either 60 beats per minute (BPM) for a live animal or a double pulse rate of 120 BPM for stationary collars which presumably would be an animal mortality. GPS (global positioning system) collars emitted VHF pulse as a lower frequency to conserve battery power, either 48 BPM for a live animal or 96 BPM for a stationary collar. Location of collars was determined by adjusting the gain on the LOTEK SRX_400 (Lotek Wireless Inc, Newmarket, Ontario) telemetry receiver and by manipulating the directional antennas.

Animal locations were recorded in form of UTM (Universal Transverse Mercator grid, NAD 83) positions along with the time and ancillary information regarding habitat and weather. Age, sex, activity, and a total group count were also recorded when it was possible. Locations of collared animals were given different status depending on how precisely the location was determined. Precision of a relocation was assumed to be 100 m or 250 m for a visual or fix, respectively. Precision for a general position was assumed to be >250 m - 1000 m and a relocation recorded as "heard" (i.e., the signal was heard but no location recorded) had no associated precision. Weather was often the influential factor in determining the positional precision (i.e., visual, fix, general, or heard). Although no location was reordered for heard signals, the information was useful in determining the animal's status (alive or dead). Telemetry methods followed the British Columbia Resource Inventory Committee (RIC) Guidelines for radio telemetry (BC MELP-2 1998).

Capture

Caribou and wolf captures were done from Bell 206 helicopter operated by an experienced pilot. All captures were done between February 18, 2008 and February 24, 2008. Animals were chosen for capture based on their location, since we desired an even distribution of collars among different groups of caribou and wolves throughout both study areas. Topography and weather also affected capture. If these factors aligned to permit capture, the helicopter landed, removed the doors, all excess gear and two animal handlers so that only the pilot and net gunner remained in the helicopter. Removing the excess weight increased the manoeuvrability of the helicopter. The pilot and net gunner then singled out one animal and using a net propelled by a modified rifle action, using either .303 British or .308 calibre blank cartridges, captured the animal. Once the animal was netted the net gunner was dropped off to secure the animal and the pilot returned to pick up the handlers so they could assist processing the animal. Animals were processed in <15 minutes. First the net was taken off the animal and the caribou was blindfolded and hobbled. Then the collar and ear tag were affixed, followed by the collection of blood, skin and hair samples. Measurements (total length, chest girth, neck girth, shoulder height, hind foot length, hind hoof width and length) were recorded and notes on the condition of the animal (teeth, reproductive condition, scarring) were observed and recorded. The animal was then released and relocated within two-three weeks of capture to ensure that capture myopathy had not occurred. Capture myopathy is a condition where skeletal and cardiac muscles can degenerate as a result of the over exertion of large muscles masses during prolonged pursuit (Cattet et al. 2005). During capture the chase never exceeded the RIC guidelines for the live capture and radio collaring of wild mammals (BC MELP-1 1998).

Only females were captured because the larger project objectives were to focus on estimating population productivity and recruitment. Any collared caribou that remained from previous studies in the area had their collars replaced if the collars were getting old and/or emitted a weak or irregular signal.

Both female and male wolves were captured since it was difficult to determine sex from the air. Therefore if a capture opportunity was presented it was taken. Wolves were captured using the immobilizing drug Telezol[®] (Fort Dodge Animal Health, Fort Dodge, Iowa) delivered intramuscularly either remotely with a dart or directly with a syringe. The darting system used was the Pnuedart^{INC} cartridge-fired system (Pneu-Dart Inc., Williamsport, Pennsylvania). Wolves were occasionally net gunned as well in order to slow them down which allowed for more accurately placed darts. If the target animal was netted well and time permitted, the helicopter landed, the animal restrained using a forked stick placed over their neck, and drugs were delivered by hand using a syringe. Hand injection was the preferred method for delivery of drugs because the internal charges in Pnuedarts were subject to failure.

LOTEK LMRT-4 VHF collars were used on caribou. For wolves, LOTEK LMRT-4 VHF or LOTEK GPS 4400 collars were used. VHF collars transmit non stop and are guaranteed to last for 4 years. The GPS collars were programmed to transmit a VHF signal for 8 hours a day and take a GPS fix every 3 hours. The LOTEK GPS collars are guaranteed for 2 years and can be downloaded remotely in the field from aircraft using a UHF receiver. Mortality triggers on both types of collars were designed to change mode after 8 hours of inactivity. All collars were tested to ensure proper functioning prior to deployment. Mortality

investigations on collared animals always included an inspection to determine if the collar had any effect on the animal's health.

RESULTS

Monitoring

One hundred and twenty seven hours were flown between May 11, 2007 and March 28, 2008 in order to effectively monitor the Wolverine and Chase caribou herds (Table 1). Of the 127 hours, 96.4 hours were spent doing active telemetry. The remaining 30.6 hours were expended in ferrying time to and from the study areas and to refuelling stations. Three hundred and thirty one positive relocations were determined and 116 animals were heard for the entire year.

Table 1. A summary of the flights conducted to monitor fate of radio-collared animals in the Chase and Wolverine caribou herd areas of north-central British Columbia.

Flight Session	Date	Time b/w Flight Sessions (days)	Total Flight Time (hours)	Total Telemetry Time (hours)	Number of Relocations (visual, fix or general location)	Collars Heard (heard but not relocated)
12	2008-03-28		14.8	2.1	13	3
	2008-03-26			1.5	17	1
	2008-03-25	12		7.6	31	18
11	2008-03-12		13.4	5.3	31	1
	2008-03-11			0.9	4	0
	2008-03-10	26		5.2	27	1
10	2008-02-13	23	8.7	5.3	21	11
9	2008-01-20		6.4	2.3	10	5
	2008-01-16		3.2	1.8	4	3
	2008-01-10		2.2	0.9	6	3
	2008-01-09	22	2.2	1.8	2	9
8	2007-12-17		5.8	1.5	2	5
	2007-12-16			1.0	3	1
	2007-12-13		6.6	0.5	2	0
	2007-12-12	10		3.2	19	0
7	2007-12-01		5.5	4.3	13	1
	2007-11-25	10	5.2	5.0	17	0
6	2007-11-14		5.4	4.3	9	7
	2007-11-11	76	5.4	3.0	10	0
5	2007-08-26		7.5	8.6	16	1
	2007-08-22	31		Unk	4	0
4	2007-07-21	34	10.4	7.9	32	3
3	2007-06-16	13	6.2	5.5	11	0
2	2007-06-02		12.7	9.1	23	3
	2007-06-01	20		0.4	2	6
1	2007-05-11		5.4	7.4	2	34
Total		Average = 25.2 days	127.0	96.4	331	116

During monitoring of the deployed radio-collars, the telemetry crews discovered seven caribou mortalities. Five of the seven caribou mortalities were collared animals. One caribou died from wolf predation, one from grizzly (*Ursus arctos*) predation and one caribou calf died from lynx (*Lynx canadensis*) predation (McNay and Giguere 2008). Another caribou mortality was the result of a hunter kill, one's cause of death was unknown as the remains were too old, and two mortalities have not been investigated. Nine moose mortalities were also discovered. All of the moose had died through wolf predation (McNay and Giguere 2008). Three wolf collars were also found on mortality. One was a dropped collar, one was a dead wolf that is suspected to have been killed by a moose and one mortality was not investigated, however we suspect that it was shot. No collared animals died as a result of the collar having adverse effects on their health.

Capture

Capture crews caught one less caribou in the Wolverine herd area than were caught in 2007 and one more wolf (Table 2). In the Chase herd area we captured two more caribou than in 2007 and 3 more wolves. The total number of animals caught in the 2008 capture session was 27 caribou and 8 wolves. The total number of animals caught combined for the 2 years was 53 caribou and 12 wolves. Fixed-wing telemetry flights between March 10, 2008 and March 12, 2008 determined that no captured animals have died as a result of capture myopathy.

Table 2. A summary of animals captures (caribou and wolf) made in 2007 and 2008 in the Chase and Wolverine caribou herd areas of north-central British Columbia.

Herd area	Year	Caribou New	Caribou Replaced	Total Caribou	Wolves VHF	Wolves GPS	Total Wolves
Wolverine	2008	13	1	14	2	2	4
	2007	6	9	15	1	2	3
	Total	19	10	29	3	4	7
Chase	2008	12	1	13	2	2	4
	2007	4	7	11	0	1	1
	Total	16	8	24	2	3	5
Total		35	18	53	5	7	12

Note: Table does not reflect current collared animal status.

All caribou were captured in alpine habitat except for four, found in groups, at low elevation winter range in the area around Carina, Tomias and Flatfish Lakes (Figure 2). All wolves were found at low elevation along river corridors. Four wolves were collared along the Omineca River in three different packs, two along the Mesilinka River in one pack, and two on the Ingenika River in one pack. The only pack that previously had a collared wolf was one of the Omineca packs, the remaining four packs are new wolf packs. Two caribou collars were added to an unknown herd in the Osilinka Range, west of Discovery Creek.

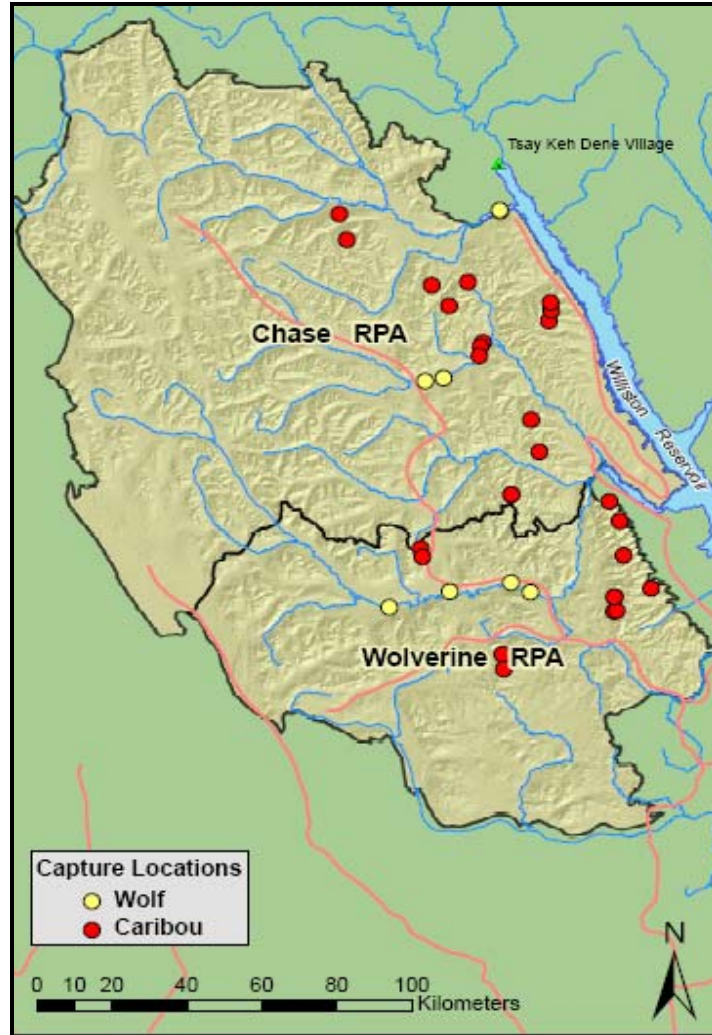


Figure 2. Locations of animal captures (caribou and wolf) conducted during February 2008 in the Wolverine and Chase caribou herd areas of north-central British Columbia.

Capture crews experienced 100 % success in the capture of caribou (i.e., none were missed and none died of capture myopathy). Capture was attempted on 12 wolves and 8 of them were successfully collared for a success rate of 67%. Seven of the wolves have been relocated in post capture telemetry flights, however one of the Omineca wolves from a new pack is missing.

DISCUSSION

Monitoring

Generally, the monitoring was conducted successfully although scheduling flights was often difficult and led to considerable variance in duration between samples. Scheduling

difficulties arose due to a combination of inclement weather, particularly during winter, and availability of the aircraft. Adding to the difficulty was the lack of accurate weather forecasts for the study area. It was not uncommon to encounter several different weather systems during one flight due to the size and mountainous terrain of the study areas. Regardless of these problems, the telemetry was always completed and flying was never pushed beyond safe limits. For the purposes of this study, a consistent schedule was not necessary as long as flights were close enough together that we could determine the animal's status. We knew from previous work that the crucial times of the year for monitoring mortalities was when caribou travel from high-elevation summer range, through valley bottoms, back to high-elevation winter range and flights were conducted during these times.

Despite having a plane with both wheels and skis, pre-planned fuel locations could not always be used due to snow conditions. Therefore other less efficient fuel caches were required which contributed to more ferry time than anticipated.

Capture

Wildlife Infometrics has been involved with caribou captures since 1999 and has never had a caribou die from capture myopathy. Post capture telemetry flights found that all recently collared animals were alive. Net gunning, when done by experienced professionals, is a live-capture method that produces only low stress on captured animals. The animal is caught quickly and handled quickly. Once the blindfold is placed on the animal it becomes quite calm. Net gunning has proven to be superior to drugging for capture of caribou as the available drugs tend to be hard on both their nervous and muscular systems.

There are several explanations for the difference in capture success rates between caribou and wolves. Caribou are more easily found than wolves in open alpine and meadow areas, sink deeper in snow if pursued, and are larger than wolves. In addition there are no drugs used with caribou so success does not rely on a dart being delivered properly. Wolves are more able to seek proximity to obstacles and other sources of shelter from capture and learn about capture attempts thereby being even more difficult to catch on subsequent occasions.

RECOMMENDATIONS

In the future, having the runway at Osilinka maintained through the winter would be beneficial. This airstrip is located centrally within the study areas, has been relied on for the past decade of monitoring radio-collared animals, and has only recently been left unattended during winter months. Since the airstrip is adjacent to a road that is maintained year round it would seem efficient to arrange for the necessary maintenance. Although it's unlikely possible, more flexibility around scheduling flights (i.e., increased availability of fixed-wing aircrafts) would create more regular updates of animal status. The number of flights seemed adequate to serve our objectives.

During the upcoming 2008/09 winter field season we hope to increase our sample size by deploying more collars both on caribou and wolves within both study areas. There is also an opportunity to increase our sample size on wolves with live trapping during the summer.

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