Quesnel Highland Wolf Project Progress Report

August 2006 – March 31, 2007

By

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Abstract

This seven-month term was a continuation of the initial Quesnel Highland wolf project, which occurred between July 2001 and March 2004. Funding for the Quesnel Highland wolf project ceased for two years and was re-initiated in November 2005. The primary objectives at this time involved increasing the number of radio-collared wolves and assessing the number and distribution of wolf packs with territories overlapping the five Mountain Caribou (*Rangifer tarandus caribou*) inventory blocks within the Cariboo Region.

Currently nine radio-collared wolves reside in the study area from six of the estimated thirteen wolf packs. These six radio-collared packs are composed of between 33 and 42 wolves. Professional wolf trappers and staff from the Ministry Environment performed ground reconnaissance and wolf trapping. Four wolves were ground trapped from two separate packs during this reporting period. Six aerial telemetry flights were conducted to determine collared wolf and caribou relocations, wolf pack composition and territory size. Fourty-nine exact wolf and caribou telemetry relocations were obtained. An additional 25 general geographic locations were obtained to confirm caribou collar status.

Key words: Caribou inventory blocks, ground trapping, Mountain Caribou, and wolves.

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1. Introduction

The initial phase of the Quesnel Highland wolf study occurred between June 2001 and March 2004 in conjunction with an ongoing caribou inventory and habitat utilization study. Following a two-year suspension of the project, funding was obtained from Forest Investment Accounts (FIA) from November 2005 until March 2006. SaRCO granted some funds to carry out wolf den work from May-July 2006 and funding from FIA, specifically from West Fraser Mills (Williams Lake) funded the August 2006 to March 2007 reporting period.

The mountain caribou is now a red-listed species throughout its range in British Columbia. There is evidence that predation by wolves is having a negative impact on caribou population stability (Wittmer et al 2005, Youds 2002, Seip 1992). Caribou calf recruitment from 1995-2001 was predominately below population stabilizing levels (<15% calves), largely due to wolf predation (Wittmer et al 2005, Young and Freeman 2001). Under this level of predation, the regional mountain caribou population of approximately 250 was declining at an average annual rate >3% per year. In 2001 wolf density within the study area (9,540 km^2) was estimated at 7.2 to 9.8 wolves per thousand square kilometres and declined to 5.4 to 6.7 wolves per thousand square kilometres by March 2004 (Roorda and Wright 2004). The reduction in wolf numbers was due to both the project's reduction of wolves, sterilization procedures and increasingly accurate information gained through the project's telemetry and inventory flights. Since 2002, the number of caribou observed in the Wells Gray North sub-population increased annually to a high of 210 caribou in 2006 (Freemand and Stalberg 2006, Young and Freeman 2003, Young and Freeman 2004). The number of observed caribou within the Barkerville and Bowron blocks appears to fluctuate more than the Wells Gray North sub-population. However, the number of observed caribou within these two blocks also appears to be increasing. It is difficult to attribute this apparent increase in numbers to any one cause, but it correlates positively with the timeline for the sterilization and removal component of the Quesnel Highland wolf project (2002 to 2004). Collared wolf mortality and dispersal rates were found to be very high, indicating that continuity of the wolf project and rigorous monitoring of wolf packs in the study area would be necessary to maintain reduced wolf densities.

The Mountain Caribou Technical Advisory Committee was formed in 1999 to develop a recovery strategy for Mountain caribou. The report produced by this committee (MWLAP 2002), the regional Recovery Implementation Plan (RIG 2005), and the establishment of the Provincial Species at Risk C-ordination Office (SaRCO) in October 2004 came together to initiate an aggressive, science-based process for developing mountain caribou recovery options. A number of recovery options were released by SaRCO in February 2007 and the consultation process with stakeholders is currently underway.

2. Acknowledgements

Funding for this project was obtained from Forest Investment Accounts (FIA), specifically through West Fraser Mills (Williams Lake). We would like to thank Dan and Kyle Lay for sharing their wealth of wolf knowledge, and Lawrence Aviation and Highland Helicopters for safely piloting the flights.

3. Study Area

The proposed treatment area (Wildlife Management Units 5-15 and 5-16) is located within south central British Columbia, east of Williams Lake, and includes portions of the Quesnel Highland, Bowron Valley and Cariboo Mountains Ecosections (Figure 1). The Bowron Valley and Quesnel Highland Ecosections are in the Columbia Highlands Ecoregion, while the Cariboo Mountains Ecosection is located within the Northern Columbia Mountains Ecoregion; all are within the Southern Interior Mountains Ecoprovince. The study area includes the five caribou census blocks; Barkerville, Stevenson, Bowron, Junction and Upper Horsefly and totals approximately 9,540 km^2 in area.

Wet climate and relatively high winter snow depths characterize this mountainous area, with winter snow depths exceeding 2 m in the mountains. Climatic moisture increases in an easterly direction and with elevation. Continuous, extensive high elevation caribou winter ranges occur on rounded sub-alpine mountain tops throughout the Quesnel Highland and Bowron Valley Ecosections. Within the higher and increased rugged terrain of the more easterly Cariboo Mountains, high elevation caribou winter ranges are present, but are more restricted and discontinuous in nature. The area is comprised of several biogeoclimatic zones including the Alpine Tundra (AT), Engelmann Spruce Sub alpine Fir (ESSF), Interior Cedar Hemlock (ICH) and Sub-Boreal Spruce (SBS) zones.

At lower elevations within the Bowron Valley Ecosection, the Sub-Boreal Spruce biogeoclimatic zone (SBS) dominates, while in the valley bottoms Quesnel Highland and Caribou Mountains Ecosections, the Interior Cedar-Hemlock zone (ICH) occurs at elevations below approximately 1250 meters (Figure 2). The Engelmann Spruce-Sub alpine Fir (ESSF) zone occurs at mid elevations within all three Ecosections, ranging from 1250 meters to about 2000 meters. Within the study area the ESSF zone is usually divided into three sub zones, with continuous forest at its lower (ESSF wk) and middle (ESSF wc) elevations and sub alpine parkland (ESSF wcp) at its upper elevations. The division point between the lower and middle sub zones is usually 1500 meters elevation while the division point between the middle and upper sub zones is approximately 1800 meters. The sub alpine parkland sub zone is transitional between true forest and alpine units and extends to about 2000 meters in elevation.

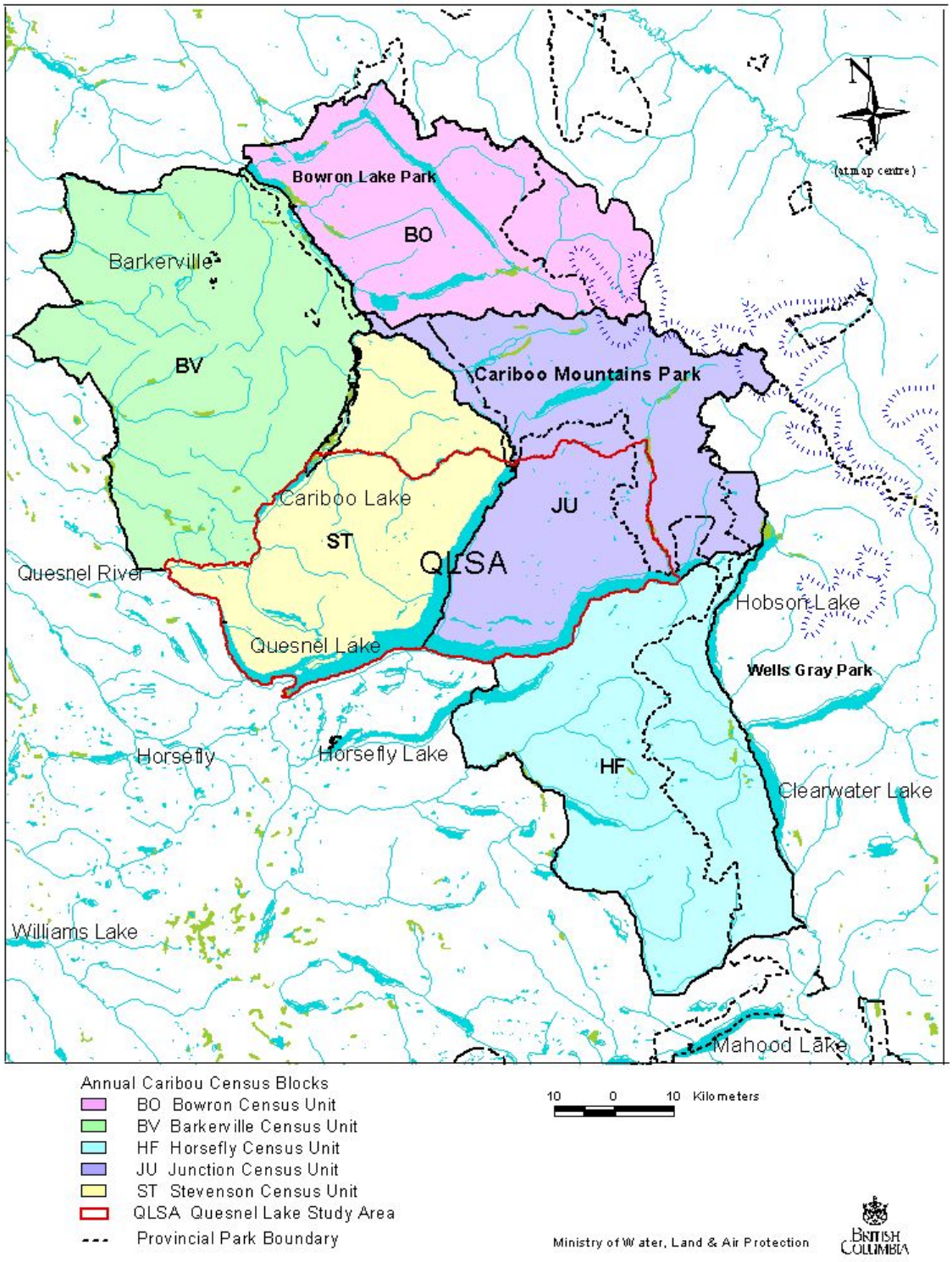
The SBS zone is dominated by stands of hybrid white spruce (*Picea engelmannii x glauca*) and sub alpine fir (*Abies lasiocarpa*), but lodgepole pine (*Pinus contorta*) and Douglas fir (*Pseudotsuga menziesii*) are often present in varying amounts. The main shrubs present are black huckleberry (*Vaccinium membranaceum*), birch-leafed spirea (*Spiraea betulifolia*), falsebox (*Paxistima myrsinites*) and thimbleberry (*Rubus parviflorus*).

The forest of the ICH zone is dominated by western hemlock (*Tsuga heterophylla*) and western red cedar (*Thuja plicata*), but hybrid white spruce, sub alpine fir, lodgepole pine and Douglas-fir are present on some sites. The shrub layer is moderately developed, with
black huckleberry, oval-leafed blueberry (*Vaccinium ovalifolium*), falsebox, devil's club (*Oplopanax horridus*), thimbleberry, and black twinberry (*Lonicera involucrata*) being some of the more common shrubs.

The lower sub zone of the ESSF is dominated by closed stands of Engelmann spruce (*Picea engelmannii*) with some sub alpine fir present, whereas the middle sub zone is dominated by more open stands of sub alpine fir. The shrub layer of these two sub zones is generally moderately well developed, and contains varying amounts

of white-flowered rhododendron (*Rhododendron albiflorum*), black huckleberry, black gooseberry (*Ribes lacustre*) and oval-leafed blueberry. In the upper sub zone clumps of sub alpine fir occur together with areas of heath and meadow.

Figure 1. Quesnel Highland Wolf Project Area and Mountain Caribou Census Blocks



4. Methods

Wolves captured during the project were caught with leg-hold traps. One attempt was made in late March 2007 to capture wolves at a bait site using live (locking) snares, however, wolves did not visit the bait site before the snares had to be removed, and the success of this technique could not be evaluated. Telemetry relocations were obtained (in UTMs) using a GPS unit during Cessna 182 fixed wing flights (Standards for Components of British Columbia's Biodiversity No.5, 1998).

Trapped wolves were sedated with the drug Telezol, muzzled, blindfolded and restrained (Standards for Components of British Columbia's Biodiversity No. 3, 1998 and Canadian Council on Animal Care, 2003). The sex, condition and approximate age were determined, and animals were fitted with a standard Lotek VHF radio-collar. Lotek VHF radio-collars deployed were equipped with a 6-hour motion sensor that altered the pulse frequency (to double pulse) to allow identification of deceased animals.

4.1 Ground Trapping/Baiting

In all seasons, determining an individual wolf pack's travel routes and cycle time (period of days or weeks in which the pack will return to a specific area) prior to setting traps was of primary importance. This involved frequent visits to record wolf activity patterns and potential territory boundaries within specified areas. Ideally, each road was traveled every 3rd or 4th day with a four-wheel drive vehicle or snow machine. Observed sign and its approximate age were recorded and the location was identified with a portable GPS unit or map. This technique reduced trapping effort, as traps were only set when the probability was high that the pack or individual wolves would frequent the trap site in the near future. The use of special lures and their placement at the trap sites targeted the dominant males and females, increasing the probability that they would be the first wolves trapped.

During the winter, draw bait stations were set up using carcasses of road-killed deer and moose. Ideally, after cycle time was established, traps were set 1-2 days prior to expected return of the wolves. In some cases, when cycle time was uncertain, traps were set as soon as wolves had begun feeding on the draw baits. Snowmobiles were often used due to the location of the bait stations and snow conditions. Traps set in the vicinity of draw bait stations were monitored daily for wolf activity by the contractors and/or Ministry Environment staff.

5. Project Costs

Project costs (funds provided by FIA) for the period August 2006 to March 31, 2007 totalled $47,237.39 (Table 1). Contributions from the Ministry Environment are not outlined in this chart but included the project leader's time and salary, use of a government truck, trailer, snow machines, ATVs and equipment repairs.

Table 1. Quesnel Highland wolf project costs from August 2006 – March 31, 2007.

Description	August 2006 – March 2007
Fixed wing flights	$8662.67
Trapping Services	$1048.40
Biologist Support	$26646.80
Helicopter Costs	$10879.52
Total	**$47,237.39**

6. Results

6.1 Wolf Pack Estimates and Approximate Home Ranges

Ground reconnaissance, helicopter and telemetry flights and incidental observations all contributed to estimations of the number of wolf packs, pack sizes and ranges within the study area. There are an estimated thirteen wolf packs with territories overlapping the 9,540km^2 study area (Figure 2). This includes 4 packs in the Horsefly census block, 3-4 packs in the Junction block, 1 in the Bowron block[1], 2-3 in the Stevenson block and 4 in the Barkerville block. A number of these packs overlap inventory block boundaries.

[1] There is likely an additional wolf pack to the East of the Bowron Lake chain, not included in this report. This was not confirmed due the extreme remoteness of this area.

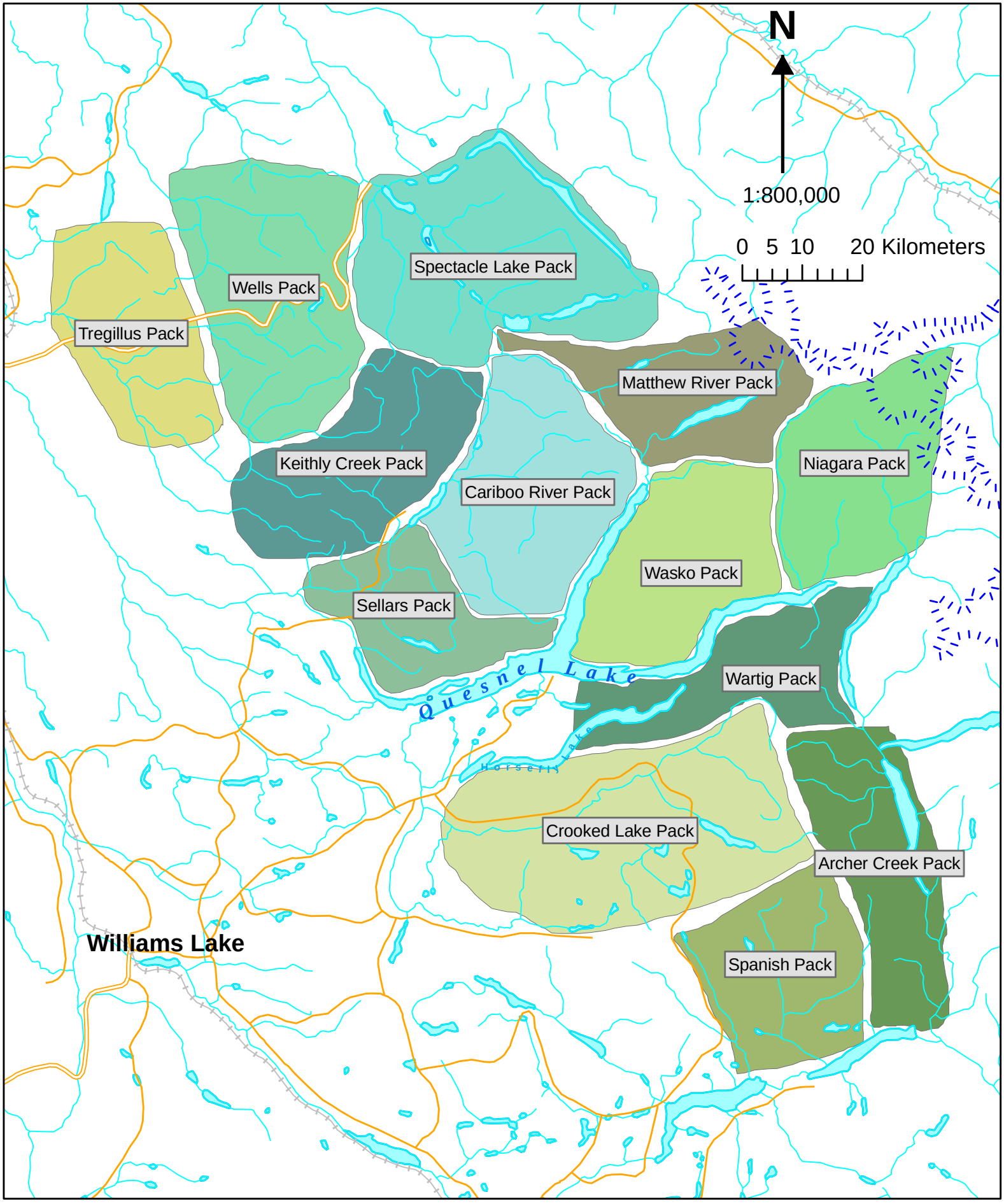


Figure 2. Estimated wolf pack territories within the study area.

The nine radio-collared wolves within the five caribou census blocks represent 6 of the estimated 13 packs (Table 2). The collared female in the Tregilus Creek wolf pack is sterile and is not expected to have pups this spring. The collared, sterile male wolf from the Crooked Lake pack was shot by a hunter on November 18, 2006, returning this pack to a fertile status. The collared male of the Spanish Creek pack and the collared females of both the Wasko and Crooked Lake packs are believed to be dominant but were not sterilized at the time of capture. Estimates of wolf packs without collared animals are unreliable as they are based solely on occasional ground track counts and incidental aerial track observations.

Table 2. Wolf packs within the study area[2].

Pack Name	Collared wolves	Pack estimate
Sellars Creek	1 (Male)	3-7
Cariboo River	2 (Male/Female)	8
Matthew River	0	3-6
Wasko	1 (Female)	6
Hobson	0	unknown
Spectacle Lake	0	unknown
Crooked Lake	3 (2 Male/1 Female)	6-8
Archer Creek	0	7-9
Gotchen	1 (Male)	5-7
Wartig Lake	0	3-5
Tregilus	1 (Female-sterile)	5-6
Keithley Creek	0	7-9
Wells	0	unknown
Totals (6 collared packs)	**9**	**33-42**

6.2 Ground Trapping and wolf mortalities

Eight trapping sessions occurred from September 2006 to March 2007 (Table 3). Four wolves were caught in leg-hold traps at or near bait sites during two separate trapping sessions (pictures in Appendix 1). Several attempts were made to utilize professional trappers to perform the ground trapping, however at the time they were needed; their schedules did not allow them to participate. Project staff conducted trapping activities on all but one occasion. Packs targeted during the spring (2006) denning period appeared particularly sensitive to the presence of project staff. This is likely the primary reason for lack of trapping success within the Gotchen wolf pack territory. During the denning period, this wolf pack moved it's pups at least three times, which required numerous site visits by project staff. This disrupted the denning process and reduced trapping success.

[2] Wolf packs shaded in grey are un-collared and numbers are either unknown or roughly estimated from limited track counts.

Table 3. Details of trapping sessions from August 2006 to March 2007.

Location	Wolf Pack	Duration	Comments
7000/7300 Roads	Archer Pack	Sept 19rd-21th	Missed pack, long cycle time
7000/7300 Roads	Archer Pack	Sept26th-Oct 5th	Professional wolf trappers not available - wolves did not return
7000/7300 Roads	Archer Pack	Nov 8th-10th	Wolves didn't return- too much snow
Gotchen Lake	Gotchen Pack	Dec 5th-8th	Warm and rainy for trapping. Professional wolf trappers not available This pack is very wary of project staff
Gotchen Lake	Gotchen Pack	Dec 13th-20th	Professional wolf trappers not available.
Ladies Creek	Cariboo Lake	Feb 1st – 16th	Wolf trappers not available due to prior commitment. Adult male wolf killed by other wolves. Russel, 2yr old male also trapped and collared
Ladies Creek/Sellars Creek	Cariboo Lake/Sellars	Feb 20th – 24th	Alpha female Sellars trapped and put down due to broken leg. Octavia, 2yr old trapped Cariboo – collared.
Ladies Creek	Cariboo Lake	Mar 14th – 20th	Hired wolf trappers for 1 day - Traps and snares set but wolves didn't return to site. Poor trapping conditions (warm weather)

A summer/fall cycle time of between ten and sixteen days (for August to October 2006) was established at bait sites targeting the Archer Creek wolf pack. The majority of this large pack's territory appears to be within Wells Gray Park in a very inaccessible area (see figure 2). The 10km of road that this pack travels outside the park boundary was used much less frequently by the wolves once the snow began to accumulate in October/November, and thus, the animals did not return to trap sites after the month of October.

Due to the unavailability of the professional wolf trappers, two trapping sessions were conducted by project staff on the west side of Gotchen Lake. This wolf pack was extremely wary of project staff due to repeated den visits the previous spring. On both occasions wolves fed upon the bait, but when traps were set did not return. Additional problems were encountered with rainy freeze/thaw conditions.

The Cariboo Lake bait site appears to be near the territorial boundary for the Cariboo River, Keithley Creek and Sellars Creek wolf packs. Tracks from the Keithley Creek wolf pack were observed several times on the west side of Cariboo Lake during bait/trap checks, resulting in a rough pack estimate of 7-9 wolves in February 2007. The Sellars Creek wolf pack appears to use the southern portion of Cariboo Lake and Cariboo River south. The Cariboo River wolf pack utilizes Cariboo River north and the northern portion of CaribooLake.

On February 13, 2007 a mature, grey-black male wolf was ground trapped at the Cariboo Lake (Ladies Creek) bait site. This wolf was found dead when project staff arrived to check the traps. Though it was not apparent at the time, a necropsy showed that this wolf had been repeatedly bitten on the head, neck and body by other wolves while restrained by the trap. This aggressive behaviour could be due to the fact that it was breeding season and/or that the bait station was located near several wolf pack territorial boundaries. This wolf may also have associated with a different pack.

On February 15, 2007 a large, two year old blonde wolf weighing about 95 pounds was caught at Ladies Creek. "Russel" was fitted with a VHF collar (frequency 151.120) and released 2km north of the trap site. He was later confirmed to be a member of the Cariboo River wolf pack. Traps were pulled out at this site on February 16th due to melting conditions.

Once freezing temperatures resumed, traps were reset both at the Ladies Creek and Sellars Creek bait sites. On February 21, 2007 the alpha female of the Sellars Creek wolf pack was trapped. This 5-8 year old black/grey female (approximately 80 pounds) was in heat at the time of capture. When stepping on the trap, her paw slipped off the pan resulting in the jaws of the trap closing high up on the leg. The location of the trap on the leg and her efforts leave the trap site resulted in the leg being broken. This animal was destroyed. The remainder of the pack became extremely wary, resulting in a lack of continued trapping success at this site.

On February 22, 2007 a two year old, blonde, female wolf (approximately 80 pounds) was trapped at the Ladies Creek site by the right front foot. "Octavia" was fitted with a standard VHF collar and released at the capture site. She was later confirmed to be a member of the Cariboo River wolf pack.

6.3 Telemetry Relocations

A total of six fixed wing flights were conducted on August 16th, October 4th, November 16th, February 22nd, March 8th and March 26th. During these flights as many wolves as possible were relocated. When collared caribou were heard close to the flight path and time allowed, these animals were also relocated. Caribou frequencies were scanned during flights to determine which collared caribou were alive at the time. Data regarding month of caribou death is useful to determine when caribou are most susceptible to mortalities.

Of the 14 collared caribou active during the March 2006 census, five have died, leaving 9 collars active and functioning as of March 26, 2007. Two caribou were relocated dead in August 2006, two were found dead in October 2006 and one was located on mortality pulse in November 2006. One collared wolf was shot by hunters in November 2006, leaving nine functioning wolf collars as of March 26, 2007. A total of 49 UTM relocations were obtained including 43 wolf and 6 caribou relocations (Appendix 2).

Twenty-five additional caribou status confirmations were obtained during fixed wing flights.

6.4 Helicopter Capture

In January 2007 additional funding was provided by FIA to conduct wolf capture from the helicopter. The prime time to capture wolves from the helicopter is mid January to mid February when the snow is deepest to limit wolf mobility and the maximum amount of open ice on lakes is available for helicopter mobility. The initial goal was to contract a highly experienced wildlife capture company to net gun or dart dominant wolves from radio-collared packs. By the time the funding had been finalized and the work had been put out to bid for the required three weeks, capture companies had no openings left to conduct the work before completion deadline of end of February 2007. Two capture companies indicated they may have time to do the work in March 2007 , so the bid process was re-initiated with a completion deadline of March 31, 2007. Again, the two preferred companies found they had no additional timeslots to conduct wolf capture in Region 5. This was very unfortunate as these capture companies have excellent success rates.

Project staff combined with a local helicopter charter company and spent 10 hours searching for radio collared wolves on March 20th, March 22nd and March 26th, 2007. During these flights, the Cariboo River, Sellars Creek, Wasko Lake and Gotchen Lake packs were targeted. Wolves were only found in open habitats on two occasions. On March 20th a blonde wolf was darted from the Cariboo River pack. Although the dart hit and stuck in the wolf's right flank, the animal did not go down. The internal charge within the dart probably malfunctioned. The second darting attempt was made on a member of the Gotchen wolf pack but proved unsuccessful. One shot was fired at the alpha male but missed. This animal quickly gained access to the timber and no other darting opportunity was available. Adverse weather conditions, limited wolf use of open habitat, and lack of opportunities resulted in no wolves being captured during the 10 hours of helicopter charter time. As a result, aerial darting was terminated.

7. Discussion

During the two-year lapse of the Quesnel Highland wolf project, the wolf density appeared to increase within the 9,540km^2 study area (Table 3). Prior to the initiation of radio collaring, sterilization of dominant pairs and removal in 2001 wolf densities were estimated between 7.2 and 9.8 wolves/100 km^2 (Roorda and Wright 2003). An accurate density estimate for the study area is not available at this time due to lack of information regarding un-collared packs. Based on the number of wolves observed in packs with collared animals, the probability is high that wolf numbers have increased throughout the entire study area. There are an estimated 13 wolf packs within the five caribou census blocks at this time. All collared, fertile packs produced pups in the spring of 2006 and it appears that pup survival this year was high (Table 4).

Table 4. Collared wolf pack estimates, member colors and pup survival as of March 31, 2007.

Pack Name	# wolves per pack	Min.	Max.	Wolves Removed	Colors[3]	Surviving 2006 Pups[4]
Sellars Creek	3-7	3	7	1	1-2gr, 2-5blk	2-4
Cariboo River	6	6	6	1	4 blk, 4bld	2-3
Wasko Lake	6	6	6	0	3bld, 2blk, 1br	2-4
Crooked Lake	6-8	6	8	6	2gr, 4blk	2-4
Tregallis Creek	5-6	5	6	0	2gr, 3-4 blk	0 - sterile
Gotchen Lake	5-7	5	7	2	4blk, 1-3gr	2-3
Totals		31	40	10		**10-18**

Neither of the wolves radio-collared during this reporting period was sterilized. The sterilization of dominant wolves during the initial Quesnel Highland wolf project (2002 to 2004) appears to have successfully reduced wolf recruitment. Wolves' territorial behaviour makes them well suited to fertility control because mated pairs will maintain and defend territories from other wolves, reducing the rate of recolonization by other wolves. A combination of fertility control of dominant wolves and sub-dominant lethal control may be most effective for several reasons. Because dominant animals are not killed, fertility control can be viewed as more ethically and socially acceptable (Bomford 1990, Cluff and Murray 1995). Also, decreased birth rates may have the prolonged effect of limiting population density, stemming from density dependent factors, which reduce the rate of exponential growth. Canid sterilization studies to date have all reported no observable change in dominance hierarchy or social behavior following surgical sterilization (Mech 1996, Bubela 1995, Lord 1956). Ultimately, reduced wolf numbers should result in a reduced predation rate on caribou, allowing the herd to increase annually as it has in previous studies (Farnell and McDonald 1988, Boertje et al. 1996, Bergerud and Elliot 1998).

7.1 Horsefly Census Block

As of March 2007 there are four wolf pack territories within or overlapping the Horsefly census block. These included the Crooked Lake, Gotchen Lake, Archer Creek and Wartig Lake wolf packs and consist of between 19 and 29 wolves. A number of territorial changes appear to have taken place within this census block.

The Wartig pack does not appear to overlap any area currently inhabited by caribou, however it ranges within good caribou habitat that has been home to mountain caribou as

[3] Colors are represented as: gr – grey, blk – black, bld – blonde, br – brown

[4] Surviving 2006 pups refers to pups born of the pack in April/May 2006 and were still alive and with pack as of the end of March 2007.

recently as five years ago (Apps and Kinley 2000). Observations by local hunters and guide outfitters indicate the un-collared pack consists of approximately 3 to 5 wolves.

The Crooked Lake pack has been relocated on most occasions west of their previous pack territory within the Horsefly valley. Location of the den site this spring should be a good indication of the "core" location of the territory. As of March 2006 this pack consisted of 10 wolves, a sighting in July 2006 on the McKusky River reported 14-15 wolves, indicating that 4-5 pups were produced last spring. In November 2006 the sterile alpha male of this pack was shot by a hunter near Patenaude Lake, returning the pack to fertile status. An additional 5 un-collared wolves were killed by hunters in the fall of 2006, bringing the number of wolves in the pack down to eight or nine (in October 2006). The alpha female of this pack, "Kyla" is a collared, grey wolf and was observed during the breeding season with a large grey male. The remaining two collared wolves of this pack (both males) have not been relocated since November 2006, in spite of extensive searches from fixed-wing aircraft and helicopter. One of the collared animals is fitted with a GPS 3300 collar and needs to be found in order to retrieve the15 months of data that are stored within the unit.

The former Spanish Creek pack, now termed the Gotchen Lake pack, also appears to have experienced a territory shift in a north-westerly direction. Where they previously spent a significant portion of the year within the Spanish Creek valley (south of Deception and Mica Mountains), they now appear to spend the majority of the time in the Gotchen, Ruth-Redford and Hendrix valleys. The Gotchen pack currently has between 5 and 7 members. The alpha male, "Munib" is a large collared black with lighter belly and throat. The alpha female is grey.

Little is known about the Archer Creek wolf pack since the majority of their territory appears to lie within Wells Gray Park. Track counts at bait sites outside of the park indicate the pack consists of between 7 and 9 wolves. We believe this pack is a component of the former Summit Pack (Roorda and Wright 2004). During the summer and fall months, this pack appears to travel the small section of road outside the park every 10-16 days. Once the snow starts to accumulate across the high pass into Wells Gray Park in November and the moose shift into the lower valleys, this wolf pack appears to remain along the lake shores and valley bottoms of western Wells Gray Park. The Archer Creek pack would be most effectively targeted from July to mid October; however, the long and sometimes inconsistent cycle time for this pack on a small section of road, combined with the remoteness of the territory makes them extremely difficult to trap.

7.2 Junction Census Block

As of March 2007 there was one collared pack and two uncollared pack territories overlapping portions of the Junction census block. These are the Wasko (formerly Niagara), Hobson and Matthew wolf packs. Due to the extreme inaccessibility of this block, capture attempts are limited to access via helicopter or possibly jet boat.

The collared Wasko pack consists of six wolves, 3 black, 2 blonde and 1 brown. The blonde alpha female, "Christina" is radio-collared but was not dominant at the time of capture and was therefore not sterilized. Last March, the pack consisted of 2-4 adults. Between 2 and 4 pups have survived with the pack since last spring. The den site was located in the spring of 2006, but funding and time constraints did not allow ground trapping to occur.

The western border of the Hobson wolf pack's territory appears to lie on the Niagara River. Aerial track counts from last winter indicated that this was a large wolf pack (greater than 8 members), possibly a splinter group of the former Summit pack. An accurate track count was not obtained from this pack in 2007 and numbers are largely unknown.

Little is known about the Matthew pack due to limited access but at least a portion of this pack's territory appears to be within the Junction block (with the remainder in the Stevenson block). Limited track counts indicate the pack consists of approximately 3 to 6 wolves. One relocation of the Cariboo River pack a short distance up the Matthew River indicates the possibility that the Matthew River may be part of the Cariboo wolf pack's territory.

7.3 Stevenson Census Block

As of March 2007, the Cariboo Lake, Sellars Creek (formerly Lynx Peninsula) and the Matthew wolf packs resided at least in part within the Stevenson block.
The Sellars Creek wolf pack appears to use the southern portion of Cariboo Lake and Cariboo River south. The Cariboo River wolf pack utilizes Cariboo River north and the northern portion of CaribooLake.

The previous Cariboo Lake wolf pack (collared, sterilized and consisting of three members) dissolved due to mortalities in 2004/2005 and a new pack re-colonized the territory. Two successful breeding seasons resulted in a pack of 8 wolves including 4 blondes and 4 blacks. One adult, black, male wolf was killed by other wolves while restrained by the trap on Cariboo Lake. It is not known if this was the dominant male, but this aggressive attack could be due to the fact that it was breeding season and/or that the bait station was located so near wolf pack territorial boundaries. The two blonde wolves (1 male and 1 female) that were collared in this pack were both non-dominant, two year old animals. Relocations and track observations indicate this pack travels the northern portion of Cariboo Lake, Cariboo River north to Sandy Lake and at least the first three kilometres of the Matthew River.

One adult, non-dominant male ("Rosco") is radio-collared in the Sellars Creek wolf pack. During denning period aerial observations and ground-based track counts it appears this pack consists of three adults and the pups of the year. In February 2007 an alpha female wolf was ground trapped at Sellars Creek and had to be put down due to a broken leg. This animal is believed to be the dominant female of the Sellars Creek pack. On February 22, 2007 Rosco was observed with an additional 5-6 dark wolves just west of

the pack's known territory. It is possible that this group of 6-7 wolves included non-pack members due to the timing of the breeding period. If all wolves observed at this time were pack members, then the three adults would have had 5 surviving pups. These inconsistent observations result in an uncertain Sellars Creek pack size, estimated at between 3 and 7 wolves.

7.4 Barkerville Census Block

A very minimal amount of work was done this reporting period within the Barkerville census block. This is mainly due to the remoteness of the area. According to previous track counts there are an estimated four wolf packs within the census block, the Keithley Creek, Tregilus, Wells and Big Valley packs. Track counts on the western side of Cariboo Lake indicate approximately 7-9 wolves in the Keithley Creek pack. Aerial counts of the collared Tregallis wolf pack show that no pups were produced (sterile adult female in this group) last spring and the pack is now composed of 5-6 adult wolves. Wolf and track observations preceding this reporting period indicates the Wells and Big Valley packs are each between 5 and 10 wolves.

8. Recommendations

- Continue with attempting to utilize aerial capture techniques (net gunning and darting)
- Relocate collared wolves on a bi-weekly or monthly basis.
- Put 2-3 collars on each of the 13 wolf packs in the study area. Preferably 1 GPS collar per pack.
- Attempt to identify, capture and sterilize dominant wolf pairs in all 13 packs.
- Eliminate sub-dominant wolves from large packs that may be negatively impacting the mountain caribou population, particularly those rated as "high" threat.
- Attempt to locate den sites, trap dominants and remove pups from high threat packs (April –May yearly)
- Conduct a late winter aerial wolf inventory to obtain an accurate count of wolf numbers within the study area and ensure that additional packs have not been missed.
- Continue to monitor each pack to observe changes in pack dynamics (i.e. animals joining/leaving existing packs, changes in dominance etc.)
- Assess the viability of using live locking snares. When weather condition are not favourable for ground traps, the locking snares may prove effective as an alternative capture technique.

9. References

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Appendix 1. Wolf capture photos

"Russell" – Caught on February15, 2007 on Cariboo Lake. Male, Cariboo River pack member weighing 95 pounds at 2 years of age. Fitted with standard VHF radio-collar 151.120.

Sellars Creek wolf pack Alpha female. Put down due to broken leg on February 21, 2007.

"Rosco" – Bedded on snow March 27, 2007. Appeared to be limping due to some injury.

March 2007 – Cariboo River pack, 4 blonde and 3 black (1 black not in photo) at mouth of Matthew River Collars visible on two of the blondes, Russel (bottom right) and Octavia (bottom left).

Mature male killed by other wolves on Cariboo Lake.

Appendix 2. Telemetry Locations

Frequency	Name	Block/Pack	C/W	Date	Location	UTMX	UTMY	Visual	Comment
150.880	Rosco	Sellars	W	Aug-16-06	NE Spanish Lk	613645	5828654	N	High up in trees
150.350	Munib	Spanish	W	Aug-16-06	S of Hendrix Lk	656507	5764119	N	thick trees
150.390	Elmer	Crooked	W	Aug-16-06	W Tisdale Lk	630227	5786940	Y(1)	black wolf in meadow with hind1/4moose
150.360	Kyla	Crooked	W	Aug-16-06	SE Tisdale Lk	639710	5786940	N	with Festus
150.478	Derek	Crooked	W	Aug-16-06	W Tisdale Lk	630227	5786940	Y(1)	black wolf in meadow with hind1/4moose
150.840	Festus	Crooked	W	Aug-16-06	SE Tisdale Lk	639710	5786940	N	in trees
150.100	#31	Horsefly	C	Aug-16-06	ESE Crooked Lake	668766	5787078	N	MORTALITY (April-July?)
150.281	#52	Junction	C	Aug-16-06	Woltzke				Alive
150.311	#54	Junction	C	Aug-16-06	Niagara/Woltzke				MORTALITY (April-July?)
150.161	#48	Barkerville	C	Oct-04-06	W Sliding Mtn				Mortality
150.720	#47	Barkerville	C	Oct-04-06	Mt Tom				Mortality
150.511	#37	Barkerville	C	Oct-04-06	Cariboo Mtn				Alive
150.609	#55	Barkerville	C	Oct-04-06	Cariboo Mtn				Alive
150.251	#56	Barkerville	C	Oct-04-06	Meridian Mtn				Alive
150.221	#50	Stevenson	C	Oct-04-06	Goose Range				Alive
150.261	#49	Stevenson	C	Oct-04-06	Stevenson				Alive
150.920	#57	Stevenson	C	Oct-04-06	Three Ladies				Alive
150.152	#59	Junction	C	Oct-04-06	Mitchell Mtn N				Alive
150.281	#52	Junction	C	Oct-04-06	Mt Matthew				Alive
150.200	#53	Junction/WG	C	Oct-04-06	Upper Clearwater R				Alive
150.350	Munib	Gotchen	W	Oct-04-06	W Bosk Lake	645387	5781361	N	spruce stand of trees
150.880	Rosco	Sellars	W	Oct-04-06	E of Benny Lake	618034	5823195	N	trees near cutblock
150.640	Christina	Wasco	W	Oct-04-06	E of Christian Lake	673722	5860516	N	moose kill in shrub (5 tracks?)
150.545	Cruella	Tregallis	W	Oct-04-06	NW of 4 Mile Lake	567141	5891534	N	sub-alpine trees near meadow - high!

150.350	Munib	Gotchen	W	Nov-16-06	W Gotchen, near den	657382	5778200	Y(7)	3 grey, 4 black (3 pups)
150.390	Elmer	Crooked	W	Nov-16-06	NE Patenaude Lk	627243	5796863	Y(2)	horse pasture
150.840	Festus	Crooked	W	Nov-16-06	NE Patenaude Lk	627186	5796044	N	in trees 500m from Elmer
150.478	Derek	Crooked	W	Nov-16-06	Offset Lake	648153	5795456	N	thick trees
150.360	Kyla	Crooked	W	Nov-16-06	McKusky R E	652101	5796278	Y(3)	Kyla =+2 blk on river
150.880	Rosco	Sellars	W	Nov-16-06	NE of Likely airstrip	603834	5829521	Y(1)	1 grey in trees near moose kill
150.640	Christina	Wasco	W	Nov-16-06	W end Wasco Lk	641259	5824241	N	no visual
150.920	#57	Junction	C	Nov-16-06	Woltzke				Alive
150.280	#52	Junction	C	Nov-16-06	Woltzke				Alive
150.200	#53	Junction	C	Nov-16-06	Mitchell East				Alive
150.221	#50	Stevenson	C	Nov-16-06	Browntop W				Alive
150.261	#49	Stevenson	C	Nov-16-06	Borland Mtn				MORTALITY
150.152	#59	Junction	C	Nov-16-06	N Mitchell Mtn				Alive
150.478	Derek	Crooked	W	Nov-18-06	Patenaude Lk	626200	5797000	Y	Wolf shot by hunters - MORTALITY
150.545	Cruella	Tregallis	W	Feb-22-07	SW of Wingdam	567128	5886088	Y(6)	2gry 4blk bed in trees
150.640	Christina	Wasco	W	Feb-22-07	Peinsula Bay	644218	5820949	Y(6)	3bld 2blk 1brwn
151.120	Russell	Cariboo	W	Feb-22-07	E Cariboo Lk	610814	5845911	N	track into deep gulch km 8407
150.880	Rosco	Sellars	W	Feb-22-07	NE of Likely dump	600041	5833732	Y(7)	6-7 mostly dark, 1 grey?
150.350	Munib	Gotchen	W	Feb-22-07	SE of Hendrix Lk	653101	5772323	Y(2)	walking in trees, blk and grey
150.360	Kyla	Crooked	W	Feb-22-07	btw McKinley & Tisdale	642217	5789626	Y(2)	2 blondes (1 big!) bed on S slope
150.920	#57	Junction	C	Mar-08-07	Niagara/Roaring	661475	5841092	Y(21)	bedded @ treeline, 6 nearby
150.152	#59	Junction	C	Mar-08-07	NE Mitchell Mtn	667805	5861679	N	windy!!
150.281	#52	Junction	C	Mar-08-07	Niagara/Roaring	661475	5841092	Y(21)	with 920
150.120	Russell	Cariboo	W	Mar-08-07	Cariboo R/Cunningham	623120	5866969	Y(7-8)	frollicking 4 blonde, 3 black (+black pup?)
150.899	Octavia	Cariboo	W	Mar-08-07	Cariboo R/Cunningham	623120	5866969	Y(7-8)	frollicking 4 blonde, 3 black (+black pup?)
150.880	Rosco	Sellars	W	Mar-08-07	S Cariboo R km 12	601409	5834697	Y(2)	blonde and black bedded in regen
150.350	Munib	Gotchen	W	Mar-08-07	NW of Hendrix Lk	648388	5781262	Y(6)	2 blonde 4 black in meadow

150.360	Kyla	Crooked	W	Mar-08-07	2 mi W of Patenaud's	622031	5799455	N	in trees, ravens nearby
151.120	Russell	Crooked	W	Mar-20-07	Cariboo River	622849	5864548	Y(7)	3bld, 4blk on river
150.899	Octavia	Crooked	W	Mar-20-07	Cariboo River	622849	5864548	Y(7)	3bld, 4blk on river
150.350	Munib	Gotchen	W	Mar-22-07	RuthRedford Cr	665084	5773445	Y(5)	4blk,1grey in meadow
150.511	#37	Barkerville	C	Mar-26-07	S Meridian				Alive
150.290	#44	Barkerville	C	Mar-26-07	Tinsdale W				Alive
150.609	#55	Barkerville	C	Mar-26-07	S Jack of Clubs Lk	595533	5881030	N	about 7 beds in trees
150.251	#56	Barkerville	C	Mar-26-07	Tinsdale W				Alive
150.221	#50	Stevenson	C	Mar-26-07	N Mt Brew				Alive
150.920	#57	Junction	C	Mar-26-07	Niagara/Roaring				Alive
150.152	#59	Junction	C	Mar-26-07	NE Mitchell Mtn	665782	5862511	N	higher up in valley, too windy to get closer
150.281	#52	Junction	C	Mar-26-07	Niagara/Roaring				Alive
150.545	Cruella	Tregallis	W	Mar-26-07	near capture site	560490	5879337	N	tracks in trees near river
150.640	Christina	Niagara	W	Mar-26-07	N Arm/Adams Cr	636565	5829650	N	cow calf bed on beach
151.120	Russell	Cariboo	W	Mar-26-07	Cariboo River	621794	5862390	Y(4+)	2bld, 2blk bed under trees
150.899	Octavia	Cariboo	W	Mar-26-07	Cariboo River	621794	5862390	Y(4+)	2bld, 2blk bed under trees
150.880	Rosco	Sellars	W	Mar-26-07	N Likely	600349	5828548	Y(1)	lying in trees, 1 black
150.350	Munib	Gotchen	W	Mar-26-07	No Name Lakes	668975	5765450	Y(5)	4 on road, 1 on lake
150.360	Kyla	Crooked	W	Mar-26-07	W of Tisdale Lk	627708	5790872	N	thick red pine on slope
150.840	Festus	Crooked	W	Mar-26-07	unknown				extensive search, no signal heard
150.390	Elmer	Crooked	W	Mar-26-07	unknown				extensive search, no signal heard
150.899	Octavia	Cariboo	W	Mar-27-07	Cariboo R/Matthew R	626284	5872794	Y(8)	4blk, 4bld trees at junction
151.120	Russell	Cariboo	W	Mar-27-07	Cariboo R/Matthew R	626284	5872794	Y(8)	4blk, 4bld trees at junction
150.880	Rosco	Sellars	W	Mar-27-07	N Likely	599845	5828557	Y(1)	injured right front foot (blood on snow, limp)
150.640	Christina	Niagara	W	Mar-27-07	Wasco W	637112	5825590	Y(5)	5 wolves in opening upslope of wasco W