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BC Boreal Caribou Implementation Plan: 2013-2014 Field Activities Progress Report



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EXECUTIVE SUMMARY

The *Implementation Plan for the Ongoing Management of Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* (BCIP; MOE 2011) addresses provincial commitments to manage threatened boreal ecotype woodland caribou (*hereafter*, boreal caribou) populations. As a component of the BCIP, 204 adult female boreal caribou were radio-collared in British Columbia's boreal caribou ranges between December 2012 and March 2014. Throughout this period, the fate of all collared caribou within BC's boreal caribou ranges was monitored to track adult survival and calf recruitment. To gain a better understanding of the role wolves play in boreal caribou population dynamics and to support ongoing research objectives, 9 radio collars were deployed on wolves in 2014 to maintain a sample of 23 wolves collared by MFLNRO within boreal ranges in 2012-2013.

Field activities completed in Year II (May 01, 2013 to April 30, 2014) included monthly fixed-wing telemetry flights and mortality site investigations, the deployment of 40 new GPS caribou collars and 7 GPS and 2 VHF wolf collars, a fall calf survey, and a late winter recruitment survey.

A total of 175 radio-collared caribou were potentially active in BC's boreal caribou ranges at the beginning of Year II, including 158 SCEK-collared caribou, 12 animals previously collared by the BC Ministry of Forests, Lands, and Natural Resource Operations (MFLNRO), and 5 collared by Alberta Environment and Sustainable Resource Development (AESRD)¹. Forty-seven SCEK caribou and 7 MFLNRO caribou died from natural causes between the commencement of the study, in December 2012, and April 30, 2014. To maintain the target sample size, 40 GPS radio-collars were deployed on 41 individual caribou (40F, 1M) between February 28 and March 31, 2014, including 1 collar that was re-deployed following the predation death of a newly collared animal. On May 1, 2014, at the beginning of Year III, 163 radio-collared caribou were active, including 157 SCEK caribou, 4 MFLNRO caribou, and 2 AESRD caribou. The annual finite survival rate for 171 adult females during the 12 month period between May 01, 2013 and April 30, 2014 was 0.72.

Serum progesterone analysis indicated the 40 adult female boreal caribou captured in late winter 2014 had a pregnancy rate of 90%.

¹ *Hereafter*, referred to as *SCEK caribou*, *MFLNRO caribou*, and *AESRD caribou*, respectively.

Late winter recruitment surveys were conducted on all herds between March 17 and 22, 2014. A total of 723 boreal caribou in 107 groups were observed. Calf recruitment to 10 months was 12 calves:100 cows, with calves comprising 8.7 % of the population, which falls below Environment Canada's (2008) threshold of 28 calves:100 cows for population stability.

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1 INTRODUCTION

The British Columbia population of boreal ecotype woodland caribou (population #14; Designatable Unit DU8) is red-listed by the Province and designated as *Threatened* under the federal *Species at Risk Act* (Environment Canada 2011). In 2010, the *Implementation Plan for the Ongoing Management of Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* was prepared to address provincial commitments to manage and/or recover species at risk under the Accord for the Protection of Species at Risk in Canada, and the Canada-British Columbia Agreement on Species at Risk (MOE 2011). The BCIP outlines several objectives to allow long-term (50 years) recovery of boreal caribou populations, including: protecting and restoring habitat, managing the industrial footprint, establishing industry standard management practices, as well as mitigating effects of the industrial footprint by reducing predators and managing habitat conditions through fire suppression. These objectives are designed to provide measurable targets for action and evaluation to ensure population and distribution goals are being achieved.

As a component of the BCIP, 164 adult female caribou were radio-collared in British Columbia's boreal caribou ranges between December 2012 and March 2013. Throughout Year II (May 01, 2013 to April 30, 2014), the fate of these animals, as well as boreal caribou previously collared by MFLNRO and Alberta ESRD, was monitored to track adult survival and calf recruitment. This report summarizes field activities completed during Year II, including conducting monthly fixed-wing telemetry monitoring flights and mortality site investigations, conducting a fall calf-survival survey (November 2013), deploying 40 new GPS caribou radio-collars, deploying 9 new wolf collars, and conducting a late winter recruitment survey (March 2014).

2 METHODS

2.1 Study Area

Boreal caribou occur in the northeastern portion of British Columbia, in an area bounded by the Northwest Territories (NT) border (N60° latitude) to the north, the Alberta (AB) border (W120° longitude) to the east, the northern Rocky Mountain foothills to the west (roughly W124°), and the northern limit of the agricultural zone to the south (roughly N57°; Fig. 1).

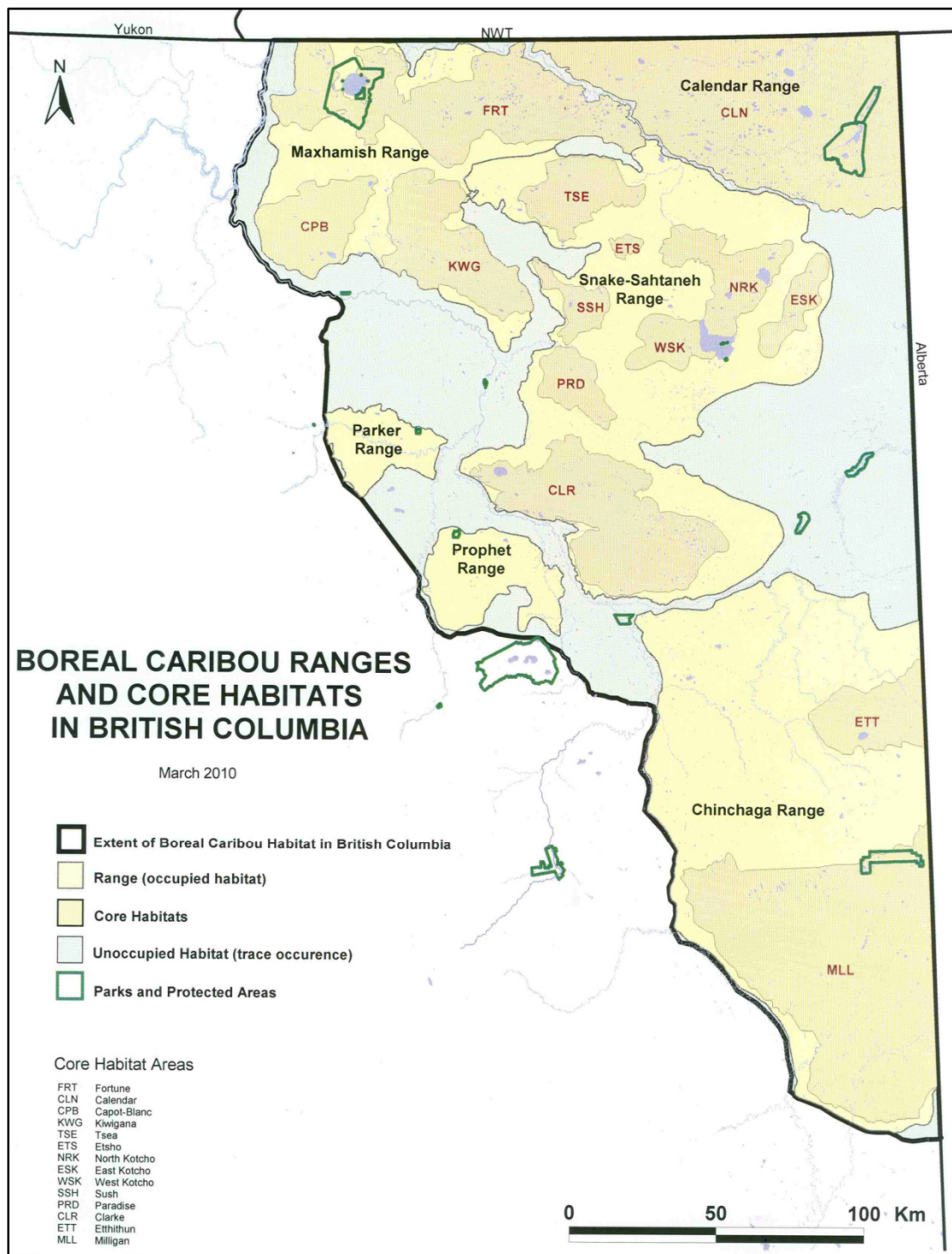


Figure 1. Boreal caribou ranges and core habitats in British Columbia (from MOE 2010).

Six boreal caribou ranges are recognized within BC, including the Chinchaga, Snake-Sahtaneh, Calendar, Maxhamish, Prophet, and Parker ranges, encompassing 16 associated core habitats² (MOE 2010). An additional area of habitat outside the defined ranges (*hereafter*, Fort Nelson Core) was identified during the original range delineation process as an “area of interest, with current status unknown” (Culling *et al.* 2004). A growing body of evidence, including telemetry data and survey observations, supports the formal inclusion of this area in future revisions of BC’s boreal caribou range map.

The Chinchaga Range lies within the Boreal Plains (BOP) ecoprovince, with the remaining BC boreal ranges in the Taiga Plains (TAP) ecoprovince. All ranges are represented by the Boreal White and Black Spruce (BWBS) biogeoclimatic zone. The BC ranges are drained by several major tributaries of the Peace and Liard rivers, including the Beatton, Chinchaga, Fontas, Sikanni Chief, Fort Nelson, and Petitot rivers.

Resource Review Areas

Several policy tools have been developed to support the management of BC’s boreal caribou populations, including the delineation of Ungulate Winter Range (UWR), Wildlife Habitat Areas (WHA), and Resource Review Areas (RRA). In June 2010, 4 RRAs were established, including RRA-A, in the northwestern portion of the Chinchaga Range, RRA-B, which overlaps portions of the Prophet Range, and RRA-C and RRA-D, in the western and eastern portions of the Calendar Range, respectively (Fig. 2). The Chinchaga RRA (RRA-A) is treated as a separate entity from the Chinchaga Range as it is relatively remote from the main areas of caribou activity in the Milligan and Etthithun cores. A minimum 5-year moratorium on issuing new oil and gas tenures within RRAs was established in 2010, with the effectiveness of the measure to be assessed in 2015. Additional information on BC’s boreal caribou ranges and RRAs is found in Culling and Culling (2013a) and the *Science Update for the Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* (MOE 2010).

² 16 core habitats include Calendar, Prophet and Parker, which are considered both ranges and core areas.

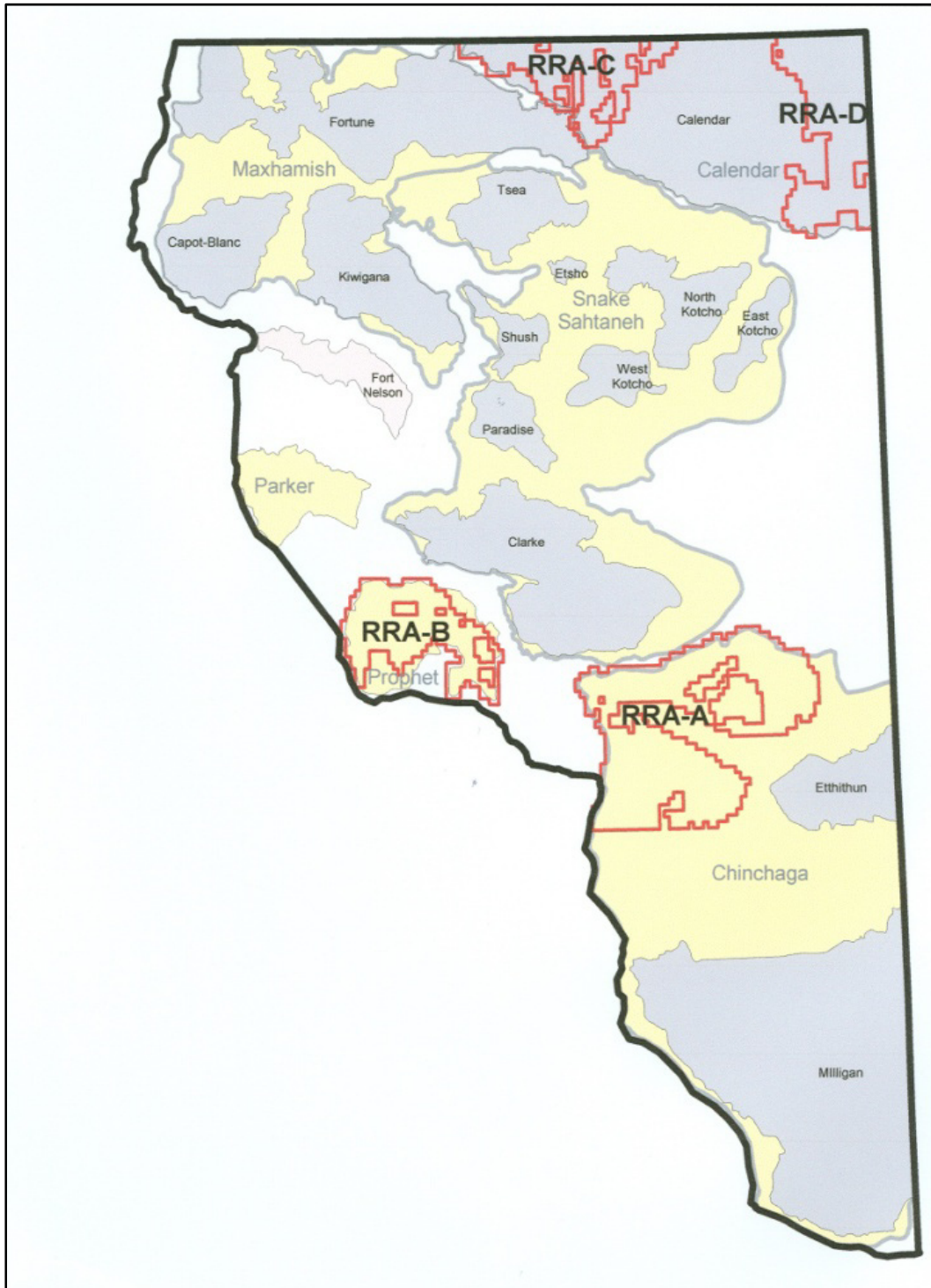


Figure 2. Location of 4 boreal caribou Resource Review Areas (RRA) established in 2010 in boreal caribou ranges, northeastern British Columbia.

2.2 Telemetry Monitoring and Mortality Site Investigations

We conducted monthly fixed-wing telemetry monitoring flights to determine the approximate location and VHF beacon status of all boreal caribou and wolf collars believed to be active in the study area, including caribou collars deployed on behalf of SCEK, caribou and wolf collars deployed on behalf of MFLNRO, and collars known to have entered BC's boreal caribou ranges from adjacent jurisdictions.

We conducted telemetry flights using a Cessna 180 fixed-wing aircraft equipped with 1 outward-facing directional antenna affixed to each wing strut. We scanned all radio-collar frequencies using a Lotek™ STR 1000 and Lotek™ BioTracker telemetry receiver. Flights were conducted at 700-1,000 m above ground level at an average speed of 160 km/hr. During the flight, we recorded the VHF beacon status of all detected collars on hard copy forms, which were later entered into an Excel database.

We recorded the status of VHF collars (Lotek LMRT4) as either normal (60 pulses per minute (ppm)) or mortality mode (120 ppm) and obtained an approximate location (+/- 1 km) using a hand-held GPS unit. For GPS/satellite collars (ATS Iridium, Vectronic Vertex, and Lotek LifeCycle), we recorded VHF mortality mode and additional diagnostic VHF beacon patterns when applicable (i.e., low battery, last fix success, etc.). As GPS/satellite collars are programmed to log multiple daily locations with high precision, we did not attempt to obtain collar locations from the aircraft unless the VHF beacon status indicated a collar malfunction or mortality. For GPS/satellite collars transmitting normal VHF beacons we recorded a waypoint at the location from which the collar was heard or estimated a direction and distance correction from the flight path.

Upon detection of a suspected caribou mortality event, through VHF signal status or transmitted GPS/satellite data, we conducted a ground-based mortality investigation to determine the cause and approximate date of death, collect biological samples, and recover the collar. We accessed mortality sites in the Milligan and Etthithun cores of the Chinchaga Range by helicopter from the Fort St. John airport and from the Fort Nelson airport for the Chinchaga RRA and all other ranges and cores. At each mortality site, we recorded animal ID, collar frequency, collar condition, GPS coordinates, photodocumentation, condition of remains, broad habitat type, and any observations relevant to suspected cause of death. Where available, and when the stage of decomposition allowed, we collected biological samples (e.g., long bones, lower jaw, tissue samples, and internal organs). Predator scat samples were collected from mortality sites, when available, and provided to the Provincial Wildlife

Veterinarian for potential use in future studies. We assigned sequential mortality investigation numbers based on the date of detection, not the date of the ground investigation.

We conducted wolf mortality investigations with similar methodology, however, biological samples were not collected. During monitoring periods when only wolf mortalities were detected, investigations of these events were generally delayed until the next caribou mortality detection.

2.3 Capture and Collar Deployment

We based caribou and wolf capture operations from the Fort St. John airport for the Milligan and Etthithun Cores of the Chinchaga Range and from the Fort Nelson airport for the Chinchaga RRA and all other ranges. As per REMB direction, we expended a portion of caribou search effort outside established cores and in portions of cores having relatively low known caribou use.

2.3.1 Caribou Capture

We complied with British Columbia Resources Inventory Committee guidelines (RIC 1998a, RIC 1998b) for all caribou and wolf capture and handling protocols. We captured adult boreal caribou using a hand-held net-gun fired from a Bell 206B Jet Ranger helicopter. We assigned a sequential identification number to each collared caribou in the field (e.g., SCEK001). SCEK-collared caribou retained their animal ID number when re-captured for collar replacement, while previously collared animals not from the SCEK series (e.g., BC1015) were assigned a SCEK project ID if re-captured and fitted with a SCEK collar.

We fitted captured caribou with 1 of 3 models of GPS/satellite collar: Vectronic Vertex Survey GlobalStar (Vectronic Aerospace, Berlin, Germany), Lotek Lifecycle GlobalStar (Lotek Wireless Inc, New Market, ON), or ATS G2110E Iridium (Advanced Telemetry Systems Inc., Isanti, MN). Vectronic collars were factory programmed to acquire GPS fixes every 13 hours and transmit VHF signals from 0800-1600 hours (GMT-7). Lotek collars were factory programmed to acquire GPS fixes every 12 hours and transmit VHF signals from sunrise to sunset. ATS collars were user-programmed to acquire GPS fixes every 12 hours and transmit VHF signals from 0800-1800 hours (GMT-7). All GPS/satellite collars were equipped with motion sensitive mortality sensors designed to transmit a satellite alert message as well as activate a distinctive VHF pulse pattern. No non-GPS VHF collars were deployed on caribou in 2014.

We collected hair, fecal, and blood (4 vials) samples and measured neck circumference and hind foot length from every caribou captured. We marked captured caribou with multi-coloured, plastic ear-tags

to allow for subsequent identification in the event of re-capture after collar detachment and to aid in identification of individuals during aerial surveys. Caribou were assigned to age classes based on incisor tooth wear. Blood serum was separated by centrifuge and a sub-sample was couriered to Prairie Diagnostic Services (University of Saskatchewan, Saskatoon, SK) for plasma progesterone analysis to assess pregnancy status. All other samples were delivered to the Provincial Wildlife Veterinarian.

John Cooke (National Council for Air and Stream Improvement, Forest & Range Sciences Lab (NCASI), La Grande, OR) assessed caribou nutritional condition using ultrasonography to measure rump fat thickness, combined with a body condition score (BCS) obtained by palpating the rump.

2.3.1 Wolf Capture

We captured wolves by aerial darting from a Bell 206B Jet Ranger helicopter using 3 ml single-use darts loaded with 300 mg of Telazol™ (Fort Dodge Animal Health, Fort Dodge, IA). Darts were placed in large muscles of the neck, shoulder, or rump and wolves were hazed toward suitable helicopter landing sites prior to becoming immobile. We assigned a sequential identification number to each collared wolf (e.g., BW001).

We fitted captured wolves with either a Lotek LMRT3 VHF collar, Lotek Iridium TrackM GPS/satellite collar, or a Vectronic Vertex Survey Iridium collar. Wolf GPS/satellite collars were programmed to acquire GPS fixes every 6 hours, except during the following periods, when fixes were to be acquired every 5 minutes: October 13-19, February 10-16, June 09-15, and August 11-17. Wolf GPS collars were equipped with motion sensitive mortality sensors designed to transmit a satellite alert message as well as activate a distinctive VHF pulse pattern.

We collected hair and blood (1 vial) samples and measured neck circumference, body and total length, chest girth, and hind foot length from captured wolves. We marked collared wolves with multi-coloured, plastic ear-tags to aid in subsequent identification in the event of re-capture for collar replacement. Wolves were assigned to broad age classes based on tooth wear and overall appearance.

2.4 Caribou Surveys

2.4.1 Fall Caribou Calf Survey

We used a Bell 206B helicopter to locate active SCEK radio-collared caribou believed to be pregnant in winter 2012-13, based on serum progesterone analysis. We also located collared caribou that were not

pregnant or were of unknown pregnancy status (i.e., previously collared by MFLNRO) that were in active search areas or within groups with pregnant SCEK-collared females. We did not attempt to locate non-pregnant animals outside active search areas, extreme outliers distant from active search areas (pregnant or non-pregnant), or AESRD-collared caribou.

We confirmed whether individual collared caribou had a calf at heel and counted and classified all caribou in each group by sex and age class using criteria defined by the Resources Inventory Standards Committee (RIC 2002).

2.4.2 Late Winter Recruitment Survey

We conducted late-winter composition surveys for all boreal caribou ranges to estimate annual juvenile recruitment. We used telemetry to locate all radio-collared female caribou from a Bell 206B helicopter. We classified all caribou in each group by sex and age using criteria defined by the Resources Inventory Standards Committee (RIC 2002), including adult females (>1 year), adult males (>1 year), calves, and mature males. We reduced helicopter disturbance (i.e., approach distance) to caribou groups by using image-stabilizing binoculars to classify animals and identify individual caribou by ear-tag colour combination. We augmented the sample of SCEK and MFLNRO collars by locating and classifying groups associated with radio-collared animals from adjacent jurisdictions found within the BC search area. We also included incidental sightings of unmarked caribou groups. Recruitment was expressed as the number of calves alive at 10 months of age per 100 females in the population and as the percentage of calves in the population.

3 RESULTS

3.1 Telemetry Monitoring and Mortality Site Investigations

3.1.1 Caribou

A total of 175 radio-collared caribou were potentially active in BC's boreal caribou ranges on May 01, 2013, including 158 SCEK caribou, 12 MFLNRO caribou, and 5 AESRD caribou. Fifty-four SCEK and MFLNRO radio-collared caribou died from natural causes between the commencement of the study, in December 2012 and April 30, 2014, including 47 SCEK caribou (5 were re-collared MFLNRO animals) and 7 MFLNRO caribou. Between May 01, 2013 and April 30, 2014, 44 radio-collared caribou died of natural causes, including 40 SCEK caribou and 4 MFLNRO caribou. Cause of death included 24 confirmed cases

of wolf predation, 4 cases of suspected wolf predation, 2 cases of wolverine predation, 11 natural non-predation deaths, and 3 of unknown cause (DES 2013, DES 2014).

One hundred seventy-one radio-collared adult female caribou were confirmed alive as of May 01, 2013. Forty-seven of these were confirmed to have died during the subsequent 12 month period, leaving 124 alive on May 01, 2014. The resulting annual finite survival rate for adult females during this period was estimated at 0.72, indicating an annual adult female mortality rate of 28%. Based on the March 2014 recruitment survey, annual female recruitment for the same period was estimated at 6% (assuming a 50:50 juvenile sex ratio).

3.1.2 Wolves

During the winter of 2012-2013, 23 wolves were captured and collared by Diversified Environmental Services (DES) in conjunction with the REMB/SCEK boreal caribou telemetry program, under a contract administered and funded by MFLNRO, Fort St. John. These collars were subsequently monitored as part of the REMB/SCEK Year II caribou telemetry monitoring program from May 2013 through April 2014. The status of all collared wolves, as of April 30, 2014, is presented in Appendix I. Of the 23 wolves collared in winter 2012-2013, 13 were active and functioning as of April 30 and 1 had normal VHF function but has never transmitted GPS data (BW011). This includes one (BW016) whose failing collar was replaced in January 2014. Of the remaining 9 wolves, five were confirmed dead, 2 experienced premature failure of GPS/satellite and VHF function and were not recovered, and the remaining 2 have experienced more recent GPS data transmission failure and have not been detected by VHF signal recently (i.e., fate unknown). Snake Pack wolf BW010 emigrated from the study area in mid-May 2013 when it left its pack territory and travelled to the Arrowhead River drainage in the Northwest Territories by a route which took it through the East Kotcho Core, the Bistcho Caribou Range of northwestern Alberta, and the Calendar Range. It arrived in the Arrowhead drainage, approximately 60 km north of the border, in early June and has remained there since. The animal was alone when observed during caribou capture operations in the NT in mid-February 2014 (B. Culling, pers.obs.).

Of the 5 wolf mortality investigations conducted between May 2013 and April 2014, one appeared to have been killed by a rival pack (BW005), one appeared to have been killed by a moose (BW015), 2 were suspected to have been shot (BW004, BW013), and one died of unknown natural causes (BW006).

3.2 Year II Capture and Collar Deployment

3.2.1 Caribou

Forty new or refurbished GPS/satellite collars (5 ATS Iridium, 23 Vectronic Vertex, and 12 Lotek Lifecycle) were deployed on 41 individual caribou in late winter 2014 (Table 1; Appendix II). The first 38 were deployed during 7 capture sessions between February 28 and March 6, with the remaining 2 deferred until the late March recruitment survey to provide opportunity for First Nations assistants to be involved.

In response to direction from the REMB, a proportion of search effort during caribou capture operations was focused on areas outside established cores and on areas within established cores showing relatively low use by previously-collared and currently-collared caribou. The efficiency of these search efforts was low due to very poor sightability conditions for both caribou and caribou sign (i.e., cratering and tracking) resulting from a combination of freeze/thaw cycles and a lack of new snowfall during February and March 2014. These poor sightability conditions were also evident throughout the late winter recruitment survey, during which an unusually low number of unmarked caribou groups were incidentally observed.

SCEK 174 was collared in the West Kotcho Core on March 01, 2014, however a mortality signal was detected during March 31 wolf capture activities in the Snake-Sahtaneh Range. The Lotek Lifecycle collar was retrieved and redeployed on SCEK204 in the North Kotcho Core the same day. GPS data revealed the caribou had been killed by wolves on March 23 (Mortality Investigation #055; DES 2013). A mature bull, which was collared as a yearling by MFLNRO (BC1037) was recaptured in March 2014; its outgrown VHF collar was replaced with a GPS/satellite collar (SCEK173).

Thirty-eight of 41 individual caribou collared in late winter 2014 were alive on April 30, 2014 (37F, 1M; Appendix II). SCEK174, SCEK190, and SCEK202 died between March 22 and April 22, 2014. Cause of death was confirmed as wolf predation in 2 cases, with wolf predation also suspected in the third.

At the end of the winter 2014 capture session, on March 31, 2014, 169 radio-collared caribou (168F, 1M) were assumed active within BC's boreal caribou ranges (Table 2). Six mortalities occurred in April, leaving a total of 163 active collars at the end of Year II (162F, 1M).

Table 1. SCEK GPS collars deployed on 41 caribou by range and core, northeastern British Columbia, February 28 to March 31, 2014.

Range	Core	Capture Session										Total Caribou
		28-Feb-2014	1-Mar-2014	2-Mar-2014	3-Mar-2014	4-Mar-2014	5-Mar-2014	6-Mar-2014	19-Mar-2014	20-Mar-2014	31-Mar-2014	
Chinchaga	Milligan Etthithun							6 1				6 1
Chinchaga RRA	CHIN-RRR		3				2		1			6
Snake-Sahtaneh	Clarke						3					3
	West Kotcho		2									2
	OS WSK-NRK					2						2
	North Kotcho					1					1	2
	O/S NRK				1							1
	Tsea									1		1
Calendar	Calendar				2	3						5
Maxhamish	Kiwigana	2										2
	Fortune			4	2							6
Parker	Parker						1					1
Fort Nelson	Fort Nelson	3										3
Total Caribou		5	5	4	5	6	6	7	1	1	1	41

Table 2. Comparison of number of radio-collared caribou assumed active within boreal caribou ranges at start and end of Year II, northeast British Columbia.

Date	SCEK Collars				MFLNRO Collars		AB Collars	Total SCEK	Total All
	ATS Iridium	Vectronic Vertex	Lotek Lifecycle	Lotek VHF	ATS Iridium	Lotek VHF	Lotek VHF		
01-May-2013	31	15	0	112	1	11	5	158	175
31-March-2014	29	36	12	86	0	4	2	163	169
01-May-2014	29	34	12	82	0	4	2	157	163

Caribou Health

No caribou mortalities or serious injuries occurred during 2013-2014 capture operations. The majority of caribou captured showed some evidence of rubbing and hair loss. Adult winter ticks (*Dermacentor albipictus*) were observed on 8 of 41 caribou captured between late February and March 31, 2014; 5 tick

voucher specimens were collected. Evidence of warble fly (*Hypoderma sp.*) larvae were observed on 3 caribou.

Based on serum progesterone analysis, 36 of 40 (90%) adult female caribou captured were pregnant (Appendix III). John Cooke (NCASI) assessed caribou body condition for 38 of 41 caribou captured in 2014; results are presented in Cook and Cook 2014.

Figures 3 and 4 show collar distribution by range and core and helicopter search lines flown during the collar deployment period, respectively.

3.2.2 Wolves

In winter 2013-2014, REMB/SCEK funded the deployment of 9 new wolf collars in BC boreal caribou ranges in conjunction with Year II caribou collaring and monitoring activities, in order to replace recovered, failed, and missing collars and maintain sample size (Appendix IV). Frequent freeze/thaw cycles and an absence of late winter snowfall resulted in very poor tracking and spotting conditions during the February-April wolf capture period. Consequently, only one new wolf pack was located and collared during 2014. Preliminary data from the newly-collared pack (Kwokullie Pack), indicate its territory encompasses portions of the North Kotcho and Calendar caribou cores. Of the 9 collars deployed in 2014, 7 were GPS/satellite (6 Lotek Iridium, 1 Vectronic Vertex) and 2 were Lotek VHF. One of the Lotek VHF collars was used to replace a failing GPS collar on BW016, with the remaining 8 collars deployed on new wolves.

3.3 Caribou Surveys

3.3.1 Fall Caribou Calf Survey

The fall calf survey was conducted between November 19 and 25, 2013. One hundred, twenty-six of 141 active caribou collars were located. A total of 668 boreal caribou, including 68 calves, were counted in 118 groups, including 49 caribou in 16 unmarked groups. Based on the subsample of located caribou, overall recruitment to 6 months was 14 calves:100 cows, with calves comprising 10.2% of the sample. Detailed results of the fall survey are presented in Culling and Culling 2013b.

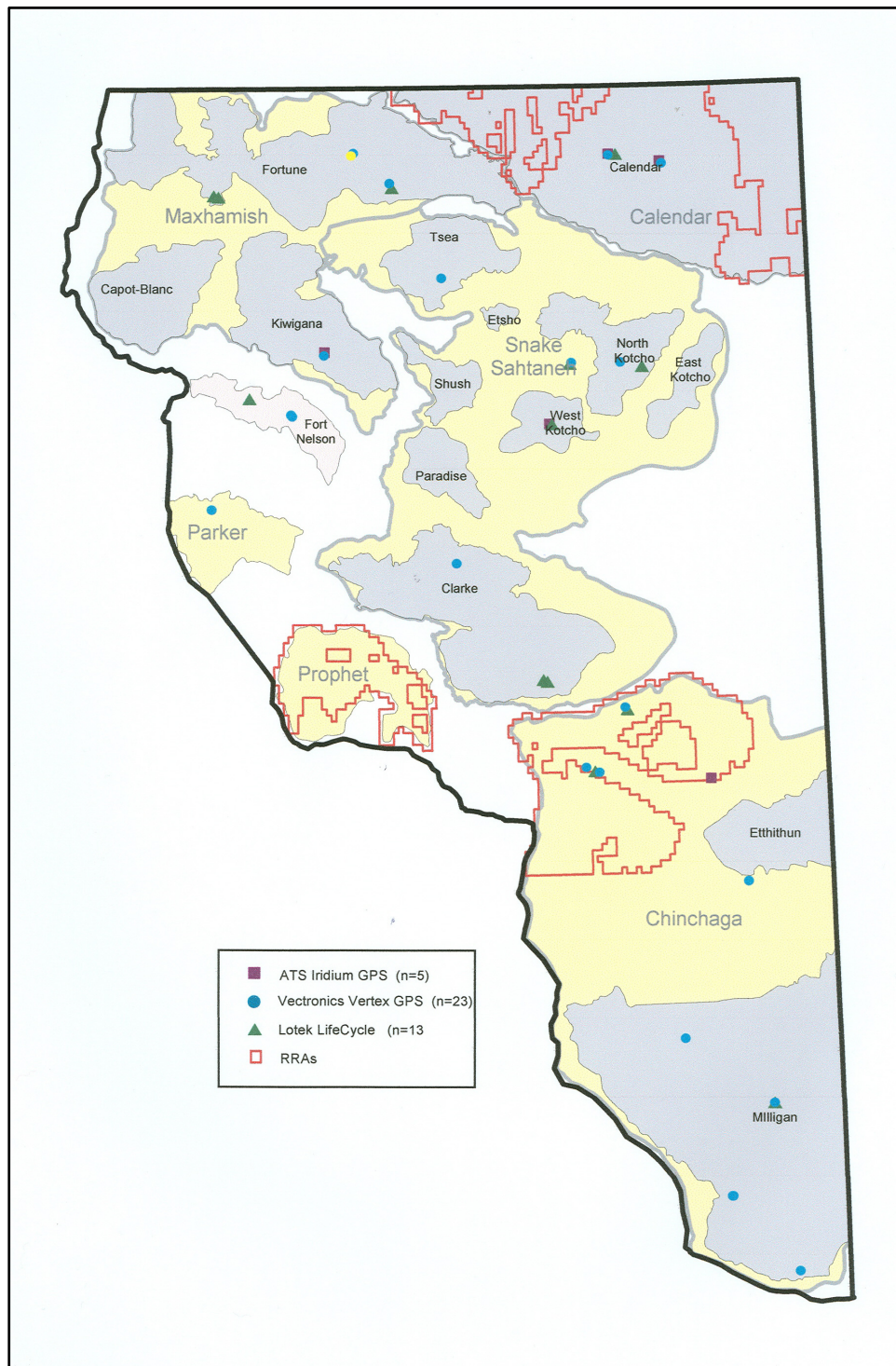


Figure 3. Deployment locations for GPS and VHF radio-collars on 41 boreal caribou in northeastern British Columbia, February 28-March 31, 2014.

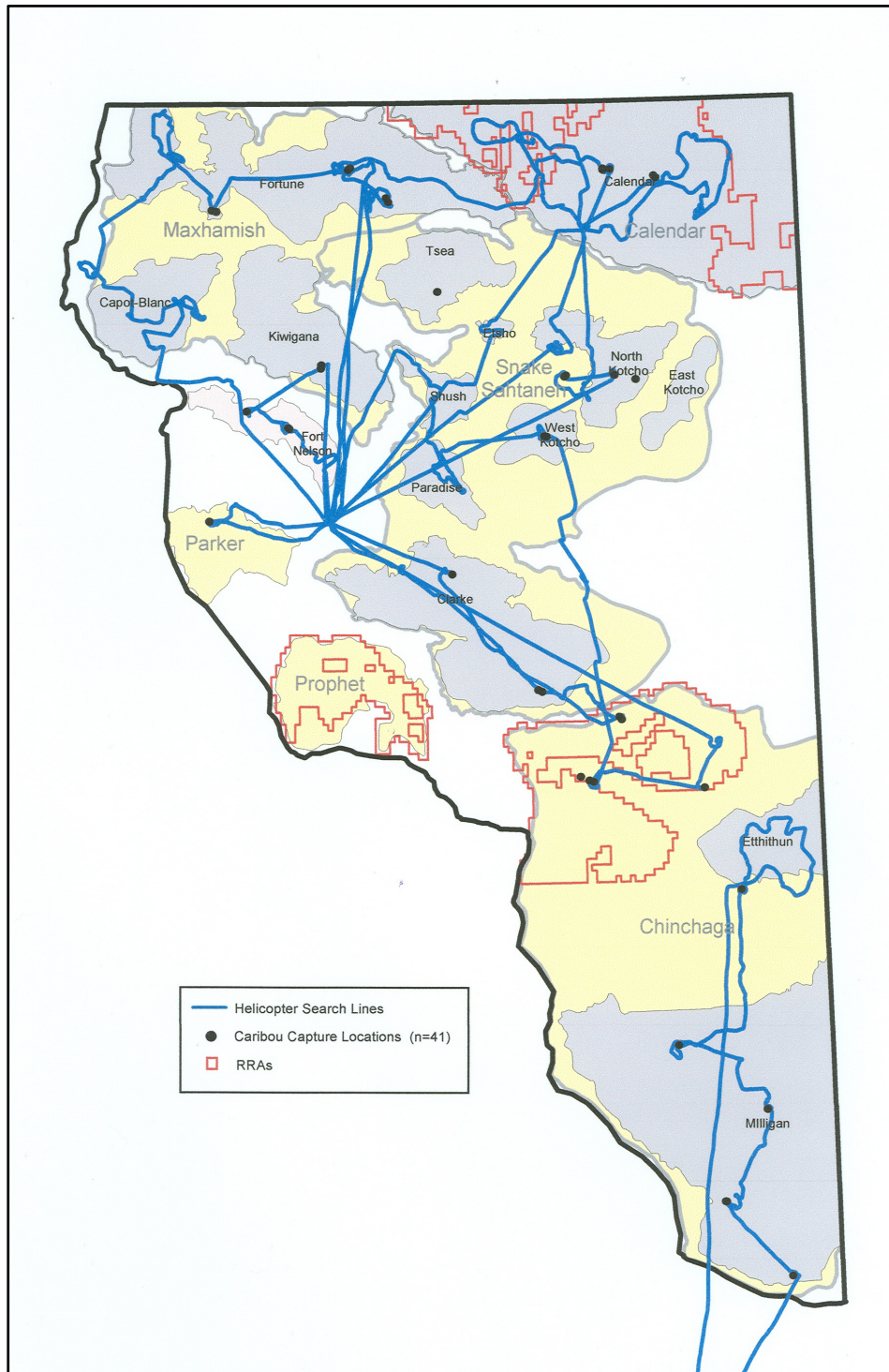


Figure 4. Helicopter and fixed-wing aircraft search lines flown during deployment of GPS radio-collars on 41 boreal caribou in northeastern British Columbia, February 28-March 31, 2014. (Black dots not connected by helicopter search lines indicate collars recovered from mortalities and redeployed during recruitment surveys and wolf collaring activities).

3.3.2 Caribou Late Winter Recruitment Survey

Late winter recruitment surveys were conducted on all herds between March 17 and 22, 2014 (Appendices V to XII). Three of 171 radio-collared caribou active prior to the start of the survey were not located. Two were not found and the third, which had previously moved to Trainor Lake, NT, was not approached at the request of the Northwest Territories Department of Environment and Natural Resources. A total of 723 boreal caribou were observed in 107 groups (Table 3). Poor sightability due to the absence of fresh snowfall for several weeks prior to the survey resulted in the observation of only 1 incidental, unmarked group. Caribou were located in groups ranging in size from 1 to 27 animals (mean 6.8 ± 4.9 SD ($n=107$ groups)). A total of 63 calves were observed during the survey. Overall recruitment to 10 months was 12 calves:100 cows, with calves comprising 8.7 % of the population (Table 4). Table 5 presents total caribou observed and age-sex classification by range, core habitat, and RRA. Figure 5 shows the distribution of all groups encountered during the survey. Survey data forms are found in Appendices V to XII.

Eight of 23 Calendar caribou were in the Northwest Territories at the time of the 2014 late winter recruitment survey, including SCEK107, SCEK113, SCEK119, SCEK120, SCEK125, SCEK135, SCEK137, and SCEK147. Prior to the survey, SCEK125 was located in the vicinity of Trainor Lake, approximately 60 km north of the BC/NT border. To avoid potential helicopter disturbance to local First Nations land users, the NT government requested that no attempt be made to locate this caribou during the recruitment survey. The 7 SCEK caribou located in NT were in 6 groups totalling 46 animals, which represented 58% of the total number counted during the 2014 late winter survey of the Calendar Range. No collared caribou were found within either Calendar RRA-C or RRA-D.

Table 3. Group size, total caribou observed, and age-sex classification by range for SCEK boreal caribou late winter recruitment surveys, northeastern British Columbia, March 17-22, 2014.

Range	No. of Groups	Mean Group Size (\pm SD)	Min Group Size	Max Group Size	Total Caribou Observed	Classification				
						F	M	Juv	Unclass	Mature Males ²
Chinchaga	19	9.2 \pm 5.8	1	19	174	135	29	10	0	21
Chinchaga RRA	6	6.7 \pm 2.6	2	9	40	31	3	6	0	2
Snake-Sahtaneh	41	5.9 \pm 4.7	1	25	241	177	41	20	3	22
Calendar	12	6.6 \pm 3.4	3	14	79	60	11	8	0	4
Maxhamish	18	5.7 \pm 5.7	1	27	102	80	14	8	0	10
Prophet	3	n/a ¹	5	18	37	29	5	3	0	5
Parker	6	6.7 \pm 2.2	4	10	40	25	7	8	0	5
Fort Nelson Core	2	n/a ¹	5	5	10	9	1	0	0	0
Total	107	6.8 \pm 4.9	1	27	723	546	111	63	3	69

¹ Ranges with < 5 groups located excluded

² Mature males defined as Class II or III bulls (RIC 2002)

Table 4. SCEK late winter recruitment survey age-sex composition and calves per 100 cows by boreal caribou range, northeastern British Columbia, March 17-22, 2014.

Range	Females	Males	Calves	Unclass	Mature Males	Total Caribou	Total Groups	Calves:100 Cows
Chinchaga	135	29	10	0	21	174	19	7 calves:100 cows
Chinchaga RRA	31	3	6	0	2	40	6	19 calves:100 cows
Snake-Sahtaneh	177	41	20	3	22	241	41	11 calves:100 cows
Calendar	60	11	8	0	4	79	12	13 calves:100 cows
Maxhamish	80	14	8	0	10	102	18	10 calves:100 cows
Prophet	29	5	3	0	5	37	3	10 calves:100 cows
Parker	25	7	8	0	5	40	6	32 calves:100 cows
Fort Nelson Core	9	1	0	0	0	10	2	0 calves:100 cows
Total	546	111	63	3	69	723	107	12 calves:100 cows

Table 5. Total caribou observed and age-sex classification by range, core habitat, and RRA, SCEK boreal caribou late winter recruitment survey, northeastern British Columbia, March 17-22, 2014.

Range	Core/RRA	Adult Females	Adult Males	Calves	Unclass	Mature Males	Total Caribou
Chinchaga	Milligan	122	26	8	0	18	156
	Etthithun	13	3	2	0	3	18
	Chinchaga RRA	31	3	6	0	2	40
	Chinchaga Total	166	32	16	0	23	214
Snake-Sahtaneh	Clarke	69	13	6	0	9	88
	East Kotcho	18	7	3	0	3	28
	North Kotcho	37	4	4	0	0	45
	Paradise	4	1	0	0	0	5
	Tsea	31	6	5	1	5	43
	West Kotcho	13	8	2	2	5	25
	Outside Cores	5	2	0	0	0	7
	Snake-Sahtaneh Total	177	41	20	3	22	241
Calendar	Calender Excluding RRAs	25	4	4	0	0	33
	RRA-C	0	0	0	0	0	0
	RRA-D	0	0	0	0	0	0
	Northwest Territories	35	7	4	0	4	46
	Calender/NT Total	60	11	8	0	4	79
Maxhamish	Capot-Blanc	2	0	0	0	0	2
	Fortune	29	4	3	0	2	36
	Kiwigana	37	6	3	0	6	46
	Outside Cores	12	4	2	0	2	18
	Maxhamish Total	80	14	8	0	10	102
Prophet	Inside Range/RRA-B	3	1	1	0	1	5
	Outside Range/BC Distrib	26	4	2	0	4	32
	Prophet Total						
Parker	Parker Total	25	7	8	0	5	40
Fort Nelson	Fort Nelson Total	9	1	0	0	0	10
Total		546	111	63	3	69	723

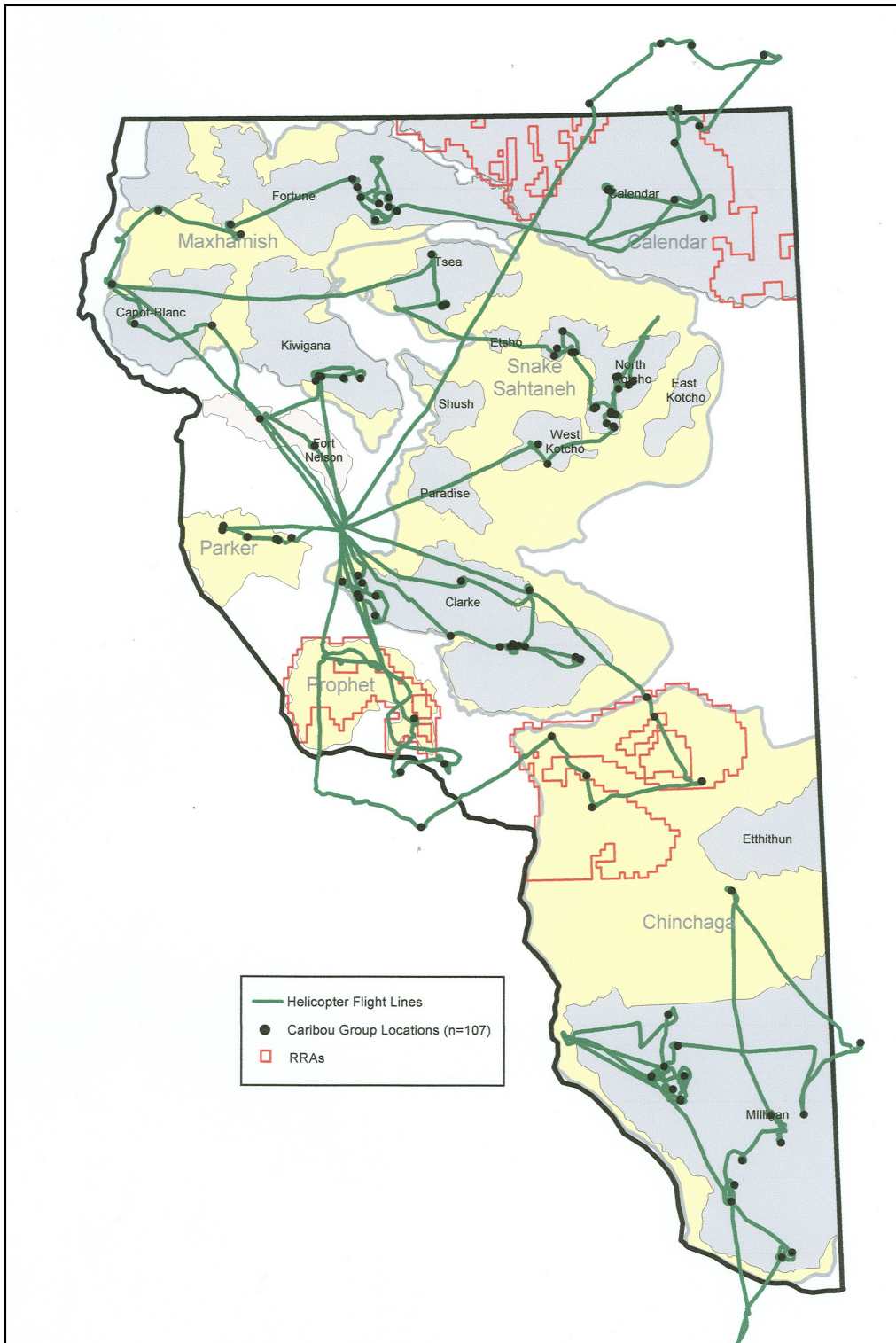


Figure 5. Location of boreal caribou groups and helicopter flight lines, SCEK late winter recruitment survey, northeastern British Columbia, March 17-22, 2014.

4 DISCUSSION

As of March 31, 2014, 169 SCEK or MFLNRO-collared caribou were active within or adjacent to BC's boreal caribou ranges. This represents 23% of all boreal caribou observed during the 2014 late winter recruitment survey (Table 6). It should be noted that this does not represent the proportion of the population that is collared because the entire population is not observed during surveys.

Table 6. Proportion of collared boreal caribou by range based on minimum population counts obtained during the March 17-22, 2014 late winter recruitment surveys, northeast British Columbia.

Range	Total Caribou Observed (Minimum Population Count)	No. Collars	% of 2014 Minimum Population Count Collared
Chinchaga	174	30	17
Chinchaga RRA	40	11	28
Snake-Sahtaneh	241	54	22
Calendar	79	23	29
Maxhamish	102	29	28
Prophet	37	8	22
Parker	40	8	20
Fort Nelson Core	10	4	40
Total	723	167	23

Excluding the Fort Nelson Core, recruitment varied from 7 calves:100 cows in the Milligan and Etthithun cores of the Chinchaga Range to 32 calves:100 cows in the Parker Range. Table 7 compares SCEK boreal caribou recruitment results for the March 2013 and 2014 late winter surveys and November 2013 calf survey. Given the limited sample size, results for individual ranges should be interpreted with caution.

Annual finite survival rate for adult females in Year II (May 01, 2013 to April 30, 2014) was estimated at 0.72. In comparison, standardized annual adult survival for 57 females during the 58-month Snake-Sahtaneh study was estimated at 0.94 (95% CI = 0.89 to 0.99; Culling *et al.* 2006).

Table 7. Comparison of SCEK boreal caribou calf:cow ratios for March 2013 and 2014 late winter surveys and November 2013 calf survey, northeastern British Columbia.

Range	March 2013	November 2013 ³	March 2014
Milligan and Etthithun	12 calves:100 cows	11 calves:100 cows	7 calves:100 cows
Chinchaga RRA	33 calves:100 cows	32 calves:100 cows	19 calves:100 cows
Chinchaga Range ¹	14 calves:100 cows	15 calves:100 cows	10 calves:100 cows
Snake-Sahtaneh	24 calves:100 cows ²	12 calves:100 cows	11 calves:100 cows
Calendar	35 calves:100 cows	15 calves:100 cows	13 calves:100 cows
Maxhamish	28 calves:100 cows	21 calves:100 cows	10 calves:100 cows
Prophet	19 calves:100 cows	0 calves:100 cows	10 calves:100 cows
Parker	4 calves:100 cows	14 calves:100 cows	32 calves:100 cows
Fort Nelson Core	0 calves:100 cows	0 calves:100 cows	0 calves:100 cows
Total	21 calves:100 cows	14 calves:100 cows	12 calves:100 cows

¹ Milligan and Etthithun cores and the Chinchaga RRA combined

² Adjusted for SCEK173/BC1037

³ Based on a limited sample, therefore not directly comparable

The winter of 2013-2014 was less severe than the previous year, when snow accumulation commenced in early October 2012 and persisted until late into April 2013. Several caribou mortalities detected from December 2012 into the summer of 2013 were attributed to poor condition. In contrast, all collared caribou mortalities investigated between December 2013 and April 30, 2014, were confirmed or suspected predation.

4.1 Recommendations

Due to the relative difficulty and considerable expense of locating unmarked wolf packs in forested habitat over large areas, particularly under poor tracking conditions, we recommend a plan be developed to direct future wolf collaring effort with consideration of the following:

- Identification of high and low priority ranges/cores for wolf data acquisition,
- Prioritization of ranges/cores where wolf habitat use and population data may be of specific benefit to other program or land use initiatives,
- Prioritization of ranges/cores where individual wolf packs appear to disproportionately target caribou, (e.g., Paradise and Fortune cores and the Chinchaga RRA).
- Identification of core caribou use areas proposed for future 3D seismic or other intensive winter industrial use, and
- Identification of opportunities to enhance the efficiency of wolf capture operations in target zones through the use of road-kill bait stations.

REFERENCES

- Cook, J., and R. Cook. 2014. Nutritional condition of caribou in northern British Columbia, 2012-2014. Annual Progress Report, 30 May 2014. National Council for Air and Stream Improvement, La Grande, OR. 14pp.
- COSEWIC. 2011. Designatable Units for Caribou (*Rangifer tarandus*) in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 88 pp.
- Culling, D., Culling, B., Backmeyer, R., and Antoniuk, T. 2004. Interim oil and gas industry guidelines for boreal caribou ranges in northeastern British Columbia. Fort St John, BC, Oil and Gas Commission.
- Culling, D., B. Culling, T. Raabis and A. Creagh. 2006. Ecology and seasonal habitat selection of boreal caribou in the Snake-Sahtaneh watershed, British Columbia. Prep. for Canadian Forest Products Ltd., Fort Nelson, BC. 80p.
- Culling, D.E., and B.A. Culling. 2013a. BC Boreal Caribou Implementation Plan: 2012-13 collar deployment and late winter recruitment survey. Prepared for SCEK, Victoria, BC. 29pp + appendices.
- Culling, D.E., and B.A. Culling. 2013b. BC Boreal Caribou Implementation Plan: 2013 fall calf survey. Prepared for BC Science and Community Environmental Knowledge (SCEK) Fund, Victoria, BC. 39pp.
- DES (Diversified Environmental Services). 2013. Mortality Investigation Summary Reports No. 1 - 6 (December 2012 through December 2013). Prepared for SCEK, Victoria, BC.
- DES (Diversified Environmental Services). 2014. Mortality Investigation Summary Reports No. 7 - 10 (January 2014 through April 2014). Prepared for SCEK, Victoria, BC.
- Environment Canada. 2011. Recovery Strategy for the Woodland Caribou, Boreal population (*Rangifer tarandus caribou*) in Canada [Proposed]. Species at Risk Act Recovery Strategy Series. Environment Canada, Ottawa. vi + 55p.
- MOE (Ministry of Environment). 2010. Science update for the Boreal Caribou (*Rangifer tarandus caribou* pop. 14) in British Columbia. Victoria, BC. 54p.
- MOE (Ministry of Environment). 2011. Implementation plan for the ongoing management of Boreal Caribou (*Rangifer tarandus caribou* pop. 14) in British Columbia. Victoria, B.C. 17p.
- RIC (Resources Inventory Committee). 1998a. Live animal capture and handling guidelines for wild mammals, birds, amphibians & reptiles. Standards for components of British Columbia's biodiversity No. 3. Version 2. Resources Inventory Branch, Ministry of Environment, Lands and Parks, Victoria, BC.
- RIC (Resources Inventory Committee). 1998b. Wildlife radio-telemetry. Standards for components of British Columbia's biodiversity No. 5. Version 2. Resources Inventory Branch, Ministry of Environment, Lands and Parks, Victoria, BC.
- RIC (Resources Inventory Committee). 2002. Aerial-based inventory methods for selected ungulates: bison, mountain goat, mountain sheep, moose, elk, deer and caribou. Standards for Components of British Columbia's Biodiversity No. 32, Vers. 2. Resources Inventory Branch, Ministry of Environment, Lands and Parks, Victoria, BC.

APPENDICES

Appendix I: Status of wolves radio-collared in boreal caribou ranges in northeast British Columbia, to April 30, 2014.

Wolf ID	Pack	Type	Date Collared	Core	Colour	Sex	Status	Comments
BW001	Tsimeh	Lotek VHF	18-Dec-12	FN	GR	M	OK	VHF normal as of Apr 30, 2014
BW002	Big Arrow	Lotek VHF	21-Jan-13	MLL	GR	M	OK	VHF normal as of Apr 30, 2014
BW003	West Clarke	Lotek Iridium	25-Jan-13	CLK	Lt GR	M	FAILED	No VHF detected since deployment; Iridium data ceased Feb 09, 2013
BW004	West Clarke	Lotek VHF	25-Jan-13	CLK	BLK	M	MORT	Remains reported by public; collar recovered
BW005	Prophet	Lotek Iridium	25-Jan-13	CLK/PPH	BLK	M	MORT	Killed Feb 18, 2014; recovered Feb 23, 2014 and redeployed on BW006
BW006	Snake	Lotek Iridium	23-Feb-13	PRD	GR/BLK	M	MORT	Iridium ceased Mar 13, 2013; VHF mortality signal July 25, 2013, recovered July 28, 2013; decomposed
BW007	Snake	Lotek VHF	23-Feb-13	PRD	GR/WH	M	UNK	VHF not detected since deployment; suspected dispersal
BW008	Tsimeh	Lotek Iridium	03-Mar-13	FN	Lt GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW009	Tsimeh	Lotek Iridium	03-Mar-13	FN	BLK	F	OK	VHF and Iridium function normal as of Apr 30, 2014
BW010	Snake	Lotek Iridium	03-Mar-13	PRD	BLK	M	OK	Dispersed to NWT; Iridium function normal as of Apr 30, 2014
BW011	Big Arrow	Lotek Iridium	04-Mar-13	MLL	GR	F	UNK	VHF normal as of Apr 30, 2014; no Iridium function since deployment
BW012	Big Arrow	Lotek Iridium	04-Mar-13	MLL	BLK	F	FAILED	no VHF signal since deployment; Iridium data ceased Jun 30, 2013

Appendix I: Status of wolves radio-collared in boreal caribou ranges in northeast British Columbia, to April 30, 2014.

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Wolf ID	Pack	Type	Date Collared	Core	Colour	Sex	Status	Comments
BW013	West Clarke	Lotek Iridium	04-Apr-13	CLK	Lt GR	F	MORT	Iridium data ceased Jun 30, 2013; VHF mortality signal Nov 14, 2013; recovered Nov 20, 2013, collar only
BW014	Tsimeh	Lotek Iridium	06-Apr-13	FN	GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW015	Snake	Lotek Iridium	06-Apr-13	PRD	Lt GR	F	MORT	killed by moose Dec 12, 2013; recovered Dec 22, 2013; VHF and Iridium functioning
BW016	Snake	Lotek Iridium	06-Apr-13	PRD	WH	F	UNK	Iridium data ceased Aug 15, 2013; low batt signal Sep 06, 2013; collar replaced Jan 25, 2014
BW016b	Snake	Lotek VHF	25-Jan-14	PRD	WH	F	OK	Re-captured Jan 25; 148.590 (destroyed by pups) replaced with VHF 149.939; active as of Apr 30, 2014
BW017	Elleh	Lotek Iridium	06-Apr-13	CLK	Dk GR	M	UNK	Iridium data ceased Oct 17, 2013; VHF last heard Nov 10, 2013
BW018	Elleh	Lotek Iridium	06-Apr-13	CLK	Dk GR	F	OK	Iridium data ceased Feb 07, 2014; VHF normal as of April 30, 2014
BW019	Parker	Lotek Iridium	07-Apr-13	PRK	GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW020	Parker	Lotek VHF	07-Apr-13	PRK	GR	M	OK	VHF normal as of April 30, 2014
BW021	Clarke	Lotek Iridium	07-Apr-13	CLK	BLK	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW022	Clarke	Lotek VHF	07-Apr-13	CLK	BLK	F	OK	VHF normal as of April 30, 2014

Appendix I: Status of wolves radio-collared in boreal caribou ranges in northeast British Columbia, to April 30, 2014.

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Wolf ID	Pack	Type	Date Collared	Core	Colour	Sex	Status	Comments
BW023	Snake	Lotek VHF	07-Apr-13	PRD	BLK	M	OK	VHF normal as of April 30, 2014
BW024	Kwokullie	Lotek Iridium	20-Mar-13	NRK	GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW025	Kwokullie	Vectronic	20-Mar-13	NRK	GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW026	Kwokullie	Lotek VHF	20-Mar-13	NRK	GR	F	OK	VHF normal as of April 30, 2014
BW027	Snake	Lotek Iridium	31-Mar-14	PRD	BLK/GR	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW028	Snake	Lotek Iridium	31-Mar-14	PRD	GR/BLK	M	OK	VHF and Iridium function normal as of Apr 30, 2014
BW029	Clarke	Lotek Iridium	01-Apr-14	CLK	Grizzled BLK	F	OK	VHF and Iridium function normal as of Apr 30, 2014
BW030	Clarke	Lotek Iridium	01-Apr-14	CLK	GR	F	OK	VHF and Iridium function normal as of Apr 30, 2014
BW031	Clarke	Lotek Iridium	01-Apr-14	CLK	BLK/GR	F	OK	VHF and Iridium function normal as of Apr 30, 2014

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
1	SCEK165	BC1023	Active	♀	FN	FN	02	41698	Vectronic	Vertex	511999	6551172	5	No	No	59	Grp included SCEK166; retrieved and replaced ATS G2000 149.698 (BC1023; first collared in Fort Nelson core on February 24, 2010); new collar frequency (149.310) is duplicate to Lotek Lifecycle collar deployed on SCEK197 in Milligan Core on March 06, 2014
2	SCEK166	n/a	Active	♀	FN	FN	01	28-Feb-14	Vectronic	Vertex	511572	6551578	5	Unk	No	43	Grp included SCEK165
3	SCEK167	n/a	Active	♀	FN	FN	01	28-Feb-14	Lotek	Lifecycle	498786	6556543	5	No	No	57	
4	SCEK168	BC1066	Active	♀	MAX	KWG	02	28-Feb-14	Vectronic	Vertex	521765	6569957	~14	No	No	53	Grp included SCEK169; retrieved and replaced ATS 149.325 (BC1066; collared in Kiwigana on March 24, 2012)

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
5	SCEK169	n/a	Active	♀	MAX	KWG	01	28-Feb-14	ATS Iridium (Refurb)	G2110E	521919	6570989	~14	Unk	WM	58	Grp included SCEK168; duplicate frequency with Clarke SCEK017 (ATS Iridium); deployed refurbished Iridium collar
6	SCEK170	n/a	Active	♀	CHIN	CHIN-RRR	01	1-Mar-14	ATS Iridium (Refurb)	G2110E	640780	6440192	2	No	No	55	Grp included SCEK058 (collared in Milligan Core in 2013); deployed refurbished Iridium collar
7	SCEK171	n/a	Active	♀	CHIN	CHIN-RRR	01	1-Mar-14	Vectronic	Vertex	606560	6441908	9	Yes	No	59	Grp included SCEK046 and SCEK172
8	SCEK172	n/a	Active	♀	CHIN	CHIN-RRR	01	1-Mar-14	Lotek	Lifecycle	605127	6442242	9	No	No	55	Grp included SCEK046 and SCEK171

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
9	SCEK173	BC1037	Active	M	SNS	WSK	02	1-Mar-14	ATS Iridium (Refurb)	G2110E	591017	6549118	9	n/a	n/a	53	Bull; capture grp included SCEK174; removed and replaced MFLNRO VHF148.310 (collared as yearling female in March 2010; original yellow ear tag #333 ripped out in net during recapture; deployed refurbished Iridium collar
10	SCEK174	n/a	MORT	F	SNS	WSK	01	1-Mar-14	Lotek	Lifecycle	591752	6549014	9	No	No*	46	Capture grp included SCEK173 (bull). Mortality Investigation #055 - mortality signal detected during 31 March 2014 wolf capture, Lotek Lifecycle collar retrieved and redeployed on SCEK204 same day; confirmed wolf kill, date of death March 23, 2014
11	SCEK175	n/a	Active	F	MAX	FRT	01	2-Mar-14	Lotek	Lifecycle	489377	6618525	13	No	No	84*	Grp included SCEK004 and SCEK176
12	SCEK176	n/a	Active	F	MAX	FRT	01	2-Mar-14	Lotek	Lifecycle	487895	6618905	13	No	No	66	Grp included SCEK004 and SCEK175

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
13	SCEK177	n/a	Active	F	MAX	FRT	01	2-Mar-14	Vectronic	Vertex	530077	6631491	~14	No	No	23	
14	SCEK005	n/a	Active	F	MAX	FRT	02	2-Mar-14	Vectronic	Vertex	530747	6632190	~12	No	WM	53	Second capture for SCEK005; recaptured and replaced ATS Iridium 148.494, first collared in Kiwigana on December 18, 2012
15	SCEK178	n/a	Active	F	MAX	FRT	01	3-Mar-14	Vectronic	Vertex	541863	6622882	6	No	No	80	Grp included SCEK129; tick voucher sample #1; group in middle of 3D seismic program, caribou had green flagging ribbon tangled in antlers at time of capture
16	SCEK179	n/a	Active	F	MAX	FRT	01	3-Mar-14	Lotek	Lifecycle	542538	6621589	7	No	No	17	Grp included SCEK087
17	SCEK180	n/a	Active	F	CAL	CAL	01	3-Mar-14	Vectronic	Vertex	625335	6629456	7	No	No*	44	Grp included SCEK108, SCEK136, and SCEK181

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
18	SCEK181	n/a	Active	F	CAL	CAL	01	3-Mar-14	ATS Iridium	G2110E	624782	6630112	7	No	No	66	Grp included SCEK108, SCEK136, and SCEK180; ATS Iridium collar 149.565 was originally deployed on SCEK162 in Fort Nelson Core on April 01, 2013 but caribou was killed by wolves on April 05, 2013, collar was retrieved on April 06, 2013 and held for redeployment in 2014
19	SCEK182	n/a	Active	F	SNS	OS NRK	01	3-Mar-14	Vectronic	Vertex	5951133	6578325	5	No	No	50	Grp included SCEK092; caribou foraging on lease and along pipeline RoW
20	SCEK183	n/a	Active	F	CAL	CAL	01	4-Mar-14	Vectronic	Vertex	609018	6631892	~11	No	No*	32	Grp included SCEK123, SCEK126, and SCEK184
21	SCEK184	n/a	Active	F	CAL	CAL	01	4-Mar-14	ATS Iridium (Refurb)	G2110E	609044	6632224	~11	No	No	32	Grp included SCEK123, SCEK126, and SCEK183; deployed refurbished Iridium collar

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
22	SCEK185	n/a	Active	♀	CAL	CAL	01	4-Mar-14	Lotek	Lifecycle	611251	6632127	4	No	No	44	
23	SCEK186	n/a	Active	♀	SNS	OS WSK-NRK	01	4-Mar-14	Vectronic	Vertex	597717	6567977	12	No	CF	51	Grp included SCEK037, SCEK073, and SCEK187; between West and North Kotcho cores
24	SCEK187	n/a	Active	♀	SNS	OS WSK-NRK	01	4-Mar-14	Lotek	Lifecycle	597285	6567597	12	No	No	48	Grp included SCEK037, SCEK073, and SCEK186; between West and North Kotcho cores
25	SCEK188	n/a	Active	♀	SNS	NRK	01	4-Mar-14	Vectronic	Vertex	612830	6568219	6	No	No	43	Grp included SCEK090; tick voucher sample #2
26	SCEK189	n/a	Active	♀	CHIN	CHIN-RRR	01	5-Mar-14	Vectronic	Vertex	614388	6462113	9	N	No	65	Grp included SCEK141 and SCEK190
27	SCEK190	n/a	Active	♀	CHIN	CHIN-RRR	01	5-Mar-14	Lotek	Lifecycle	615100	6461336	9	N	No	58	Group included SCEK141 and SCEK189; tick voucher sample #3

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
28	SCEK191	n/a	Active	♀	SNS	CLK	01	5-Mar-14	Lotek	Lifecycle	590462	6469886	~10	N	No	12.5	Grp included SCEK148 and SCEK192; tick voucher sample #4
29	SCEK192	n/a	Active	♀	SNS	CLK	01	5-Mar-14	Lotek	Lifecycle	589250	6470396	~10	N	No	59	Including SCEK148 and SCEK191
30	SCEK193	n/a	Active	♀	SNS	CLK	01	5-Mar-14	Vectronic	Vertex	562513	6506152	5	N	No	65	Grp includes SCEK154
31	SCEK194	n/a	Active	♀	PRK	PRK	01	5-Mar-14	Vectronic	Vertex	487350	6522378	7	N	No	50	Grp includes SCEK013 and SCEK015
32	SCEK195	n/a	Active	♀	CHIN	ETT	01	6-Mar-14	Vectronic	Vertex	652324	6408601	7	No	No	60	Grp includes SCEK040
33	SCEK196	n/a	Active	♀	CHIN	MILL	01	6-Mar-14	Vectronic	Vertex	632924	6360147	6	No	No	53	Grp includes SCEK059

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
34	SCEK197	n/a	Active	♀	CHIN	MLL	01	6-Mar-14	Lotek	Lifecycle	660414	6340478	~ 6	No	No	73	Grp includes SCEK061 and SCEK198
35	SCEK198	n/a	Active	♀	CHIN	MLL	01	6-Mar-14	Vectronic	Vertex	660408	6340481	~ 6	No	No	n/a	Grp includes SCEK061 and SCEK197; tick voucher sample #5
36	SCEK199	n/a	Active	♀	CHIN	MLL	01	6-Mar-14	Vectronic	Vertex	647427	6311820	12+	No	No	65	Grp includes SCEK052 and SCEK200
37	SCEK200	n/a	Active	♀	CHIN	MLL	01	6-Mar-14	Vectronic	Vertex	647641	6311794	12+	Yes	CF	76	Grp includes SCEK052 and SCEK199
38	SCEK201	n/a	Active	♀	CHIN	MLL	01	6-Mar-14	Vectronic	Vertex	668126	6288816	11	No	No	69	Grp includes SCEK027; very hard crust at 12 cm depth (8 mm thick)
39	SCEK202	n/a	Active	♀	CHIN	CHIN-RRR	01	19-Mar-14	Vectronic	Vertex TD	602465	6443394	9	No	No	32	Capture grp includes SCEK142 (late winter survey group #20)

2014 Capture #	Caribou ID	Original ID	Status on April 30, 2014	Sex	Herd	Core ¹	Capture Event	Capture Date	Collar Make	Collar Model	UTM Easting	UTM Northing	Group Size	Calf at Heel	Lactating	Mean Snow Depth (cm)	Capture Comments
40	SCEK203	NX04	Active	♀	SNS	TSEA	02	20-Mar-14	Vectronic	Vertex TD	557835	6593829	25	No	No	38	Capture grp includes SCEK131 and SCEK132 (late winter survey group #20); first capture Calendar Range Feb 08, 2008 (NEXEN study; ATS G2000 collar went on low battery mode Sept 2009, detached automatically and was retrieved 15 Sept 2009; caribou retained original Nexen eartag)
41	SCEK204	n/a	Active	♀	SNS	NRK	01	31-Mar-14	Lotek	Lifecycle	619421	6566917	6	Yes	No	5	Capture grp includes SCEK111; collar redeployed from mortality SCEK174 (retrieved and redeployed on same day)

¹ MLL - Milligan, ETT - Etthithun, Chin-RRA - Chinchaga RRA, CLK - Clarke, WSK - West Kotcho, NRK - North Kotcho, Tsea - Tsea, Cal - Calendar, KWG - Kiwigana, FRT - Fortune, PRK - Parker, OS - Outside core

Appendix III: Pregnancy status of SCEK caribou captured in Feb-March 2014 ($n=40$).

ID	(ng/mL)	Status		ID	(ng/mL)	Status
SCEK005	0.21	Not Pregnant		SCEK183	2.95	Pregnant
SCEK169	0.81	Not Pregnant		SCEK184	4.60	Pregnant
SCEK197	0.83	Not Pregnant		SCEK185	5.89	Pregnant
SCEK199	0.70	Not Pregnant		SCEK186	3.23	Pregnant
SCEK165	4.62	Pregnant		SCEK187	3.37	Pregnant
SCEK166	6.52	Pregnant		SCEK188	5.95	Pregnant
SCEK167	3.40	Pregnant		SCEK189	11.14	Pregnant
SCEK168	7.56	Pregnant		SCEK190	10.32	Pregnant
SCEK170	9.63	Pregnant		SCEK191	6.58	Pregnant
SCEK171	5.39	Pregnant		SCEK192	7.81	Pregnant
SCEK172	6.52	Pregnant		SCEK193	5.35	Pregnant
SCEK174	5.34	Pregnant		SCEK194	4.16	Pregnant
SCEK175	5.55	Pregnant		SCEK195	8.38	Pregnant
SCEK176	6.20	Pregnant		SCEK196	4.76	Pregnant
SCEK177	6.45	Pregnant		SCEK198	6.60	Pregnant
SCEK178	5.62	Pregnant		SCEK200	8.40	Pregnant
SCEK179	8.43	Pregnant		SCEK201	9.09	Pregnant
SCEK180	5.78	Pregnant		SCEK202	6.19	Pregnant
SCEK181	4.07	Pregnant		SCEK203	6.72	Pregnant
SCEK182	5.66	Pregnant		SCEK204	4.88	Pregnant

Appendix IV: SCEK wolf capture data, northeast British Columbia, January-March, 2014 (abridged).

Wolf ID	Capt No.	Status	Pack	No. Wolves Observ	Date Collared	Type	Ear Tag	East	North	Sex	Colour	Age Class	Comments
BW016	2	Active	Snake	9	25-Jan-14	Lotek VHF	Orange Right w/ Green Button	541981	6539837	F	White	A	Recaptured and replaced collar; alpha female; Iridium collar destroyed - appeared pups chewed ear tag and collar; good condition - not skinny; collar from Seip
BW024	1	Active	Kwokullie	4-5	20-Mar-13	Lotek Iridium	None	620264	6582713	M	Grey	YA	4-5 grey wolves on moose kill on cutline; grp included BW025 and BW026
BW025	1	Active	Kwokullie	4-5	20-Mar-13	Vectronic	None	620264	6582713	M	Grey	YA	4-5 grey wolves on moose kill on cutline; grp included BW024 and BW026
BW026	1	Active	Kwokullie	4-5	20-Mar-13	Lotek VHF	None	620264	6582713	F	Grey	YA	4-5 grey wolves on moose kill on cutline; grp included BW024 and BW025; old VHF collar (black)
BW027	1	Active	Snake	6-7	31-Mar-14	Lotek Iridium	Orange Right	536883	6539236	M	Black/ Grey	YA	On moose kill on Snake River; mean snow depth 56 cm; grp included BW028
BW028	1	Active	Snake	6-7	31-Mar-14	Lotek Iridium	Yellow Left	536883	6539236	M	Grey/ Black	YA	On moose kill on Snake River; grp included BW027
BW029	1	Active	TBD	1	01-Apr-14	Lotek Iridium	Green Right	529089	6506254	F	Grizzled Black	A	Pack allegiance to be determined - travelling along ploughed RoW approx. 5 km from Clarke Pack; mean snow depth 39 cm
BW030	1	Active	Clarke	4	01-Apr-14	Lotek Iridium	Blue Right	523379	6502910	F	Grey	YA	Grp included BW031
BW031	1	Active	Clarke	4	01-Apr-14	Lotek Iridium	Red Left	523379	6502910	F	Black/ Grey	YA	Grp included BW030

Appendix V: Chinchaga Range late winter survey results: March 22, 2014

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga

Obs Date: March 22, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 22)	08:13	Clear (1)	Calm (1)	-22 C	None	51-75cm (5)	76-100 % (6)
End (March 22)	17:48	Clear (1)	Light Breeze (2)	-10 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Keith Lawrence

Observer: Maxine Davis (DRFN)

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK026	MLL	GPS	No	1	16	11	5	0	0	4	10	664802	6290683	BB	
SCEK027	MLL	VHF	No	2	10	7	3	0	0	3	10	668098	6292216	BB	
SCEK029	MLL	VHF	No	8	16	12	2	2	0	0	11	328334	6358189	BG	Caribou in Alberta (UTM Zn 11)
SCEK030	MLL	VHF	No	12	7	7	0	0	0	0	10	628848	6367654	LP	
SCEK032	MLL	VHF	No	14	15	10	4	1	0	2	10	633956	6348274	BB	
SCEK033	MLL	GPS	No	(14)	dupl	dupl	dupl	dupl	dupl	dupl	10	633956	6348274	BB	In 100 m diameter patch of Sb bog within mature At/PI stand
SCEK034	MLL	GPS	No	11	12	11	1	0	0	1	10	627523	6351252	BL	
SCEK035	MLL	VHF	No	(12)	dupl	dupl	dupl	dupl	dupl	dupl	10	628848	6367654	LP	Grp included unidentified VHF collar (yellow right eartag); mature PI
SCEK036	MLL	GPS	No	15	4	4	0	0	0	0	10	632724	6340947	LP	Mature PI
SCEK037	MLL	VHF	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	664802	6290683	BB	
SCEK038	MLL	GPS	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	664802	6290683	BB	
SCEK040	MLL	GPS	No	7	18	13	3	2	0	3	10	648967	6406900	BB	Retreated to adjacent to Sb/PI patch for cover
SCEK041	MLL	VHF	No	(12)	dupl	dupl	dupl	dupl	dupl	dupl	10	628848	6367654	BL	
SCEK042	MLL	GPS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Failed Iridium/VHF; not heard

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga

Obs Date: March 22, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK052	MLL	VHF	No	19	1	1	0	0	0	0	10	648776	6308385	BL	Holed up in small patch of mature Sb/PL timber; hind leg injured; calf present in November survey
SCEK053	MLL	VHF	No	(11)	dupl	dupl	dupl	dupl	dupl	dupl	10	627523	6351252	BL	
SCEK054	MLL	VHF	No	17	8	6	1	1	0	0	10	632646	6340442	LP	
SCEK055	MLL	GPS	No	10	5	4	1	0	0	1	10	631799	6357756	BL	
SCEK056	MLL	VHF	Yes	6	3	1	1	1	0	0	10	661420	6335833	BB	
SCEK057	MLL	VHF	No	18	4	3	1	0	0	1	10	623434	6347935	BL	
SCEK059	MLL	VHF	No	13	12	8	3	1	0	2	10	623494	6348208	BB	
SCEK060	MLL	VHF	No	(13)	dupl	dupl	dupl	dupl	dupl	dupl	10	623494	6348208	BB	
SCEK061	MLL	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not found: searched entire range, in group with SCEK197 and SCEK198 on March 6, 2014, but group had dispersed by March 22
SCEK195	ETT	GPS	No	(7)	dupl	dupl	dupl	dupl	dupl	dupl	10	648967	6406900	BB	Deployed in 2014
SCEK196	MLL	GPS	No	(10)	dupl	dupl	dupl	dupl	dupl	dupl	10	631799	6357756	BL	Deployed in 2014
SCEK197	MLL	GPS	No	5	9	9	0	0	0	0	10	664633	6327085	BB	Deployed in 2014
SCEK198	MLL	GPS	No	16	1	1	0	0	0	0	10	630351	6344015	BL	Deployed in 2014
SCEK199	MLL	GPS	No	4	11	9	1	1	0	1	10	652278	6321530	BB	Deployed in 2014 ; in 100 m diameter patch of mature Sb within aspen stand
SCEK200	MLL	GPS	Und	3	19	15	3	1	0	3	10	649807	6313683	BB	Deployed in 2014

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga

Obs Date: March 22, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK201	MLL	GPS	No	(2)	dupl	dupl	dupl	dupl	dupl	dupl	10	668098	6292216	BB	Deployed in 2014
AB149.391	MLL	VHF	No	9	3	3	0	0	0	0	10	671888	6336029	BL	
AB150.470	MLL	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	n/a	n/a	n/a	Heard OK; in Alberta, east of Group #8
Obs #	UTM		Additional Observations												
1	10. (Wpt 803)		Moose x 1												
2	10. (Wpt 805)		Moose x 1												
3	10. (Wpt 806)		Moose x 1												
Additional Comments															

¹ MLL - Milligan, ETT - Etthithun

² Und - calf status undetermined

³ Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine LP - Lodgepole Pine BG-Sphagnum Bog

Appendix VI: Chinchaga RRA late winter survey results: March 19, 2014

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga RRA

Obs Date: March 19, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 19)	09:10	Unbroken Clouds (4)	Moderate Breeze (4)	-7 C	None (N)	26-50 cm (4)	76-100 % (6)
End (March 19)	11:08	Unbroken Clouds (4)	Moderate Breeze (4)	- 8 C	None (N)	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Cam Allen

Observer: Eva Needley

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK046	RRA-A	GPS	No	4	9	7	0	2	0	0	10	604545	6433351	BB	Grp includes SCEK171 and SCEK172; mature MW patch adjacent (C1)
SCEK047	RRA-A	GPS	Yes	6	7	5	0	2	0	0	10	591662	6455831	BB	Grp includes SCEK048; mature MW patch adjacent
SCEK048	RRA-A	VHF	Yes	(6)	dupl	dupl	dupl	dupl	dupl	dupl	10	591662	6455831	BB	Grp includes SCEK047; mature MW patch adjacent
SCEK058	RRA-A	VHF	No	3	2	2	0	0	0	0	10	639499	6441688	BB	Originally collared in MLL Core (C2); grp includes SCEK170; mature MW patch adjacent
SCEK141	RRA-A	VHF	No	1	6	4	2	0	0	1	10	621959	6468292	BB	Grp includes SCEK190; mature MW patch adjacent
SCEK142	RRA-A	GPS	No	5	9	8	0	1	0	0	10	602770	6443405	BB	Deployed new collar SCEK202 in group (C3)
SCEK170	RRA-A	GPS	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	639499	6441688	BB	Deployed in 2014; grp includes SCEK058; mature MW patch adjacent (C1)
SCEK171	RRA-A	GPS	Yes	(4)	dupl	dupl	dupl	dupl	dupl	dupl	10	604545	6433351	BB	Deployed in 2014; grp includes SCEK046 and SCEK172; mature MW patch adjacent (C1)
SCEK172	RRA-A	GPS	No	(4)	dupl	dupl	dupl	dupl	dupl	dupl	10	604545	6433351	BB	Deployed in 2014; grp includes SCEK046 and SCEK171; mature MW patch adjacent (C1)

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga RRA

Obs Date: March 19, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK189	RRA-A	GPS	No	2	7	5	1	1	0	1	10	624336	6462113	BB	Deployed in 2014
SCEK190	RRA-A	GPS	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	621959	6468292	BB	Deployed in 2014; Grp includes SCEK141; mature MW patch adjacent (C1)
Obs #	UTM					Additional Observations									
1	10.604545.6433351 (Wpt 728)					Moose x 1; heavy tick load (ghost moose)									
2															
Additional Comments															
C1	Several groups found in Sb peatlands with adjacent upland mixedwood patches (spruce/pine/aspen); caribou often appeared reluctant to move out of mature timber, likely due to snow conditions (hard crust in exposed areas)														
C2	SCEK058 originally collared in Milligan Core.														
C3	New collar deployed on caribou in Group #5 (SCEK202; Vectronic Vertex GPS)														

¹ Und - calf status undetermined

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog

Appendix VII: Snake-Sahtaneh Range late winter survey results: March 17 & 20, 2014
 Animal Observation Form – Boreal Caribou 2014 W Recruitment Survey

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Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh
 Obs Date: March 17 & 20, 2014

Obs Day: 1/2	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 17)	10:46	Unbroken Clouds (4)	Moderate Breeze (4)	- 4 C	None (N)	26-50 cm (4)	76-100 % (6)
End (March 17)	14:45	< 50 % (2)	Moderate Breeze (4)	0 C	None (N)	Days since 5 cm Snow: > 14 days	
Obs Day: 2/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 20)	08:52	> 50 % (3)	Moderate Breeze (4)	- 20 C	None (N)	26-50 cm (4)	76-100 % (6)
End (March 20)	15:44	< 50 % (2)	Moderate Breeze (4)	-16 C	None (N)	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Keith Lawrence

Observer: Eva Needley

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Unc	mm					
SCEK017	CLR	GPS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	535640	6500514	BB	Failed Iridium collar released; retrieved from ground
SCEK018	CLR	VHF	Yes	15	2	1	0	1	0	0	10	530487	6499956	LP	Bedded in mature conifer
SCEK019	CLR	VHF	No	9	8	8	0	0	0	0	10	580139	6484613	TR	Bedded on cutline through mature conifer; grp includes SCEK021
SCEK020	CLR	GPS	No	10	5	2	3	0	0	3	10	575215	6484472	BL	
SCEK021	CLR	VHF	No	(9)	dupl	dupl	dupl	dupl	dupl	dupl	10	580139	6484613	TR	Bedded on cutline through mature conifer; grp includes SCEK019
SCEK024	CLR	VHF	No	5	5	2	2	1	0	1	10	583221	6484491	BB	
SCEK025	CLR	VHF	No	11	9	6	2	1	0	2	10	559519	6487911	BB	
SCEK068	CLR	VHF	No	12	2	2	0	0	0	0	10	529982	6506957	BB	
SCEK070	CLR	VHF	No	14	7	5	1	1	0	0	10	529841	6501101	BB	
SCEK071	WSK	GPS	No	25	7	4	1	0	2	0	10	595130	6584552	BL	In mature conifer
SCEK073	WSK	VHF	No	32	5	3	2	0	0	0	10	612830	6566395	BB	Grp includes SCEK145
SCEK074	NRK	VHF	No	29	2	2	0	0	0	0	10	610468	6559145	BB	

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh

Obs Date: March 17 & 20, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Unc	mm					
SCEK079	TSE	GPS	No	19	4	3	0	1	0	0	10	556624	6592638	BB	Grp includes SCEK082
SCEK081	TSE	VHF	No	18	14	11	1	2	0	1	10	553378	6608840	BB	Grp includes SCEK083 and SCEK127
SCEK082	TSE	VHF	No	(19)	dupl	dupl	dupl	dupl	dupl	dupl	10	556624	6592638	BB	Grp includes SCEK079
SCEK083	TSE	VHF	No	(18)	dupl	dupl	dupl	dupl	dupl	dupl	10	553378	6608840	BB	Grp includes SCEK081 and SCEK127
SCEK088	NRK	VHF	No	36	2	2	0	0	0	0	10	617405	6568763	BL	
SCEK089	NRK	VHF	No	38	2	2	0	0	0	0	10	611253	6554419	BB	Grp includes SCEK103
SCEK090	NRK	VHF	No	35	10	8	0	2	0	0	10	616136	6567574	BB	
SCEK091	WSK	VHF	No	23	12	6	4	2	0	2	10	597936	6577858	TR	Cutline through Sb forest
SCEK092	NRK	VHF	No	24	3	2	0	1	0	0	10	598958	6577860	BB	
SCEK094	WSK-OS	VHF	No	37	15	8	5	2	0	3	10	609064	6555298	BB	Grp includes SCEK102
SCEK096	PRD	VHF	No	13	5	4	1	0	0	0	10	531339	6504681	BG	Clarke Lake
SCEK097	WSK	GPS	No	31	11	8	2	1	0	0	10	611950	6558202	BB	Grp includes SCEK186
SCEK100	ESK	GPS	No	30	4	3	1	0	0	0	10	610424	6558371	BB	
SCEK102	ESK	VHF	No	(37)	dupl	dupl	dupl	dupl	dupl	dupl	10	609064	6555298	BB	Grp includes SCEK094
SCEK103	ESK	VHF	No	(38)	dupl	dupl	dupl	dupl	dupl	dupl	10	611253	6554419	BB	Grp includes SCEK089
SCEK104	ESK	GPS	Yes (NP)	21	2	1	0	1	0	0	10	592344	6576792	BL	Feb 2013 progesterone level 0.01 ng/ml - assume calf adopted
SCEK105	ESK	VHF	No	26	5	4	1	0	0	0	10	605786	6560551	BB	
SCEK110	NRK-OS	GPS	No	39	2	2	0	0	0	0	10	611524	6553988	BB	
SCEK111	NRK	GPS	No	33	7	6	1	0	0	0	10	612795	6570292	BB	

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh

Obs Date: March 17 & 20, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Unc	mm					
SCEK127	TSE	VHF	Yes	(18)	dupl	dupl	dupl	dupl	dupl	dupl	10	553378	6608840	BB	Grp includes SCEK081 and SCEK083
SCEK131	TSE	VHF	No	20	25	17	5	2	1	4	10	558035	6593125	BB	Grp includes SCEK132; added new collar to group (SCEK203; formerly NX04)
SCEK132	TSE	VHF	No	(20)	dupl	dupl	dupl	dupl	dupl	dupl	10	558035	6593125	BB	Grp includes SCEK131; added new collar to group (SCEK203; formerly NX04)
SCEK145	CLR-OS	VHF	No	(32)	dupl	dupl	dupl	dupl	dupl	dupl	10	612830	6566395	BB	Grp includes SCEK073
SCEK148	CLR	VHF	No	7	6	5	1	0	0	0	10	600843	6480431	LS	Caribou on lake
SCEK149	CLR	VHF	No	8	9	8	0	1	0	0	10	578503	6484507	BB	
SCEK150	CLR	VHF	No	4	7	5	2	0	0	2	10	581116	6484909	BB	
SCEK151	CLR	VHF	Yes	16	11	8	2	1	0	1	10	535500	6494316	BB	Grp includes SCEK157
SCEK152	CLR	VHF	No	3	4	4	0	0	0	0	10	579244	6485315	TR	On cutline through mature Sb
SCEK153	CLR	VHF	No	17	4	4	0	0	0	0	10	524935	524935	BB	
SCEK154	CLR	VHF	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	562787	6505299	BB	Grp includes SCEK193
SCEK156	CLR	VHF	No	2	1	1	0	0	0	0	10	584600	6502468	BB	
SCEK157	CLR	VHF	No	(16)	dupl	dupl	dupl	dupl	dupl	dupl	10	535500	6494316	BB	Grp includes SCEK151
SCEK173	WSK	GPS	n/a	40	2	0	2	0	0	2	10	590281	6542446	BB	Bull; originally BC1037, collar replaced Feb 2014
SCEK174	WSK	GPS	No	41	4	3	1	0	0	0	10	587273	6548736	BB	Deployed 2014
SCEK182	NRK	GPS	No	22	3	3	0	0	0	0	10	593265	6579116	BL	Deployed 2014
SCEK186	NRK	GPS	No	(31)	dupl	dupl	dupl	dupl	dupl	dupl	10	611950	6558202	BB	Deployed 2014; grp includes SCEK097

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh

Obs Date: March 17 & 20, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments															
						F	M	Juv	Unc	mm																				
SCEK187	NRK	GPS	No	28	3	2	1	0	0	0	10	605182	6560104	BB	Deployed 2014															
SCEK188	NRK	GPS	No	34	2	2	0	0	0	0	10	612026	6570070	BB	Deployed 2014															
SCEK191	CLK	GPS	No	6	3	3	0	0	0	0	10	599255	6481100	LS	Deployed 2014; grp includes SCEK192; caribou on lake															
SCEK192	CLK	GPS	No	(6)	dupl	dupl	dupl	dupl	dupl	dupl	10	599255	6481100	LS	Deployed 2014; grp includes SCEK191; caribou on lake															
SCEK193	CLK	GPS	No	1	5	5	0	0	0	0	10	562787	562787	BB	Deployed 2014; grp includes SCEK154															
Unid #1	NRK	VHF	No	27	2	2	0	0	0	0	10	605031	6560240	BB	Unidentified dead collar with red left eartag															
Obs #	UTM				Additional Observations																									
1	10. 595249.6478472 (Wpt 670)				Moose x 2																									
2																														
Additional Comments																														
C1	Sightability poor due to lack of fresh snow for > 14 days - mosaic of bare ground and hard, crusted, snow patches, no un-collared groups observed																													
C2	Abundance of older tracks through Tsea Core																													

¹ Und - calf status undetermined

² CLR - Clarke PRD - Paradise WSK - West Kotcho ESK - East Kotcho NRK - North Kotcho TSE - Tsea OS - Outside core

³ Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BP - Boreal White Spruce-Lodgepole Pine FE - Sedge Fen LS - Small Lake UV - Unvegetated

Appendix VIII: Calendar Range late winter survey results: March 18, 2014
 Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Calendar
 Obs Date: March 18, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 18)	08:35	< 50% (2)	Light Air (1)	- 6 C	None	26-50 cm (4)	76-100 % (6)
End (March 18)	12:35	< 50% (2)	Calm (0)	0 C	None	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Cam Allen

Observer: Eva Needley

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK107	n/a	VHF	No	2	10	8	2	0	0	1	10	626318	6675965	BB	In NT; grp includes SCEK147; mature conifer patch adjacent; (C1)
SCEK108	CLN	VHF	No	8	7	7	0	0	0	0	10	630658	6626275	BB	Grp includes SCEK136, SCEK180 and SCEK181
SCEK112	CLN	VHF	Yes	7	4	3	0	1	0	0	10	630725	6644356	BB	Grp includes SCEK114; mature conifer patch adjacent
SCEK113	n/a	VHF	No	4	11	8	2	1	0	2	10	658970	6672241	BL	NT, Grp included 1 unidentified AB collar (C1)
SCEK114	CLN	GPS	No	(7)	dupl	dup	dup	dup	dup	dup	10	630725	6644356	BB	Grp includes SCEK112; mature conifer patch adjacent
SCEK119	n/a	GPS	No	1	4	4	0	0	0	0	10	603621	6656809	BB	In NT
SCEK120	n/a	VHF	Yes	3	14	10	2	2	0	1	10	636132	6675436	BB	Grp includes SCEK135; in NT; within burned area
SCEK122	CLN	VHF	Yes	5	3	2	0	1	0	0	10	638559	6649693	BB	
SCEK123	CLN	VHF	No	10	5	4	0	1	0	0	10	609665	6629652	BB	Grp includes SCEK126
SCEK125	n/a	VHF	Und	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not relocated at request of ENR; at Trainor Lake, NT
SCEK126	CLN	GPS	No	(10)	dupl	dupl	dupl	dupl	dupl	dupl	10	609665	6629652	BB	Grp includes SCEK123
SCEK134	CLN	VHF	No	9	5	3	2	0	0	0	10	610354	6628940	BB	Grp includes SCEK184

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Calendar

Obs Date: March 18, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK135	n/a	GPS	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	636132	6675436	BB	Grp includes SCEK120; in NT; within burned area
SCEK136	CLN	GPS	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	630658	6626275	BB	Grp includes SCEK108, SCEK180 and SCEK181
SCEK137	n/a	VHF	No	6	7	5	1	1	0	0	10	631984	6655369	BB	In NT
SCEK138	CLN	VHF	No	12	4	4	0	0	0	0	10	640076	6620404	BB	Grp includes SCEK146
SCEK146	CLN	GPS	No	(12)	dupl	dupl	dupl	dupl	dupl	dupl	10	640076	6620404	BL	Failed Iridium collar; grp includes SCEK138; attempted to recapture to replace collar but would not go into openings due to snow conditions
SCEK147	n/a	GPS	No	(2)	dupl	dupl	dupl	dupl	dupl	dupl	10	626318	6675965	BB	In NT; grp includes SCEK107; mature conifer patch adjacent
SCEK180	CLN	GPS	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	630658	6626275	BB	Deployed in 2014; grp includes SCEK108, SCEK136 and SCEK181
SCEK181	CLN	GPS	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	630658	6626275	BB	Deployed in 2014; grp includes SCEK108, SCEK136 and SCEK180
SCEK183	CLN	GPS	No	11	5	2	2	1	0	0	10	609374	6629274	BB	Deployed in 2014; grp includes SCEK185; mature conifer patch adjacent
SCEK184	CLN	GPS	No	(9)	dupl	dupl	dupl	dupl	dupl	dupl	10	610354	6628940	BB	Deployed in 2014; grp includes SCEK134
SCEK185	CLN	GPS	No	(11)	dupl	dupl	dupl	dupl	dupl	dupl	10	609374	6629274	BB	Deployed in 2014; grp includes SCEK183; mature conifer patch adjacent

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Calendar

Obs Date: March 18, 2014

Obs #	UTM	Additional Observations
Additional Comments		
C1		
C2	Group 4 includes SCEK113 and 1 unidentified AB collar (Lotek Iridium Track M)	
C3	Did not attempt to located caribou in vicinity of Trainor Lake at request of NT Department of Environment & Natural Resources (Fort Simpson, NT)	
C4	Attempted to recapture failed Iridium collar 149.583 (SCEK146) to replace but caribou would not move into open areas. likely due to hard crusting observed in Calendar Range during survey period (very hard crust in open areas at Wildboy Camp but bare ground under Sb/Pl canopy, snow depth in opening 30-50 cm)	

¹ CLN - Calendar Range excluding RRA-C and RRA-D (central portion)

² Und - calf status undetermined

³ Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine

Appendix IX: Maxhamish Range late winter survey results: March 17, 18 & 20, 2014

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

Page: 1/4

Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish

Obs Date: March 17, 18 & 20, 2014

Obs Day: 1/3	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 17)	15:38	< 50% (2)	Moderate Breeze (4)	0 C	None	26-50 cm (4)	76-100 % (6)
End (March 17)	16:17	< 50% (2)	Moderate Breeze (4)	0 C	None	Days since 5 cm Snow: > 14 days	
Obs Day: 2/3	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 18)	13:08	< 50% (2)	Light Breeze (2)	0 C	None	26-50 cm (4)	76-100 % (6)
End (March 18)	17:13	< 50% (2)	Gentle Breeze (3)	+ 4 C	None	Days since 5 cm Snow: > 14 days	
Obs Day: 3/3	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 20)	07:57	Unbroken Clouds (4)	Moderate Breeze (4)	-20 C	None	26-50 cm (4)	76-100 % (6)
End (March 20)	08:14	Unbroken Clouds (4)	Moderate Breeze (4)	-20 C	None	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Keith Lawrence

Observer: Eva Needley

Field ID	Core ²	Type	Calf ¹	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK001	CPB-OS	VHF	No	17	9	7	0	2	0	0	10	483706	6586239	BB	Grp includes SCEK002, SCEK066 and BC1014
SCEK002	CPB-OS	GPS	Yes	(17)	dupl	dupl	dupl	dupl	dupl	dupl	10	483706	6586239	BB	Grp includes SCEK001, SCEK066 and BC1014
SCEK003	KWG	GPS	Yes	3	4	3	0	1	0	0	10	525408	6569640	BB	
SCEK004	FRT-OS	VHF	No	14	6	3	3	0	0	2	10	492784	6615031	BB	Collared in KWG moved to FRT; grp includes SCEK175; within active 3D seismic program area
SCEK005	FRT	GPS	No	8	9	9	0	0	0	0	10	536669	6624906	BB	Grp includes SCEK178 and BC1033; active 3D seismic program
SCEK006	KWG	VHF	No	1	27	20	6	1	0	6	10	516582	6568745	BB	Grp includes SCEK064 and SCEK169

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish

Obs Date: March 17, 18 & 20, 2014

Field ID	Core ²	Type	Calf ¹	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK007	CPB-OS	ATS	No	18	3	2	1	0	0	0	10	452082	6599276	BB	(C1)
SCEK062	KWG	VHF	No	2	5	5	0	0	0	0	10	518417	6570075	BB	Grp includes SCEK168
SCEK063	KWG	VHF	No	4	5	5	0	0	0	0	10	530821	6569532	BB	
SCEK064	KWG	VHF	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	516582	6568745	BB	Grp includes SCEK006 and SCEK169
SCEK066	CPB-OS	VHF	No	(17)	dupl	dupl	dupl	dupl	dupl	dupl	10	483706	6586239	BB	Grp includes SCEK001, SCEK002 and BC1014
SCEK076	CPB	VHF	No	16	2	2	0	0	0	0	10	459230	6586675	BB	
SCEK078	FRT	VHF	Yes	15	5	3	1	1	0	1	10	466699	6622693	BL	Grp includes SCEK163; mature PI patch adjacent
SCEK085	FRT	GPS	No	11	4	4	0	0	0	0	10	529844	6630095	BB	Group includes SCEK128, SCEK177, and unidentified VHF collar; within active 3D seismic project area
SCEK086	FRT	VHF	No	12	1	1	0	0	0	0	10	528189	6632885	BB	
SCEK087	FRT	VHF	Yes	7	4	2	0	2	0	0	10	539889	6626791	BB	Within active 3D seismic program; caribou using open lines to flee helicopter
SCEK128	FRT	VHF	No	(11)	dupl	dupl	dupl	dupl	dupl	dupl	10	529844	6630095	BB	Group includes SCEK085, SCEK177, and unidentified VHF collar; within active 3D seismic project area
SCEK129	FRT	VHF	No	10	3	2	1	0	0	1	10	539703	6623857	BB	Within active 3D seismic program; photos 3316-3318
SCEK163	FRT	GPS	No	(15)	dupl	dupl	dupl	dupl	dupl	dupl	10	466699	6622693	BL	Grp includes SCEK078; mature PI patch adjacent

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish

Obs Date: March 17, 18, & 20, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK164	FRT	VHF	No	6	3	1	2	0	0	0	10	542336	6622633	BB	Within active 3D seismic program
SCEK168	FRT	GPS	No	(2)	dupl	dupl	dupl	dupl	dupl	dupl	10	518417	6570075	BB	Deployed in 2014; grp includes SCEK062
SCEK169	FRT	GPS	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	516582	6568745	BB	Deployed in 2014; grp includes SCEK006 and SCEK064
SCEK175	FRT-OS	GPS	No	(14)	dupl	dupl	dupl	dupl	dupl	dupl	10	492784	6615031	BB	Deployed in 2014; grp includes SCEK004; within active 3D seismic program area
SCEK176	FRT	GPS	No	13	2	2	0	0	0	0	10	489634	6618269	BB	Deployed in 2014
SCEK177	FRT	GPS	No	(11)	dupl	dupl	dupl	dupl	dupl	dupl	10	529844	6630095	BB	Deployed in 2014; group includes SCEK085, SCEK128, and unidentified VHF collar; within active 3D seismic project area
SCEK178	FRT	GPS	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	536669	6624906	BB	Deployed in 2014; grp includes SCEK005 and BC1033; within active 3D seismic program
SCEK179	FRT	GPS	No	9	5	5	0	0	0	0	10	535591	6619676	BB	Deployed in 2014; within active 3D seismic program
BC1009	KWG	VHF	Yes	5	5	4	0	1	0	0	10	517443	6570296	BB	Old wolf collar (black)
BC1014	CPB-OS	VHF	Yes	(17)	dupl	dupl	dupl	dupl	dupl	dupl	10	483706	6586239	BB	Grp includes SCEK001, SCEK002 and SCEK066
BC1031	FRT	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	530877	6626840	BB	Mortality; wolf kill in middle of active 3D seismic through black spruce; MI #053

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Maxhamish
Obs Date: March 17, 18, & 20, 2014

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
BC1033	FRT	VHF	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	536669	6624906	BB	Grp includes SCEK005 and SCEK178; active 3D seismic program
Unid Coll#1	FRT	VHF	No	(11)	dupl	dupl	dupl	dupl	dupl	dupl	10	529844	6630095	BB	Unidentified VHF collar with red right "FSJ F&W" eartag; group includes SCEK085, SCEK128 and SCEK177; within active 3D seismic project area
Obs #	UTM			Additional Observations											
1	10.503027.6551894 (Wpt 721)			Moose kill on creek (in territory of Snake Pack)											
2	10.520293.6527850 (Wpt 722)			Moose x 2											
3	10.593645.6495822 (Wpt 723)			Moose x 1											
Additional Comments															
C1	Signal shut-off at 16:00 hrs on survey day; returned on 20 March 2014 (Day 3/3) to find caribou														

¹ CPB - Capot-Blanc FRT - Fortune KWG - Kiwigana OS - Outside core

² Und - calf status undetermined

³ Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BP - Boreal White Spruce-Lodgepole Pine FE - Sedge Fen LS - Small Lake UV - Unvegetated

Appendix X: Prophet Range late winter survey results: March 19 & 21, 2014
 Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

Page: 1/3

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Prophet
 Obs Date: March 19 & 21, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 19)	11:20	Unbroken (4)	Moderate Breeze (4)	-8 C	Low Cloud	26	76-100 % (6)
End (March 19)	11:30	Unbroken (4)	Moderate Breeze (4)	-5 C	Freezing Rain	26	
Obs Day: 2/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 21)	07:50	< 50% (2)	Gentle Breeze (3)	- 22 C	None (N)	26-50 cm (4)	76-100 % (6)
End (March 21)	09:54	< 50% (2)	Gentle Breeze (3)	- 22 C	None (N)	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Cam Allen

Observer: Eva Needley

Field ID	Core ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK043	n/a	VHF	No	3	18	16	2	0	0	2	10	543617	6444525	BB	Grp includes SCEK044, SCEK049 and SCEK161; outside current boundary of BC distribution; adjacent to mature MW patch
SCEK044	n/a	GPS	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	543617	6444525	BB	Grp includes SCEK043, SCEK049 and SCEK161; outside current boundary of BC distribution; adjacent to mature MW patch
SCEK045	PPH-OS	VHF	No	2	5	3	1	1	0	1	10	547967	6461438	BL	Only caribou found within the currently defined boundaries of Prophet Core

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

Page: 2/3

Project: SCEK Boreal Caribou
Obs Date: March 19 & 21, 2014

Survey: Late Winter Recruitment

Study Area: Prophet

Field ID	Core ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK049	n/a	VHF	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	543617	6444525	BB	Grp includes SCEK043, SCEK044 and SCEK161; outside current boundary of BC distribution; adjacent to mature MW patch
SCEK050	PPH-OS	GPS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	10	557568	6447131	n/a	Mortality (failed Iridium & VHF previously); wolf kill, destroyed collar frozen between layers of ice on small lake adjacent to open Sb forest; outside range and RRA but inside BC boreal distribution
SCEK051	n/a	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not detected; search included outlying areas of range
SCEK143	n/a	GPS	No	1	14	10	2	2	0	2	10	550134	6427065	BL	Grp includes SCEK144; outside current boundary of BC distribution
SCEK144	n/a	VHF	Yes	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	550134	6427065	BL	Group includes SCEK143, outside current boundary of BC distribution
SCEK161	n/a	GPS	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	543617	6444525	BB	Grp includes SCEK043, SCEK044 and SCEK049; outside current boundary of BC distribution; adjacent to mature MW patch

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Prophet

Obs Date: March 19 & 21, 2014

Obs #	UTM	Additional Observations
1	10.517931.6454652 (Wpt 733)	Old caribou tracks in Sb peatlands on SW edge of Prophet Range (March 19)
2	10.525018. 6513712 (Wpt 734)	Moose x 1 (March 19)
3	10.524531. 6520389 (Wpt 735)	Moose x 1 (March 19)
4	10.525242.6513470 (Wpt 776)	Moose x 1 (March 21)
5	10. 552283.6451632 (Wpt 781)	Otter tracks
6	10.535462.6486481 (Wpt 783)	Moose x 1 (March 21)
Additional Comments		
C1	Survey aborted after Group #1 on March 19 due to freezing rain; resumed on March 21; Group #1 discreet from other groups therefore no risk of double counts	
C2	Day 2 survey time includes reconnaissance of northern portion of Prophet Range; no additional caribou or recent sign observed	

¹ n/a - outside current boundary of BC boreal caribou distribution, PPH-OS - outside Prophet Range

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine

Appendix XI: Parker Range late winter survey results: March 17, 2014
 Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

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Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Parker

Obs Date: March 17, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 17)	09:38	Unbroken (4)	Moderate Breeze (4)	-4 C	None	26-50 cm (4)	76-100 % (6)
End (March 17)	10:20	Unbroken (4)	Moderate Breeze (4)	-4 C	None	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Keith Lawrence

Observer: Eva Needley

Field ID	Core ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK010	PRK	VHF	Yes	2	7	3	2	2	0	1	10	504110	6518539	BB	
SCEK012	PRK	VHF	Yes	3	10	5	2	3	0	2	10	504750	6518013	BB	Grp includes BC1001
SCEK013	PRK	VHF	Yes	5	6	4	0	2	0	0	10	487028	6521260	BB	
SCEK014	PRK	GPS	No	1	5	4	1	0	0	0	10	508934	6518893	BB	
SCEK015	PRK	VHF	No	6	4	2	2	0	0	2	10	487307	6522621	BB	Grp includes SCEK194
SCEK016	PRK	GPS	No	4	8	7	0	1	0	0	10	494984	6519171	BB	
SCEK194	PRK	GPS	No	(6)	dupl	dupl	dupl	dupl	dupl	dupl	10	487307	6522621	BB	Deployed in 2014; grp includes SCEK015
BC1000	n/a	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Old VHF collar, not detected - assumed stopped transmitting
BC1001	PRK	VHF	Yes	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	504750	6518013	BB	Grp includes SCEK012
Obs #	UTM			Additional Observations											
1	10.493309.6520231 (Wpt 660)			Heard Parker Pack wolf BW020 (VHF) in distance (transmitting normal mode)											
Additional Comments															
C1															

¹ PRK - Parker Range

² Und - calf status undetermined

³ Broad Ecosystem Unit (BEU): BB - Black Spruce Bog

Appendix XII: Fort Nelson Core late winter survey results: March 17, 2014

Animal Observation Form – Boreal Caribou 2014 LW Recruitment Survey

Page: 1/1

Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Fort Nelson

Obs Date: March 17, 2014

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 17)	15:12	< 50 % (2)	Moderate Breeze (4)	0 C	None	26-50 cm (4)	76-100 % (6)
End (March 17)	15:30	< 50 % (2)	Moderate Breeze (4)	0 C	None	Days since 5 cm Snow: > 14 days	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Keith Lawrence

Observer: Kathy Needley

Field ID	Core ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK009	FN	GPS	N	2	5	4	1	0	0	0	10	498865	6556629	BB	Grp includes SCEK167
SCEK165	FN	GPS	N	1	5	5	0	0	0	0	10	516280	6548028	BB	Deployed in 2014; Grp includes SCEK166
SCEK166	FN	GPS	N	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	516280	6548028	BB	Deployed in 2014; Grp includes SCEK165
SCEK167	FN	GPS	N	(2)	dupl	dupl	dupl	dupl	dupl	dupl	10	498865	6556629	BB	Deployed in 2014; Grp includes SCEK009
Obs #	UTM			Additional Observations											
Comments															

¹ FN - Fort Nelson Core (undifferentiated range)

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog