

BC Boreal Caribou Implementation Plan: Year VI (2017-2018) Field Activities Progress Report



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Prepared for
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British Columbia's boreal caribou ranges fall within the traditional lands of the Treaty 8 First Nations; we appreciate the continued support of the Treaty 8 Chiefs and Communities for this project. Kathy Needlay, Fort Nelson First Nation, acted as an observer during the February 2018 late winter recruitment survey.

From the commencement of this project, in December 2012, the commitment and cooperation of Zonk Dancevik and Cam Allen, owners of Qwest Helicopters, Fort Nelson, has been a key factor in the success of the field activities. The first several years of field work coincided with a period of intense activity in the petroleum industry in northeastern British Columbia, but no matter how great the demand for helicopters, Zonk and Cam ensured that their most highly-skilled pilots were at our disposal for radio-collar deployment and surveys. The 2018 recruitment survey was very ably flown by Qwest pilot Kura Field.

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Cover photo – Kathy Needlay, Fort Nelson First Nation, measuring snow depth in the Prophet Core Area, February 2018 (photo by B. Culling).

EXECUTIVE SUMMARY

The boreal ecotype of woodland caribou (*Rangifer tarandus*; boreal caribou) is listed as *Threatened* by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and is on the provincial red list in British Columbia (BC). The *Implementation Plan for the Ongoing Management of Boreal Caribou (Rangifer tarandus caribou pop. 14) in British Columbia* (BCIP; MOE 2011) addresses provincial commitments to manage boreal caribou within the province.

Between December 2012 and March 2016, 239¹ adult female caribou were radio-collared in British Columbia's boreal caribou ranges as a component of the BCIP and funded through the BC Oil and Gas Research and Innovation Society (OGRIS; formerly the Science and Community Environmental Knowledge Fund [SCEK]). These animals (*hereafter*, SCEK caribou²), as well as boreal caribou previously collared by Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), have been monitored through transmitted GPS/satellite data, telemetry monitoring flights, and late winter recruitment surveys to track adult female survival, collect information on causes of caribou mortality, and estimate annual calf recruitment to late winter. This report describes results of field activities conducted in Year VI (May 1, 2017-April 30, 2018), including scheduled fixed-wing telemetry monitoring flights and late winter calf recruitment survey. Information on adult female caribou mortality and survival is used in conjunction with annual calf recruitment surveys to assess population trend.

At the beginning of Year VI (May 1, 2017), 106 radio-collared caribou were potentially active in BC's boreal caribou ranges, including 105 SCEK caribou (54 Vectronic Vertex GPS, 51 Lotek VHF) and 1 FLNRORD caribou (Lotek VHF).

Between May 1, 2017 and April 30, 2018, 4 SCEK caribou mortalities (3 GPS, 1 VHF) were detected through GPS data notification or during scheduled telemetry flights. A total of 121 boreal caribou mortalities (105 SCEK, 7 FLNRORD, 9 uncollared) were identified within BC's ranges over the course of the project (December 2012-April 2018).

The standardized annual finite survival rate for 106 adult females during the 12-month period between May 1, 2017 and April 30, 2018 was 0.96 ± 0.22 SE (95% C.I. = 0.91-0.99).

¹ A total of 240 individual caribou were radio-collared during the project, including 1 male, which had previously been radio-collared by FLNRORD.

² The use of the term SCEK appears throughout this document for consistency with Year I to Year V progress reports.

Late winter recruitment surveys were conducted for all herds between February 25 and 28, 2018. A total of 454 boreal caribou (303 adult females, 73 adult males, and 73 calves) were recorded in 81 groups, including 15 unmarked groups located incidentally and 4 groups (26 animals) associated with 6 SCEK-collared caribou located north of the BC/Northwest Territories (NT) border. Mean group size was 5.6 ± 3.4 SD (range 1 to 15). Overall calf recruitment to March 1, 2018 was estimated at 24 calves/100 cows, with calves representing 16% of the minimum count.

Based on a March 2018 overall recruitment rate (i.e., all ranges combined) of 24 calves/100 cows and the 2017-2018 standardized finite adult female survival rate of 0.96, lambda equals 1.09, which indicates BC's boreal caribou population was slightly increasing during Year VI.

At the end of Year VI, 61 radio-collars deployed during the project were still functioning normally, including 12 Vectronic Vertex GPS and 49 Lotek VHF. Thirty-nine SCEK Vectronic collars reached the end of their battery lives and ceased functioning or were confirmed to have failed during Year VI, including SCEK231/BC1009 and the malfunctioning SCEK232, which ceased transmitting GPS data in June 2017 but continued to transmit a normal VHF beacon through April 2018. Caribou SCEK231/BC1009 was recaptured to replace its expired SCEK Vertex collar with a FLNRORD Lotek LifeCycle GPS collar in March 2018. Two Lotek VHF collars (BC1028; SCEK029) also expired during Year VI. No Lotek VHF collars previously deployed by FLNRORD prior to commencement of the project remain active. All ATS Iridium and Lotek LifeCycle collars deployed during the project ceased to function during the previous year (Year V; 2016-2017) and all SCEK GPS collars still active on April 30, 2018 are approaching the end of their battery life.

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1 INTRODUCTION

Boreal ecotype woodland caribou (*Rangifer tarandus*; boreal caribou) are designated as *Threatened* under the federal *Species at Risk Act* (COSEWIC 2011, Environment Canada 2011). Within British Columbia (BC), boreal caribou (population #14; Designatable Unit DU6) are red-listed. In 2010, 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 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, and mitigating effects of the industrial footprint by reducing predators and managing habitat conditions through fire suppression. These objectives are designed to provide measurable targets for action and evaluation to ensure population and distribution goals are being achieved.

As a component of the BCIP, 239³ adult female caribou (*hereafter*, SCEK caribou⁴) were radio-collared in BC's boreal caribou ranges between December 2012 and February 2016. The fate of these animals, as well as boreal caribou previously collared by Forests, Lands, Natural Resource Operations and Rural Development (FLNRORD), is monitored to track adult survival and calf recruitment and determine sources of adult mortality. Information on adult female caribou mortality and survival is used in conjunction with annual calf recruitment surveys to assess population trend. Biological samples collected from mortality site investigations in Years I to V (December 2012-April 2017) has supported associated research on boreal caribou health in BC.

This report provides details of field activities conducted during the final year of the project (Year VI; May 1, 2017 to April 30, 2018), including scheduled fixed-wing telemetry monitoring flights and a late winter recruitment survey. At the end of Year VI, responsibility for monitoring the remaining active radio-collars deployed during the project will revert to FLNRORD.

³ A total of 240 individual boreal caribou were radio-collared during the project, including 1 male (SCEK173/BC1037), which was recaptured to replace an existing FLNRORD VHF collar with a GPS collar.

⁴ The project was commenced under the BC Oil and Gas Commission's *Science and Community Environmental Knowledge Fund*; the use of the term SCEK is used throughout this document for consistency with Year I to Year V progress reports.

2 METHODS

2.1 Study Area

Boreal caribou occur in northeastern BC, in an area bounded by the Northwest Territories (NT) border (N60° latitude) to the north, the Alberta (AB) border (W120° longitude) to the east, the northern Rocky Mountain foothills to the west (roughly W124° longitude), and the northern limit of the agricultural zone to the south (roughly N57° latitude; Fig. 1). BC's boreal caribou ranges and core areas were first delineated in 2004 (Culling et al. 2004). Within the ranges, core areas were defined as areas of high current capability and suitability based on general habitat requirements (i.e., treed peatlands, terrestrial and arboreal lichen forage base). Ranges and core areas have been subsequently updated as additional telemetry data was collected. Range and core area boundaries were last revised in 2015 based on data from the current project (Wilson 2014). Five ranges are currently proposed and pending approval, including the previously-established Chinchaga (CHIN), Snake-Sahtaneh (SNS), Calendar (CAL), and Maxhamish (MAX) ranges, and the newly-delineated Westside Fort Nelson Range (WSR). The WSR incorporates the previously-defined Prophet, Parker, and Fort Nelson core areas. The northern portion of the Chinchaga Range includes the newly-delineated Chinchaga North Core Area [CNCA], which roughly corresponds to the former Chinchaga Resource Review Area (Chinchaga RRA).

The Chinchaga Range lies within the Boreal Plains (BOP) ecoprovince, with the remaining BC boreal ranges in the Taiga Plains (TAP) ecoprovince. All ranges are represented by the Boreal White and Black Spruce (BWBS) biogeoclimatic zone. The 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. Additional information on BC's boreal caribou ranges and core areas are found in MOE (2010) and Culling and Cichowski (2017).

Throughout the field component of the project, the CNCA (Chinchaga RRA) has been treated as a separate entity from the Chinchaga Range as it is relatively remote from the main areas of caribou activity in the Milligan and Etthithun core areas and has typically been accessed via helicopter from Fort

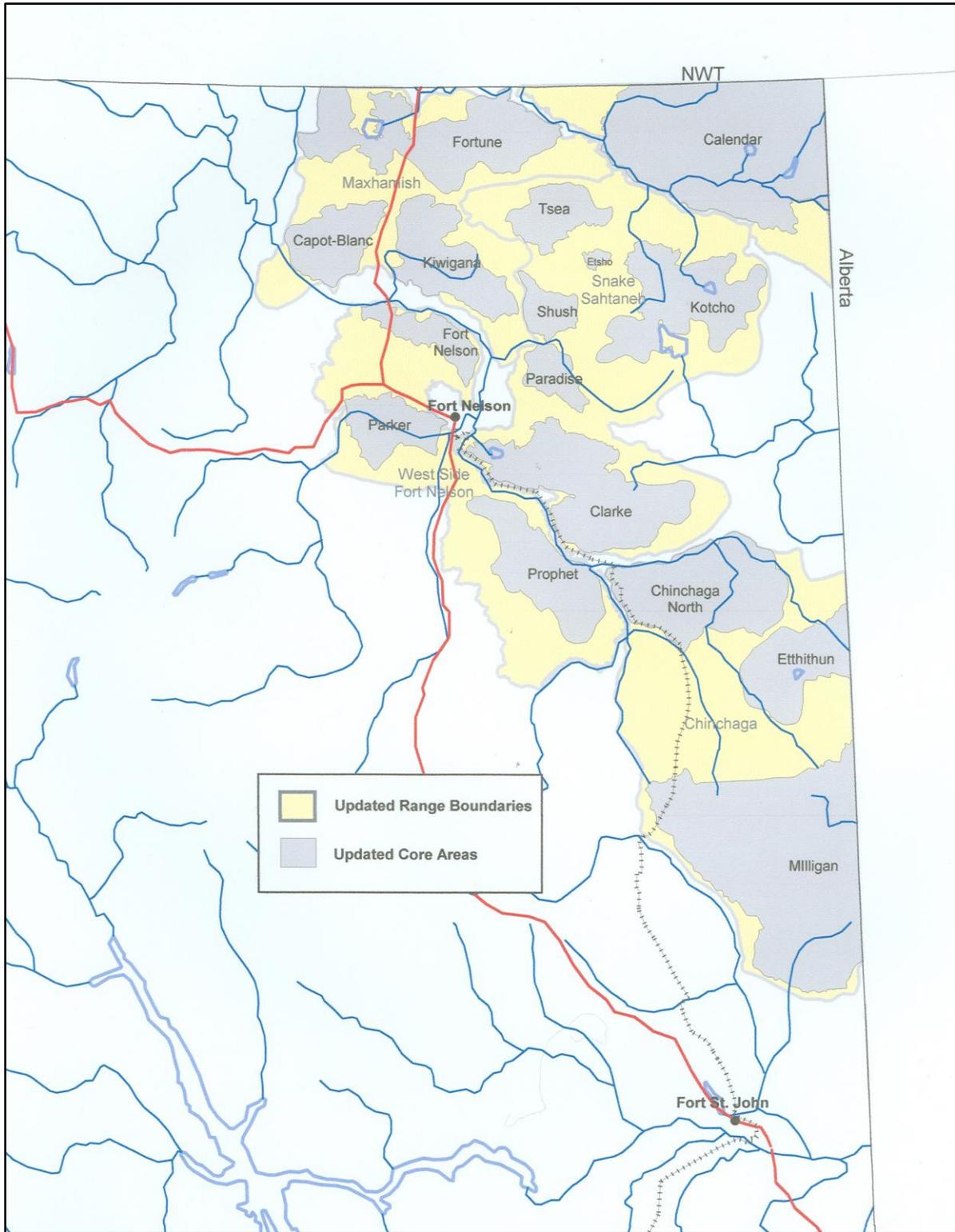


Figure 1. Boreal caribou ranges and core areas in British Columbia (proposed FLNRORD 2015 revisions)

Nelson. For consistency with previous years, the 3 core areas (Prophet, Parker, Fort Nelson) of the newly-described Westside Fort Nelson Range are presented separately.

2.2 Telemetry Monitoring

We conducted scheduled fixed-wing telemetry monitoring flights throughout Year VI to determine the approximate location and VHF beacon status of all boreal caribou believed to be active in the project area, including SCEK caribou and 1 remaining caribou previously collared by FLNRORD. Mortality site investigations were not conducted in Year VI.

We estimated standardized annual adult survival rates for caribou using the Kaplan-Meier method staggered entry design, with standard error (SE) calculated using Greenwood's formula (Pollock et al. 1989; Krebs 1999, 2003).

2.3 Late Winter Recruitment Survey

We conducted late-winter composition surveys in all BC boreal caribou ranges to estimate annual calf recruitment. We used telemetry to locate all radio-collared caribou from a Bell 206B helicopter and classified all caribou in each group encountered by sex and age using criteria defined by the Resources Inventory Standards Committee (RIC 2002), including adult females (F; >1 year), adult males (M; >1 year), calves (Cf), unclassified adults (UA), and mature males (mm). To reduce helicopter disturbance (i.e., approach distance) to caribou groups, we used image-stabilizing binoculars to classify animals and identify individual collared caribou by ear tag colour/radio-collar type. We augmented the sample of SCEK and FLNRORD collars by classifying all incidental unmarked caribou groups encountered. Recruitment was expressed as the number of calves alive at late winter (approximately 9 months of age) per 100 females and as the percentage of calves in the total count.

3 RESULTS

3.1 Year VI Telemetry Monitoring

At the beginning of Year VI (May 1, 2017), 106 radio-collared caribou were potentially active in BC's boreal caribou ranges, including 105 SCEK caribou (54 Vectronic Vertex GPS, 51 Lotek VHF) and 1 FLNRORD caribou (Lotek VHF).

Fixed-wing telemetry monitoring flights were conducted in May, June, July, September, and December 2017 and April 2018. February 2018 monitoring was conducted in conjunction with the 2018 late winter recruitment survey. Results of telemetry monitoring flights are found in DES (2017) and DES (2018).

Four SCEK caribou mortalities were identified in Year VI. Three occurred between June and December 2017, including SCEK016B (Parker; GPS), SCEK149 (Clarke; VHF), and SCEK186 (Kotcho; GPS). SCEK218 (Clarke; GPS) was found alive during the February 2018 late winter survey of the Snake-Sahtaneh Range, but a GPS mortality notification was received in mid-April (date of death April 16, 2018) and confirmed on the April 2018 telemetry flight. The standardized annual finite survival rate for 106 adult female caribou active during the 12-month period between May 2017 and April 2018 was 0.96 ± 0.22 SE (95% C.I. = 0.91-0.99).

Thirty-nine SCEK Vectronic Vertex GPS collars reached the end of their battery lives and ceased functioning or were confirmed to have failed during Year VI, including SCEK136B (Calendar) and Kiwigana caribou SCEK231/BC1009 and SCEK232 (Appendix I). SCEK136B ceased transmitting GPS data on April 9, 2018; the VHF beacon was heard transmitting normally on the April 2018 fixed-wing telemetry flight but is expected to expire shortly. SCEK231/BC1009 was recaptured in late March 2018 to replace the expired SCEK Vertex collar with a FLNRORD Lotek LifeCycle collar (FLNRORD, *unpubl. data*). SCEK232's Vertex collar malfunctioned shortly after deployment in February 2016. The collar transmitted sporadic GPS data until June 2017; the VHF beacon was heard transmitting normally on the December 2017 and April 2018 telemetry flights but the caribou was not heard or seen during the February 2018 late winter survey.

Two Lotek VHF collars reached the end of their battery lives in Year VI (Appendix I). The VHF beacon of BC1028 (Tsea), the only original FLNRORD collar remaining active at the start of Year VI, was last detected in December 2017. The VHF beacon of SCEK029, which regularly moves between the Milligan Core Area and the CNCA, was last heard in Milligan during the September 2017 telemetry flight. We located the caribou visually in a collared group in the CNCA during the February 2018 survey and confirmed that its VHF beacon had expired.

Sixty-one SCEK radio-collars were functioning normally at the end of Year VI (Table 1). Excluding SCEK231/BC1009 and SCEK232, 12 Vectronic Vertex GPS collars remained active to April 30, 2018 (Appendix II).

Table 1. SCEK-deployed boreal caribou radio-collars remaining active to April 30, 2018, northeastern British Columbia ($n=61$).

Range	Collar Type		Total
	Vertex GPS	Lotek VHF	
Chinchaga - Milligan ¹	2	8	10
Chinchaga - CNCA	1	1	2
Snake-Sahtaneh	6	23	29
Calendar	0	9	9
Maxhamish ^{2,3}	1	6	7
West Side Range - Prophet	1	1	2
West Side Range - Parker	0	1	1
West Side Range - Fort Nelson	1	0	1
Total	12	49	61

¹ No active collars in Etthithun Core Area

² Not including SCEK231/BC1009 (recaptured in Kiwigana on March 29, 2018 to replace expired SCEK Vertex collar with FLNRORD Lotek Lifecycle collar)

³ Not including SCEK232 (malfunctioned: ceased transmitting GPS data in 2017 but VHF beacon still transmitting in April 2018)

The final fixed-wing telemetry flight was conducted between April 24-26, 2018; 48 SCEK VHF collars were transmitting normal VHF signals and 1 caribou (SCEK059; Milligan) was not heard but is assumed to be still active (Appendix III). SCEK059 was not detected in 3 consecutive passes through the Chinchaga Range during the April flight but was transmitting a normal VHF beacon and located, with a calf at heel, during the February 2018 recruitment survey. As the VHF collar, which was deployed in January 2013, is not expected to have reached the end of its battery life; it is suspected that the caribou moved east into the AB portion of the Chinchaga Range.

Table 2 shows the status to April 30, 2018 of the 240 radio-collars deployed during the project. All ATS Iridium and Lotek LifeCycle collars ceased functioning prior to Year VI. The 14 remaining SCEK Vectronic Vertex GPS collars are all approaching the end of their battery life.

3.2 Year VI Caribou Late Winter Recruitment Survey

To avoid unseasonably warm temperatures and relatively poor survey conditions experienced during the month of March in previous years, we conducted the late winter recruitment survey on all herds between February 25 and 28, 2018 (Appendices IV to X1). Figure 2 shows helicopter flight lines flown and the location of caribou groups encountered. Results of the survey are presented in Table 3.

Table 2. Status to April 30, 2018 of 240 GPS and VHF radio-collars deployed on boreal caribou in northeastern British Columbia between December 2012 and February 2016.

Radio-collar Status April 30, 2018	Range								Total
	Chinchaga		Snake- Sahtaneh	Calendar	Maxhamish	Westside Fort Nelson			
	Milligan/ Etthithun	CNCA ¹				Prophet	Parker	Fort Nelson	
Active	10	2	29	9	7	2	1	1	61
Battery Expired/Retired ²	13	5	11	9	15	1	1	2	57
Collar Failed ³	2	2	5	3	3	0	2	0	17
Caribou Mortality	17	10	33	12	17	7	6	3	105
Total Collars	42	19	78	33	42	10	10	6	240

¹ CNCA – Chinchaga North Core Area (formerly, the Chinchaga RRA)

² Including SCEK136B (GPS expired April 2018/VHF still working) and SCEK231/BC1009 (recollared by FLNRORD March 2018)

³ Including SCEK232 (GPS malfunctioned; ceased transmitting data in 2017 but VHF still working to April 2018)

With the exception of an isolated snow storm encountered in the vicinity of the Etthithun Core Area on February 27, we experienced favourable weather conditions throughout the survey period (Appendices IV-XI). Daytime temperatures ranged from a morning low of -16°C on February 26 to an afternoon high of -1°C on February 27. There was 100 % snow cover throughout the survey area, with snow depths ranging from 26-50 cm in the Milligan, Parker, and Fort Nelson core areas, and 51-75 cm in the remainder of the survey area. Over 5 cm of fresh snow fell less than 3 days before the start of the survey, resulting in excellent spotting conditions.

In contrast to previous years, the low number of radio-collars active in Year VI provided the opportunity to survey the 3 core areas of the Chinchaga Range as a single unit. Staging out of the Fort Nelson airport, we flew matrix habitat between the Milligan and Etthithun core areas and the CNCA over a period of a day and a half, taking advantage of excellent spotting conditions to search for unmarked groups.

During the February 25-28, 2018, survey, we counted a total of 454 boreal caribou (303F, 73M, 73Cf, 5 unclassified adults) in 81 groups (Table 3). Good sightability and snow conditions resulted in the incidental observation of 15 unmarked groups, totalling 60 caribou. Overall mean group size was 5.6 ± 3.4 SD (range 1-15). Six SCEK-collared Calendar caribou were located north of the BC/NT border in 4 separate groups, totalling 26 animals. It is unknown what proportion of these groups represent caribou

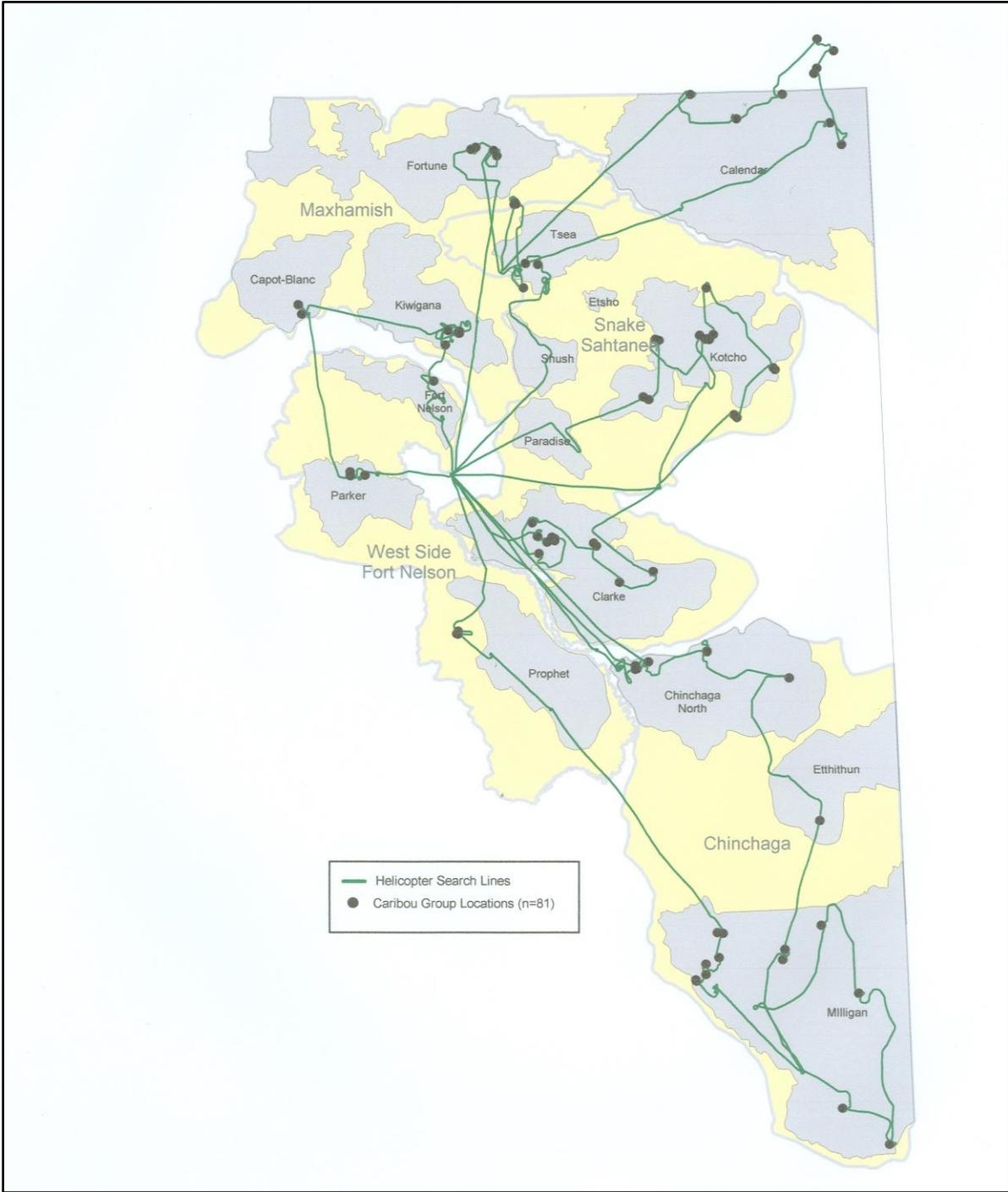


Figure 2. Helicopter flight lines and location of boreal caribou groups ($n=81$) observed during late winter recruitment survey, northeastern British Columbia, February 25-28, 2018.

Table 3. Results of 2018 boreal caribou late winter recruitment survey, northeastern British Columbia, February 25-28, 2018.

Range	Classification ¹					Total Caribou	Calves:100 Cows	Total No. Groups	Mean Group Size \pm SD (range)
	F	M	Cf	UA	mm				
Chinchaga: MLL/ETT	58	11	15	1	7	85	26 calves:100 cows	14	6.1 \pm 4.0 SD (2-15)
Chinchaga: CNCA	27	3	6	2	2	38	22 calves:100 cows	7	5.4 \pm 2.7 SD (2-9)
Snake-Sahtaneh	108	34	24	0	25	166	22 calves:100 cows	33	5.0 \pm 3.4 SD (1-12)
Calendar ²	42	6	7	1	5	56	17 calves:100 cows	9	6.2 \pm 3.3 SD (2-11)
Maxhamish	44	17	12	1	14	74	28 calves:100 cows	11	6.7 \pm 3.4 SD (2-11)
WSR: Prophet	7	1	1	0	1	9	n/a ³	3	3.0 \pm 2.6 SD (1-6)
WSR: Parker	8	1	5	0	0	14	n/a ³	3	4.7 \pm 1.5 SD (3-6)
WSR: Fort Nelson	9	0	3	0	0	12	n/a ³	1	n/a
Total_All Groups	303	73	73	5	54	454	24 calves:100 cows	81†	5.6 \pm 3.4 (1-15)

¹ F - Females > 1 year M - Males > 1 year Cf - Calves UA - Unclassified Adults (> 1 year) mm - Mature Males

² Including 4 groups (6 SCEK collars/26 caribou) located in NT

³ Ratio of calves/100 cows not presented for ranges with less than 10 cows observed

† Including 15 unmarked groups observed incidentally

that originated in BC. Three of these 6 SCEK cows had calves at heel. If we include only these 9 animals and all groups found within BC, the February 2018 survey resulted in a minimum count of 437 caribou. Based on a total of 454 boreal caribou observed (i.e., including all caribou in NT groups), overall late winter 2018 calf recruitment was 24 calves/100 cows, with calves comprising 16% of the total minimum count of caribou observed (Table 3). Recruitment by range varied from 17 calves/100 cows to 28 calves/100 cows in Calendar and Maxhamish, respectively.

Detailed survey results by range are provided in the following sections. Consistent with previous years, results for the 3 core areas recently amalgamated into the WSR are presented separately.

Chinchaga Range (Milligan and Etthithun Core Areas)

On February 27, 2018, we counted 85 caribou (58F, 11M, 15Cf, 1 UA) in 14 groups in the Milligan and Etthithun core areas combined (Table 3, Appendix IV). Mean group size was 6.1 ± 4.0 SD (range 1-15). Only 1 active radio-collared animal was present in each of the 18 groups located, however SCEK035 (Milligan) was found in a group of 5 females including 1 unidentified animal with an older VHF collar and a yellow right ear tag. We did not locate any uncollared groups incidentally. We calculated a ratio of 26 calves/100 cows for the Milligan and Etthithun core areas of the Chinchaga Range, combined.

During the February survey, we scanned for 19 radio-collared caribou that had been active in the Milligan or Etthithun core areas at the start of Year VI (Appendix IV). The VHF beacon of SCEK029 (Milligan; Lotek VHF) was last heard in Milligan on the September 2017 telemetry flight. This caribou is known to move between Milligan and the CNCA. During the February 2018 survey, we located it visually in a collared group in the CNCA and confirmed that its VHF beacon had expired. SCEK033B (Vertex GPS) ceased transmitting GPS data in January 2018 but we located it transmitting a normal VHF beacon in the February survey. Four of 5 Vertex collars that ceased transmitting GPS data or a VHF beacon in Year VI (SCEK195, SCEK196, SCEK198, SCEK224) were not heard or seen during the survey, including the last 2 active Etthithun collars (Appendix I). The fifth, SCEK201, which ceased transmitting GPS data/VHF signal in fall 2017, was located visually in a group with SCEK226. The battery of the only Lotek Lifecycle collar deployed in Milligan during the project (SCEK197) had expired the previous year (last data August 2016); while the collar was not transmitting, the caribou was located visually in a group with SCEK033B during the February 2018 survey. No radio-collared caribou mortalities were detected, therefore 13 active

Milligan collars contributed to the 2018 survey of Milligan and Etthithun core areas of the Chinchaga Range (Appendix IV).

Chinchaga North Core Area (CNCA; formerly, Chinchaga RRA)

On February 27-28, 2018, we counted 38 caribou (27F, 3M, 6Cf, 2 UA) in 7 groups within the CNCA, including 2 unmarked groups encountered incidentally (Table 3, Appendix V). Only 1 group contained multiple radio-collared caribou (2 collars, including failed Lotek VHF SCEK029). Mean group size was 5.4 ± 2.7 SD (range 2-9). We calculated a ratio of 22 calves/100 cows for the portion of the Chinchaga Range encompassed by the Chinchaga North Core Area.

During the February survey, we scanned for 8 SCEK radio-collars that were active at the start of Year VI, including SCEK029 (Appendix V). As noted in the previous section, SCEK029 was collared in Milligan but was known to move between that core area and the CNCA. The caribou's Lotek VHF collar was no longer transmitting by February 2018, but we located it visually in a group with SCEK161B/BC1059. Two CNCA Vertex GPS collars (SCEK170B, SCEK189) reached the end of their expected battery life in 2017 and were not transmitting GPS data or VHF beacons; neither caribou was incidentally located visually during the survey (Appendix V). Two CNCA Vectronic GPS collars ceased transmitting GPS data in January 2018, but were still transmitting normal VHF beacons during the February survey. While both SCEK213 and SCEK215 were located using telemetry during the survey, neither was heard during the subsequent April 2018 fixed-wing telemetry flight and it is assumed their batteries have now expired. No radio-collared caribou mortalities were detected. Five active collars contributed to the February 2018 CNCA survey, including SCEK161B/ BC1059, which was collared in Prophet, but moves between Prophet and the CNCA (Appendix V).

Snake-Sahtaneh Range

On February 25-26, 2018, we counted 166 caribou (108F, 34M, 24Cf) in 33 groups, including 8 unmarked groups encountered incidentally (Table 3, Appendix VI). Six groups contained multiple radio-collared animals, including 5 groups with 2 collars and 1 group with 3 collars. Mean group size was 5.0 ± 3.4 SD (range 1-12). We calculated a ratio of 22 calves/100 cows for the Snake-Sahtaneh Range.

During the February survey, we scanned for 38 radio-collared caribou that had been active in the Snake-Sahtaneh Range at the start of Year VI, including 4 caribou whose collars had reached the end of their

battery life (Appendix VI). Two of the 4 animals with expired batteries were not heard or seen (SCEK239, SCEK240), but SCEK193 and SCEK233 were located visually in groups with other collared animals and their identification confirmed by collar type/ear tag configuration. SCEK070 (Lotek VHF) was not heard or seen in Clarke, Kotcho or Paradise during the February survey, however, its VHF beacon was heard transmitting normally on both the December 2017 and April 2018 telemetry flights. BC1028 (Lotek VHF) was not heard or seen during the February survey; the battery is presumed expired (Appendix I). SCEK148 was collared in Clarke in March 2013, but moved to the Prophet Core Area (WSR), where it was found in February 2018. SCEK209 was collared in West Kotcho in December 2014 and moved to the Kiwigana Core Area of the Maxhamish Range; it was found in Kiwigana in February 2018. No radio-collared caribou mortalities were detected, therefore 30 active collars contributed to the 2018 Snake-Sahtaneh survey (Appendix VI).

As snow conditions were excellent for tracking, we searched the Paradise Core Area intensively during the February 2018 survey, but found no caribou or fresh tracks.

Calendar Range

On February 26, 2018, we counted 56 caribou (42F, 6M, 7Cf, 1 UA) in 9 groups, including 6 SCEK caribou (SCEK107, SCEK112, SCEK120, SCEK122, SCEK125, SCEK136B) found in 4 separate groups (26 caribou) in the NT (Table 3, Appendix VII). Three of the 6 SCEK caribou located in the NT had a calf at heel. We did not encounter any unmarked groups during the Calendar survey. Mean group size was 6.2 ± 3.3 SD (range 2-11), with a ratio of 17 calves/100 cows.

We located all 12 SCEK caribou with active radio-collars and scanned for 3 additional Vertex GPS collars that had reached the end of their expected battery life in late 2017 (SCEK146B, SCEK180, SCEK183); none were heard or seen. No radio-collared caribou mortalities were detected, therefore 12 collars contributed to the February 2018 survey of the Calendar Range (Appendix VII).

Maxhamish Range

During the February 26-28, 2018 survey of the Maxhamish Range we counted 74 caribou (44F, 17M, 12Cf, 1 UA) in 11 groups, including 2 unmarked groups encountered incidentally (Table 3, Appendix VIII). Mean group size was 6.7 ± 3.4 SD (range 2-11), with a ratio of 28 calves/100 cows.

Thirteen active SCEK collars contributed to the 2018 Maxhamish survey, including SCEK209, which was collared in the Kotcho Core Area of the Snake-Sahtaneh Range and subsequently moved to Kiwigana. We also scanned for 6 additional Vertex GPS collars that had reached the end of their expected battery life in Year VI (Appendix I). SCEK066B, SCEK168, SCEK178, SCEK206, SCEK208, and SCEK232 were not transmitting GPS data or VHF beacons at the time of the survey; none were heard or located visually in groups with other collared caribou. Three caribou (SCEK209, SCEK211, SCEK221) ceased transmitting GPS data late in Year VI, but were still transmitting VHF beacons at the time of the 2018 survey. Caribou SCEK209 and SCEK211, who both ceased transmitting data in December, were found in the same group on February 28. Fortune caribou SCEK221, who ceased transmitting data on Feb 17, was also located using telemetry. An unidentified (failed) Vertex GPS collar was seen in a group with SCEK007B. No radio-collared caribou mortalities were detected during the survey.

Prophet Core Area (Westside Fort Nelson Range)

On February 27, 2018, we counted 9 caribou (7F, 1M, 1Cf) in 3 groups in the Prophet Core Area of the Westside Fort Nelson Range (Table 3, Appendix IX). No uncollared groups were found. Mean group size was 3.0 ± 2.6 SD (range 4-8). As less than 10 adult females were located, calf recruitment was not estimated.

On February 27, 2018, we searched for 4 SCEK radio-collars that were potentially active in the Prophet Core Area in Year VI, including SCEK148, which was originally collared in the Clarke Core Area of the SNS Range (Appendix IX). SCEK217 ceased transmitting GPS data in January 2018, but its VHF beacon was transmitting normally during the February 2018 survey. The beacon was not heard during the subsequent April 2018 telemetry flight and the collar is now assumed to have expired (Appendix I). SCEK161B/BC1059 was initially collared in the Prophet Core Area in February 2011, prior to commencement of the SCEK telemetry project, and was subsequently recaptured and recollared in Prophet in April 2013 and March 2015. This caribou, which has made multiple movements between Prophet and the CNCA, was located in the CNCA during both the March 2017 and February 2018 surveys. No radio-collared caribou mortalities were detected, therefore 3 active SCEK collars contributed to the 2018 Prophet survey.

Parker Core Area (Westside Fort Nelson Range)

On February 28, 2018, we counted 14 caribou (8F, 1M, 5Cf) in 3 groups in the Parker Core Area of the Westside Fort Nelson Range, including 2 unmarked groups found incidentally (Table 3, Appendix X). Mean group size was 4.7 ± 1.5 SD (range 3-6). As less than 10 adult females were located, calf recruitment was not estimated.

Three SCEK radio-collared caribou were active in the Parker Core Area at the beginning of Year VI, including SCEK016B (Vertex GPS), which died in September 2017. SCEK194 ceased transmitting GPS data in November 2017 and its VHF beacon was last heard on the December 2017 telemetry flight; the caribou was not heard or seen in the February 2018 survey. Therefore, only 1 active radio-collar (SCEK015/BC1040) contributed to the 2018 Parker survey (Appendix X).

Fort Nelson Core Area (Westside Fort Nelson Range)

On February 28, 2018, we counted 12 caribou (9F, 3Cf) in 1 group in the Fort Nelson Core Area of the Westside Fort Nelson Range (Table 3, Appendix XI). We did not find any uncollared groups, however, based on fresh tracks and cratering observed at a site some distance from group #1, there appeared to be an additional group of caribou active in the area. As less than 10 adult females were located, calf recruitment was not estimated for the Fort Nelson Core Area.

SCEK009B/BC1055 was the sole remaining active SCEK collar in the WSR's Fort Nelson Core Area during the February 2018 survey, however, expired collars SCEK166 and SCEK167 were located visually in the same group and their identification confirmed by collar type/ear tag configuration (Appendix XI). SCEK166 last transmitted GPS data/VHF beacon in December 2017 (Appendix I). SCEK167 expired the previous year (last GPS data transmitted August 2016); the caribou was located visually in a collared group with SCEK009B/BC1055 during both March 2017 and Feb 2018 LW surveys.

3.2.1 Incidental Observations

Incidental observations made during the February 25-28, 2018 recruitment survey are found in the individual range survey results in Appendices IV to XI. We counted 38 moose (32 unclassified adults, 3 females, 3 calves) within all ranges combined.

We saw 2 moose kills, including 1 on the ice of the Petitot River (Calendar; UTM 10.603679.6613208) and 1 in Kiwigana (Maxhamish; UTM 10.533448.6574340), as well as an elk skeleton on a creek in the Parker Core Area (WSR; UTM 10.499154.6521889). The elk had been scavenged but the skeleton was not disarticulated, which suggests it was not a wolf kill.

We saw a pack of 3 wolves on a lake in the Tsea Core Area (Snake-Sahtaneh; UTM 10.539927.6598546), a single wolf on the Kiwigana moose kill, and fresh wolf tracks close to caribou group #3 in the Parker Core Area (WSR; UTM 10.495748.6522335).

We noted abundant cratering and activity on lakes throughout the Clarke and Kotcho core areas (Snake-Sahtaneh), in the Calendar Range, and in the Fortune Core Area (Maxhamish). On February 27, 2018, we measured a mean snow depth of 55 cm, with no crust, in the Prophet Core Area (WSR; UTM 10.538084.6459532).

4 SUMMARY

At the end of Year VI, 61 radio-collars deployed during the project were still functioning normally, including 12 Vectronic Vertex GPS and 49 Lotek VHF. Thirty-nine SCEK Vertex collars reached the end of their battery lives and ceased functioning or were confirmed to have failed during the year, including SCEK231/BC1009 and the malfunctioning SCEK232, which ceased transmitting GPS data in June 2017 but continued to transmit a normal VHF beacon through April 2018. Caribou SCEK231/BC1009 was recaptured to replace its expired SCEK Vertex collar with a FLNRORD Lotek LifeCycle GPS collar in March 2018. Two Lotek VHF collars (BC1028; SCEK029) also expired during Year VI. No Lotek VHF collars previously deployed by FLNRORD prior to commencement of the project remain active. All ATS Iridium and Lotek LifeCycle collars deployed during the project ceased to function during the previous year (Year V; 2016-2017). All SCEK GPS collars still active on April 30, 2018 are approaching the end of their battery life and are expected to expire shortly.

Table 4 compares the standardized annual finite survival for radio-collared adult female caribou over the course of the project.

Table 4. Standardized finite annual survival of radio-collared adult female boreal caribou in northeastern British Columbia, 2013-2018 (Kaplan-Meier staggered entry design).

Year ¹	Time Period	No. Adult Female Caribou Radio-Collared in Entire Time Period	Finite Survival Rate
II	May 1, 2013 - April 30, 2014	209	0.73 ± 0.03 SE (95% CI 0.67 – 0.80)
III	May 1, 201 - April 30, 2015	180	0.86 ± 0.03 SE (95% CI 0.81 – 0.91)
IV	May 1, 2015 - April 30, 2016	168	0.87 ± 0.03 SE (95% CI 0.84 – 0.93)
V	May 1, 2016 - April 30, 2017	146	0.89 ± 0.03 SE (95% CI 0.84 – 0.95)
VI	May 1, 2017 - April 30, 2018	106	0.96 ± 0.22 SE (95% CI 0.91 – 0.99)

¹ Year I of the project encompassed the initial winter capture season (December 17, 2012 to April 30, 2013)

4.1 Calf Recruitment and Population Trend

Based on an overall recruitment rate to March 1, 2018 (i.e., all ranges combined) of 24 calves/100 cows and the 2017-2018 standardized finite adult female survival rate of 0.96, lambda equals 1.09, which suggests BC's boreal caribou population was slightly increasing during Year VI. Table 5 compares annual calf recruitment over the course of the study (Culling and Culling 2013, 2014, 2015, 2016, 2017).

4.2 Discussion and Recommendations

As recommended following the March 2017 recruitment survey (Culling and Culling 2017), we conducted the Year VI late winter recruitment survey approximately 2-3 weeks earlier than in the past. Late winter weather conditions in BC's boreal caribou ranges are becoming increasingly unpredictable, with what formerly was considered unseasonably warm temperatures for March now common. Extreme fluctuations in temperature can create crusted or patchy snow conditions and result in animals seeking denser coniferous cover, thus reducing sightability for both collared animals and uncollared caribou groups. In contrast to the previous year, we experienced excellent survey conditions in late February 2018, which allowed us to find a relatively high number of unmarked groups despite having fewer active collars. We recommend conducting future recruitment surveys in BC's boreal caribou ranges in late February to increase the chances of having optimal survey conditions.

The SCEK collars were not equipped with programmed drop-off mechanisms. Therefore, an increasing number of unidentified GPS and VHF collars are present in groups with active collars. To minimize

Table 5. Comparison of annual calf recruitment (calves/100 cows) in BC's boreal caribou ranges, 2013-2018, northeastern British Columbia.

Range/Core Area	March 2013	March 2014	March 2015	March 2016	March 2017	Feb 28 2018
Chinchaga Range ¹	14	10	9	18	19	25
Milligan/Etthithun	12	7	9	17	18	26
CNCA (Chinchaga RRA)	33	19	8	21	22	22
Snake-Sahtaneh	24	11	18	18	27	22
Calendar - All ²	35	13	22	26	15	17
Maxhamish	28	10	21	29	16	28
Westside Fort Nelson Range (WSR) ³	9	17	8	13	22	38
Prophet Core Area (WSR)	19	10	0	15	6	n/a ⁴
Parker Core Area (WSR)	4	32	8	15	33	n/a ⁴
Fort Nelson Core Area (WSR)	0	n/a ⁴				
Overall calves/100 cows	21	12	15	20	21	24

¹ Milligan, Etthithun, and CNCA (Chinchaga RRA) combined

² All caribou in groups with SCEK-collared caribou (including groups located in NT or AB)

³ Combined Prophet, Parker and Fort Nelson core areas

⁴ Individual survey areas with less than 10 adult females observed excluded

confusion in subsequent recruitment surveys, we recommend that future radio-collar deployment activities in BC's boreal caribou ranges opportunistically recapture animals with expired radio-collars for collar replacement. While maintaining an appropriate age class distribution of radio-collared individuals is a consideration, selecting animals with failed collars would provide additional information on boreal caribou health over time, as well as being consistent with best practices for animal care.

Conditions at the end of Year VI were similar to those experienced during the first winter/spring of the project (December 2012-spring 2013), with snow accumulations beginning in late fall and lasting well into April, followed by a rapid rise in temperature (Culling and Culling 2013). Abrupt temperature increases could potentially cause heat stress in animals that have not yet lost their winter coats. Such conditions are suspected to have been a factor in the high adult female mortality documented in spring 2013. High snow pack lasting into April can also subject caribou to increased predation risk if alternating daytime thawing and overnight freezing results in hard-crusting snow that impedes caribou movement but allows wolves to travel on the surface. Only 1 collared caribou mortality was detected in April 2018, however, if a spike in mortalities is identified between May and July 2018 the potential effects of the protracted winter of 2017-2018 should be considered.

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APPENDICES

Appendix I: SCEK and FLNRORD radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
BC1028	SNS	Tsea	VHF	24-03-2010 (1) 26-03-2012 (2)	n/a	Expired	Battery expired; collared by FLNRORD; VHF beacon last heard Dec 2017; not heard or seen during Feb 2018 survey or on April 2018 telemetry flight
SCEK026B	CHIN	Milligan	Vertex	17-01-2013 (1) 01-04-2015 (2)	15-Mar-18	Expired	Battery expired; GPS/VHF active during Feb 2018 LW survey; last VHF signal heard Feb 2018; not heard on April 2018 telemetry flight
SCEK029	CHIN	CNCA ²	VHF	17-Jan-2013	n/a	Expired	Battery expired; collared in MLL, moves between MLL and CNCA; VHF signal last heard on Sept 2017 telemetry flight, but caribou located in collared group in CNCA during Feb 2018 LW survey
SCEK033B	CHIN	Milligan	Vertex	20-01-2013 (1) 27-02-2015 (2)	23-Jan-2018	Expired	Battery expired; last GPS data transmitted Jan 2018 but was transmitting normal VHF beacon during Feb LW survey; not heard on April 2018 telemetry flight
SCEK066B	MAX	Capot-Blanc	Vertex	02-02-2013 (1) 16-02-2016 (2)	1-Oct-2017	Expired	Battery expired; last VHF signal heard Sept 2017 telemetry flight; not heard or seen in Feb 2018 LW survey; not heard on April 2018 telemetry flight
SCEK097B	SNS	Kotcho	Vertex	23-02-2013 (1) 12-12-2014 (2)	15-Mar-2018	Expired	Battery expired; last VHF signal heard/located visually in Feb 2018 (LW survey); not heard on April 2018 telemetry flight
SCEK100B	SNS	Kotcho	Vertex	24-02-2013 (1) 09-12-2014 (2)	13-Feb-2018	Expired	Battery expired; last VHF signal heard/located visually in Feb 2018 (LW survey); not heard on April 2018 telemetry flight

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX - Maxhamish WSR - Westside Fort Nelson

² CNCA - Chinchaga North Core Area

Appendix I cont.: SCEK-OGRIS GPS radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
SCEK126B	CAL	Calendar	Vertex	26-02-2013 (1) 25-02-2015 (2)	20-Mar-2018	Expired	Battery expired; GPS/VHF active during Feb 2018 LW survey; last VHF signal heard Feb 2018; not heard on April 2018 telemetry flight
SCEK136B	CAL	Calendar	Vertex	28-02-2013 (1) 26-02-2015 (2)	9-Apr-2018	Failing	Battery failing; VHF beacon heard transmitting normally on April 2018 FW telemetry flight but expected to cease within next few months
SCEK146B	CAL	Calendar	Vertex	02-03-2013 (1) 09-12-2014 (2)	7-Jan-2018	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen during Feb 2018 survey
SCEK166	WSR	Fort Nelson	Vertex	28-Feb-2014	17-Dec-2017	Expired	Battery expired; last VHF signal Dec 2017; collar not transmitting but located visually in collared grp during Feb 2018 LW survey
SCEK167	WSR	Fort Nelson	LFC	28-Feb-2014	29-Aug-2016	Expired	Battery expired previous year; collar not transmitting but located visually in collared group during Feb 2018 LW survey
SCEK168/ BC1066	MAX	Kiwigana	Vertex	02-02-2013 (1) 28-02-2014 (2)	15-Dec-2017	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK170B	CHIN	CNCA ²	Vertex	01-03-2014 (1) 26-02-2016 (2)	15-Oct-2017	Expired	Collar malfunctioned/battery expired; sporadic GPS data; last VHF signal heard May 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK177	MAX	Fortune	Vertex	2-Mar-2014	17-Jan-2018	Expired	Battery expired; last VHF signal heard Feb 2018; not heard on April 2018 telemetry flight

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX- Maxhamish WSR - Westside Fort Nelson

² CNCA - Chinchaga North Core Area

Appendix I cont.: SCEK-OGRIS GPS radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
SCEK178	MAX	Fortune	Vertex	3-Mar-2014	5-Oct-2017	Expired	Battery expired; last VHF signal heard Sept 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK180	CAL	Calendar	Vertex	3-Mar-2014	30-Oct-2017	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK181B	CAL	Calendar	Vertex	03-03-2014 (1) 25-02-2016 (2)	11-Mar-2018	Expired	Battery expired; GPS/VHF active during Feb 2018 LW survey; last VHF signal heard Feb 2018; not heard on April 2018 telemetry flight
SCEK183	CAL	Calendar	Vertex	4-Mar-2014	29-Oct-2017	Expired	Battery expired; last GPS data transmitted Oct 29, 2017; last VHF signal heard Sept 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK189	CHIN	CNCA ²	Vertex	5-Mar-2014	31-Oct-2017	Expired	Battery expired; last VHF signal heard Sept 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK193	SNS	Clarke	Vertex	5-Mar-2014	9-Oct-2017	Expired	Battery expired; last GPS data transmitted Oct 9, 2017; VHF signal last heard Sept 2017 telemetry flight; located visually in collared group in Feb 2018 survey
SCEK194	WSR	Parker	Vertex	5-Mar-2014	1-Nov-2017	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX - Maxhamish WSR - Westside Fort Nelson

² CNCA - Chinchaga North Core Area

Appendix I cont.: SCEK-OGRIS GPS radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
SCEK195	CHIN	Etthithun	Vertex	6-Mar-2014	15-Dec-2017	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK196	CHIN	Milligan	Vertex	6-Mar-2014	16-Dec-17	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK198	CHIN	Milligan	Vertex	6-Mar-2014	27-Sep-17	Expired	Battery expired; last signal VHF heard Sept 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK201	CHIN	Milligan	Vertex	6-Mar-2014	16-Oct-17	Expired	Battery expired; last VHF signal heard Sept 2017 telemetry flight; located visually in collared group during Feb 2018 LW survey
SCEK205	MAX	Fortune	Vertex	8-Dec-2014	16-Mar-18	Expired	Battery expired; GPS/VHF active during Feb 2018 LW survey; last VHF signal heard Feb 2018; not heard on April 2018 telemetry flight
SCEK206	MAX	Fortune	Vertex	8-Dec-2014	13-Feb-18	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey; not heard on April 2018 telemetry flight
SCEK208	MAX	Fortune	Vertex	8-Dec-2014	21-Jan-18	Expired	Battery expired; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX – Maxhamish WSR – Westside Fort Nelson

Appendix I cont.: SCEK-OGRIS GPS radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
SCEK209	SNS	Kotcho	Vertex	9-Dec-2014	17-Dec-17	Expired	Battery expired; last GPS data transmitted Dec 2017 but still transmitting VHF signal during Feb 2018 LW survey (located in KWG); VHF signal not heard on April 2018 FW telemetry flight
SCEK211	MAX	Kiwigana	Vertex	10-Dec-2014	18-Dec-17	Expired	Battery expired; last GPS data transmitted Dec 2017 but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight
SCEK213	CHIN	CNCA ²	Vertex	11-Dec-2014	20-Jan-18	Expired	Battery expired; GPS data transmission ceased but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight
SCEK215	CHIN	CNCA ²	Vertex	11-Dec-2014	23-Jan-18	Expired	Battery expired; GPS data ceased transmitting but still transmitting VHF signal/located visually during Feb 2018 LW survey; not heard on April 2018 telemetry flight
SCEK217	WSR	Prophet	Vertex	11-Dec-2014	19-Jan-18	Expired	Battery expired; GPS data transmission ceased but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight
SCEK221	MAX	Fortune	Vertex	28-Mar-2015	17-Feb-2018	Expired	Battery expired; last GPS data transmitted Feb 2018, but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX - Maxhamish WSR - Westside Fort Nelson

² CNCA - Chinchaga North Core Area

Appendix I cont.: SCEK-OGRIS GPS radio-collars confirmed to have ceased functioning during Year VI (May 1, 2017 to April 30, 2018)

ID	Range ¹	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Last GPS Data Transmitted	VHF Signal Status on April 30, 2018	Comments
SCEK223	CHIN	Milligan	Vertex	1-Apr-2015	20-Jan-2018	Expired	Battery expired; last GPS data transmitted Jan 2018, but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight
SCEK224	CHIN	Etthithun	Vertex	1-Apr-2015	5-Nov-2017	Expired	Battery expired; last VHF heard Sept 2017 telemetry flight; not heard or seen on Feb 2018 LW survey
SCEK231/ BC1009	MAX	Kiwigana	Vertex	07-03-2008 (1) 24-02-2016 (2) 29-03-2018 (3)	20-Feb-2018	Expired & Recollared	SCEK collar expired; last GPS data transmitted Feb 2018 but VHF signal transmitted until recaptured on March 29, 2018 to replace collar with FLNRORD Lotek Lifecycle collar
SCEK232	MAX	Kiwigana	Vertex	25-Feb-2016	01-Jun-17	GPS Failed	Collar malfunctioned; last GPS data transmitted June 2017 but VHF signal heard Dec 2017 and April 2018 telemetry flights; not heard or seen in Feb 2018 LW survey
SCEK233	SNS	Tsea	Vertex	25-Feb-2016	12-Jul-17	Failed/ Expired	Collar failed/battery expired; intermittent GPS data ceased July 2017; last VHF signal heard May 2017 telemetry flight; found in marked group in Feb 2018 survey
SCEK239	SNS	Clarke	Vertex	27-Feb-16	24 July 20147	Failed/ Expired	Collar failed/battery expired; intermittent GPS data ceased July 24, 2017; last heard on May 2017 telemetry flight; not heard or seen in Feb 2018 LW survey
SCEK240	SNS	Clarke	Vertex	27-Feb-16	21-Aug-17	Failed/ Expired	Collar failed/battery expired; intermittent GPS data ceased Aug 2017; VHF signal last heard May 2017; not heard or seen in Feb 2018 LW survey

¹ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX - Maxhamish WSR - Westside Fort Nelson

Appendix II: SCEKS GPS radio-collars active to the end of Year VI (April 30, 2018)

ID ^{1,2}	Range ³	Core Area	Collar Type	Date Collar Deployed (Capture No.)	Status to End of Year VI
SCEK007B	MAX	Capot-Blanc	Vertex	18-12-2012 (1) 25-02-2015 (2)	GPS and VHF functioning normally
SCEK009B/ BC1055	WSR	Fort Nelson	Vertex	18-12-2012 (1) 24-02-2015 (2)	GPS and VHF functioning normally
SCEK020B	SNS	Clarke	Vertex	08-01-2013 (1) 31-01-2015 (2)	GPS and VHF functioning normally
SCEK036B	CHIN	Milligan	Vertex	20-01-2013 (1) 27-02-2015 (2)	GPS and VHF functioning normally
SCEK079B	SNS	Tsea	Vertex	05-02-2013 (1) 25-02-2015 (2)	GPS and VHF functioning normally
SCEK161B/ BC1059	WSR	Prophet	Vertex	01-04-2013 (1) 31-02-2015 (2)	GPS and VHF functioning normally
SCEK214	CHIN	CNCA	Vertex	11-Dec-2014	GPS and VHF functioning normally
SCEK219	SNS	Kotcho	Vertex	26-Feb-2015	GPS and VHF functioning normally
SCEK220	SNS	Clarke	Vertex	26-Feb-2015	GPS and VHF functioning normally
SCEK226	CHIN	Milligan	Vertex	19-Feb-2016	GPS and VHF functioning normally
SCEK229	SNS	Kotcho	Vertex	24-Feb-2016	GPS and VHF functioning normally
SCEK230	SNS	Kotcho	Vertex	24-Feb-2016	GPS and VHF functioning normally

¹ Excluding SCEK231/BC1009, which was recaptured to replace the failed SCEK Vectronic Vertex collar with a FLNRORD Lotek LifeCycle GPS collar on March 29, 2018

² Excluding SCEK232; collar malfunctioned shortly after February 2016 deployment/relayed sporadic GPS data; last GPS data transmitted June 2017 but VHF signal heard Dec 2017 and April 2018 telemetry flights

³ Ranges: CHIN - Chinchaga SNS - Snake-Sahtaneh CAL - Calendar MAX - Maxhamish WSR - Westside Fort Nelson

Appendix III: SCEK VHF radio-collars active to the end of Year VI (April 30, 2018)

Animal ID	No. Capture Events	Agency ¹	Range	Original Core Area ²	VHF Collar Deployed (dd/mm/yy)	Located Feb 2018 LW Survey	Located April 2018 Telemetry Flight	Status to April 30, 2018
SCEK015/BC1040	2	FLNRORD/SCEK	West Side Range	Parker	7-Jan-2013	Yes	Yes	Active
SCEK019	1	SCEK	Snake-Sahtaneh	Clarke	8-Jan-2013	Yes	Yes	Active
SCEK024	1	SCEK	Snake-Sahtaneh	Clarke	8-Jan-2013	Yes	Yes	Active
SCEK025/BC1056	2	FLNRORD/SCEK	Snake-Sahtaneh	Clarke	8-Jan-2013	Yes	Yes	Active
SCEK032	1	SCEK	Chinchaga	Milligan	20-Jan-2013	Yes	Yes	Active
SCEK035	1	SCEK	Chinchaga	Milligan	20-Jan-2013	Yes	Yes	Active
SCEK041	1	SCEK	Chinchaga	Milligan	21-Jan-2013	Yes	Yes	Active
SCEK048	1	SCEK	Chinchaga	CNCA ¹	26-Jan-2013	Yes	Yes	Active
SCEK049/BC1044	2	FLNRORD/SCEK	West Side Range	Prophet	26-Jan-2013	Yes	Yes	Active
SCEK054	1	SCEK	Chinchaga	Milligan	30-Jan-2013	Yes	Yes	Active
SCEK057	1	SCEK	Chinchaga	Milligan	31-Jan-2013	Yes	Yes	Active
SCEK059	1	SCEK	Chinchaga	Milligan	31-Jan-2013	Yes	No	Assumed Active; possibly moved to AB portion of the Chinchaga Range
SCEK060	1	SCEK	Chinchaga	Milligan	31-Jan-2013	Yes	Yes	Active

¹ Agency/project deploying collars

Appendix III cont.: SCEK VHF radio-collars active to the end of Year VI (April 30, 2018)

Animal ID	No. Capture Events	Agency ¹	Range	Original Core Area ²	VHF Collar Deployed (dd/mm/yy)	Located Feb 2018 LW Survey	Located April 2018 Telemetry Flight	Status to April 30, 2018
SCEK061	1	SCEK	Chinchaga	Milligan	31-Jan-2013	Yes	Yes	Active
SCEK062	1	SCEK	Maxhamish	Kiwigana	2-Feb-2013	Yes	Yes	Active
SCEK064	1	SCEK	Maxhamish	Kiwigana	2-Feb-2013	Yes	Yes	Active
SCEK068	1	SCEK	Snake-Sahtaneh	Paradise	03-Feb-13	Yes	Yes	Active
SCEK070	1	SCEK	Snake-Sahtaneh	Paradise	03-Feb-13	No	Yes	Active
SCEK076	1	SCEK	Maxhamish	Capot-Blanc	04-Feb-13	Yes	Yes	Active
SCEK082	1	SCEK	Snake-Sahtaneh	Tsea	5-Feb-2013	Yes	Yes	Active
SCEK088	1	SCEK	Snake-Sahtaneh	Kotcho	6-Feb-2013	Yes	Yes	Active
SCEK089	1	SCEK	Snake-Sahtaneh	Kotcho	6-Feb-2013	Yes	Yes	Active
SCEK090	1	SCEK	Snake-Sahtaneh	Kotcho	6-Feb-2013	Yes	Yes	Active
SCEK091	1	SCEK	Snake-Sahtaneh	Kotcho	6-Feb-2013	Yes	Yes	Active
SCEK092	1	SCEK	Snake-Sahtaneh	Kotcho	6-Feb-2013	Yes	Yes	Active
SCEK096	1	SCEK	Snake-Sahtaneh	Paradise	23-Feb-2013	Yes	Yes	Active

¹ Agency/project deploying collars

Appendix III cont.: SCEK VHF radio-collars active to the end of Year VI (April 30, 2018)

Animal ID	No. Capture Events	Agency ¹	Range	Original Core Area ²	VHF Collar Deployed (dd/mm/yy)	Located Feb 2018 LW Survey	Located April 2018 Telemetry Flight	Status to April 30, 2018
SCEK103	1	SCEK	Snake-Sahtaneh	Kotcho	24-Feb-2013	Yes	Yes	Active
SCEK105	1	SCEK	Snake-Sahtaneh	Kotcho	24-Feb-2013	Yes	Yes	Active
SCEK107	1	SCEK	Calendar	Calendar	24-Feb-2013	Yes	Yes	Active
SCEK112	1	SCEK	Calendar	Calendar	25-Feb-2013	Yes	Yes	Active
SCEK113	1	SCEK	Calendar	Calendar	25-Feb-2013	Yes	Yes	Active
SCEK120	1	SCEK	Calendar	Calendar	26-Feb-2013	Yes	Yes	Active
SCEK122	1	SCEK	Calendar	Calendar	26-Feb-2013	Yes	Yes	Active
SCEK123	1	SCEK	Calendar	Calendar	26-Feb-2013	Yes	Yes	Active
SCEK125	1	SCEK	Calendar	Calendar	26-Feb-2013	Yes	Yes	Active
SCEK127	1	SCEK	Snake-Sahtaneh	Tsea	27-Feb-2013	Yes	Yes	Active
SCEK128	1	SCEK	Maxhamish	Fortune	27-Feb-2013	Yes	Yes	Active
SCEK129	1	SCEK	Maxhamish	Fortune	27-Feb-2013	Yes	Yes	Active

¹ Agency/project deploying collars

Appendix III cont.: SCEK VHF radio-collars active to the end of Year VI (April 30, 2018)

Animal ID	No. Capture Events	Agency ¹	Range	Original Core Area ²	VHF Collar Deployed (dd/mm/yy)	Located Feb 2018 LW Survey	Located April 2018 Telemetry Flight	Status to April 30, 2018
SCEK131	1	SCEK	Snake-Sahtaneh	Tsea	27-Feb-2013	Yes	Yes	Active
SCEK132	1	SCEK	Snake-Sahtaneh	Tsea	28-Feb-2013	Yes	Yes	Active
SCEK134	1	SCEK	Calendar	Calendar	28-Feb-2013	Yes	Yes	Active
SCEK137	1	SCEK	Calendar	Calendar	28-Feb-13	Yes	Yes	Active
SCEK145	1	SCEK	Snake-Sahtaneh	Clarke	01-Mar-13	Yes	Yes	Active
SCEK148	1	SCEK	Snake-Sahtaneh	Clarke	02-Mar-13	Yes	Yes	Active
SCEK150	1	SCEK	Snake-Sahtaneh	Clarke	02-Mar-13	Yes	Yes	Active
SCEK152	1	SCEK	Snake-Sahtaneh	Clarke	02-Mar-13	Yes	Yes	Active
SCEK156	1	SCEK	Snake-Sahtaneh	Clarke	03-Mar-13	Yes	Yes	Active
SCEK157	1	SCEK	Snake-Sahtaneh	Clarke	03-Mar-13	Yes	Yes	Active
SCEK164	1	SCEK	Maxhamish	Fortune	1-Apr-2013	Yes	Yes	Active

¹ Agency/project deploying collars

Appendix IV: Chinchaga late winter recruitment survey, February 27, 2018

Animal Observation Form – Boreal Caribou 2017 Late Winter Recruitment Survey
 Project: OGRIS (SCEK) Boreal Caribou Survey: Late Winter Recruitment
 Observation Date: February 27, 2018

Study Area: Chinchaga Range

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth (cm)	Snow Cover
Start (February 27, 2018)	09:40	> 50% (3)	Gentle Breeze (3)	- 4 C	None (N)	26-50 (4)	76-100 % (6)
End (February 27, 2018)	15:30	Clear (1)	Gentle Breeze (3)	- 5 C	None (N)	Days since 5 cm Snow: < 3 (Code 2)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK026B	MLL	Vert	Yes	9	4	3	0	1	0	0	10	674874	6290490	BL	In Sb forest immediately adjacent to Osborne Burn
SCEK029	MLL	VHF	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Located in CNCA on Feb 27, 2018
SCEK032	MLL	VHF	Yes	12	2	1	0	1	0	0	10	639092	6357734	BL	In mature upland LP/Sb forest in Milligan Hills
SCEK033B	MLL	Vert	No	13	15	11	2	2	0	1	10	638326	6354166	BL	Transmitting normal VHF beacon; last GPS data transmitted Jan 23, 2018; group included SCEK197 (failed LifeCycle)
SCEK035	MLL	VHF	No	5	5	4	1	0	0	1	10	611906	6349021	BL	
SCEK036B	MLL	Vert	Yes	2	5	3	0	2	0	0	10	617753	6363191	LP	In mature upland lodgepole pine
SCEK041	MLL	VHF	No	3	6	3	2	1	0	1	10	616383	6354893	BB	Abundant cratering on adjacent cutline

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga Range
 Observation Date: February 27, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK054	MLL	VHF	No	11	2	2	0	0	0	0	10	651570	6365936	LP	In mature upland LP forest in Milligan Hills
SCEK057	MLL	VHF	Yes	4	5	2	2	1	0	1	10	611947	6352642	BL	
SCEK059	MLL	VHF	Yes	1	6	5	0	1	0	0	10	615805	6363520	BL	Bedded in mature Sb/LP forest
SCEK060	MLL	VHF	Yes	6	5	2	1	1	1	0	10	608706	6346730	BB	
SCEK061	MLL	VHF	No	10	12	9	1	2	0	1	10	664211	6342514	UV	Grp included unid VHF collar; bedded on lease
SCEK195	ETT	Vert	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 heard or seen; battery expired; last GPS data transmitted Dec 15 2017; last VHF signal heard Dec 2017 telemetry flight
SCEK196	MLL	Vert	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 heard or seen; battery expired; last GPS data transmitted Dec 16, 2017; last VHF signal heard Dec 2017 telemetry flight
SCEK197	MLL	LFC	No	(13)	dupl	dupl	dupl	dupl	dupl	dupl	10	638326	6354166	BL	Battery expired previous year; last GPS data transmitted Aug 15, 2016; not transmitting VHF signal but located visually in group with SCEK033B (C1)

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga Range
 Observation Date: February 27, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK198	MLL	Vert	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 heard or seen; battery expired; last GPS data transmitted Sept 27, 2017, last VHF signal heard Sept 2017 telemetry flight
SCEK201	MLL	Vert	No	8	12	10	1	1	0	1	10	658804	6302959	UV	Battery expired; last GPS data transmitted Oct 16, 2017, last VHF signal heard Sept 2017; located visually in group with SCEK226; group bedded on lease
SCEK223	MLL	Vert	Yes	7	2	1	0	1	0	0	10	608508	6347155	BB	
SCEK224	ETT	Vert	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 heard or seen; battery expired; last GPS data transmitted Nov 5, 2017; last VHF heard Sept 2017
SCEK226	MLL	Vert	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	658804	6302959	UV	Grp included SCEK201; group bedded on lease
Uncoll1	Outside ETT	n/a	n/a	14	4	2	1	1	0	1	10	650956	6402137	BL	South of Etthithun Core Area

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga Range
 Observation Date: February 27, 2018

Obs #	UTM	Chinchaga Range Additional Observations
1	10.581530.6413009	Moose x 1
2	10.592898.6395738	Moose x 1 (on lease)
3	10.610833.6373330	Moose x 1
4	10.675050.6305277	Moose x 1
Comments		
C1	SCEK197 was the only LFC deployed in MLL	

¹ MLL – Milligan ETT - Etthithun

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine LP - Lodgepole Pine TR - Transmission Corridor (including cutline)
 UV – Unvegetated (includes petroleum leases)

Appendix V: Chinchaga North Core Area late winter survey, February 27-28, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

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Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga North Core Area

Obs Date: February 27-28, 2018

Obs Day: 1/2	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 27, 2018)	16:36	> 50 % (3)	Gentle Breeze (3)	- 5 C	None (N)	51-75 cm (5)	76-100 % (6)
End (February 27, 2018)	17:55	> 50 % (3)	Calm (0)	- 1 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	
Obs Day: 2/2	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 28, 2018)	09:33	> 50 % (3)	Gentle Breeze (3)	- 7 C	None (N)	51-75 cm (5)	76-100 % (6)
End (February 28, 2018)	10:06	> 50 % (3)	Moderate Breeze (4)	- 7 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK029	MLL-CNCA	VHF	No	3	9	7	0	2	0	0	10	612413	6460420	BL	Collared in MLL, moves between MLL and CNCA; VHF signal not transmitting but located in group with SCEK161B/BC1059; VHF signal last heard on Sept 2017 telemetry flight
SCEK048	CNCA	VHF	No	2	9	7	1	1	0	0	10	612429	6460636	BL	
SCEK161B/BC1059	PPH to CNCA	Vert	Yes	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	612413	6460420	BL	Group included SCEK029; collared outside Prophet, moves between Prophet and CNCA (C1)
SCEK170B	CNCA	GPS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not heard or seen during survey; battery expired; last GPS data transmitted Oct 15, 2017; last VHF signal heard May 2017 telemetry flight

Project: SCEK Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Chinchaga North Core Area

Obs Date: February 27-28, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK189	CNCA	GPS	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Not heard or seen during survey; battery expired; last GPS data transmitted Oct 31, 2017; VHF signal last heard Sept 2017 telemetry flight
SCEK213	CNCA	GPS	No	4	5	4	0	1	0	0	10	592377	6456961	BB	Last GPS data transmitted Jan 20, 2018, but still transmitting VHF signal; group included old LifeCycle collar (no ear tags)
SCEK214	CNCA	GPS	Yes	5	2	1	0	1	0	0	10	587838	6455634	BL	C2
SCEK215	CNCA	GPS	No	1	3	1	0	0	2	0	10	640680	6451291	BL	Last GPS data transmitted Jan 23, 2018, but still transmitting VHF signal (C3); in closed canopy, mature LP; grp included 2 unclassified adults
CNCA Uncoll1	n/a	n/a	n/a	6	5	4	1	0	0	1	10	588324	6454442	BB	
CNCA Uncoll2	n/a	n/a	n/a	7	5	3	1	1	0	1	10	587912	6454248	BB	
Obs #	UTM			Chinchaga North Core Area Additional Observations											
1	10.572262.6471558			Moose x 1											
2	10. 553785.6491155			Moose x 2											
3	10.547664.6497477			Moose x 2											

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Chinchaga North Core Area
 Obs Date: February 27-28, 2018

Obs #	UTM	Chinchaga North Core Area Additional Observations cont.
4	10.525314.6521120	Moose x 2
5	10.524509.6521935	Moose x 2
6	10.552083.6488401	Moose x 2
Comments		
C1	SCEK161B/BC1059 collared outside Prophet on 3 occasions (Feb 2011, April 2013, March 2015); moves between Prophet and CNCA; also located in CNCA in March 2017 survey	
C2	Abundant tracks in area suggest more caribou may be present, but none found	
C3	SCEK215's VHF beacon was not heard on the April 2018 telemetry flight; battery expired	
CX1	Good tracking conditions – searched for additional, unmarked groups on Day 2	

¹ CNCA - Chinchaga North Core Area

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

Appendix VI: Snake-Sahtaneh late winter survey, February 25-26 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

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Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh Range

Obs Date: February 25-26, 2018

Obs Day: 1/4	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (Feb 25, 2018)	12:00	< 50 % (2)	Calm (0)	- 7 C	None (N)	51-75 cm (5)	76-100 % (6)
End (Feb 25, 2018)	17:15	> 50 % (3)	Calm (0)	- 8 C	None (N)	Days since 5 cm Snow: < 1/2	
Obs Day: 2/4	Time	CC	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (Feb 26, 2018)	09:40	Clear (1)	Gentle Breeze (3)	- 16 C	None (N)	51-75 cm (5)	76-100 % (6)
End (Feb 26, 2018)	12:00	Clear (1)	Gentle Breeze (3)	- 11 C	None (N)	Days since 5 cm Snow: < 3 (Code 2)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK019	CLR	VHF	No	2	10	7	2	1	0	1	10	557666	6498349	BB	
SCEK020B	CLR	Vert	No	13	3	2	1	0	0	1	10	594040	6488300	BL	Outside Kotcho Core Area
SCEK024	CLR	VHF	No	9	10	9	1	0	0	1	10	552512	6504986	BL	Grp included SCEK096
SCEK025 / BC1056	CLR	VHF	No	3	5	4	0	1	0	0	10	559343	6500123	BB	
SCEK068	CLR	VHF	Yes	8	4	3	0	1	0	0	10	553622	553622	BB	Grp included SCEK150 and SCEK193
SCEK070	CLR	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 heard or seen in Clarke, Kotcho or Paradise, but VHF beacon heard transmitting normally on Dec 2017 telemetry flight; (C1)
SCEK079B	TSE	Vert	Yes	29	9	5	3	1	0	0	10	550248	6594442	BL	Grp included SCEK131
SCEK082	TSE	VHF	No	30	5	2	3	0	0	2	10	549612	6585985	BL	

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh Range
 Obs Date: February 25-26, 201

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK088	KOT-OS	VHF	No	14	6	5	1	0	0	0	10	621857	6542284	BL	Outside Kotcho Core Area
SCEK089	KOT	VHF	Yes	24	2	1	0	1	0	0	10	594843	6568315	BB	
SCEK090	KOT	VHF	No	20	6	6	0	0	0	0	10	613372	6568127	BL	Grp included SCEK229
SCEK091	KOT	VHF	No	22	1	1	0	0	0	0	10	610090	6569686	BB	
SCEK092	KOT	VHF	Und	18	7	2	3	2	0	2	10	612398	6585911	BL	Male calf appeared to be with 2 mature males, not with either female
SCEK096	PRD to CLR	VHF	No	(9)	dupl	dupl	dupl	dupl	dupl	dupl	10	552512	6504986	BL	Grp included SCEK024; collared in PRD, then moved to CLR
SCEK097B	KOT	Vert	No	23	5	4	0	1	0	0	10	611935	6568286	BL	(C2)
SCEK100B	KOT	Vert	No	17	7	4	2	1	0	2	10	635883	6557773	BB	Grp included SCEK105
SCEK103	KOT-OS	VHF	No	15	12	8	2	2	0	2	10	622861	6541320	BL	Outside Kotcho Core Area
SCEK105	KOT	VHF	No	(17)	dupl	dupl	dupl	dupl	dupl	dupl	10	635883	6557773	BL	Grp included SCEK100B
SCEK127	TSE	VHF	No	32	2	2	0	0	0	0	10	546969	6614815	BL	Grp included SCEK233
SCEK131	TSE	VHF	No	(29)	dupl	dupl	dupl	dupl	dupl	dupl	10	550248	6594442	BL	Grp included SCEK079B
SCEK132	TSE	VHF	No	28	1	1	0	0	0	0	10	554517	6594029	BB	

Project: SCEK Boreal Caribou Survey: Late Winter Recruitment Study Area: Snake-Sahtaneh Range
 Obs Date: February 25-26, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK145	CLR	VHF	No	27	8	3	4	1	0	4	10	590719	6548453	BL	Collared in CLR, moves between CLR and Kotcho
SCEK148	CLR to PPH	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	Collared in CLR, moves between CLR/CNCA/PPH; located in PPH
SCEK150	CLR	VHF	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	553622	6505896	BB	Grp included SCEK068 and SCEK193
SCEK152	CLR	VHF	No	6	4	4	0	0	0	0	10	560255	6499600	BB	
SCEK156	CLR	VHF	No	1	8	7	0	1	0	0	10	554386	6500424	BB	
SCEK157	CLR	VHF	No	7	1	1	0	0	0	0	10	554843	6494468	BL	
SCEK193	CLR	Vert	No	(8)	dupl	dupl	dupl	dupl	dupl	dupl	10	553622	553622	BB	Battery expired; last GPS data transmitted Oct 9, 2017; VHF beacon last heard Sept 2017 telemetry flight; located visually in group with SCEK068 and SCEK150 (C3)
SCEK209	KOT to KWG	Vert	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Collared in Kotcho; moved to KWG; located in KWG in Feb 2018
SCEK218	CLR	Vert	No	11	2	2	0	0	0	0	10	573606	6498103	BB	(C4)
SCEK219	KWG to TSE	Vert	Yes	33	3	1	1	1	0	0	10	546422	6614742	BL	Collared in Kotcho, moved to Tsea; found between Tsea and Fortune in Feb 2018 survey
SCEK220	CLR	Vert	Yes	12	8	4	2	2	0	2	10	582465	6484467	BL	

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh Range

Obs Date: February 25-26, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK229	KOT	Vert	No	(20)	dupl	dupl	dupl	dupl	dupl	dupl	10	613372	6568127	BL	Grp included SCEK090
SCEK230	KOT	Vert	No	25	11	8	0	3	0	0	10	596120	6567928	BB	
SCEK233	TSE	Vert	No	(32)	dupl	dupl	dupl	dupl	dupl	dupl	10	546969	6614815	BL	Battery expired; located visually in group with SCEK127; last GPS data transmitted July 12, 2017; last VHF signal heard June 2017 (C5)
SCEK239	CLR	Vert	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 heard or seen; battery expired; last GPS data transmitted July 24, 2017; last heard on May 2017 telemetry flight
SCEK240	CLR	Vert	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 heard or seen; battery expired; last GPS data transmitted Aug 21, 2017; last heard on May 2017 telemetry flight
BC1028	TSE	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 heard or seen; VHF beacon last heard Dec 2017; battery expired (C6)
SNS Uncoll1	CLR	n/a	n/a	4	3	3	0	0	0	0	10	560253	6498909	BB	
SNS Uncoll2	CLR	n/a	n/a	5	2	1	0	1	0	0	10	560254	6499200	BB	
SNS Uncoll3	CLR	n/a	n/a	10	2	0	2	0	0	2	10	574559	6497088	BB	
SNS Uncoll4	KOT	n/a	n/a	16	3	0	3	0	0	3	10	635212	6558480	BB	

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh Range

Obs Date: February 25-26, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SNS Uncoll5	KOT	n/a	n/a	19	1	1	0	0	0	0	10	614720	6569982	BB	
SNS Uncoll6	KOT	n/a	n/a	21	11	4	4	3	0	3	10	612764	6568551	BL	
SNS Uncoll7	KOT	n/a	n/a	26	2	1	0	1	0	0	10	592611	6547514	UV	On lease
SNS Uncoll8	TSE	n/a	n/a	31	2	2	0	0	0	0	10	546637	6615497	BB	

Snake-Sahtaneh Additional Observations

Obs #	UTM	Observation
1	10.530474.6513071	Clarke; Moose x 1
2	10.542532.6499891	Clarke; Moose x 3
3	10.561693.6491359	Clarke; Moose x 3
4	10.549146.6499356	Clarke; Moose x 2
5	10.549167.6500986	Clarke; Moose x 2
6	10.593541.6484497	Clarke; Moose x 2
7	10.623341.6541981	Lynx tracks (close to caribou group); Kotcho
8	10.554102.6594661	Tsea; Moose x 2

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Snake-Sahtaneh Range

Obs Date: February 25-26, 2018

Snake-Sahtaneh Additional Observations cont.

Obs #	UTM	Observation
9	10.548859.6585566	Tsea; Moose x 1
10	10.546144.6613374	Tsea; Moose x 1
Comments		
C1	SCKE070 was not heard or seen in survey, but VHF beacon heard transmitting normally on April 2018 telemetry flight	
C2	SCEK097B was located in survey but battery expired afterwards; last GPS data transmitted March 15, 2018; last VHF signal heard/located visually in Feb 2018 (LW survey); not heard on April 2018 telemetry flight	
C3	SCEK193 was collared in Feb 2013; battery expired - not transmitting GPS data or VHF signal, but was located visually in group with SCEK068 and SCEK150 (ID confirmed by collar type/ear tag configuration); last GPS data transmitted Oct 9, 2017; VHF signal last heard on Sept 17, 2017 telemetry flight	
C4	SCEK218 was found during the Feb 25, 2018 LW survey; GPS mortality notification received in April 2018 (date of death April 16, 2018); VHF mortality signal was confirmed during April 2018 telemetry flight	
C5	SCEK233 was collared in Feb 2016; Vertex collar failed prematurely; intermittent GPS data last transmitted July 12, 2017; VHF signal last heard on May 2017 telemetry flight; found in marked group in Feb 2018 survey; not heard in April 2018 telemetry flight	
C6	VHF beacon from BC1028 was also not heard during the April 2018 fixed-wing telemetry flight, therefore assumed battery expired; caribou first collared by FLNRORD on March 24, 2010, then recaptured to replace collar on March 26, 2012; field age estimate at original capture was 4-6 yrs.	
CX1	Abundant cratering/activity on lakes throughout Clarke and Kotcho	

¹ CLR - Clarke PRD - Paradise KOT – Kotcho (includes previous West, East and North polygons) TSE - Tsea OS - Outside core

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL- Black Spruce-Lodgepole Pine UV – Unvegetated (including lease)

Appendix VII: Calendar late winter survey, February 26, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

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Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Calendar Range

Obs Date: February 26, 2018

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 26, 2018)	12:06	< 50% (2)	Moderate Breeze (4)	- 9 C	None (N)	51 – 75 cm (5)	76-100 % (6)
End (February 26, 2018)	14:30	> 50% (3)	Gentle Breeze (3)	- 7 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK107	NT	VHF	Yes	5	8	5	1	2	0	0	10	656145	6667712	BL	In NT; grp included SCEK112 and SCEK125; located just south of BC/NT border in March 2017 and in NT during March 2015 survey
SCEK112	NT	VHF	No	(5)	dupl	dupl	dupl	dupl	dupl	dupl	10	656145	6667712	BL	In NT; grp included SCEK107 and SCEK125; located in NT in March 2016, 2017 & 2018 surveys and at headwaters of Shekelie drainage (BC) during March 2015 survey
SCEK113	CAL	VHF	Yes	2	2	1	0	1	0	0	10	658764	6635431	BL	Located ~ 4 km north of BC/NT border and at headwaters of Shekelie drainage (AB) during March 2016 and March 2015 surveys, respectively
SCEK120	NT	VHF	No	6	6	4	2	0	0	2	10	650485	6671749	BL	In NT

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Calendar Range

Obs Date: February 26, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK122	NT	VHF	Yes	3	8	6	1	1	0	1	10	649393	6659925	BB	In NT; also located in NT during March 2016 survey
SCEK123	CAL	VHF	Yes	9	11	8	0	2	1	0	10	606952	6652753	BL	Grp included SCEK126B
SCEK125	NT	VHF	Yes	(5)	dupl	dupl	dupl	dupl	dupl	dupl	10	656145	6667712	BL	Located in NT; grp included SCEK107 and SCEK112; regularly moves between BC and NT as far north as Trainor Lake
SCEK126B	CAL	Vert	No	(9)	dupl	dupl	dupl	dupl	dupl	dupl	10	606952	6652753	BL	Grp included SCEK123
SCEK134	CAL	VHF	No	8	2	2	0	0	0	0	10	622739	6644316	BB	Located in NT in March 2017 and south of Petilot in March 2015
SCEK136B	NT	Vert	No	4	4	4	0	0	0	0	10	650370	6661768	BB	Located in NT
SCEK137	CAL	VHF	No	7	5	4	0	1	0	0	10	638507	6652774	BB	Located just below BC/NT border; not found during March 2017 survey but VHF signal detected on April 2017 and subsequent telemetry flights
SCEK146B	n/a	Vert	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 heard or seen; battery expired; last GPS data transmitted Dec 23, 2017; last VHF signal heard Dec telemetry flight

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Calendar Range

Obs Date: February 26, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK180	n/a	Vert	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 heard or seen; battery expired; last GPS data transmitted Oct 30, 2017; last VHF signal heard Dec telemetry flight
SCEK181B	CAL	Vert	No	1	10	8	2	0	0	2	10	654733	6642905	BB	
SCEK183	n/a	Vert	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 heard or seen; battery expired; last GPS data transmitted Oct 29, 2017; last VHF signal heard Sept 2017 telemetry flight
Obs #	UTM		Calendar Range Additional Observations												
1	10.603679.6613208		Moose kill on ice on Petitot River												
2	10.621135.6643850		Moose x 1												
Comments															
CX1	Good tracking conditions; flew the northwest portion of the Calendar Range (west of Hossitl Creek) looking for unmarked groups after all active collars located														
CX2	Abundant use of lakes (cratering, bedding); sedge patches cratered down to bare ground at several sites														

¹ CAL – Calendar NT – Northwest Territories

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

Appendix VIII: Maxhamish late winter survey, February 26-28, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

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Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish Range

Obs Date: February 26-28, 2018

Obs Day: 1/2	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 26, 2018)	15:16	Unbroken (4)	Light Air (1)	- 8 C	None (N)	51-75 cm (5)	76-100 % (6)
End (February 26, 2018)	16:10	< 50% (2)	Light Air (1)	- 7 C	None (N)	Days since 5 cm Snow: < 14 (3)	
Obs Day: 2/2	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 28, 2018)	12:05	Clear (1)	Light Air (1)	- 7 C	None (N)	51-75 cm (5)	76-100 % (6)
End (February 28, 2018)	13:30	< 50% (2)	Light Air (1)	- 10 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK007B	CPB	Vert	No	11	9	5	3	0	1	2	10	472452	6580074	BL	Grp included 1 unid Vertex (failed)
SCEK062	KWG	VHF	No	5	4	3	1	0	0	1	10	523664	6571359	BB	Grp included SCEK231/BC1009
SCEK064	KWG	VHF	Yes	8	2	1	0	1	0	0	10	527642	6571077	BB	Collared in KWG in Feb 2013, found in Tsea (SNS) during March 2016 survey; returned to KWG
SCEK066B	CPB	Vert	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 heard or seen; battery expired; last GPS data transmitted Oct 1, 2017; last VHF signal heard Sept 2017 telemetry flight
SCEK076	CPB	VHF	Yes	10	2	1	0	1	0	0	10	473647	6576863	BL	

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish Range

Obs Date: February 26-28, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK128	FRT	VHF	No	3	10	6	3	1	0	3	10	533302	6634494	BB	Grp included SCEK164
SCEK129	FRT	VHF	No	1	9	8	0	1	0	0	10	540491	6631540	BB	Grp included SCEK205
SCEK164	FRT	VHF	No	(3)	dupl	dupl	dupl	dupl	dupl	dupl	10	533302	6634494	BB	Grp included SCEK128
SCEK168/ BC1066	KWG	Vert	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 heard or seen; battery expired; last GPS data transmitted Dec 15, 2017; last VHF signal heard Dec 2017 telemetry flight
SCEK177	FRT	Vert	Yes	4	11	8	0	3	0	0	10	531628	6633784	FE	
SCEK178	FRT	Vert	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 heard or seen; battery expired; last GPS data transmitted Oct 5, 2017; last VHF signal heard Sept 2017 telemetry flight
SCEK205	FRT	Vert	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	540491	6631540	BB	Grp included SCEK129
SCEK206	FRT	Vert	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 heard or seen; battery expired; last GPS data transmitted Feb 13, 2018; last VHF signal heard Dec 2017 telemetry flight

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish Range

Obs Date: February 26-28, 2018

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK208	FRT	Vert	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 heard or seen; battery expired; last GPS data transmitted Jan 21, 2018; last VHF signal heard Dec 2017 telemetry flight
SCEK209	KOT to KWG	Vert	Yes	6	8	5	0	3	0	0	10	527122	6570603	BB	Moved from Kotcho to KWG; grp included SCEK211; (C1)
SCEK211	KWG	Vert	Yes	(6)	dupl	dupl	dupl	dupl	dupl	dupl	10	527122	6570603	BB	Grp included SCEK209
SCEK221	FRT	Vert	No	2	10	5	4	1	0	3	10	539331	6633364	BB	(C2)
SCEK231/ BC1009	KWG	Vert	No	(5)	dupl	dupl	dupl	dupl	dupl	dupl	10	523664	6571359	BB	Ceased GPS data transmission on Feb 20, 2018, but VHF beacon still transmitting normally (C3); grp included SCEK062
SCEK232	KWG	Vert	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 heard or seen; battery expired; last GPS data transmitted June 1, 2017; last VHF signal heard Dec 2017 telemetry flight: (C4)
Max Uncoll1	KWG	n/a	n/a	7	4	2	1	1	0	0	10	527587	6570331	FE	
Max Uncoll2	KWG	n/a	n/a	9	5	0	5	0	0	5	10	522815	6566292	TR	Cutline through Sb/LP forest

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Maxhamish Range

Obs Date: February 26-28, 2018

Maxhamish Range Additional Observations		
Obs #	UTM	Observation
1	10.539927.6598546	Wolf pack on lake (≥ 3 wolves)
2	10.536225.6593492	Moose x 2 (1F, 1cf)
3	10.533448.6574340	Wolf x 1 on moose kill
4	10.522364.6566089	Moose x 1 adult
5	10.505083.6573754	Moose x 1 adult
Comments		
C1	SCEK209 Battery expired; last GPS data transmitted Dec 17, 2017 but still transmitting VHF signal during Feb 2018 LW survey (located in KWG); VHF signal not heard in April 2018 FW telemetry flight	
C2	SCEK211 Battery expired; last GPS data transmitted Dec 18, 2017 but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight	
C3	SCEK221: last GPS data transmitted Feb 17, 2018, but still transmitting VHF signal during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight; battery expired	
C4	SCEK231/ BC1009: Vertex collar (149.970) ceased transmitting GPS data Feb 20, 2018; VHF beacon continued to transmit a normal signal - caribou was located during the February 2018 recruitment survey. On March 29, 2018, SCEK231/ BC1009 was recaptured to replace the expired collar with FLNRORD collar (Lotek Lifecycle)	
C5	SCEK232 was collared in Feb 2016 but collar malfunctioned; relayed sporadic GPS data in Year V, with no GPS locations transmitted January-March 2017; caribou was not heard or seen during the March 2017 survey, but the VHF signal was detected during the April 24 2017 telemetry flight; last GPS data transmitted June 01, 2017; VHF signal was transmitting normally in December 2017	

¹ CPB - Capot-Blanc FRT - Fortune KWG - Kiwigana KOT – Kotcho

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog BL - Black Spruce-Lodgepole Pine FE - Sedge Fen TR - Transmission Corridor (including cutline)

Appendix IX: Prophet late winter survey, February 27, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

Page: 1/2

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Prophet Core Area (Westside Fort Nelson Range)

Obs Date: February 27, 2018

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 27, 2018)	08:50	> 50 % (3)	Gentle Breeze (3)	- 12 C	None (N)	51-75 cm (5)	76-100 % (6)
End (February 27, 2018)	10:15	> 50 % (3)	Gentle Breeze (3)	- 12 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK049/ BC1044	PPH	VHF	No	2	6	5	1	0	0	1	10	526987	6466547	BL	Mature Sb/LP forest
SCEK148	CLR to PPH	VHF	No	3	1	1	0	0	0	0	10	526609	6466689	BL	Originally collared in Clarke Core Area (SNS Range (C1); mature Sb/LP forest
SCEK217	PPH	Vert	Yes	1	2	1	0	1	0	0	10	527117	6467595	BL	Ceased transmitting GPS data on Jan 19, 2018 but VHF beacon functioning normally (C3); mature Sb/LP forest (C1); mature Sb/LP forest

Obs #	UTM	Prophet Core Area Additional Observations
1	10.526899.6468283	Moose x 2 (1F, 1cf)
2	10.527435.6467065	Moose x 2 (1F, 1cf)
3	10.534328.6460595	Moose x 1

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Prophet Core Area (Westside Fort Nelson Range)

Obs Date: February 27, 2018

Comments	
C1	SCEK148 (Lotek VHF) was collared in CLR in March 2013, moved between CLR and CNCA; moved to PPH in fall 2016 and was located in PPH during the March 2017 survey
C2	SCEK217 ceased GPS data transmission in January 2018 but the VHF beacon was still transmitting during Feb 2018 LW survey; VHF signal not heard in April 2018 FW telemetry flight; battery expired
CX1	Mean snow depth measured at 55 cm with no crust (UTM 10.538084.6459532)

¹ PPH - Prophet CLR – Clarke CNCA – Chinchaga North

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

Appendix X: Parker late winter survey, February 28, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

Page: 1/1

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Parker Core Area (Westside Fort Nelson Range)

Obs Date: February 28, 2018

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 28, 2018)	13:45	> 50 % (3)	Moderate Breeze (4)	- 11 C	None (N)	26-50 cm (4)	76-100 % (6)
End (February 28, 2018)	14:12	> 50 % (3)	Gentle Breeze (3)	- 11 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf	Grp #	Grp Tot	Classification					Zone	East	North	BEU ²	Comments
						F	M	Juv	Uncl	mm					
SCEK015/BC1040	PRK	VHF	Yes	2	3	2	0	1	0	0	10	490261	6521104	BB	
PRK Uncoll1	n/a	n/a	n/a	1	5	3	0	2	0	0	10	490212	6522468	LS	Bedded on lake in BB
PRK Uncoll2	n/a	n/a	n/a	3	6	3	1	2	0	0	10	495214	6521303	BB	Older wolf tracks in area
Obs #	UTM			Parker Core Area Additional Observations											
1	10.495748.6522335			Older wolf tracks; close to group #3											
2	10.499154.6521889			Elk skeleton on creek; scavenged but skeleton not disarticulated											
Comments															
C1	SCEK194 - Battery expired; last GPS data transmitted Nov 1, 2017; last VHF signal heard Dec 2017 telemetry flight; not heard or seen in Feb 2018 LW survey														

¹ PRK - Parker

² Broad Ecosystem Unit (BEU): BB - Black Spruce Bog LS – Small Lake

Appendix XI: Fort Nelson late winter survey, February 28, 2018

Animal Observation Form – Boreal Caribou 2018 Late Winter Recruitment Survey

Page: 1/1

Project: OGRIS (SCEK) Boreal Caribou

Survey: Late Winter Recruitment

Study Area: Fort Nelson Core Area (Westside Fort Nelson Range)

Obs Date: February 28, 2018

Obs Day: 1/1	Time	Cloud Cover	Wind	Temp	Precip	Snow Depth	Snow Cover
Start (February 28, 2018)	11:23	> 50 % (3)	Light Air (1)	- 7 C	None (N)	26-50 cm (4)	76-100 % (6)
End (February 28, 2018)	12:03	> 50 % (3)	Light Air (1)	- 7 C	None (N)	Days since 5 cm Snow: < 14 days (Code 3)	

Navigator/Observer: Brad Culling

Recorder/Observer: Diane Culling

Pilot/Observer: Kura Field

Observer: Kathy Needlay (FNFN)

Caribou ID	Core Area ¹	Type	Calf ²	Grp #	Grp Tot	Classification					Zone	East	North	BEU ³	Comments
						F	M	Juv	Uncl	mm					
SCEK009B/BC1055	FN	Vert	No	1	12	9	0	3	0	0	10	518784	6553815	BB	VHF beacon very weak
SCEK166	FN	Vert	No	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	518784	6553815	BB	Not transmitting GPS data or VHF signal but located visually in collared grp with SCEK009B/BC1055; last GPS data transmitted Dec 2017; battery expired
SCEK167	FN	LFC	Yes	(1)	dupl	dupl	dupl	dupl	dupl	dupl	10	518784	6553815	BB	Not transmitting GPS data or VHF signal but located visually in group with SCEK009B/BC1055 (C1); last GPS data transmitted Aug 2016; battery expired

Obs #	UTM	Fort Nelson Core Area Additional Observations
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1	10.517360.6551034	Moose x 2 adults
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Comments	
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C1	SCEK167 was located visually in a collared grp that included SCEK009B/BC1055 during both March 2017 and Feb 2018 LW surveys (ID confirmed by collar/ear tag configuration)
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CX1	Possibly an additional group in FN Core Area; fresh tracks/cratering observed in area distant from group #1 but unable to locate animals
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¹ FN - Fort Nelson

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