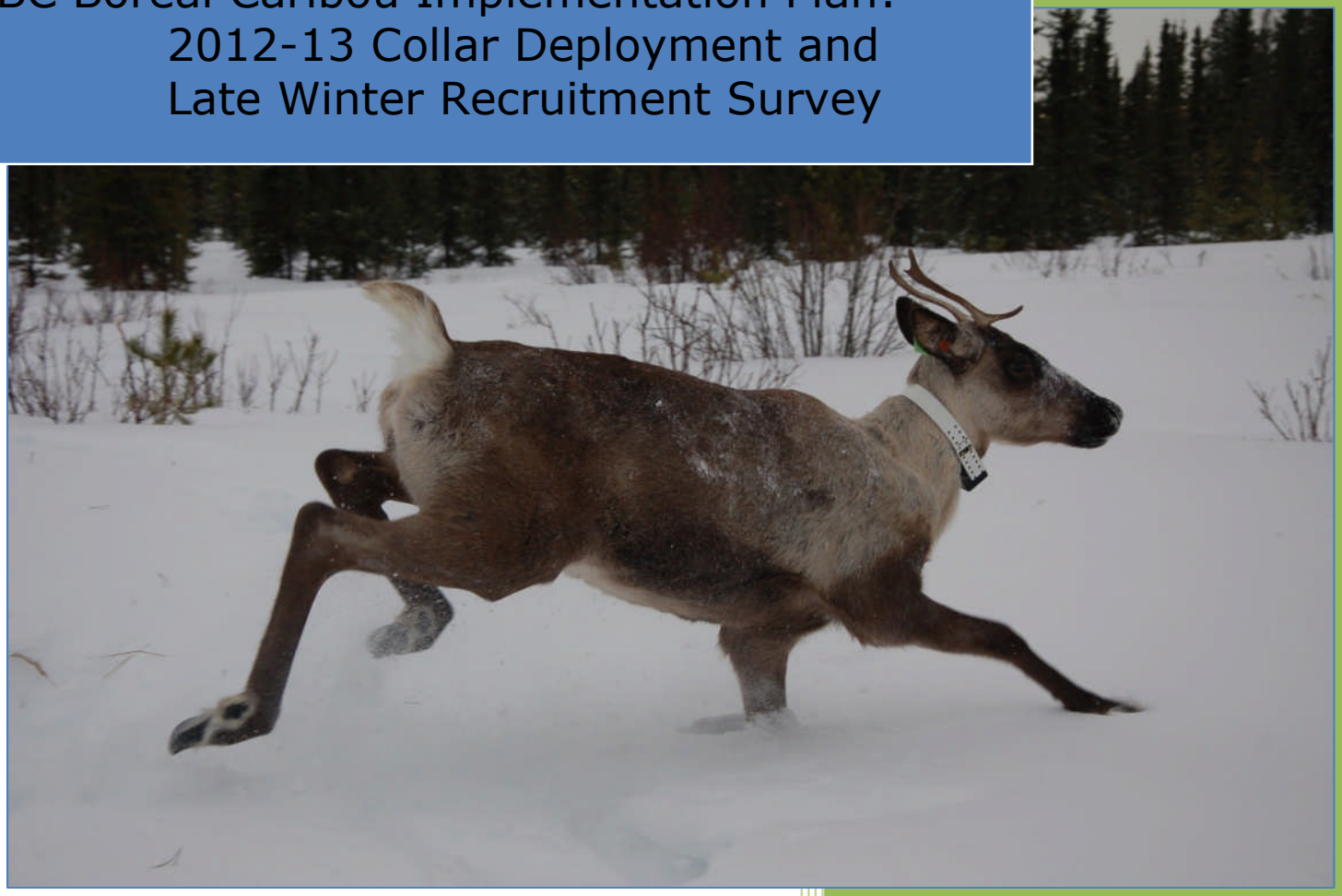
2013

BC Boreal Caribou Implementation Plan: 2012-13 Collar Deployment and Late Winter Recruitment Survey



Diane Culling, R.P. Bio. , and
Brad Culling, R.P. Bio.

Diversified Environmental Services
Fort St. John, British Columbia

July 2013

Acknowledgements

Funding for the project was provided by the British Columbia *Science and Community Environmental Knowledge Fund* (SCEK). Direction was provided by the *Research and Effectiveness Monitoring Board* (REMB) board members Scott Wagner (Nexen Inc.), Steve Wilson (EcoLogic Research), and Megan Watters (BC Ministry of Forests, Lands, and Natural Resources Operations (MFLNRO)). Thanks to Brian Thompson (SCEK) for administering the project. Day to day leadership and support was provided by MFLNRO, with Megan Watters acting as principal advisor. Joelle Scheck and Chris Addison provided additional MFLNRO support. Provincial Wildlife Veterinarian Helen Schwantje (BC Ministry of Environment) provided support to ensure that full advantage was made of this opportunity to learn about the health and biology of BC's boreal caribou herds.

British Columbia's boreal caribou ranges fall within the traditional lands of the Treaty 8 First Nations; we appreciate the support of the Treaty 8 Chiefs and Communities for the project.

Special thanks go to Zonk Dancevik and Cam Allen, owners of Qwest Helicopters, Fort Nelson, and Qwest pilot Mike Koloff for, once again, making our priorities their priorities; over the past decade their efforts have contributed greatly to the understanding of boreal caribou ecology in northeastern British Columbia. Mike did the majority of the flying for the project. His willingness to pull out all the stops to ensure the successful completion of both the collar deployment and recruitment survey phases confers upon him unsung hero status.

Thanks to Kathy Needley and William Irvine of the Fort Nelson Indian Band and Maxine Davis of Doig River First Nation for their excellent work participating in both the collar deployment and survey phases.

Thanks also to John Cooke (National Council for Air and Stream Improvement, Forest & Range Sciences Lab, La Grande, Oregon) and Ted Euchner (Diversified Environmental Services) for helping out with capture activities.

Locating caribou in the vast expanses of BC's peatlands was a team effort. Ted Euchner flew fixed-wing reconnaissance with pilot Jason Holland (Trek Aerial Surveys, Fort St. John) to increase search efficiency in areas where caribou were especially thin on the ground. Dan Webster (Eco-Web Ecological

Consulting Ltd., Fort St. John) provided coordinates of incidental sightings of boreal caribou during a SCEK-funded moose survey of BC's boreal caribou ranges.

The final collar sample size was augmented by the inclusion of 6 additional ATS collars contributed by MFLNRO and Craig DeMars (University of Alberta).

Cover photo – Brad and Diane Culling

EXECUTIVE SUMMARY

The *Implementation Plan for the Ongoing Management of Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* (BCIP; MOE 2011) was prepared to address provincial commitments to manage threatened boreal ecotype woodland caribou (*boreal caribou)* populations. The BCIP outlines several objectives to promote the long-term recovery of boreal caribou populations in British Columbia (BC). These objectives are designed to provide measurable targets for action and evaluation to ensure population and distribution goals are being achieved. This report summarizes field activities completed during the initial year of BCIP effectiveness monitoring specific to evaluating caribou population condition, including the deployment of radio-collars on a target of approximately 15% of the estimated population of each BC boreal caribou herd and subsequent late winter recruitment surveys.

Using a total of 161 radio-collars (32 ATS GPS, 15 Vectronic GPS, and 114 Lotek VHF), 164 individual boreal caribou were collared between December 2012 and April 2013, including re-deployments of 3 collars recovered from wolf mortalities. A total of 6 confirmed wolf kills of radio-collared caribou occurred in late winter, leaving 158 collars known to be active in BC's boreal caribou ranges by 07 April 2013.

The collaring phase of the project provided an unprecedented opportunity to gather information on the health and condition of BC's boreal caribou herds. Biological samples collected under the direction of the Provincial Wildlife Veterinarian will support a variety of research efforts over time. The project also provided the opportunity for a researcher from the National Council for Air and Stream Improvement, Forest & Range Sciences Lab (Oregon, U.S.A.) to accompany the capture crew for several days to collect body condition data using ultrasonography of rump fat thickness. Data collected during the SCEK collaring program, as well as from woodland caribou herds in Ontario and Alaska, will contribute to the development of an integrated index to evaluate body condition in caribou.

Late winter recruitment surveys were conducted on all herds between 25 March and 03 April 2013. All but 1 of 160 caribou collared prior to the start of the survey were relocated. A total of 952 boreal caribou in 130 groups were observed.

Cichowski *et al*. (2012) recommends the collection of 3 years of recruitment data prior to assessing the trend for BC's boreal caribou populations. Results of the first year's recruitment survey indicate that, with the exception of the Calendar Range (35 calves/100 females) and Chinchaga RRA-A (33 calves/100 females), recruitment in all boreal caribou ranges and Resource Review Areas was below Environment Canada's (2008) threshold of 28.9 calves/100 cows to maintain a stable population.

While information on minimum population counts within BC's boreal caribou ranges has been accumulated through a number of telemetry studies over the past decade, these projects have been based on variable samples sizes and their scope has been limited to either single ranges or portions of multiple ranges. The 2013 SCEK recruitment surveys provided the first opportunity to assess caribou demographics in all ranges using relatively consistent effort. The minimum population counts observed in 2013 fall below the lower range of 2004 population estimates calculated for the 4 largest boreal caribou ranges (Chinchaga, Snake-Sahtaneh, Maxhamish, and Calendar) by the Ministry of Water, Land and Air Protection (MWLAP). These minimum counts, coupled with results of the 2013 survey and limited historic information on calf recruitment, support the assumption of an overall population decline consistent with that observed across the national distribution of boreal caribou. However, the 2004 density estimates, which were applied across the extent of BC boreal caribou distribution, may have over-estimated populations in some ranges. Therefore, while data on recruitment and adult survival collected over 3 years (2012/13 to 2014/15) may confirm the suspected long-term decline in BC's boreal caribou populations, comparison of the 2004 population estimates with the 2013 minimum population counts may not accurately reflect the rate and extent of change between that time and the present.

The interaction of factors, such as an active disturbance footprint (e.g., winter 3D seismic programs), coupled with weather and snow conditions that inhibit caribou movements while improving wolf mobility and access, may result in conditions with the potential to rapidly reduce caribou numbers locally.

Table of Contents

List of Tables

List of Figures

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* by the Committee on the Status of Endangered Wildlife in Canada (Environment Canada 2011). Provincial recovery planning was initiated in 2004, with a long-term monitoring program launched by the BC Ministry of Environment (MOE) in 2008 (Thiessen 2009). 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.

In June 2010, Resource Review Areas (RRAs) were established to support the management of BC's boreal caribou populations (MEMPR 2010). The RRAs are intended to provide conditions more favourable for caribou persistence than those that occur outside RRAs. 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.

Cichowski *et al*. (2012) recommended several performance measures for assessing the effectiveness of RRAs with respect to boreal caribou population condition, including tracking population rate of change, adult mortality rate, and calf recruitment rate. Additional performance measure recommendations focused on range conditions (habitat and disturbance), including % area within 500 m of industrial activities, % area in burns <40 years, undisturbed patch size distribution, % area of undisturbed low gradient slope, and the relative density of predators and alternate prey species.

This report summarizes field activities completed during the initial year of BCIP effectiveness monitoring specific to evaluating caribou population condition, including the deployment of radio-collars on a target

of approximately 15% of the estimated population of each BC boreal caribou herd and subsequent late winter recruitment surveys.

2 METHODS

2.1 Study Area

The British Columbia distribution of boreal caribou encompasses the northeastern portion of the province, on the Alberta Plateau physiographic area. The area is bounded by the Northwest Territories (NT) border (N60° latitude) to the north, the Alberta (AB) border (W120° longitude) to the east, the northern Rocky Mountains to the west (roughly W124°), and the northern limit of the agricultural zone to the south (roughly N57°; Fig. 1).

Within this area, BC's boreal caribou ranges are defined as "broad areas of known historical or assumed current use that supply resources necessary to support local populations of boreal caribou…ranges encompass adequate space to allow for periodic shifts in areas of activity due to local depletion of forage resources, disturbance, or stochastic events such as wildfire. Ranges also provide for movement between core habitats" Culling *et al*. (2004). Core habitats are areas of high suitability for boreal caribou within the ranges. As little was known about BC's boreal caribou population in 2004, it was understood that range and core habitat polygons would be modified as more information was collected on the movements of local caribou herds. There are currently 6 boreal caribou ranges recognized, including the Chinchaga, Snake-Sahtaneh, Calendar, Maxhamish, Prophet, and Parker, with 16 associated core habitats[1] (MOE 2010). Recent observations and telemetry data support the inclusion of an additional area of habitat outside the defined ranges, which was described by Culling *et al*. (2004) as an "area of interest, with current status unknown", in future revisions of BC's boreal caribou range map (*hereafter*, Fort Nelson core).

The 6 ranges vary in size (Table 1) and composition of habitat types. Peatlands are dominant along the eastern portion of the BC distribution, with a higher proportion of uplands moving westward toward the Rocky Mountains. While the climate is continental throughout the area of distribution, the ranges span roughly 3.5 degrees latitude and almost 400 km north to south, with considerable differences in winter

[1] 16 core habitats include Calendar, Prophet and Parker, which are considered both ranges and core areas.

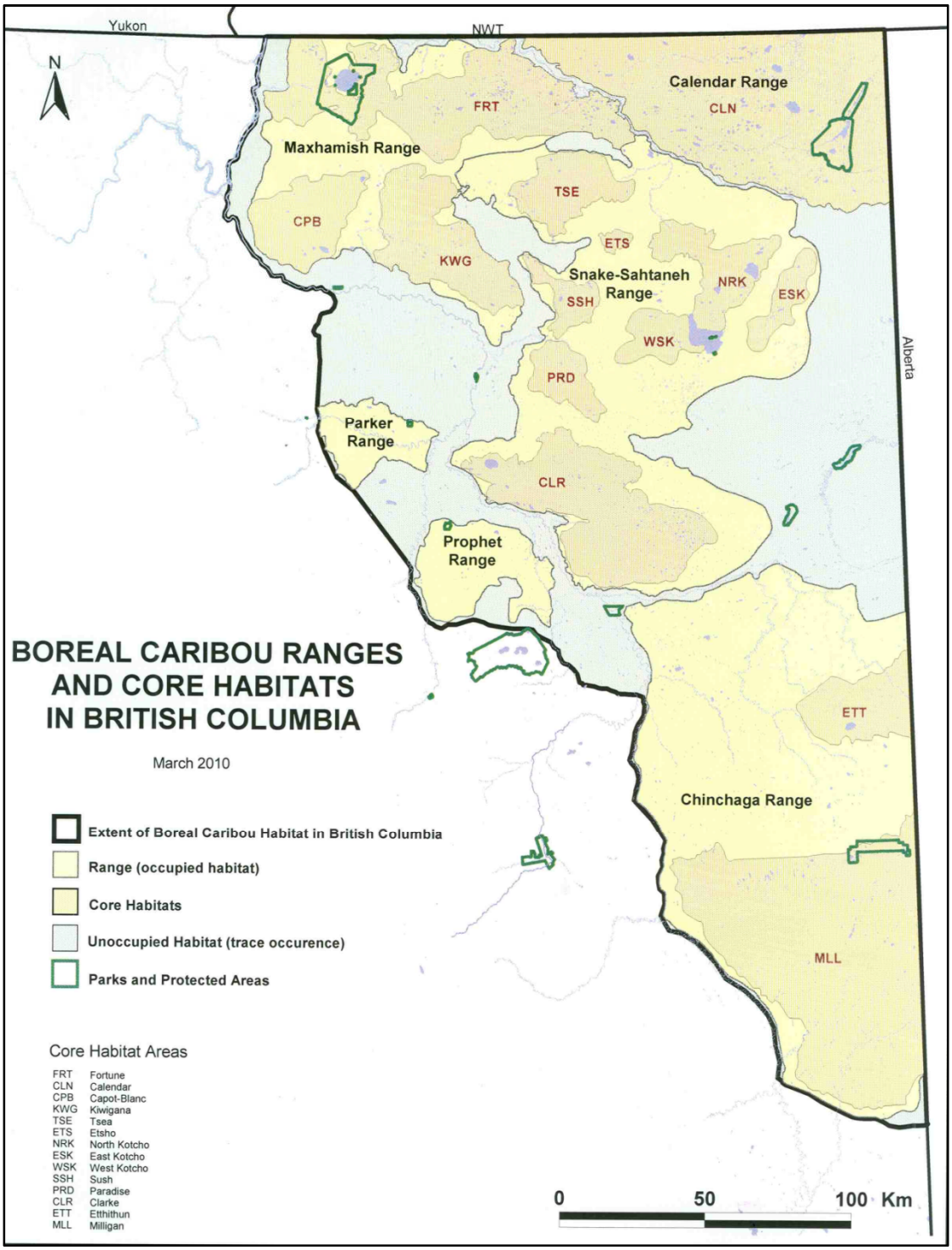


Figure 1. Boreal caribou ranges and core habitats in British Columbia (from MOE 2010).

Table 1. Comparison of area of 6 boreal caribou ranges in northeastern British Columbia.

	Chinchaga (BC)	Snake-Sahtaneh	Calendar	Maxhamish	Prophet	Parker
Area (ha)	1,389,750	1,199,976	497,296	709,553	119,303	75,162
Elevation (m)	700-900 m	400-700 m	420-540 m	400-600 m	400-800 m	300-600 m

severity and duration. Appendix I compares historic Environment Canada weather station data for Fort St. John and Fort Nelson, BC, and Fort Simpson, NT, approximately 200 km north of the Calendar Range.

The Chinchaga Range is in the Boreal Plains (BOP) ecoprovince, with the remaining BC boreal ranges lying within 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.

In addition to boreal caribou, medium and large mammal species common to the area include moose (*Alces americanus*), grey wolf (*Canus lupus*), black bear (*Ursus americanus*), and lynx (*Lynx canadensis*). Wolverine (*Gulo gulo*) and grizzly bear (*Ursus arctos*) also occur at low densities. Beaver (*Castor canadensis*) play an important role in the ecology of boreal caribou ranges, both for their ability to influence hydrology and habitat, and as a prey species that supports wolf populations. Northward range expansion of 2 species, white-tailed deer (*Odocoileus virginianus*) and coyote (*Canis latrans*), is of concern due to possible impacts to boreal caribou (Latham 2009, Boisjoly *et al*. 2010). Golden eagles (*Aquila chrysaetos*), which have been reported to prey on northern ecotype woodland caribou calves (Gustine *et al*. 2006), are observed occasionally in BC's boreal caribou ranges (Culling and Culling, pers. obs.).

BC's boreal caribou ranges generally fall within resource management zones in which industrial activity is promoted (Fort Nelson LRMP 1997, Fort St. John LRMP 1997). The ranges are crossed by several all-weather roads, including the Alaska and Liard highways, and the Komie, Sierra-Yoyo-Desan, Milligan, and Fontas petroleum development roads (PDRs), as well as numerous secondary petroleum and forestry development roads. While the petroleum industry has been active throughout northeastern BC since the 1950's, technological advances that allow extraction of extensive reserves of shale gas in the Horn River Basin (HRB) and Cordova Embayment has resulted in an increase in activity within a number of boreal caribou ranges in recent years.

Additional information on individual ranges is found in the *Science Update for the Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* (Ministry of Environment 2010).

2.1.1 Resource Review Areas (RRAs)

Four RRAs have been designated in boreal caribou ranges in northeastern BC (Fig. 2), including the Chinchaga Range (RRA-A), Prophet Range (RRA-B), and Calendar Range (RRA-C and RRA-D). The RRAs comprise 13% of the currently defined boreal range and 13% of Ungulate Winter Ranges (Cichowski *et al*. 2012). Seventy-four percent of the combined RRAs consist of areas of extremely low gradient slopes (0-0.6°), which have been found to be a good predictor of boreal caribou habitat in northeastern BC (Culling *et al*. 2006).

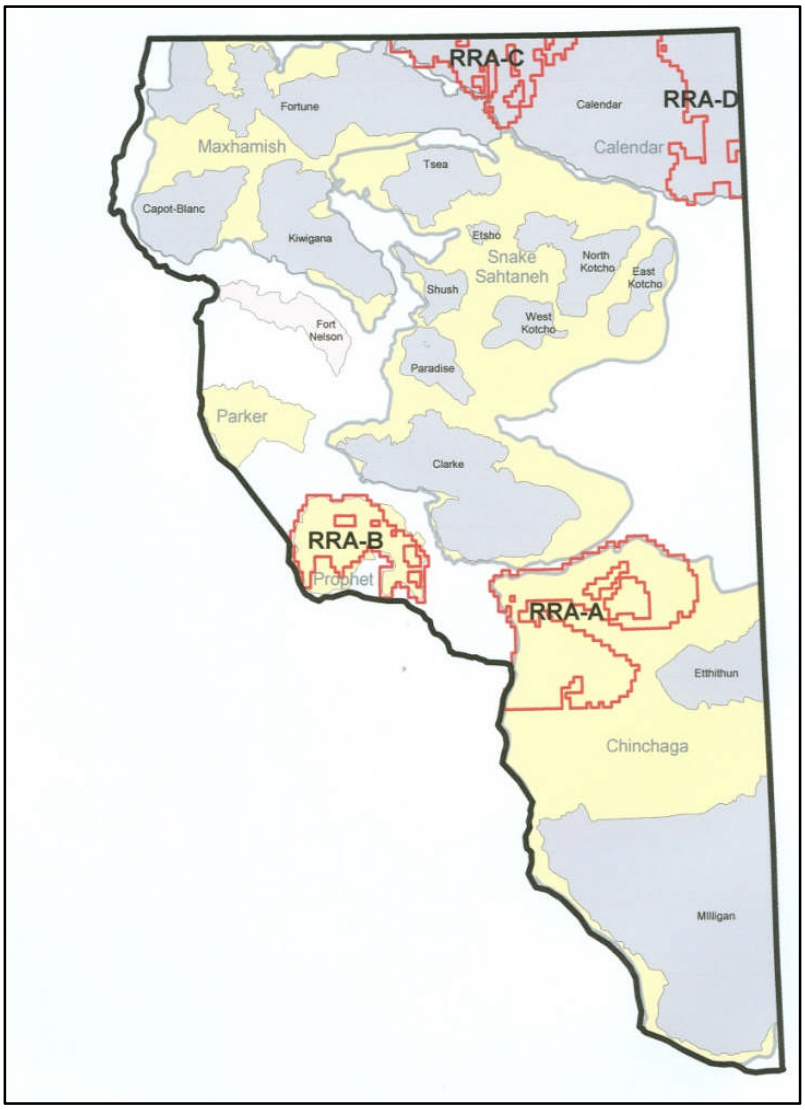


Figure 2. Location of 4 boreal caribou Resource Review Areas (RRAs) established in 2010 in boreal caribou ranges, northeastern British Columbia.

The Chinchaga RRA (RRA-A) is remote from the main areas of caribou activity in the Chinchaga Range (i.e., the Milligan and Etthithun cores). As well, the RRA is in relatively close proximity to both the Prophet and Snake-Sahtaneh ranges, with the potential for movement between this RRA and adjacent areas as yet undetermined. Therefore, for the purpose of this report, the Chinchaga RRA is treated as a separate entity from the Chinchaga Range.

2.2 Capture and Collar Deployment

We complied with British Columbia Resources Inventory Committee guidelines (RIC 1998a, RIC 1998b) for all caribou capture and handling. We planned collar deployment in consultation with MFNLRO staff based on the objective of maintaining a sample of approximately 15% of the estimated population of individual herds. We considered the following factors when organizing collar distribution: avoid potential frequency conflicts with active northeast BC, AB, or NT radio-collars; deploy Global Positioning System (GPS) collars in areas where little or no existing habitat use data exists; deploy collars throughout all cores to provide a balanced distribution for late winter recruitment surveys; and recapture caribou to recover and replace failed GPS collars. To avoid confusion between concurrent, associated collaring programs, we assigned all collared caribou a temporary sequential field identification number (Field ID SCEK00X), with permanent ID numbers assigned by MFLNRO.

We based capture operations out of the Fort St. John airport for the Chinchaga Range and the Fort Nelson airport for all other ranges. In areas where previously collared sentinel animals were not present and when weather conditions were favourable, we used a fixed-wing spotter aircraft to reduce helicopter search effort and to optimize collar distribution. We conducted multiple capture sessions in each caribou range during well-spaced periods of suitable conditions (i.e., sufficient snow depth to prevent animal injury, 48-72 hours since last snow fall, and good visibility and light conditions).

We captured adult female boreal caribou using a hand-held net-gun fired from a Bell 206B Jet Ranger helicopter. We collected hair, fecal, and blood (4 vials) samples and measured neck circumference and hind foot length. 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 during aerial surveys when multiple collared animals might be present in the same group. Caribou were assigned to broad age classes based on incisor tooth wear. Blood serum was sent 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.

We fitted captured caribou with 1 of 3 collar types: ATS Iridium GPS G2110E (Advanced Telemetry Systems Inc., Isanti, Minnesota (ATS)), Vectronic GPS (Vectronic Aerospace, Berlin, Germany (Vectronic)), or Lotek LMRT4 VHF (Lotek Wireless Inc., Newmarket, Ontario (VHF)) radio-collars. GPS collars were programmed to log positions at variable intervals depending on collar type and season. Collars were equipped with mortality sensors programmed to activate following a period of 4 hours (VHF), 6 hours (ATS), or 12 hours (Vectronics) without movement.

2.3 Late Winter Recruitment Surveys

Following collar deployment, we used a Bell 206B helicopter to conducted late-winter composition surveys for all boreal caribou ranges to estimate annual juvenile recruitment. We used telemetry to locate all radio-collared females, then 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 (Table 2). We augmented the sample of SCEK collars by locating and classifying groups associated with radio-collared animals from adjacent jurisdictions (AB, NT) 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.

Table 2. Resources Inventory Standards Committee classification for woodland caribou (RIC 2002).

		Description
Juvenile	Calf	Antlers (if any) are short (spikes) with velvet; darker body and smaller than adults
Female	Cow	Small antlers 2-3 times the ear length; black vulval patch
Mature Male	Class 2	Antlers larger than females; antlers are lighter and smaller than Class III bulls; antlers without shovels
	Class 3	Large, heavy-beamed antlered males; antlers with many points and a palmated brow tine; may have shovel with few points, but heavy beams

3 RESULTS

3.1 Capture and Collar Deployment

Detailed summaries of capture activities and recruitment surveys by individual range are presented in section 3.3.

A total of 161 radio-collars (32 ATS, 15 Vectronic, and 114 VHF) were available for deployment, including 155 SCEK-funded collars and an additional 6 ATS collars provided by MFLNRO and the University of Alberta. Capture and collaring activities took place during 27 individual capture sessions between 17 December 2012 and 01 April 2013 (Table 3). Group fidelity was typically weak, with collared animals frequently forming new groups between capture sessions. Figures 3 and 4 show collar distribution by range and core and helicopter search lines flown during the collar deployment period, respectively.

The first 160 collars were deployed by 04 March 2013. One ATS collar malfunctioned during pre-field programming and was returned to the manufacturer for repair. It was deployed on 01 April 2013, during the late winter recruitment survey. Three additional caribou were collared during the recruitment survey using collars retrieved and re-deployed following caribou mortality investigations. A fourth collar (VHF), retrieved from a mortality site, was damaged beyond repair by predators. A total of 164 individual caribou were captured and collared, with 160 alive on 03 April 2013. Two additional caribou mortalities were discovered on 06 April 2013 following completion of the recruitment survey (*see section 3.4*), leaving a total of 158 collars known to be active by that date. Table 4 summarizes collar deployment by range and core.

Vectronic collar 148.850 (SCEK071) started transmitting a mortality signal in late March. The caribou was found to be alive during the March 30 recruitment survey, however the collar was transmitting a VHF signal of 100 beats per minute (BPM).

No caribou mortalities or serious injuries occurred during capture operations. One caribou (SCEK109) suffered a superficial net-cut to its tail, which bled profusely. The wound appeared to have completely healed when the animal was relocated during the recruitment survey 3 weeks later.

As the capture season progressed, increasing numbers of caribou displayed hair loss and patches of bald skin. Adult winter ticks (*Dermacentor albipictus*) were observed on several caribou from late February through March. Winter tick voucher specimens were collected from caribou in the Clarke and Milligan cores (2 samples).

3.2 Late Winter Recruitment Surveys

Late winter recruitment surveys were conducted on all herds between 25 March and 03 April 2013. All but 1 of 160 caribou collared prior to the start of the survey were relocated. A total of 952 boreal

Table 3. SCEK radio-collars deployed on 164 boreal caribou by range and core, northeastern British Columbia, 17 December 2012 to 01 April 2013.

Range	Core/RRA	No. Capture Sessions	Collar Type			Total Collars	% Min Pop Count[2]
			ATS	Vectronic	VHF		
Chinchaga	Milligan	6	7	3	19	29	
	Etthithun	2 + FWR[1]			1	1	
	Chinchaga Total	8	7	3	20	30	13.4[3]
Chinchaga RRA	Chinchaga RRA Total	2 + FWR	2	2	3	7	21.9[3]
Snake-Sahtaneh	Clarke	4	2	0	16	18	
	East Kotcho	1	1	1	4	6	
	North Kotcho	3	0	1	7	8	
	Outside Cores	n/a	1	0	2	3	
	Paradise	3	0	1	6	7	
	Tsea	3	1	0	7	8	
	West Kotcho	2	1	1	4	6	
	Snake-Sahtaneh Total	12	6	4	46	56	17.4
Calendar	Calender Excluding RRAs	3 + FWR	4	2	13	19	
	RRA-C	1 + FWR	1	0	0	1	
	RRA-D	3 + FWR	2	1	4	7	
	Calender Total	5 + FWR	7	3	17	27	20.0
Maxhamish	Capot-Blanc	4	2	0	5	7	
	Fortune	4	0	3	8	11	
	Kiwigana	3	2	0	5	7	
	Maxhamish Total	7	4	3	18	25[4]	17.4[4]
Prophet	Inside Range/RRA-B	4	1	1	2	4	
	Outside Range/RRA-B	3	2	0	3	5	
	Prophet Total	4	3	1	5	9	25.7
Parker	Parker Total	1	2	0	5	7	11.9
Fort Nelson	Fort Nelson Total	2	2	0	1	3	14.3[5]
Grand Total			33	16	115	164	17.9

[1] FWR - fixed wing reconnaissance

[2] Based on results of 2013 late winter recruitment survey

[3] Chinchaga Range and RRA-A combined = 14.5%

[4] Total of 25 individual caribou collared using 23 radio-collars; 23 caribou collars active at end of recruitment survey

[5] Both collared caribou killed by wolves, therefore 0% population collared as of April 06, 2013

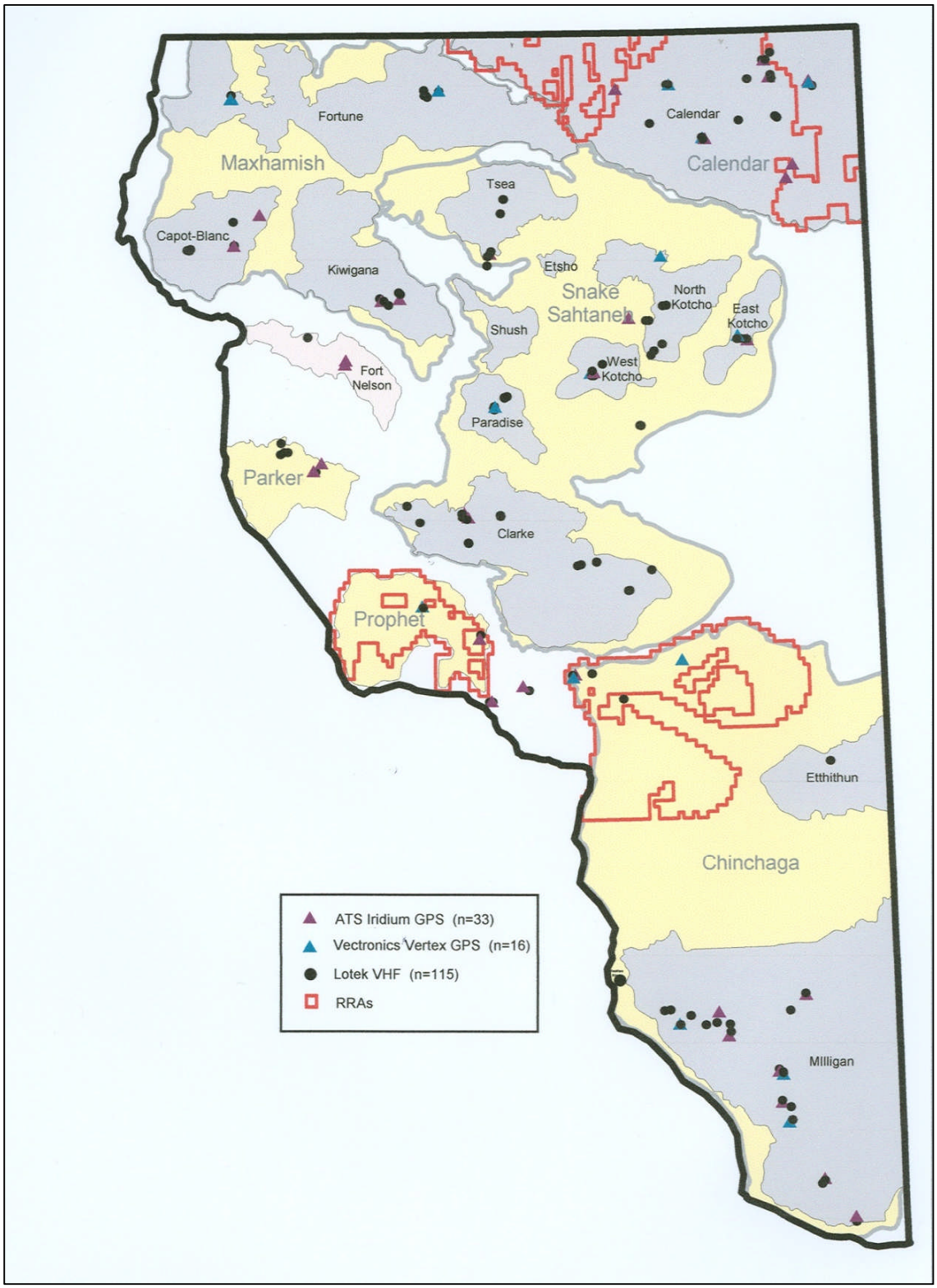


Figure 3. Deployment locations for GPS and VHF radio-collars on 164 boreal caribou in northeastern British Columbia, 17 December 2012 to 01 April 2013.

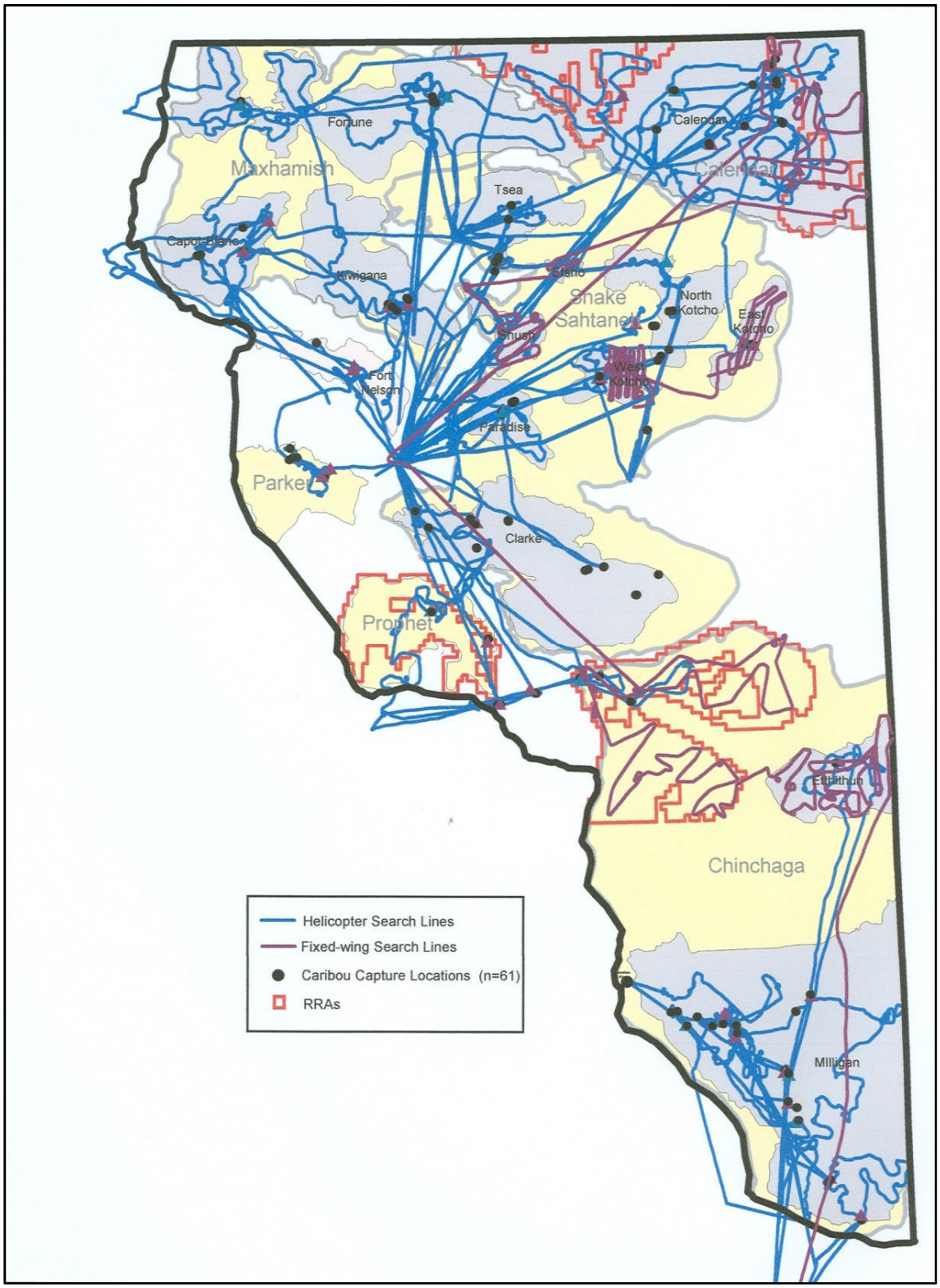


Figure 4. Helicopter and fixed-wing aircraft search lines flown during deployment of GPS and VHF radio-collars on 164 boreal caribou in northeastern British Columbia, 17 December 2012 to 01 April 2013.

caribou in 130 groups were observed (Table 4), including 110 groups with one or more SCEK collars, 14 previously collared BC caribou, 5 AB caribou, 4 caribou with collars of unknown origin, and 10 incidentally observed, unmarked groups. Mean group size was 7.3 ± 5.1 SD (range 1-36). Figure 5 shows the distribution of all groups encountered during the survey. Table 5 presents total caribou observed and age-sex classification by range, core habitat, and RRA. A total of 128 calves were observed during the survey (Table 6). Overall boreal caribou recruitment to 10 months was 21 calves/100 females.

Table 4. Group size, total caribou observed, and age-sex classification by range for SCEK boreal caribou late winter recruitment surveys, northeastern British Columbia, 25 March to 03 April 2013.

Range	No. of Groups	Mean Group Size (± SD)	Min Group Size	Max Group Size	Total Caribou Observed	Classification				
						F	M	Juv	Unclass	Mature Males[1]
Chinchaga	35	6.1 ± 3.7	1	19	224	171	33	20	0	6
Chinchaga RRA	5	6.4 ± 4.2	1	11	32	18	8	6	0	0
Snake-Sahtaneh	44	7.3 ± 5.8	1	36	321	190	85	46	0	31
Calendar	14	9.6 ± 7.3	3	26	135	78	30	27	0	17
Maxhamish	18	7.3 ± 4.2	1	16	132	79	31	22	0	5
Prophet	6	5.8 ± 2.3	2	9	35	26	4	5	0	3
Parker	6	9.8 ± 6.1	4	18	59	45	12	2	0	6
Fort Nelson Core	2	7.0 ± 4.2			14	10	4	0	0	2
Total	130	n/a	1	36	952	617	207	128	0	70

[1] Mature males defined as Class II or III bulls (RIC 2002)

3.3 Range Summaries

3.3.1 Chinchaga Range

Eight capture sessions were conducted in the Chinchaga Range between 17 January and 04 March 2013, including 6 in the Milligan Core and 2 in the Etthithun Core (Table 3). No caribou were found in Etthithun during the January 17 session; however, a local helicopter pilot reported seeing several caribou in the area in December 2012. Four caribou (1F, 3M) were located during a fixed-wing reconnaissance flight of Etthithun on February 23; the female was subsequently collared on 04 March. A total of 20 collars were deployed in the Milligan and Etthithun cores, representing 13% of the minimum population count derived from the late winter recruitment survey.

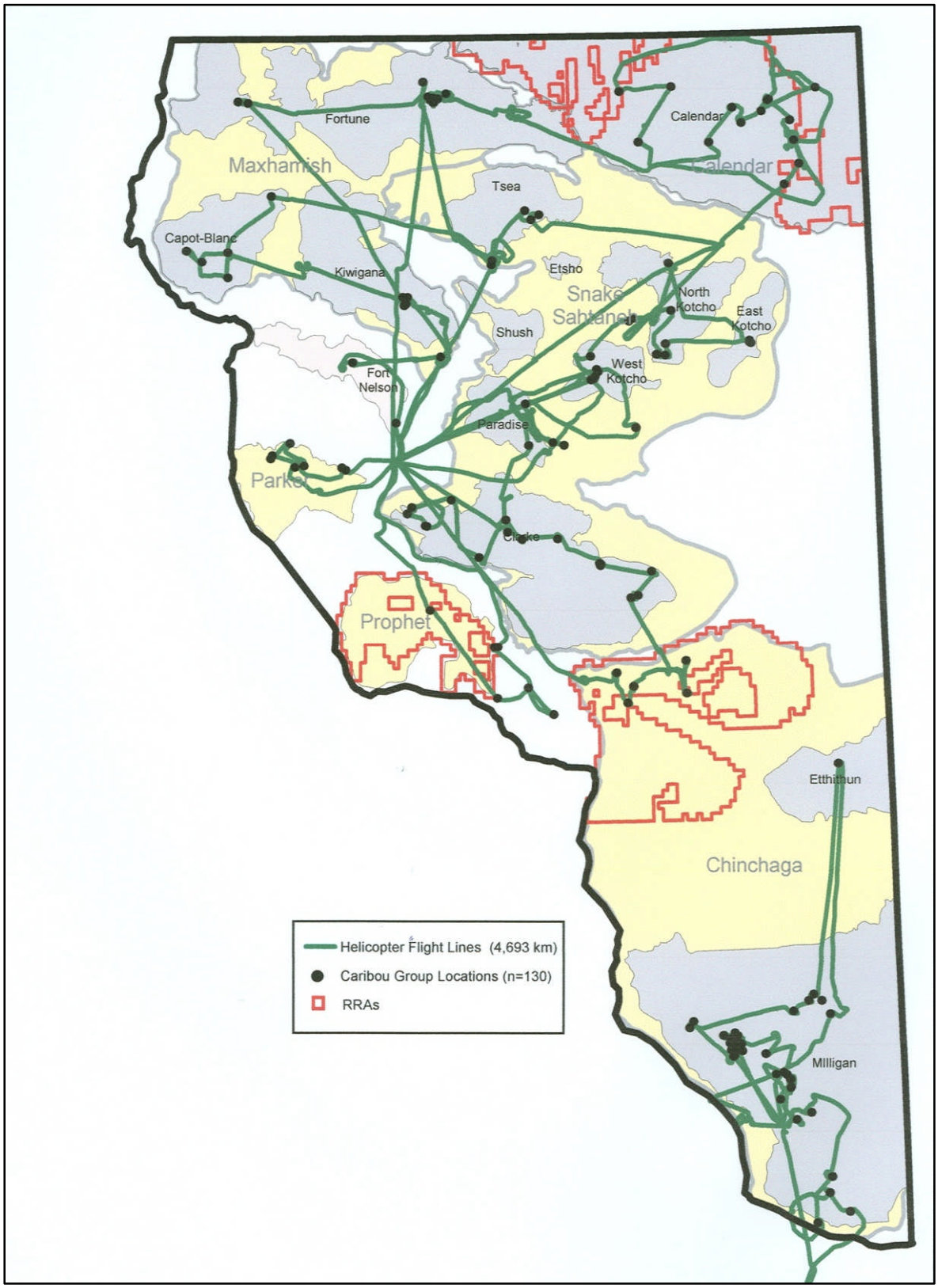


Figure 5. Location of boreal caribou groups and helicopter flight lines, SCEK late winter recruitment survey, northeastern British Columbia, 25 March to 03 April 2013.

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, 25 March to 03 April 2013.

Range	Core	Adult Females	Adult Males	Calves	Mature Males[1]	Total
Chinchaga	Milligan	170	30	20	4	220
	Etthithun	1	3	0	2	4
	RRA-A	18	8	6	0	32
		189	41	26	6	256
Snake-Sahtaneh	Clarke	57	28	9	6	94
	Clarke-OS[2]	1	1	0	0	2
	East Kotcho	17	7	8	1	32
	North Kotcho	25	9	13	3	47
	North Kotcho-OS	5	6	2	5	13
	Paradise	11	4	1	2	16
	Paradise-OS	4	1	2	1	7
	Tsea	42	8	5	1	55
	Tsea-OS	1	2	0	2	3
	West Kotcho	25	13	5	4	43
	West Kotcho-OS	2	6	1	6	9
		190	85	46	31	321
Calendar	Calendar[3]	69	25	24	16	118
	RRA-C	1	1	1	0	3
	RRA-D	8	4	2	1	14
		78	30	27	17	135
Maxhamish	Capot-Blanc	12	4	1	3	17
	Fortune	38	15	16	1	69
	Kiwigana	25	11	3	1	39
	Kiwigana-OS	4	1	2	0	7
		79	31	22	5	132
Prophet	Prophet-OS	15	1	4	1	20
	RRA-B	11	3	1	2	15
		26	4	5	3	35
Parker	Parker	45	12	2	6	59
		45	12	2	6	59
Undifferentiated	Fort Nelson	10	4	0	2	14
		10	4	0	2	14
		617	207	128	70	952

[1] Mature males defined as Class II or III bulls (RIC 2002)

[2] OS - outside core habitat

[3] Calendar Range excluding portions encompassed by RRA-C and RRA-D

Table 6. Age-sex composition and calves per 100 females for boreal caribou ranges and RRAs from SCEK late winter recruitment surveys, northeastern British Columbia, 25 March to 03 April 2013.

Range	Adult Females	Adult Males	Calves	Total	Calves/100 Females
Chinchaga[1]	171	33	20	224	11.7
Chinchchaga RRA-A	18	8	6	32	33.3
Snake-Sahtaneh	190	85	46	321	24.2
Calendar Total	78	30	27	135	34.6
Calendar[2]	69	25	24	118	34.8
Calendar RRA-C	1	1	1	3	n/a
Calendar RRA-D	8	4	2	14	25.0
Maxhamish	79	31	22	132	27.8
Prophet Total	26	4	5	35	19.2
Prophet RRA-B	11	3	1	15	9.1
Parker	45	12	2	59	4.4
Fort Nelson	10	4	0	14	0.0
	617	207	128	952	20.7

[1] Chinchaga Range excluding portions encompassed by Chinchaga RRA-A

[2] Calendar Range excluding portions encompassed by RRA-C and RRA-D

[3] Prophet Range including RRA-B and caribou found outside range boundaries

At the time of the 25 March recruitment survey, 1 caribou (SCEK028) was transmitting a mortality signal. A site investigation confirmed the cause of death was wolf predation. The collar was retrieved, but because the extent of damage was uncertain, it was not immediately re-deployed.

Excluding the RRA, a total of 224 caribou were counted in the BC portion of the Chinchaga Range on 25 March 2013, with a recruitment rate of 11.7 calves/100 females (Table 6).

3.3.2 Chinchaga RRA

A group of 11 caribou were spotted incidentally in the northern portion of the Chinchaga RRA-A during the SCEK January 2013 moose survey (D. Webster, pers. comm.). On 26 January, 15 caribou were located at the coordinates and 2 ATS and 1 VHF collars were deployed. Two caribou were observed during a 23 February 2013 fixed-wing reconnaissance. On a subsequent capture session on 01 March, a mixed group of 12-13 animals was found at that location; an additional 2 Vectronic and 2 VHF collars were deployed.

Using the 7 active collars, a total of 32 caribou were located in 5 groups during the 30 March 2013 recruitment survey, with a recruitment rate of 33.3 calves/100 females. Based on this minimum population count, 22% of caribou found in the Chinchaga RRA were fitted with radio-collars.

3.3.3 Snake-Sahtaneh Range

Forty-five radio-collars were deployed in the Snake-Sahtaneh Range between 08 January and 28 February 2013. An additional 11 collars were transferred from the original allotment of Calendar collars (*see below*) and deployed in the Clarke Core from March 01-03 to address gaps in collar distribution for the late winter recruitment survey. A total of 56 collars were deployed in 6 cores in the Snake-Sahtaneh Range in 12 capture sessions. Three collars were deployed outside the defined cores, including 2 VHF collars in a group of 11 caribou (2F, 9M) and 1 ATS collar in a group of 7 caribou (4F, 3M) south and west of North Kotcho, respectively. The Shush and Etsho cores were searched on 3 occasions; old caribou sign (tracks and cratering) was observed but no caribou were located.

A total of 321 Snake-Sahtaneh caribou were located in 44 groups during the March 30-31, 2013 recruitment survey, including 34 animals located outside core areas. The recruitment rate was 24.2 calves/100 females (Table 6). Based on this minimum population count, 17% of caribou found in the Snake-Sahtaneh Range in late winter 2013 were radio-collared.

3.3.4 Calendar Range Including RRA-C and RRA-D

The Calendar Range was searched by helicopter on 3 different dates, as well as on 1 fixed-wing reconnaissance and during ferry flights to and from unrelated projects in the southern NT. Despite this search effort, fewer caribou than anticipated were found. On subsequent sessions, the capture crew frequently located groups containing previously collared animals without the aid of telemetry, suggesting that the majority of animals were concentrated in the central portion of the range and that significant numbers of unmarked groups were not being missed. To avoid saturation of groups, excess collars originally allocated to the Calendar Range were transferred to the Clarke and Milligan cores of the Snake-Sahtaneh and Chinchaga ranges, respectively, to address gaps in collar distribution for the late winter recruitment surveys.

One caribou (SCEK126), in a group of 4 (1F, 2M, 1 calf), was collared within RRA-C, in the western portion of the Calendar Range. Seven caribou were captured and fitted with radio-collars within the boundaries of RRA-D, in the eastern portion of the Calendar Range, including 2 ATS, 1 Vectronic, and 4 VHF collars.

Calendar caribou SCEK113 (VHF150.030) was not found during the 03 April 2013 survey. Immediately following completion of the survey, the Tsea Core and eastern portion of the Fortune Core were revisited to determine whether the animal had moved to one of these adjacent areas. As VHF collars are typically not prone to signal failure, it was assumed SCEK113 had moved outside the search area into either the adjacent Dehcho (NT) or Bistcho (northwestern AB) range.

A total of 135 Calendar caribou were counted in 14 groups during the 03 April 2013 recruitment survey, including 3 and 14 animals in RRA-C and RRA-D, respectively. The recruitment rate was 34.6 calves/100 females. Based on the minimum count, 20% of caribou found in the Calendar Range in late winter 2013 were radio-collared.

3.3.5 Maxhamish Range

Six capture sessions were conducted in the Maxhamish Range between 17 December 2012 and 27 February 2013, resulting in the deployment of 23 radio-collars. Two mortalities (1 Vectronic, 1 VHF) were detected in the Fortune Core on 01 April 2013 during the recruitment survey. Both collars were retrieved and immediately re-deployed, for a total of 25 individual caribou collared in the Fortune Core using 23 collars over 7 capture sessions.

A total of 132 Maxhamish caribou were located in 18 groups during the 31 March-01 April 2013 recruitment survey, with a recruitment rate of 24.2 calves/100 females. A group of 7 caribou were located outside the Kiwigana Core. Based on the minimum population count and a total of 23 collars deployed on live animals at the end of the recruitment survey, 17% of caribou found in the Maxhamish Range in late winter 2013 were radio-collared.

3.3.6 Prophet Range Including RRA-B

Eight caribou were radio-collared during 3 capture sessions in the Prophet Range between 25 January and 01 March 2013, including 4 animals located to the south of the current range boundary. The ATS collar retrieved from the Chinchaga mortality on 25 March was re-deployed during the Prophet recruitment survey on 01 April, for a total of 9 caribou collared in 4 capture sessions. Five of these were previously collared animals recaptured to recover and replace failed GPS collars.

Including the area encompassed by the range and RRA-B, as well as outside the range, a total of 35 caribou in 6 groups were counted during the 01 April survey. The overall recruitment rate was 19.2

calves/100 females. Based on the minimum population count, 26% of caribou found in the Prophet Range in late winter 2013 were radio-collared.

3.3.7 Parker Range

Seven caribou were collared during 1 capture session in the Parker Range on 07 January 2013, including 5 animals recaptured to replace failed ATS collars.

A total of 59 caribou were located in 6 groups during the 30 March 2013 Parker recruitment survey. Forty-five adult females and 2 calves were counted, for a recruitment rate of 4.4 calves/100 females. Based on this minimum population count, 12% of caribou found in the Parker Range in late winter 2013 were fitted with radio-collars.

3.3.8 Fort Nelson Core

Two radio collars (1 ATS, 1 VHF) were deployed on caribou in the undifferentiated Fort Nelson Core on 18 December 2012. Using the ATS collar returned to the manufacturer for repair prior to initial deployment, a third caribou was collared from a group of 10 located during the 01 April recruitment survey.

A total of 14 caribou (10F, 4M) were located in 2 groups during the survey; based on these results, there was no recruitment into the subpopulation within the Fort Nelson Core in 2013. As of 01 April 2013, 14% of caribou found alive in the Fort Nelson Core had been fitted with radio-collars, however, 2 of 3 collared caribou were killed by wolves between that date and 06 April 2013 (*see section 3.4*), leaving only 1 ATS collar active.

3.4 Caribou Mortalities

Between 17 December 2012 and 07 April 2013, 17 boreal caribou were found to have died of natural causes, including 14 cases of wolf predation, 2 natural non-predation deaths, and 1 unknown cause. These mortalities included 6 radio-collared animals from the current SCEK collaring program, 5 existing collars, and 6 unmarked animals. Of the 2 non-predation deaths, the first animal (BC1064; Iridium 149.333) was found intact and frozen. The caribou was slung by helicopter to a road-accessible site, then transported to Fort St. John and stored frozen pending necropsy by the Provincial Wildlife Veterinarian. Results of the necropsy and associated tissue pathology analysis indicated poor condition as the cause of death (H. Schwantje, DVM, pers. comm.). The second animal was scavenged by

predators between the time of first observation during the recruitment survey and returning to recover the carcass two days later. A field *post-mortem* assessment was completed and all available organs and tissue samples were collected.

High snow accumulations (>100 cm) and hard crusting occurred throughout all BC boreal caribou ranges in late winter 2013. In the Fortune Core of the Maxhamish Range, deep, crusted snow, coupled with ploughed winter access associated with active gas exploration, contributed to increased caribou vulnerability to wolf predation during March and April. During this period, the majority of Fortune caribou had become concentrated within a relatively intact lake complex in the centre of the core. While investigating 3 recently killed Fortune caribou on April 1, including 2 collared animals (SCEK077 and SCEK084) and 1 uncollared, a wolf pack was back-tracked from a kill site on a small lake to a ploughed water source access on the same lake, back to the adjacent ploughed winter road network originating from upland habitat to the south. Similar conditions occurred in the Calendar Range, where an active late-winter 3D seismic program encompassed several areas of intensive caribou use in the east-central portion of the range. Although no mortality of collared caribou occurred during late winter, tracks of both caribou and wolves were observed on open seismic lines on numerous occasions.

A group of 10 caribou (Grp #2) were found in a patch of good habitat in the Fort Nelson Core during the late winter recruitment survey, including SCEK008 (VHF collar). A second caribou (SCEK162; ATS collar) was collared in the group at that time. On 06 April 2013, following completion of the recruitment survey, radio-collared wolves from the Tsimeh Pack were tracked to UTM 10.512040.6551578, where 4 of 10 caribou in Grp #2 were found dead, including both collared animals. The 4 caribou killed by the Tsimeh pack were either partially consumed or killed and left uneaten. Despite >100 cm of snow, the remaining Grp #2 caribou left the area. The animals were tracked by helicopter from the kill site for several km, however, the search was aborted prior to finding them.

3.5 Incidental Observations

A total of 239 moose in 178 groups, ranging from 1 to 9 animals, and 52 bison (11 groups) were incidentally observed in the boreal caribou ranges and adjacent river corridors during winter 2013 field activities[2], including 10 moose observed during the late winter recruitment surveys (Fig. 6).

[2] No observations available for Milligan Core on January 30-31, therefore, relative moose occurrence in Chinchaga Range is under-represented.

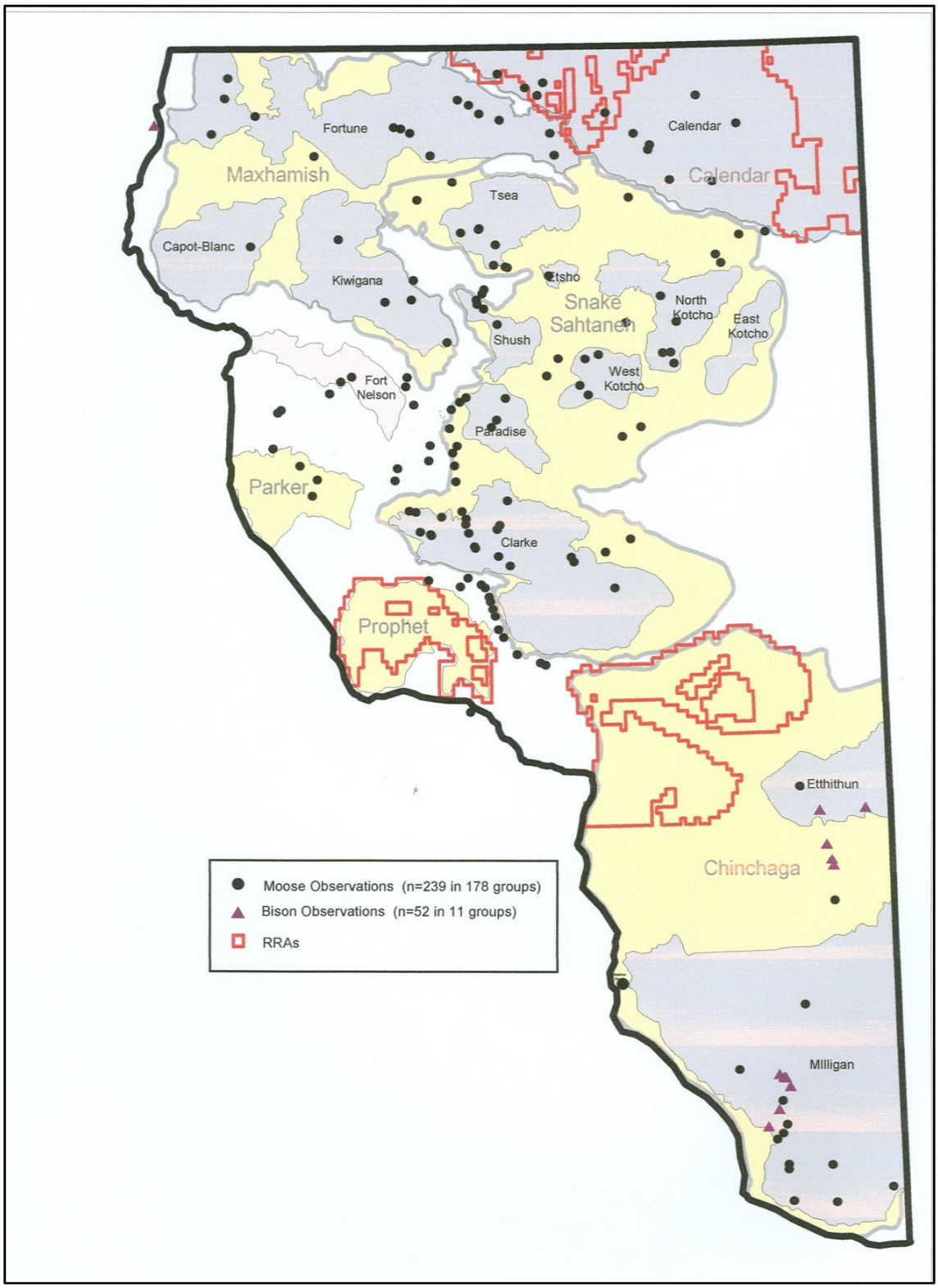


Figure 6. Incidental observations of moose and bison in boreal caribou ranges during SCEK collar deployment and late winter recruitment surveys, Jan-April, 2013.

A total of 38 individual wolves in 8 packs were counted during the December 2012-April 2013 collar deployment and recruitment survey period (Table 7).

Table 7. Radio-collared wolf packs active in boreal caribou ranges in northeast British Columbia, December 2012-April 2013.

Pack Name	Core	Minimum Pack Size	# Wolves Collared
Big Arrow	Milligan	6	3
Clarke	Clarke	2	2
Elleh	Clarke	2	2
Parker	Parker	3	2
Prophet	Clarke/Prophet	3	1
Snake	Paradise	10	6
Tsimeh	Fort Nelson	6	4
West Clarke	Clarke	6	3
8	6	38	23

A number of other potential caribou predators were observed in the cores during field activities, including 3 wolverine, 5 lynx, and 1 golden eagle. In early March, 1 wolverine was found in the midst of a group of 15 caribou in the Calendar RRA-D and a second was observed excavating 2 adjacent beaver lodges in the Clarke Core. A third wolverine was observed on a beaver lodge in the Calendar Range on April 03.

On 27 February, the capture crew witnessed a lynx attack on a young adult male caribou trotting along a ploughed road. The lynx launched itself off a high snow berm at the edge of the right-of-way onto the passing caribou. Although the lynx attached itself to the animal's flank, it was unable to maintain the position and the attack was ultimately unsuccessful.

Drought conditions in summer and fall 2012 resulted in very low stream flows by early October, with a high potential for winter dewatering of beaver impoundments (Culling and Culling, pers. observ.; MFLNRO beaver cache survey, Oct 6-8, 2012). By March 2013, despite over 100 cm of accumulated snow, sign of beaver activity outside lodges was observed at several sites throughout the ranges.

Three otters (*Lontra canadensis*) and numerous flocks of sharp-tailed grouse (*Tympanuchus phasianellus*) were also observed.

In addition to the 17 caribou described in Section 3.4, 17 mortality sites of other ungulate species were found during the course of 2013 field activities, including 11 moose, 2 elk, and 4 unknown species. Although the cause of mortality was not confirmed for these incidental observations, wolf sign was observed at all sites.

4 DISCUSSION

Capture and Collar Deployment

The collared sample size accounted for approximately 17% of all caribou observed during the 2013 late winter recruitment survey (minimum population count). This proportion was higher in the Prophet Range as replacing existing failed GPS collars and insuring adequate GPS collars were available to support ongoing refinement of the range boundaries were priorities.

Based on over a decade of caribou capture in BC's boreal ranges, observations of winter ticks on caribou are becoming more frequent (Culling and Culling, pers. observ.). Winter ticks appear to be undergoing a northward range expansion (H. Schwantje, pers. comm.). In February 2013, winter ticks were observed on boreal caribou in the Hay River Lowlands, Northwest Territories (Culling and Culling, pers. observ.). While Samuel (2004) states that winter ticks have been historically present, but not prevalent, on moose in the southern Northwest Territories, observations of ticks on boreal caribou have been rare (A. Kelley, pers. comm.). Hair loss resulting from rubbing to relieve tick-related irritation, as well as time and energy spent grooming over foraging, could impair boreal caribou condition, particularly during extended periods of cold weather in late winter.

Minimum Population Counts

Due to their wide distribution and low-density use of habitats with low sightability, accurate estimates of boreal caribou population size using standard ungulate inventory techniques are difficult to obtain (MOE 2010). However, with sufficient sample sizes of collared animals, minimum population counts recorded during aerial surveys may approach actual population size in some ranges, where survey conditions, sightability, and seasonal distributions are favourable. It is important to recognize the

distinction between minimum population counts (i.e., number of caribou observed during a survey) and a total population estimate.

While information on minimum population counts within BC's boreal caribou ranges has been accumulated through a number of telemetry studies over the past decade, these projects have been based on variable samples sizes of collars and have been limited in scope to either single ranges or portions of multiple ranges. The 2013 SCEK recruitment surveys provided the first opportunity to document relative caribou numbers in all BC boreal ranges simultaneously.

In February 2004, a moose and boreal caribou inventory of management units MU 7-55 and 7-56, which encompass the Calendar and Snake-Sahtaneh ranges, was conducted by MWLAP (MWLAP 2004). Caribou densities derived from the inventory were used to establish range-specific population estimates to support the recovery planning process undertaken by the *Boreal Caribou Technical Advisory Committee* (Table 8). Acknowledging the limitations of the available data, MWLAP (2004) suggested a population estimate of 1500 $\pm$ 300 (1200-1800) boreal caribou within the entire extent of their occurrence in BC. This estimate was a refinement of an earlier regional estimate of approximately 750 caribou reported in a status update by Heard and Vagt (2008).

Table 8. Comparison of the 2004 boreal caribou population estimate by range and 2013 late winter recruitment survey minimum population count.

Range	2004 Population Estimate for Range[1] (lower and upper estimate)	2013 Late Winter Recruitment Survey Minimum Population Count	Percent of 2004 Lower Estimate
Chinchaga[2, 3]	483 (433-533)	256	59
Snake-Sahtaneh	365 (359-371)	321	89
Maxhamish	306 (220-392)	132	60
Calendar	291 (154-429)	135	88
Prophet Core	54 (28-79)	35	125
Parker Core	13 (7-19)	59	843
Fort Nelson Core	n/a	14	n/a
Total	1512 (1201-1823)	952	

[1] Based on MWLAP 2004 estimate reported in Culling *et al* . 2004

[2] British Columbia portion of the contiguous BC/AT Chinchaga Range

[3] Including Chinchaga RRA-A

The 2013 minimum population counts for the 4 major caribou ranges (Chinchaga, Snake-Sahtaneh, Maxhamish, and Calendar) are roughly 10% to 40% less than their 2004 lower population estimates (Table 8). The 2004 estimates were based on a coarse-scale assessment of habitat suitability made during the range delineation process described in Culling *et al*. (2004), which attempted to capture the majority of treed peatlands important to caribou. Calculating an average density of caribou over the 34,260 km² 2004 survey area (MWLAP 2004) may have masked some variability within and between ranges. Applying a uniform density over the entire BC extent of boreal caribou occurrence may have resulted in an overestimate of the actual 2004 population in some ranges, particularly for the Chinchaga and Maxhamish.

Late Winter Recruitment

Variable sample sizes of collared animals, as well as differences in timing and geographic area of surveys (i.e., portions of multiple ranges) confound direct comparisons with historic calf recruitment surveys. Rowe reported recruitment of approximately 17 calves/100 females in March 2005 in the Chinchaga Range (Rowe 2007a) and 6 calves/100 females for a March 2006 survey of the Maxhamish Range (Rowe 2007b). In the Snake-Sahtaneh Range, Culling *et al*. (2006) reported March recruitment of 5 calves/100 cows and 9 calves/100 cows in 2003 and 2004, respectively. In the Calendar Range[3], Culling and Culling (2013) found 24 calves/100 cows and 15 calves/100 cows in March 2008 and 2009, respectively.

While not directly comparable to late winter recruitment surveys, work by Thiessen (2009) and DeMars *et al*. (2011, 2012) provide additional information on calf survival in BC's boreal caribou ranges. During an October 2008 (rut) survey of the Parker Range, Thiessen (2009) reported 25 calves/100 cows (n=25 caribou). DeMars *et al*. (2011) tracked the fate of 20 calves between 07 May and 17 July 2011, in a study area that encompassed portions of 4 different ranges; the cow/calf ratio to the end of the neonate period (6 weeks) was 28 calves/100 cows. In 2012, DeMars *et al*. (2012) tracked calf survival to 4 weeks of age (19 May to 09 July 2012). They estimated that 17 of 23 collared females calved, with 6 of the 17 calves surviving to 4 weeks of age (26 calves/100 females).

In recommending performance indicators for RRAs, Cichowski *et al*. (2012) suggested recruitment be averaged over 3 years (2012/13, 2013/14, and 2014/15), therefore results of the 2013 late winter

[3] Based on 15 Nexen collars and 2 AB collars within the Calendar Range at the time of the March 2009 survey; 6 Nexen collars active in the Tsea Core of the Snake-Sahtaneh Range were excluded.

surveys should be interpreted with caution. Although noting that thresholds can vary depending on survival of adult females, Environment Canada (2008) suggests a minimum recruitment rate of 28.9 calves/100 females as a guideline for evaluating the probability of caribou persistence. With the exception of the Calendar Range and Chinchaga RRA-A, recruitment in all boreal caribou ranges and resource review areas surveyed fell below the recommended threshold. However, recruitment for the Maxhamish Range was just marginally lower. Estimates of recruitment for subgroups may reflect varying sample size of caribou observed.

Caribou Mortality

In late winter 2013, boreal caribou in the Maxhamish Range were concentrated in small, central portions of the Kiwigana, Capot Blanc, and Fortune cores. Cichowski *et al*. (2012) note that as caribou population size decreases, animals tend to occupy less of their range, often contracting into the best habitat. This contraction is frequently associated with increasing group size. Contracting distribution within the ranges can lead to increased vulnerability to wolf predation, as observed in late March and early April in the Fortune and Fort Nelson cores. Hummel and Ray (2008) note how small populations of caribou are increasingly susceptible to "plain bad luck." During the late winter of 2013, caribou were observed to have extreme difficulty moving through deep, crusted snow and many individual groups exhibited little movement off previously cratered patches. During the latter phase of this period (early April), wolves were able to travel efficiently over the snow crust and access areas of caribou concentration with relatively little effort. A series of successive events such as this could have a significant impact on caribou populations at a local level.

Range and Core Delineation

The 2012-13 capture and collaring program and subsequent recruitment surveys provided the first comprehensive opportunity to compare conditions between ranges. Telemetry data collected during the current project, combined with studies completed over the past decade, will allow further refinement of BC's boreal caribou ranges and cores. This may include both delineating new areas of use (e.g., Fort Nelson Core), as well as adjusting boundaries of existing ranges and cores to exclude areas shown not to be of value to boreal caribou, as recommended in Culling *et al*. (2004). Care must be taken in the latter case to ensure that any areas removed are truly of lower value; given the potential for long-term range rotation, the absence of telemetry data alone is not sufficient grounds for exclusion. The assumption that boreal caribou shift their use over broad areas temporally is supported by observations from the Tsea Core of the Snake Sahtaneh Range. During initial collar deployment for the Nexen study,

the Tsea Core was searched intensively on 3 occasions in January and February 2008, with no caribou or recent sign of caribou activity found (Culling and Culling 2013). In contrast, a loose grouping of 44 caribou was found in the same area during collar deployment on 06 February 2013. As well, potential for shifts in caribou use within identified ranges in response to industrial development activities over the long-term should be recognized.

No caribou or caribou sign was found in the western portion of the Calendar Range during the current project. During capture work associated with the Nexen Calendar study, efforts were made to distribute collars as widely as possible throughout the range; however, no collars were deployed west of Hossitl Creek (Culling and Culling 2013). Pending the collection of additional GPS data from the current project, it may be appropriate to contract the Calendar Core into the central and eastern portions of the Calendar Range, with the area to the west maintained as matrix habitat within the range.

Delineation of the Prophet Range has been an adaptive process, with range boundaries evolving as additional radio-telemetry was collected. In 2004, the area was classified as the Prophet Core within an *undifferentiated range* based on available habitat and numerous caribou sightings (Culling *et al*. 2004). GPS data collected by BC Environment (Thiessen 2009) provided support for the expansion of the boundaries southeastward in 2010. Additional telemetry (DeMars *et al*. 2011) and the current project indicate a need for a further southeast extension of the range, while areas within the existing western boundary should be re-evaluated in terms of their importance to boreal caribou. It is anticipated that with the completion of the current radio-telemetry project, sufficient information on boreal caribou movements and habitat use will have been collected to adequately describe the boundaries of the Prophet Range.

4.1 Recommendations

- During the 2004 range delineation process the *Fort Nelson core* was identified as an area of interest due to the presence of suitable boreal caribou habitat but an apparent absence of caribou and lack of linkage to existing ranges. It was assumed that the status of this area would be finalized subject to future monitoring. In 2011, MFLRO located caribou within this area and deployed a small number of collars to confirm the presence of resident caribou. During the 2013 SCEK collaring program, 3 additional caribou were collared in the Fort Nelson core, however, 2 were killed by wolves during the course of the winter. It is recommended that

additional GPS collars be deployed in the Fort Nelson core during winter 2013/14 to gather information to support final designation of this area.

- Although late winter adult mortality in boreal caribou appears to have been higher than normal in 2012/13, poor health and condition appears to have played a role in mortality as early as mid-December. It is recommended that the role of health and condition in boreal caribou population trends be further investigated. This may, in part, involve providing Drs. John and Rachel Cook further opportunity to collect ultrasonic condition information on boreal caribou captured for the purpose of collar re-deployment, as well as the initiation of further health studies coordinated through the Provincial Wildlife Veterinarian.

REFERENCES

Boisjoly, D., Jean-Pierre Ouellet, and Réhaume Courtois. 2010. Coyote habitat selection and management implications for the Gaspésie Caribou. J. Wildlife Management 74(1):3–11.

Cichowski, D., D. Culling, and S. McNay. 2012. Performance measures for resource review areas for woodland caribou in British Columbia. Prep. for Ministry of Forests, Lands and Natural Resource Operations, Prince George, BC. 60p.

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. 2013. Boreal caribou ecology and seasonal habitat use in the Calendar Range and Tsea Core Habitat, Snake-Sahtaneh Range, northeastern British Columbia – 2008 to 2010. Prep. for Nexen Inc., Calgary, AB.

DeMars, C., C. Thiessen, and S. Boutin. 2011. Assessing Spatial Factors Affecting Predation Risk to Boreal Caribou Calves: Implications for Management: 2011 Annual Report.

DeMars, C., D. Leowinata, C. Thiessen, and S. Boutin. Assessing Spatial Factors Affecting Predation Risk to Boreal Caribou Calves: Implications for Management - 2012 Annual Report. 45p.

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.

Fort St. John LRMP. 1997. Fort St. John Land and Resource Management Plan. Prep. by Fort St. John LRMP Working Group, Fort St. John, BC. 203pp + map.

Fort Nelson LRMP. 1997. Fort Nelson Land and Resource Management Plan. Prep. by Fort Nelson LRMP Working Group, Fort Nelson, BC. 178pp + map.

Gustine, D. D., K. L. Parker, R. J. Lay, M. P. Gillingham, D.C. Heard. 2006. Calf survival of woodland caribou in a multi-predator ecosystem. Wildlife Monographs, No. 165:1-32.

Heard, D.C., and K.L. Vagt. 1998. Caribou in British Columbia: a 1996 status report. Rangifer Special Issue 10: 117-123.

Hummel, M., and J.C. Ray. 2008. Caribou and the North: A Shared Future. Dundurn Press, Toronto, ON. 288p.

Latham, A. D. M. 2009. Wolf ecology and caribou-primary prey-wolf spatial relationships in low productivity peatland complexes in northeastern Alberta. Ph.D. thesis, University of Alberta, Edmonton, AB.

MEMPR (Ministry of Energy, Mines and Petroleum Resources). 2010. Province takes action to manage boreal caribou. Information Bulletin 2010EMPR0027-000734 June 21, 2010. Victoria, BC.

MWLAP (Ministry of Water, Land and Air Protection). 2004. Moose and boreal caribou inventory, Management Units 7-55 and 7-56, February 2004. Unpubl. report, Environmental Stewardship Division, Ministry of Water, Land and Air Protection, Fort St. John, BC.

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.

Rowe, M.R. 2007a. Boreal caribou and wolf movement and habitat selection within the Chinchaga Range. Peace Region Technical Report, Fish & Wildlife Section, Ministry of Environment, Fort St. John, BC.

Rowe, M.R. 2007b. Boreal caribou movement and habitat selection within the Maxhamish Range. Peace Region Technical Report, Fish & Wildlife Section, Ministry of Environment, Fort St. John, BC.

Samuel, W.M., 2004. White As A Ghost: Winter Ticks And Moose. Federation of Alberta Naturalists, Edmonton, AB. 100p.

Thiessen, C. 2009. Boreal caribou monitoring: annual report 2008-09. Peace Region Technical Report, Fish & Wildlife Section, Ministry of Environment, Fort St. John, BC. 36p.

Personal Communications

Allicia Kelly, South Slave Regional Biologist, Environment and Natural Resources, Government of the Northwest Territories, Fort Smith, NT.

Helen Schwantje, DVM, M.SC., Wildlife Veterinarian, Ministry of Environment, Victoria, BC.

Dan Webster, Eco-Web Ecological Consulting Ltd., Fort St. John, BC.

APPENDICES

Appendix I: Comparison of historic Environment Canada weather station data for Fort St. John and Fort Nelson, British Columbia, and Fort Simpson, Northwest Territories, 1971-2000. (http://climate.weatheroffice.gc.ca/climate_normals/results).

Env Canada Weather Stn	January Temperature (°C)			July Temperature (°C)			Annual Precipitation			Average Feb[1] Snow Depth (cm)	Snow Depth at Month-end (cm)			
	Daily Average (°C)	Daily Max (°C)	Daily Min (°C)	Daily Average (°C)	Daily Max (°C)	Daily Min (°C)	Total Precip (mm)	Rainfall (mm)	Snowfall (cm)		Jan	Feb	Mar	Apr
Fort St. John, BC (N56°14')	-14.2 ± 5.7 SD	-9.9	-18.4	15.7 ± 1.1 SD	21.2	10.2	465.6	312.6	185.6	31	31	29	16	0
Fort Nelson, BC (N58°50')	-21.2 ± 4.5 SD	-16.8	-25.6	16.8 ± 1.1 SD	23.0	10.6	451.7	319.8	177.8	51	47	52	41	0
Fort Simpson, NT (N61°45')	-25.4 ± 4.7 SD	-20.8	-29.9	-17.2 ±	23.6	10.7	369	224	170.3	48	44	50	46	6

[1] February typically had the highest average snow depth value for the 3 weather stations during the period 1971-2000.

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK001	BC1049	Active	MAX	CPB	17-Dec-2012	VHF	151.291	VHF17691	10	476981	6587377	4	Y	Replaced ATS 149.054
SCEK002	BC1048	Active	MAX	CPB	17-Dec-2012	ATS	148.555	031726	10	484737	6596809	2	Y	Replaced ATS 149.104
SCEK003	BC1051	Active	MAX	KWG	17-Dec-2012	ATS	148.185	031716	10	527698	6570998	8	N	Replaced ATS 149.073
SCEK004	BC1050	Active	MAX	KWG	18-Dec-2012	VHF	151.339	VHF17694	10	521572	6571094	2	N	Replaced ATS 149.133
SCEK005	new	Active	MAX	KWG	18-Dec-2012	ATS	148.494	031724	10	522114	6570403	2	Y	
SCEK006	BC1053	Active	MAX	KWG	18-Dec-2012	VHF	151.270	VHF17690	10	522794	6570288	8	N	Replaced ATS 149.244
SCEK007	new	Active	MAX	CPB	18-Dec-2012	ATS	149.256	031734	10	476947	6587287	2	N	
SCEK008	new	MORT	FN	FN	18-Dec-2012	VHF	151.350	VHF17695	10	499524	6559036	2	N	Mort discovered April 06, 2013 - Tsimeh pack killed 4 of 10 in grp, including SCEK008 and SCEK162
SCEK009	BC1055	Active	FN	FN	18-Dec-2012	ATS	148.535	031725	10	510945	6550713	5	N	Replaced ATS 149.083
SCEK010	BC1039	Active	PRK	PRK	7-Jan-2013	VHF	151.190	VHF17684	10	493473	6523525	4	Y	Replaced ATS 149.023
SCEK011	BC1038	Active	PRK	PRK	7-Jan-2013	VHF	151.209	VHF17686	10	492399	6523530	5	N	Replaced ATS 149.173
SCEK012	BC1041	Active	PRK	PRK	7-Jan-2013	VHF	151.239	VHF17688	10	491211	6522817	5	N	Replaced ATS 149.142
SCEK013	BC1042	Active	PRK	PRK	7-Jan-2013	VHF	150.929	VHF17664	10	502024	6517478	4	N	Replaced ATS 149.045
SCEK014	new	Active	PRK	PRK	7-Jan-2013	ATS	148.373	031749	10	501355	6517672	4	N	
SCEK015	BC1040	Active	PRK	PRK	7-Jan-2013	VHF	151.359	VHF17696	10	491404	6526264	3	N	Replaced ATS 149.062
SCEK016	new	Active	PRK	PRK	7-Jan-2013	ATS	148.136	031748	10	503857	6520173	2	N	
SCEK017	new	Active	SNS	CLR	8-Jan-2013	ATS	149.223	030313	10	547678	6504810	10	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK018	BC1062	Active	SNS	CLR	8-Jan-2013	VHF	151.301	VHF17692	10	546957	6504656	10	N	Replaced ATS 149.014
SCEK019	new	Active	SNS	CLR	8-Jan-2013	VHF	151.049	VHF17674	10	547067	6503525	13	N	
SCEK020	new	Active	SNS	CLR	8-Jan-2013	ATS	148.325	031720	10	548899	6503482	6	N	
SCEK021	new	Active	SNS	CLR	8-Jan-2013	VHF	151.099	VHF17679	10	548390	6502905	6	N	
SCEK022	BC1058	Active	SNS	PRD	8-Jan-2013	VHF	151.089	VHF17678	10	556757	6536996	5	N	Replaced ATS 149.193
SCEK023	new	Active	SNS	PRD	8-Jan-2013	VHF	151.160	VHF17683	10	556749	6537967	4	N	
SCEK024	new	Active	SNS	CLR	8-Jan-2013	VHF	151.250	VHF17689	10	588230	6489859	4	N	
SCEK025	BC1056	Active	SNS	CLR	8-Jan-2013	VHF	151.200	VHF17685	10	588173	6489781	5	N	Replaced ATS 149.164
SCEK026	new	Active	CHIN	MLL	17-Jan-2013	ATS	148.484	031723	10	658435	6300407	7	Y	
SCEK027	new	Active	CHIN	MLL	17-Jan-2013	VHF	151.039	VHF17673	10	658442	6299745	7	N	
SCEK028	new	Mort	CHIN	MLL	17-Jan-2013	ATS	148.575	031727	10	652508	6356719	12	N	Mort investigation conducted March 25, 2013 - confirmed wolf kill; collar retrieved, checked in office and redeployed on SCEK161 on 01 April, 2013 (Prophet Range).
SCEK029	new	Active	CHIN	MLL	17-Jan-2013	VHF	151.130	VHF1768	10	652316	6357046	12	N	
SCEK030	new	Active	CHIN	MLL	17-Jan-2013	VHF	152.019	VHF17745	10	644271	6333617	9	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK031	new	Active	CHIN	MLL	20-Jan-2013	ATS	149.223	031751	10	645362	6323578	7	N	
SCEK032	new	Active	CHIN	MLL	20-Jan-2013	VHF	151.119	VHF17681	10	645294	6324081	7	N	
SCEK033	new	Active	CHIN	MLL	20-Jan-2013	ATS	148.595	031728	10	644306	6333087	15	Y	
SCEK034	new	Active	CHIN	MLL	20-Jan-2013	VECT	149.800	12954	10	645609	6332107	31	N	
SCEK035	new	Active	CHIN	MLL	20-Jan-2013	VHF	150.970	VHF17667	10	645448	6332808	31	N	
SCEK036	new	Active	CHIN	MLL	20-Jan-2013	ATS	148.275	031718	10	628977	6343988	7	N	
SCEK037	new	Active	CHIN	MLL	21-Jan-2013	VHF	150.120	VHF17633	10	668109	6287157	7	N	
SCEK038	new	Active	CHIN	MLL	21-Jan-2013	ATS	148.285	031719	10	668119	6288845	7	N	
SCEK039	new	Active	CHIN	MLL	21-Jan-2013	VHF	151.829	VHF17730	10	657709	6298810	11	N	
SCEK040	new	Active	CHIN	MLL	21-Jan-2013	VECT	149.640	12951	10	647499	6317582	2	Y	
SCEK041	new	Active	CHIN	MLL	21-Jan-2013	VHF	151.000	VHF17670	10	648484	6318212	11	N	
SCEK042	new	Active	CHIN	MLL	21-Jan-2013	ATS	149.264	031735	10	625852	6351265	5	N	
SCEK043	BC1043	Active	PPH	RRA-B	25-Jan-2013	VHF	151.690	VHF17721	10	552621	6467374	17	N	Replaced ATS 149.231
SCEK044	new	Active	PPH	RRA-B	25-Jan-2013	ATS	148.153	031715	10	552333	6466152	17	N	
SCEK045	BC1045	Active	PPH	OS	25-Jan-2013	VHF	151.730	VHF17724	10	555356	6446726	10	N	Replaced ATS 149.154
SCEK046	new	Active	CHIN-RRA	RRA-A	26-Jan-2013	ATS	148.984	031750	10	581719	6455276	15	N	
SCEK047	new	Active	CHIN-RRA	RRA-A	26-Jan-2013	ATS	149.285	031736	10	581100	6454453	15	N	
SCEK048	new	Active	CHIN-RRA	RRA-A	26-Jan-2013	VHF	151.079	VHF17677	10	580903	6455009	15	N	
SCEK049	BC1044	Active	PPH	OS	26-Jan-2013	VHF	151.570	VHF17711	10	556330	6446681	11	N	Replaced ATS 149.114

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK050	new	Active	PPH	OS	26-Jan-2013	ATS	148.625	031729	10	556135	6446960	14	N	
SCEK051	BC1060	Active	PPH	OS	26-Jan-2013	VHF	151.529	VHF17707	10	567522	6450343	5	N	Replaced ATS 149.033
SCEK052	new	Active	CHIN	MLL	30-Jan-2013	VHF	152.001	VHF17743	10	629507	6345144	4	N	
SCEK053	new	Active	CHIN	MLL	30-Jan-2013	VHF	152.010	VHF17744	10	629238	6347513	5	N	
SCEK054	new	Active	CHIN	MLL	30-Jan-2013	VHF	152.049	VHF17748	10	621904	6347261	5	N	
SCEK055	new	Active	CHIN	MLL	31-Jan-2013	VECT	149.900	12956	10	613886	6347551	6	N	
SCEK056	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.030	VHF17746	10	614125	6347325	6	N	
SCEK057	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.059	VHF17749	10	611063	6351769	6	N	
SCEK058	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.040	VHF17747	10	609201	6351543	7	N	
SCEK059	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.070	VHF17750	10	625185	6347933	5	Y	
SCEK060	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.100	VHF17753	10	617284	6350132	7	N	
SCEK061	new	Active	CHIN	MLL	31-Jan-2013	VHF	152.080	VHF17751	10	645520	6332443	14	Y	
SCEK062	new	Active	MAX	KWG	2-Feb-2013	VHF	150.549	VHF17648	10	524253	6569038	5	Y	
SCEK063	new	Active	MAX	KWG	2-Feb-2013	VHF	150.390	VHF17646	10	527326	6572903	20	N	
SCEK064	new	Active	MAX	KWG	2-Feb-2013	VHF	150.439	VHF17647	10	527848	6572457	20	N	
SCEK065	new	Active	MAX	CPB	2-Feb-2013	VHF	150.270	VHF17641	10	476713	6594623	3	N	
SCEK066	new	Active	MAX	CPB	2-Feb-2013	VHF	151.470	VHF17703	10	463648	6586209	6	N	
SCEK067	BC1047	Active	MAX	CPB	2-Feb-2013	VHF	151.870	VHF17734	10	463277	6585672	6	N	Replaced ATS 149.092

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK068	new	Active	SNS	PRD	03-Feb-13	VHF	150.170	VHF17635	10	556632	6537483	~ 20	N	
SCEK069	new	Active	SNS	PRD	03-Feb-13	VECT	148.725	12946	10	557008	6537869	~ 20	N	
SCEK070	new	Active	SNS	PRD	03-Feb-13	VHF	151.920	VHF17737	10	559796	6540769	6	Y	
SCEK071	new	Active	SNS	WSK	03-Feb-13	VECT	148.850	12949	10	586284	6548310	12	Y	
SCEK072	new	Active	SNS	WSK	03-Feb-13	VHF	151.069	VHF17676	10	586632	6547446	7	N	
SCEK073	new	Active	SNS	WSK	03-Feb-13	VHF	151.960	VHF17740	10	587244	6547435	7	N	
SCEK074	new	Active	SNS	NRK	03-Feb-13	VHF	151.430	VHF17700	10	604797	6553862	4	N	
SCEK075	new	Active	SNS	NRK	03-Feb-13	VHF	151.840	VHF17731	10	605692	6555156	4	N	
SCEK076	new	Active	MAX	CPB	04-Feb-13	VHF	151.409	VHF17699	10	462607	6585880	5	Y	
SCEK077	new	MORT	MAX	FRT	04-Feb-13	VECT	149.990	12958	10	476225	6632488	10	N	Confirmed wolf mort on 01 April 2013; collar retrieved/ redeployed on SCEK163 (Fortune) same
SCEK078	new	Active	MAX	FRT	04-Feb-13	VHF	151.649	VHF17718	10	475961	6633595	10	Y	
SCEK079	new	Active	SNS	TSE	05-Feb-13	ATS	149.365	031738	10	555311	6585055	25	N	
SCEK080	new	Active	SNS	TSE	05-Feb-13	VHF	150.749	VHF17657	10	555210	6584684	25	Y	
SCEK081	new	Active	SNS	TSE	05-Feb-13	VHF	150.850	VHF17660	10	555651	6585665	25	N	
SCEK082	new	Active	SNS	TSE	05-Feb-13	VHF	151.800	VHF17728	10	559474	6601726	7	N	
SCEK083	new	Active	SNS	TSE	05-Feb-13	VHF	150.950	VHF17666	10	559390	6601714	7	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK084	new	MORT	MAX	FRT	05-Feb-13	VHF	151.490	VHF17704	10	539583	6634937	6	Y	Confirmed wolf mort 01 April 2013; collar retrieved/ redeployed on SCEK164 (Fortune) same day
SCEK085	new	Active	MAX	FRT	05-Feb-13	VECT	148.800	12948	10	539611	6635220	6	Y	
SCEK086	new	Active	MAX	FRT	05-Feb-13	VHF	151.740	VHF17723	10	535007	6635283	7	Y	
SCEK087	new	Active	MAX	FRT	05-Feb-13	VHF	151.979	VHF17742	10	535201	6633661	7	Y	
SCEK088	new	Active	SNS	NRK	06-Feb-13	VHF	151.619	VHF17716	10	609407	6569193	5	Y	
SCEK089	new	Active	SNS	NRK	06-Feb-13	VHF	151.559	VHF17710	10	608278	6569099	5	Y	
SCEK090	new	Active	SNS	NRK	06-Feb-13	VHF	151.861	VHF17733	10	603196	6564503	6	N	
SCEK091	new	Active	SNS	NRK	06-Feb-13	VHF	151.439	VHF17701	10	604055	6564557	6	N	
SCEK092	new	Active	SNS	NRK	06-Feb-13	VHF	151.970	VHF17741	10	608237	6557254	12	N	
SCEK093	new	Active	SNS	OS	06-Feb-13	VHF	151.370	VHF17697	10	601730	6532215	11	Y	Located south of North Kotcho core
SCEK094	new	Active	SNS	OS	06-Feb-13	VHF	151.519	VHF17706	10	601444	6532363	11	N	Located south of North Kotcho core
SCEK095	new	Active	SNS	PRD	23-Feb-13	VHF	151.579	VHF17712	10	560606	6541044	4	N	
SCEK096	new	Active	SNS	PRD	23-Feb-13	VHF	150.910	VHF17663	10	559908	6540562	~15	Unk	
SCEK097	new	Active	SNS	WSK	23-Feb-13	ATS	149.524	30935	10	587312	6548561	3	Y	
SCEK098	new	Active	SNS	WSK	23-Feb-13	VHF	151.610	VHF17715	10	586790	6548890	4	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK099	new	Active	SNS	WSK	23-Feb-13	VHF	151.059	VHF17675	10	589871	6551009	5	Y	
SCEK100	new	Active	SNS	ETS	24-Feb-13	ATS	149.464	30932	10	634320	6558761	22	N	
SCEK101	new	Active	SNS	ETS	24-Feb-13	VHF	150.249	VHF17640	10	633525	6558923	22	N	
SCEK102	new	Active	SNS	ETS	24-Feb-13	VHF	151.660	VHF17719	10	631989	6559052	22	Y	
SCEK103	new	Active	SNS	ETS	24-Feb-13	VHF	151.599	VHF17714	10	634109	6558854	5	Y	
SCEK104	new	Active	SNS	ETS	24-Feb-13	VECT	149.950	12957	10	631305	6560043	7	Unk	
SCEK105	new	Active	SNS	ETS	24-Feb-13	VHF	151.760	VHF17725	10	631073	6558974	7	Unk	
SCEK106	new	Active	CLN	RRA-D	24-Feb-13	ATS	148.683	31731	10	646086	6608681	3	Y	
SCEK107	new	Active	CLN	RRA-D	24-Feb-13	VHF	150.090	VHF17631	10	653994	6636896	15	N	
SCEK108	new	Active	CLN	RRA-D	24-Feb-13	VHF	150.020	VHF17627	10	653999	6637066	15	N	
SCEK109	new	Active	CLN	RRA-D	24-Feb-13	VHF	150.709	VHF17656	10	653991	6637044	15	N	
SCEK110	new	Active	SNS	OS	25-Feb-13	ATS	149.444	30931	10	597957	6565242	7	N	Grp first observed in North Kotcho core Feb 6, 2013
SCEK111	new	Active	SNS	NRK	25-Feb-13	VECT	149.750	12953	10	607698	6584368	2	N	
SCEK112	new	Active	CLN	RRA-D	25-Feb-13	VHF	151.010	VHF17671	10	641046	6647180	4	Y	
SCEK113	new	Active	CLN	CLN	25-Feb-13	VHF	150.030	VHF17672	10	638752	6644868	8	Y	
SCEK114	new	Active	CLN	CLN	25-Feb-13	ATS	148.224	31717	10	639193	6644918	8	N	
SCEK115	new	Active	CLN	CLN	25-Feb-13	VHF	150.830	VHF17659	10	639678	6644968	8	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK116	new	Active	CLN	CLN	25-Feb-13	VHF	150.860	VHF17661	10	634060	6639060	18	N	
SCEK117	new	Active	CLN	CLN	25-Feb-13	VHF	150.289	VHF17643	10	604256	6625243	2	Y	
SCEK118	new	Active	CLN	CLN	26-Feb-13	VHF	150.809	VHF17658	10	609349	6637211	23	N	
SCEK119	new	Active	CLN	CLN	26-Feb-13	VECT	149.850	12955	10	610132	6637237	23	Y	
SCEK120	new	Active	CLN	CLN	26-Feb-13	VHF	150.569	VHF17649	10	609963	6637304	23	N	
SCEK121	new	Active	CLN	CLN	26-Feb-13	ATS	148.394	31722	10	640764	6639720	18	N	
SCEK122	new	Active	CLN	CLN	26-Feb-13	VHF	150.069	VHF17630	10	641258	6640415	18	N	
SCEK123	new	Active	CLN	CLN	26-Feb-13	VHF	150.059	VHF17629	10	642680	6627661	5	N	
SCEK124	new	Active	CLN	CLN	26-Feb-13	VHF	151.769	VHF17726	10	643265	6627135	5	N	
SCEK125	new	Active	CLN	CLN	26-Feb-13	VHF	151.790	VHF17727	10	631455	6626316	4	N	
SCEK126	new	Active	CLN	RRA-C	26-Feb-13	ATS	148.654	31730	10	593786	6635809	4	Y	
SCEK127	new	Active	SNS	TSE	27-Feb-13	VHF	151.811	VHF17729	10	558571	6597394	6	N	Lynx attacked young bull in group during capture
SCEK128	new	Active	MAX	FRT	27-Feb-13	VHF	151.720	VHF17722	10	535212	6633720	25	Y	
SCEK129	new	Active	MAX	FRT	27-Feb-13	VHF	151.930	VHF17738	10	536116	6633168	25	N	
SCEK130	new	Active	MAX	FRT	27-Feb-13	VHF	151.379	VHF17698	10	535196	6633658	25	Y	
SCEK131	new	Active	SNS	TSE	27-Feb-13	VHF	150.240	VHF17639	10	554410	6581244	18	N	
SCEK132	new	Active	SNS	TSE	28-Feb-13	VHF	151.630	VHF17717	10	554617	6584083	10	N	
SCEK133	new	Active	CLN	CLN	28-Feb-13	ATS	149.404	30929	10	648148	6612876	4	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK134	new	Active	CLN	CLN	28-Feb-13	VHF	150.880	VHF17662	10	641467	6639271	12	N	
SCEK135	new	Active	CLN	CLN	28-Feb-13	VECT	149.600	12950	10	620501	6620948	16	N	
SCEK136	new	Active	CLN	CLN	28-Feb-13	ATS	149.295	31737	10	621264	6620625	16	N	
SCEK137	new	Active	CLN	CLN	28-Feb-13	VHF	150.369	VHF17645	10	620333	6620974	16	N	
SCEK138	new	Active	CLN	CLN	28-Feb-13	VHF	150.359	VHF17644	10	620607	6620359	16	N	
SCEK139	new	Active	CHIN-RRA	RRA-A	01-Mar-13	VECT	148.735	12947	10	614394	6459967	~12	Y	
SCEK140	new	Active	CHIN-RRA	RRA-A	01-Mar-13	VHF	152.120	VHF17755	10	596559	6447668	10	N	
SCEK141	new	Active	CHIN-RRA	RRA-A	01-Mar-13	VHF	152.110	VHF17754	10	586865	6455497	10	N	
SCEK142	new	Active	CHIN-RRA	RRA-A	01-Mar-13	VECT	148.705	12944	10	581136	6454368	7	Y	
SCEK143	new	Active	PPH	RRA-B	01-Mar-13	VECT	148.715	12945	10	534754	6476071	2	N	
SCEK144	new	Active	PPH	RRA-B	01-Mar-13	VHF	150.109	VHF17632	10	534984	6475800	2	N	
SCEK145	new	Active	SNS	CLR	01-Mar-13	VHF	150.129	VHF17634	10	530002	6507013	4	N	
SCEK146	new	Active	CLN	RRA-D	02-Mar-13	ATS	149.583	30938	10	653009	6638677	15	Y	Wolverine with group
SCEK147	new	Active	CLN	RRA-D	02-Mar-13	VECT	149.710	12952	10	653072	6637946	15	Unk	
SCEK148	new	Active	SNS	CLR	02-Mar-13	VHF	150.279	VHF17642	10	605062	6487496	4	N	
SCEK149	new	Active	SNS	CLR	02-Mar-13	VHF	151.499	VHF17705	10	598341	6481195	15+	N	Minimum count of 15
SCEK150	new	Active	SNS	CLR	02-Mar-13	VHF	150.189	VHF17636	10	598064	6481132	15+	N	
SCEK151	new	Active	SNS	CLR	02-Mar-13	VHF	150.649	VHF17652	10	583385	6489077	5	N	
SCEK152	new	Active	SNS	CLR	02-Mar-13	VHF	150.669	VHF17654	10	582422	6488747	13	N	

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK153	new	Active	SNS	CLR	03-Mar-13	VHF	150.599	VHF17650	10	534012	6501871	7	N	*Dermacentor albipictus* voucher specimen #1 collected
SCEK154	new	Active	SNS	CLR	03-Mar-13	VHF	151.450	VHF17702	10	558758	6503920	9	N	
SCEK155	new	Active	SNS	CLR	03-Mar-13	VHF	150.030	VHF17628	10	558696	6504240	9	N	Female is bald with blocky head similar to mature male
SCEK156	new	Active	SNS	CLR	03-Mar-13	VHF	151.670	VHF17720	10	548968	6495527	8	Y	Wolverine excavating 2 beaver lodges in vicinity of caribou
SCEK157	new	Active	SNS	CLR	03-Mar-13	VHF	151.890	VHF17735	10	548899	6495711	8	Y	
SCEK158	new	Active	CHIN	ETT	04-Mar-13	VHF	152.089	VHF17752	10	659843	6428805	4	N	
SCEK159	new	Active	CHIN	MLL	04-Mar-13	VHF	152.130	VHF17756	10	647965	6322116	~ 11	N	
SCEK160	new	Active	CHIN	MLL	04-Mar-13	VHF	151.109	VHF17680	10	647737	6351799	~ 11	N	*Dermacentor albipictus* voucher specimen #2 collected
SCEK161	BC1059	Active	PPH	OS	01-Apr-13	ATS	148.575	31727	10	565681	6451633	9	Unk	Grp # 3 in Prophet Range recruitment survey; replaced ATS collar 149.213 with ATS retrieved from Chinchaga mort SCEK028 (retrieved 25 March); mean snow depth 85 cm with 3 cm crust

Field ID	Office ID	Status as of 07 April 2013	Herd	Core/RRA	First Capture (dd/mm/yy)	Collar Type	Frequency	Collar ID	Zone	Easting	Northing	Group Size	Calf at Heel	Comments
SCEK162	new	MORT	FN	OS	01-Apr-13	ATS	149.565	30937	10	511177	6552035	10	N	Mort discovered April 06, 2013 - Tsimeh pack killed 4 of grp of 10, including SCEK162 and SCEK008
SCEK163	new	Active	MAX	OS	01-Apr-13	VECT	149.990	12958	10	475849	6632394	7	N	Collar retrieved from Fortune caribou SCEK077 mort 01 April 2013; redeployed on SCEK163 same day in Grp # 11 in Maxhamish recruitment
SCEK164	new	Active	MAX	FRT	01-Apr-13	VHF	151.490	VHF17704	10	535561	6633774	13	N	Collar retrieved from Fortune caribou SCEK084 mort 01 April 2013; redeployed on SCEK164 same day in Grp #13 in Maxhamish recruitment survey

Appendix III-I: Chinchaga Range Late Winter Survey Results, 25 March 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga

Obs Date: 25 March 2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	08:00	Clear (1)	Light Air (1)	-9 C	None	76-100 cm (6)	76-100 % (6)
End	16:50	Clear (1)	Gentle Breeze (3)	+ 3 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Maxine Davis

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK026	148.484	ATS	Y	4	13	8	1	4	0	0	MLL	659741	6301047	BB	
SCEK027	151.039	VHF	N	2	9	4	4	1	0	1	MLL	658955	6296099	BB	
SCEK028	148.575	ATS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	MLL	656442	6355327	TC	Mortality – confirmed wolf kill on cutline; *see* Comment 1
SCEK029	151.130	VHF	N	31	3	2	0	1	0	0	MLL	652398	6355307	TC	Velma airstrip
SCEK030	152.019	VHF	N	15	5	4	1	0	0	0	MLL	631809	6339727	BB	
SCEK031	149.223	ATS	N	7	6	4	2	0	0	0	MLL	643581	6324828	BB	
SCEK032	151.119	VHF	N	6	5	5	0	0	0	0	MLL	648846	6318593	BB	Mature PL patch adjacent
SCEK033	148.595	ATS	U	14	8	7	0	1	0	0	MLL	639077	6338827	BB	Calf status undetermined
SCEK034	149.800	VECT	N	9	10	9	1	0	0	0	MLL	646929	6328658	BB	
SCEK035	150.970	VHF	N	16	19	16	1	2	0	0	MLL	628098	6342046	BB	
SCEK036	148.275	ATS	N	17	4	4	0	0	0	0	MLL	631543	6341991	BL	
SCEK037	150.120	VHF	N	3	4	3	1	0	0	0	MLL	655203	6286905	BB	
SCEK038	148.285	ATS	N	1	6	4	0	2	0	0	MLL	665197	6290484	BB	
SCEK039	151.829	VHF	N	5	7	5	0	2	0	0	MLL	653438	6320764	BB	Mature PL patch adjacent

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga
Obs Date: 25 March 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK040	149.640	VECT	Y	12	2	1	0	1	0	0	MLL	646614	6331005	UV	On gas lease with mature Pl/At adjacent
SCEK041	151.000	VHF	N	8	10	7	1	2	0	0	MLL	646795	6328370	BB	Mature Pl patch adjacent
SCEK042	149.264	ATS	N	22	8	5	2	1	0	0	MLL	629438	6338288	BL	Mature PL patch
SCEK052	152.001	VHF	N	23	2	2	0	0	0	0	MLL	629280	6340385	BL	Mature Pl patch
SCEK053	152.010	VHF	N	21	6	6	0	0	0	0	MLL	629354	6344312	BL	Mature Pl patch
SCEK054	152.049	VHF	N	24	8	8	0	0	0	0	MLL	628521	6339957	BL	Mature Pl patch
SCEK055	149.900	VECT	N	29	4	3	1	0	0	0	MLL	615766	6346857	BB	
SCEK056	152.030	VHF	N	28	1	1	0	0	0	0	MLL	616937	6348767	BL	
SCEK057	152.059	VHF	N	27	3	3	0	0	0	0	MLL	629090	6337934	BL	
SCEK058	152.040	VHF	N	26	2	2	0	0	0	0	MLL	630509	6344406	BB	
SCEK059	152.070	VHF	N	(22)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	MLL	629438	6338288	BL	Mature PL patch
SCEK060	152.100	VHF	N	(16)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	MLL	628098	6342046	BB	
SCEK061	152.080	VHF	Y	13	12	10	1	1	0	0	MLL	646841	6330926	BP	Mature Pl/At/Sw patch
SCEK158	152.089	VHF	N	33	4	1	3	0	0	2	ETT	661343	6428421	BB	
SCEK159	152.130	VHF	N	30	8	8	0	0	0	0	MLL	647707	6352098	BB	
SCEK160	151.109	VHF	N	(30)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	MLL	647707	6352098	BB	
AB149.391	149.391	Unk	N	32	4	4	0	0	0	0	MLL	653894	6357287	BL	
AB148.079	148.079	Unk	N	19	4	3	1	0	0	0	MLL	628296	6343386	BL	Mature Sb stand
AB150.079	150.079	Unk	N	18	7	5	2	0	0	0	MLL	630315	6342189	UV	Bedded on active O&G lease
AB150.470	150.470	Unk	N	20	11	8	3	0	0	3	MLL	629597	6345281	BL	Mature Sb stand

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga
Obs Date: 25 March 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
AB150.419	150.419	Unk	N	25	6	4	0	2	0	0	MLL	626152	6344466	BL	Mature Sb stand
Uncoll #1	n/a	n/a	n/a	10	8	6	2	0	0	0	MLL	644591	6333181	(BL)	Bedded on cutline through mature Pl
Uncoll #2	n/a	n/a	n/a	11	5	1	4	0	0	0	MLL	645576	6332402	FE	Mature Pl/At adjacent
Uncoll #3	n/a	n/a	n/a	34	6	6	0	0	0	0	MLL	659109	6351232	LS	Bedded on Chinchaga Lake
Uncoll #4	n/a	n/a	n/a	35	4	2	2	0	0	0	MLL	642246	6332527	FE	

Obs #	UTM	Additional Observations
1	10.648806.6293576	Moose x 1
2	10.647613.6329257	Bison x 1
3	10.634162.6318716	Wolf BW002 (VHF148.405) in dense, mature Pl timber, no additional wolves seen; ATS collar x 2 shut off (after 16:00 hrs)
4	10.635045.6317782	Wolf kill in dense timber – kill site/prey species could not be seen; 10-15 ravens plus wolf tracks
5	10.645489.6314641	Moose x 1
6	10.647234.6303419	Moose x 1

Additional Comments	
C1	Wolf kill on unploughed cutline through mature Pl/Sb; collar retrieved and redeployed on SCEK161 (Prophet Herd) on 01April2013

[1] U - calf status undetermined
[2] MLL - Milligan, ETT - Etthithun
[3] Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine FE - Sedge Fen LS - Small Lake TC – Transmission Corridor UV - Unvegetated

Appendix III-II: Chinchaga RRA Late Winter Survey Results, 30 March 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga RRA

Obs Date: 30/March/2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	09:32	Unbroken (4)	Light Air (1)	0 C	None (N)	76-100 cm (6)	76-100 % (6)
End	10:45	Unbroken (4)	Light Air (1)	- 3 C	None (N)	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core	East	North	BEU[2]	Comments
						F	M	Juv	Uncl	mm					
SCEK046	148.984	ATS	N	1	11	7	2	2	0	0	RRA-A	592878	6456297	BB	Mature Sw/At/Pl patch adjacent
SCEK047	149.285	ATS	N	3	3	1	2	0	0	0	RRA-A	598181	6452148	BA	Mature upland patch (Sw/At/Pl) in Sb lowland
SCEK048	151.079	VHF	N	4	1	1	0	0	0	0	RRA-A	614616	6450112	BB	
SCEK139	148.735	VECT	Y	5	8	4	2	2	0	0	RRA-A	614309	6460111	BB	Mature upland patch (Sw/At/Pl) adjacent
SCEK140	152.120	VHF	N	2	9	5	2	2	0	0	RRA-A	596348	6447056	BB	
SCEK141	152.110	VHF	N	(1)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-A	592878	6456297	BB	Mature upland patch (Sw/At/Pl) adjacent
SCEK142	148.705	VECT	N	(2)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-A	596348	6447056	BB	

Obs #	UTM	Additional Observations
1	10.613190.6456914	Otter tracks
2	10.611300.6457316	Wolf tracks

Additional Comments	
C1	Recent beaver activity outside lodges at multiple sites; possibly related to low water in previous fall
C2	Caribou making abundant use of interface between Sb peatlands and upland patches (Sw/At/Pl); cratering at base of trees (snow interception)

[1] U - calf status undetermined

[2] Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BA - Boreal White Spruce-Trembling Aspen

Appendix III-III: Snake-Sahtaneh Range Late Winter Survey Results, 30-31 March 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh

Obs Date: 30-31 March 2013

Obs Day: 1/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 30)	10:54	Unbroken (4)	Light Air (1)	- 3 C	None (N)	76-100 cm (6)	76-100 % (6)
End (March 30)	16:00	Scattered (3)	Light Breeze (2)	+ 5 C	None (N)	Days since 5 cm Snow: < 14 days (3)	
Obs Day: 2/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (March 31)	08:00	Unbroken (4)	Light Breeze (2)	- 4 C	None (N)	76-100 cm (6)	76-100 % (6)
End (March 31)	13:20	Scattered (3)	Light Breeze (2)	+ 3; C	None (N)	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Unc	mm					
SCEK017	149.223	ATS	N	12	2	2	0	0	0	0	CLR	534135	6501654	FE	
SCEK018	151.301	VHF	N	11	2	2	0	0	0	0	CLR	533745	6501801	FE	
SCEK019	151.049	VHF	N	14	3	2	0	1	0	0	CLR	529543	6507420	BB	
SCEK020	148.325	ATS	N	13	8	5	2	1	0	0	CLR	528205	6505551	BB	
SCEK021	151.099	VHF	N	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLR	528205	6505551	BB	
SCEK022	151.089	VHF	N	20	6	3	1	2	0	1	PRD-OS	576515	6526718	BP	Mature mixedwood Sw/At/Pl
SCEK023	151.160	VHF	N	21	10	6	4	0	0	2	PRD	564573	6539451	BB	
SCEK024	151.250	VHF	N	8	9	3	5	1	0	3	CLR	574550	6497838	BB	
SCEK025	151.200	VHF	N	4	7	5	2	0	0	0	CLR	587876	6489620	LS	
SCEK068	150.170	VHF	N	9	7	5	0	2	0	0	CLR	563556	6497673	LS	
SCEK069	148.725	VECT	N	19	1	1	0	0	0	0	PRD-OS	573031	6527504	BP	Mature mixedwood Sw/At/Pl
SCEK070	151.920	VHF	Y	(9)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLR	563556	6497673	LS	
SCEK071	148.850	VECT	N	26	7	4	2	1	0	1	WSK	585611	6547111	BB	Collar transmitting 100 bpm
SCEK072	151.069	VHF	N	28	12	6	5	1	0	3	WSK	584690	6554063	BB	
SCEK073	151.960	VHF	U	25	7	4	2	1	0	0	WSK	586059	6547866	BB	

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh
Obs Date: 30-31 March 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Unc	mm					
SCEK074	151.430	VHF	Y	33	4	2	0	2	0	0	NRK	605071	6554747	BB	
SCEK075	151.840	VHF	N	34	18	7	7	4	0	3	NRK	607800	6554485	BB	
SCEK079	149.365	ATS	N	44	36	29	2	5	0	0	TSE	554220	6583714	LS	Tsea Lakes
SCEK080	150.749	VHF	Y	(44)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	TSE	554220	6583714	LS	Tsea Lakes
SCEK081	150.850	VHF	U	(44)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	TSE	554220	6583714	LS	Tsea Lakes
SCEK082	151.800	VHF	N	41	4	2	2	0	0	0	TSE	568724	6597769	BB	
SCEK083	150.950	VHF	N	42	7	4	3	0	0	1	TSE	564326	6599102	BB	
SCEK088	151.619	VHF	Y	31	10	6	0	4	0	0	NRK	609449	6568423	BB	
SCEK089	151.559	VHF	Y	(31)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	NRK	609449	6568423	BB	
SCEK090	151.861	VHF	N	32	4	3	0	1	0	0	NRK	605343	6554749	BB	
SCEK091	151.439	VHF	N	27	5	3	2	0	0	0	WSK	584802	6546841	BP	Mature mixedwood Sw/At/Pl
SCEK092	151.970	VHF	N	35	10	6	2	2	0	0	NRK	607833	6558139	BB	
SCEK093	151.370	VHF	Y	22	9	2	6	1	0	6	WSK-OS	598791	6532262	LS	
SCEK094	151.519	VHF	N	(22)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	WSK-OS	598791	6532262	LS	
SCEK095	151.579	VHF	N	18	6	5	0	1	0	0	PRD	565621	6526592	BP	Mature mixedwood Sw/At/Pl
SCEK096	150.910	VHF	N	(21)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	PRD	564573	6539451	BB	
SCEK097	149.524	ATS	Y	23	4	3	0	1	0	0	WSK	587038	6549420	BB	
SCEK098	151.610	VHF	N	(27)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	WSK	584802	6546841	BP	Mature mixedwood Sw/At/Pl
SCEK099	151.059	VHF	N	24	8	5	2	1	0	0	WSK	586591	6550026	(BB)	On cutline through Sb
SCEK100	149.464	ATS	Y	36	14	8	3	3	0	1	ESK	633753	6558739	BB	

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh
Obs Date: 30-31 March 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Unc	mm					
SCEK101	150.249	VHF	Y	37	6	2	2	2	0	0	ESK	634139	6558431	BB	
SCEK102	151.660	VHF	Y	(37)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	ESK	634139	6558431	BB	
SCEK103	151.599	VHF	Y	(36)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	ESK	633753	6558739	BB	
SCEK104	149.950	VECT	N	38	12	7	2	3	0	0	ESK	633759	6559190	BB	
SCEK105	151.760	VHF	Y	(36)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	ESK	633753	6558739	BB	
SCEK110	149.444	ATS	Y	29	5	2	1	2	0	0	NRK-OS	596523	6565145	BB	
SCEK111	149.750	VECT	N	39	1	1	0	0	0	0	NRK	608678	6582934	BB	
SCEK127	151.811	VHF	N	40	8	7	1	0	0	0	TSE	566224	6596276	UV	On petroleum lease
SCEK131	150.240	VHF	N	(44)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	TSE	554220	6583714	LS	Tsea Lakes
SCEK132	151.630	VHF	N	(44)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	TSE	554220	6583714	LS	Tsea Lakes
SCEK145	150.129	VHF	N	15	2	1	1	0	0	0	CLR-OS	541736	6509824	BB	Clarke
SCEK148	150.279	VHF	N	3	3	2	1	0	0	0	CLR	603681	6487961	BB/LS	
SCEK149	151.499	VHF	N	1	13	8	3	2	0	0	CLR	599436	6480588	LS	
SCEK150	150.189	VHF	N	(1)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLR	599436	6480588	LS	
SCEK151	150.649	VHF	N	6	3	2	1	0	0	0	CLR	588005	6489943	BB/LS	
SCEK152	150.669	VHF	N	5	3	3	0	0	0	0	CLR	587870	6490045	BB/LS	
SCEK153	150.599	VHF	N	(12)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLR	534135	6501654	FE	
SCEK154	151.450	VHF	N	17	4	3	1	0	0	0	CLR	559091	6499903	BB	
SCEK155	150.030	VHF	N	10	5	1	4	0	0	0	CLR	558545	6503646	BB	
SCEK156	151.670	VHF	Y	16	7	3	3	1	0	1	CLR	550308	6492048	BB	

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh
Obs Date: 30-31 March 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Unc	mm					
SCEK157	151.890	VHF	N	(16)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLR	550308	6492048	BB	
Uncoll #1	n/a	n/a	n/a	2	10	7	2	1	0	0	CLR	597369	6479825	LS	
Uncoll #2	n/a	n/a	n/a	7	8	4	4	0	0	2	CLR	587600	6490436	BB/LS	
BC1037	148.310	VHF	N	30	8	3	5	0	0	5	NRK-OS	597743	6565979	BB	
Uncoll #3	n/a	n/a	n/a	43	3	1	2	0	0	2	TSE-OS	553971	6582224	LS	Tsea Lakes

Obs #	UTM	Additional Observations
1	10.558622.6504113	Dead un-collared caribou found near Grp 10; collected samples for Provincial veterinarian
2	10.556581.6502595	1 x moose

Additional Comments	

[1] U - 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 III-IV: Calendar Range Late Winter Survey Results, 03 April 2013
Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Calendar
Obs Date: 03 April 2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	08:30	Unbroken (4)	Light Air (1)	- 18 C	None	76-100 cm (6)	76-100 % (6)
End	13:18	Scattered (3)	Light Air (1)	- 15 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK106	148.683	ATS	Y	1	3	1	1	1	0	1	CLN	644534	6607288	BB	
SCEK107	150.090	VHF	N	8	14	8	4	2	0	1	RRA-D	654078	6637199	BB/LS	5 collars in group
SCEK108	150.020	VHF	U	(8)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-D	654078	6637199	BB/LS	
SCEK109	150.709	VHF	U	(8)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-D	654078	6637199	BB/LS	See Comment C1
SCEK112	151.010	VHF	Y	10	3	1	1	1	0	1	CLN	628342	6631015	BB	
SCEK113	150.030	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CLN	n/a	n/a	n/a	Not heard during survey (C2)
SCEK114	148.224	ATS	N	5	16	13	1	2	0	1	CLN	639203	6633281	BB	Within 3D seismic program
SCEK115	150.830	VHF	N	4	7	3	2	2	0	1	CLN	646187	6627144	BB	Within 3D seismic program
SCEK116	150.860	VHF	N	(5)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	639203	6633281	BB	Within 3D seismic program
SCEK117	150.289	VHF	Y	12	6	1	4	1	0	4	CLN	599496	6620265	LS	
SCEK118	150.809	VHF	N	13	26	20	2	4	0	1	CLN	609548	6637351	LS/FE	4 collars in group, including old VHF (yellow left ear-tag)
SCEK119	149.850	VECT	N	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	609548	6637351	LS/FE	
SCEK120	150.569	VHF	Y	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	609548	6637351	LS/FE	
SCEK121	148.394	ATS	N	3	17	10	4	3	0	1	CLN	647446	6620999	BB	4 collars in group; within 3D seismic program

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Calendar
Obs Date: 03 April 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK122	150.069	VHF	U	(3)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	647446	6620999	BB	Within 3D seismic program
SCEK123	150.059	VHF	Y	7	3	2	0	1	0	0	CLN	637396	6629895	LL	Along shore of July Lake
SCEK124	151.769	VHF	Y	(3)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	647446	6620999	BB	Within 3D seismic program
SCEK125	151.790	VHF	N	9	13	7	3	3	0	1	CLN	631139	6626302	BB	
SCEK134	150.880	VHF	U	(3)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	647446	6620999	BB	Within 3D seismic program
SCEK135	149.600	VECT	N	11	16	8	4	4	0	4	CLN	621189	6620280	LS	4 collars in group
SCEK136	149.295	ATS	Y	(11)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	621189	6620280	LS	
SCEK137	150.369	VHF	U	(11)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	621189	6620280	LS	
SCEK138	150.359	VHF	Y	(11)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	621189	6620280	LS	
SCEK146	149.583	ATS	Y	(8)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-D	654078	6637199	LS	
SCEK147	149.710	VECT	N	(8)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-D	654078	6637199	LS	
Uncoll #1	n/a	n/a	n/a	6	4	2	0	2	0	0	CLN	639598	6633554	BB	Within 3D seismic program
Unk #1	Unknown	VHF	N	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CLN	609548	6637351	LS/FE	Old collar; yellow left ear-tag

Obs #	UTM	Additional Observations
1	10.623105.6611089	Moose x 1

Additional Comments	
C1	Caribou sustained cut on tail from net during capture that bled profusely; appeared to have healed well at time of LW survey
C2	SCEK113 not found during survey; searched Calendar Range to NT/AB borders, plus Tsea Core (Snake-Sahtaneh Range) and Fortune Core (Maxhamish Range)

[1] U - calf status undetermined
[2] CLN - Calendar Range excluding RRA-C and RRA-D (central portion) 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 III-V: Maxhamish Range Late Winter Survey Results, 31 March To 01 April 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013 Page: 1/3

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Maxhamish

Obs Date: 31 March-01 April 2013

Obs Day: 1/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (31 March)	13:38	Scattered (3)	Light Breeze (2)	+ 3 C	None	76-100 cm (6)	76-100 % (6)
End (31 March)	17:33	Scattered (3)	Light Breeze (2)	+ 6 C	None	Days since 5 cm Snow: < 14 days (3)	
Obs Day: 2/2	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (01 April)	13:52	Scattered (3)	Light Breeze (2)	+ 4 C	None	76-100 cm (6)	76-100 % (6)
End (01 April)	18:40	Scattered (3)	Light Breeze (2)	+ 3 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK001	151.291	VHF	U	2	5	4	0	1	0	0	CPB	464631	6582992	BB	
SCEK002	148.555	ATS	N	1	3	1	2	0	0	2	CPB	486092	6603242	BB	
SCEK003	148.185	ATS	N	5	8	6	1	1	0	0	KWG	527100	6569760	BB	
SCEK004	151.339	VHF	N	6	9	6	3	0	0	0	KWG	527301	6570036	BB	
SCEK005	148.494	ATS	Y	10	7	4	1	2	0	0	KWG-OS	538338	6553837	BB	
SCEK006	151.270	VHF	N	(10)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	KWG-OS	538338	6553837	BB	
SCEK007	149.256	ATS	N	3	3	2	1	0	0	0	CPB	459964	6586389	BB	
SCEK062	150.549	VHF	Y	(10)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	KWG-OS	538338	6553837	BB	
SCEK063	150.390	VHF	Y	(5)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	KWG	527100	6569760	BB	
SCEK064	150.439	VHF	N	(5)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	KWG	527100	6569760	BB	
SCEK065	150.270	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	CPB	472736	6585942	BB	Mortality - confirmed wolf kill; collar destroyed by wolves

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Maxhamish
Obs Date: 31 March-01 April 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK066	151.470	VHF	U	(2)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CPB	464631	6582992	BB	
SCEK067	151.870	VHF	Und	(2)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CPB	464631	6582992	BB	
SCEK076	151.409	VHF	NO	4	6	5	1	0	0	1	CPB	472615	6578145	BB	
SCEK077	149.990	VECT	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FRT	478879	6632000	BB	Mortality - confirmed wolf kill; collar redeployed on SCEK163
SCEK078	151.649	VHF	Y	11	7	2	4	1	0	0	FRT	475849	6632394	BB	
SCEK084	151.490	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	FRT	540000	6635061	BB	Mortality - confirmed wolf kill; collar redeployed on SCEK164
SCEK085	148.800	VECT	Y	16	16	10	2	4	0	1	FRT	536003	6632372	LS	Vectronic collar transmitting on mortality – caribou alive
SCEK086	151.740	VHF	Y	15	9	3	3	3	0	Unk	FRT	537452	6633522	LS	
SCEK087	151.979	VHF	Y	13	13	8	4	1	0	Unk	FRT	535078	6633309	LS	
SCEK128	151.720	VHF	Y	18	2	1	0	1	0	0	FRT	534437	6634125	BB	
SCEK129	151.930	VHF	N	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	FRT	535078	6633309	LS	
SCEK130	151.379	VHF	N	(13)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	FRT	535078	6633309	LS	
BC1014	148.040	VHF	N	(4)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CPB	472615	6578145	BB	
BC1015	148.109	VHF	N	(4)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	CPB	472615	6578145	BB	
BC1054	149.185	ATS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Demars' collar; not found - assumed stopped transmitting
Uncoll #1	n/a	n/a	n/a	7	4	2	1	1	0	1	KWG	527665	6570250	BB	
BC1006	151.821	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	KWG	527628	6571495	BB	Confirmed mortality ; *see* Comment C1

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Maxhamish
Obs Date: 31 March-01 April 2013

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
Uncoll #2	n/a	n/a	n/a	8	5	1	3	1	0	0	KWG	528148	6572285	BB	
BC1066	149.325	VHF	N	9	13	10	3	0	0	0	KWG	526624	6572275	BB	
BC1009	151.701	VHF	N	(9)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	KWG	526624	6572275	BB	Old wolf collar; hanging upside down on neck
BC1024	148.259	VHF	N	12	1	1	0	0	0	0	FRT	532911	6638750	BB	Purple/or red left ear-tag
BC1033	148.249	VHF	Y	(16)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	FRT	536003	6632372	LS	
Unknown	Unknown	VHF	N	14	9	5	1	3	0	0	FRT	535992	6633769	BB	Old VHF, red right ear-tag
Unknown	Unknown	VHF	Y	(15)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	FRT	537452	6633522	LS	Old VHF, purple left ear-tag
BC1021	148.289	VHF	U	17	12	8	1	3	0	0	FRT	536211	6632347	LS	

Obs #	UTM	Additional Observations

Additional Comments	
C1	Old collar - date and source of mortality undetermined; collar under approximately 100 cm snow but not transmitting on mortality mode; retrieve during snow-free months

[1] U - calf status undetermined
[2] CPB - Capot-Blanc FRT - Fortune KWG - Kiwigana 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 III-VI: Prophet Range Late Winter Survey Results, 01 April 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Prophet

Obs Date: 01 April 2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	08:00	Unbroken (4)	Light Breeze (2)	- 1 C	None	76-100 cm (6)	76-100 % (6)
End	10:08	Unbroken (4)	Light Breeze (2)	+ 2 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK043	151.690	VHF	N	6	7	4	2	1	0	1	RRA-B	556143	6464246	BB	
SCEK044	148.153	ATS	N	5	6	5	1	0	0	1	RRA-B	555152	6464135	BB	
SCEK045	151.730	VHF	N	4	6	5	0	1	0	0	PPH-OS	573518	6443434	BB/BA	
SCEK049	151.570	VHF	N	(4)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	PPH-OS	573518	6443434	BB/BA	
SCEK050	148.625	ATS	N	2	5	4	0	1	0	0	PPH-OS	556131	6448358	BB	
SCEK051	151.529	VHF	U	3	9	6	1	2	0	1	PPH-OS	565680	6451633	BB	
SCEK143	148.715	VECT	N	1	2	2	0	0	0	0	RRA-B	535270	6475782	BB	
SCEK144	150.109	VHF	N	(1)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	RRA-B	535270	6475782	BB	
BC1059 (SCEK161)	149.213	ATS	U	(3)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	PPH-OS	565680	6451633	BB	*See* Comments C1 and C2

Obs #	UTM	Additional Observations

Additional Comments	
C1	Recaptured caribou BC1059 and replaced failed ATS collar (149.213) with ATS 148.575 (retrieved from SCEK028 Chinchaga mortality on 25 March 2013); Field ID assigned as SCEK161
C2	Mean snow depth at capture site = 85 cm with 3 cm hard crust
C3	Several beaver lodges excavated by predators throughout range; beaver active outside lodges

[1] U - calf status undetermined

[2] PPH - Prophet Range excluding RRA-B OS - Outside core

[3] Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BA - Boreal White Spruce-Trembling Aspen

Appendix III-VII: Parker Range Late Winter Survey Results, 01 April 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Parker

Obs Date: 01 April 2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	11:00	Unbroken (4)	Light Breeze (2)	+ 2 C	None	76-100 cm (6)	76-100 % (6)
End	12:28	Unbroken (4)	Light Breeze (2)	+ 4 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf[1]	Grp #	Grp Tot	Classification					Core[2]	East	North	BEU[3]	Comments
						F	M	Juv	Uncl	mm					
SCEK010	151.190	VHF	N	3	6	4	2	0	0	1	PRK	486451	6523365	BB/BL	Grp includes unrecovered ATS collar; *see* Comment C1
SCEK011	151.209	VHF	Y	2	16	13	2	1	0	1	PRK	491866	6527121	BB	
SCEK012	151.239	VHF	U	1	18	16	1	1	0	1	PRK	493395	6519845	BB	
SCEK013	150.929	VHF	N	5	11	8	3	0	0	2	PRK	507979	6519634	BB	
SCEK014	148.373	ATS	N	6	4	2	2	0	0	1	PRK	509114	6518902	BB	
SCEK015	151.359	VHF	N	4	4	2	2	0	0	0	PRK	485953	6522387	BB	
SCEK016	148.136	ATS	N	(5)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	PRK	507979	6519634	BB	
BC1001	151.782	VHF	N	(4)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	PRK	485953	6522387	BB	
BC1000	151.460	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 - assumed stopped transmitting
BC1003	151.880	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	PRK	496193	6520206	BB	*See* Comment C2

Obs #	UTM	Additional Observations

Additional Comments	
C1	Group includes SCEK010 and an unidentified ATS collar (not transmitting) – no capture openings available to attempt recovery
C2	Collar not transmitting mortality signal but definitely on the ground; no landing sites and > 85 cm snow so recovery not possible

[1] U - calf status undetermined

[2] PRK - Parker Range

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

Appendix III-VIII: Fort Nelson Core Late Winter Survey Results, 01 April 2013

Animal Observation Form – Boreal Caribou LW Recruitment Survey March 2013 Page: 1/1

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Fort Nelson

Obs Date: 01/April/2013

Obs Day: 1/1	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start	12:42	Unbroken (4)	Moderate Breeze (4)	+ 4 C	None	76-100 cm (6)	76-100 % (6)
End	13:50	Unbroken (4)	Moderate Breeze (4)	+ 4 C	None	Days since 5 cm Snow: < 14 days (3)	

Navigator/Observer: Brad Culling Recorder/Observer: Diane Culling Pilot/Observer: Mike Koloff Observer: Kathy Needley

Field ID	FREQ	Type	Calf	Grp #	Grp Tot	Classification					Core[1]	East	North	BEU[2]	Comments
						F	M	Juv	Uncl	mm					
SCEK008	151.350	VHF	N	2	10	7	3	0	0	2	FNU	511177	6552035	FE	Including SCEK162; *see* Comment 1
SCEK009	148.535	ATS	N	1	4	3	1	0	0	0	FNU	524627	6533508	BA	Sw/At/Pl upland patch in Sb peatlands
Unknown	Unknown	GPS	N	(1)	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	Dpl.	FNU	524627	6533508	BA	Sw/At/Pl upland patch in Sb peatlands; collar not transmitting - caribou has purple left ear-tag

Obs #	UTM	Additional Observations

Comments	
C1	SCEK008 originally collared in group of 2 female caribou in December 2012; augmented sample with new collar SCEK162 (ATS 149.565) in group of 10 during survey.

[1] FNU - Fort Nelson Core - undifferentiated range

[2] Broad Ecosystem Unit (BEU): BA - Boreal White Spruce-Trembling Aspen FE - Sedge Fen