

# DIVERSIFIED ENVIRONMENTAL SERVICES

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## BC OIL AND GAS RESEARCH AND INNOVATION SOCIETY BOREAL CARIBOU TELEMETRY PROGRAM

### FIXED-WING TELEMETRY MONITORING FLIGHT – November 27-28, 2016

**Date:** December 15, 2016

**Attention:** Brian Thomson  
BC Oil and Gas Research and Innovation Society  
Victoria, BC

#### *Executive Summary*

One hundred forty-five boreal caribou collar frequencies and 21 wolf collar frequencies were scanned during a fixed-wing telemetry monitoring flight conducted on November 27-28, 2016. One hundred nineteen caribou collars were heard transmitting normal VHF signals; no mortality signals were detected.

The VHF beacons of the remaining 26 caribou collars were not detected. These included 1 SCEK ATS Iridium collar that has ceased Iridium data transmission and is believed to have failed (Kotcho male SCEK173), 2 MFLNRO VHF collars that may be nearing the end of their battery life (Fortune BC1033, Capot Blanc BC1014), and 23 SCEK GPS collars that ceased GPS data transmission prior to the November monitoring flight and may be nearing the end of their battery life.

#### *Background*

Between December 17, 2012 and March 31, 2016, 240 individual adult boreal caribou were radio-collared in British Columbia's boreal caribou ranges as part of the *British Columbia Boreal Caribou Implementation Plan* (BCIP). On November 27-28, 2016, Diversified Environmental Services (DES) conducted a fixed-wing telemetry monitoring flight under contract to the BC Oil and Gas Research and Innovation Society (OGRIS; formerly the *Science and Community Environmental Knowledge Fund* (SCEK)) on behalf of the Research and Effectiveness Monitoring Board (REMB). Fixed-wing monitoring flights are conducted at regular intervals throughout the year in order to identify mortality events to be followed up by ground-based mortality investigations and collar recoveries, as well as to track potential long distance seasonal movements of VHF-collared caribou.

### *Objectives*

The objective of the November 27-28, 2016 monitoring flight was to determine the approximate location and VHF beacon status of all boreal caribou and wolf collars believed to be active in the survey area. These included caribou and wolf collars deployed on behalf of SCEK, caribou collars deployed on behalf of MFLNRO, wolf collars deployed for a research program funded by Nexen Inc., and pre-existing collars known to have entered BC's boreal caribou ranges from adjacent jurisdictions.

### *Methods*

The monitoring flight was conducted using a Cessna 180 fixed-wing aircraft equipped with 1 outward-facing directional antenna affixed to each wing strut. Collar frequencies were scanned using Lotek™ STR 1000 and Lotek BioTracker telemetry receivers. The flight was conducted at 700-1,200 m above ground level at an average speed of 160 km/hr. The VHF beacon status of all detected collars was recorded on hard copy forms. In the case of VHF collars (Lotek LMRT4), status was recorded as either normal (60 pulses per minute (ppm)) or mortality mode (120 ppm), and a location (+/- 1 km) was recorded using a hand-held GPS unit. As GPS/satellite collars are programmed to log multiple daily locations with high precision, additional effort to obtain collar locations after VHF signal detection is not necessary. Therefore, waypoints for GPS/satellite collars were typically recorded at the location from which the collar was heard, with corrections for estimated bearing and distance, unless the VHF beacon status indicated a collar malfunction or mortality, in which case, more precise locations were obtained.

### *Results*

The monitoring flight preceding the November 27-28 flight was conducted on September 6-7, 2016; no flights were conducted in October. One caribou mortality (SCEK182) was detected through GPS data transmission subsequent to the September flight and investigated on October 7. One hundred forty-five caribou collar frequencies were scanned during the November 2016 monitoring flight, including 142 SCEK collars (1 ATS Iridium, 72 Vectronic Vertex, 10 Lotek LifeCycle, and 59 Lotek VHF), and 3 previously-deployed MFLNRO VHF collars. In addition, 21 wolf collar frequencies were scanned during the flight, including 15 SCEK wolf collars (11 Lotek Iridium, 4 Lotek VHF) and 6 University of Alberta/Nexen collars (Lotek Iridium). Several unrecovered SCEK Iridium wolf collars assumed to have exceeded their battery lives were not scanned.

Results of the November 27-28, 2016 monitoring flight are presented in Table 1. Flight paths searched within and adjacent to each core habitat area are shown in Figure 1. Total flight line distance was 1,880 km. Of 145 caribou collar frequencies scanned, 119 normal VHF signals and no mortality signals were detected. The VHF beacons of the remaining 26 caribou collars were not detected. These included

1 SCEK ATS Iridium collar that has ceased Iridium data transmission and is believed to have failed (Kotcho male SCEK173), 2 MFLNRO VHF collars that may be nearing the end of their battery life (Fortune BC1033, Capot Blanc BC1014), and 23 SCEK GPS collars (10 Lotek LifeCycle and 13 Vectronic Vertex) that ceased GPS data transmission prior to the November monitoring flight and may be nearing the end of their battery life. (SCEK034, SCEK040, SCEK055, SCEK071, SCEK085, SCEK111, SCEK119, SCEK135, SCEK142, SCEK 167, SCEK169B, SCEK172, SCEL175, SCEK176, SCEK185, SCEK187, SCEK191, SCEK192, SCEK197, SCEK204, SCEK228, SCEK234, SCEK236).

Of the 21 wolf collar frequencies scanned during the November 2016 monitoring flight, 7 normal VHF signals and one low battery VHF signal (BW033) were detected. The remaining 13 wolf collars were not detected. These included 3 VHF collars, 2 GPS/satellite collars transmitting data indicating normal activity, and 8 GPS/satellite collars whose GPS data transmissions ceased prior to the November monitoring flight. No mortality signals were detected.

There were no opportunities for First Nations field assistance on this monitoring flight.

Cordially,

A handwritten signature in black ink, appearing to read 'Brad Culling', with a stylized flourish at the end.

Brad Culling, R.P.Bio  
Diversified Environmental Services  
Fort St. John, BC

Table 1. VHF signal status and location of boreal caribou and wolf collars detected during the Nov 27-28, 2016 OGRIS fixed-wing telemetry monitoring flight.

ID	Species	Range	Core	Collar Type	Status	Date	Zone	East	North	Comments
SCEK112	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	650788	6649094	normal
SCEK113	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	605523	6639177	normal
SCEK119	Caribou	Calendar	Calendar	Vectr-Vertex	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 13, 16
SCEK120	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	612200	6640910	normal
SCEK122	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	635316	6649056	normal
SCEK123	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	597453	6629761	normal
SCEK125	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	n/a	n/a	n/a	VHF signal heard in NWT; not located
SCEK134	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	652039	6641299	normal
SCEK135	Caribou	Calendar	Calendar	Vectr-Vertex	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Aug 12, 16
SCEK136b	Caribou	Calendar	Calendar	Vectr-VertexTD	42 ppm	11/28/2016	10	618531	6608739	normal
SCEK137	Caribou	Calendar	Calendar	Lotek VHF	60 ppm	11/28/2016	10	628569	6641043	normal
SCEK146b	Caribou	Calendar	Calendar	Vectr-VertexTD	42 ppm	11/28/2016	10	611868	6636827	normal
SCEK180	Caribou	Calendar	Calendar	Vectr-VertexTD	42 ppm	11/28/2016	10	633866	6643140	normal
SCEK181b	Caribou	Calendar	Calendar	Vectr-VertexTD	42 ppm	11/28/2016	10	622083	6622782	normal
SCEK183	Caribou	Calendar	Calendar	Vectr-VertexTD	42 ppm	11/28/2016	10	601801	6633567	normal
SCEK185	Caribou	Calendar	Calendar	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 20, 16
SCEK234	Caribou	Calendar	Calendar	Vectr-VertexTD	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 26, 16
SCEK126b	Caribou	Calendar	RRA-C	Vectr-VertexTD	42 ppm	11/28/2016	10	608732	6641276	normal
SCEK107	Caribou	Calendar	RRA-D	Lotek VHF	60 ppm	11/28/2016	10	602522	6637814	normal
SCEK040	Caribou	Chinchaga	Ethhithun	Vectr-Vertex	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 22, 16
SCEK195	Caribou	Chinchaga	Ethhithun	Vectr-VertexTD	42 ppm	11/27/2016	10	653050	6409672	normal
SCEK224	Caribou	Chinchaga	Ethhithun	Vectr-VertexTD	42 ppm	11/27/2016	10	654150	6409463	normal
SCEK026b	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/27/2016	10	658545	6295945	normal
SCEK029	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/28/2016	11	326754	6354303	normal
SCEK032	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/27/2016	10	661179	6346901	normal
SCEK033b	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/28/2016	10	622322	6351867	normal
SCEK034	Caribou	Chinchaga	Milligan	Vectr-Vertex	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Dec 7, 15
SCEK035	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/28/2016	11	331263	6350911	normal
SCEK036b	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/28/2016	10	617313	6353338	normal
SCEK038b	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/28/2016	10	661579	6298448	normal
SCEK041	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/27/2016	10	660432	6346957	normal
SCEK053	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/28/2016	11	329134	6352004	normal
SCEK054	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/27/2016	10	664995	6353838	normal
SCEK055	Caribou	Chinchaga	Milligan	Vectr-Vertex	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Mar 16, 16
SCEK057	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/28/2016	10	673532	6349165	normal
SCEK059	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/27/2016	10	657455	6344783	normal
SCEK060	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/28/2016	10	613847	6368653	normal
SCEK061	Caribou	Chinchaga	Milligan	Lotek VHF	60 ppm	11/27/2016	n/a	n/a	n/a	VHF signal heard but not located
SCEK196	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/27/2016	10	647322	6398388	normal
SCEK197	Caribou	Chinchaga	Milligan	Lotek-Lifecycle	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Aug 15, 16
SCEK198	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/28/2016	11	334312	6354017	normal
SCEK201	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/27/2016	10	658411	6296302	normal
SCEK223	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/27/2016	10	645322	6341156	normal
SCEK226	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/27/2016	10	658758	6295413	normal
SCEK227	Caribou	Chinchaga	Milligan	Vectr-VertexTD	42 ppm	11/28/2016	11	324537	6351191	normal
SCEK048	Caribou	Chinchaga	RRA-A	Lotek VHF	60 ppm	11/27/2016	10	617816	6463464	normal
SCEK142	Caribou	Chinchaga	RRA-A	Vectr-Vertex	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 12, 16
SCEK170b	Caribou	Chinchaga	RRA-A	Vectr-Vertex	42 ppm	11/27/2016	10	643272	6458959	normal
SCEK172	Caribou	Chinchaga	RRA-A	Lotek-Lifecycle	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Jul 20, 16

Table 1 cont. VHF signal status and location of boreal caribou and wolf collars detected during the Nov 27-28, 2016 OGRIS fixed-wing telemetry monitoring flight.

ID	Species	Range	Core	Collar Type	Status	Date	Zone	East	North	Comments
SCEK189	Caribou	Chinchaga	RRA-A	Vectr-VertexTD	42 ppm	11/27/2016	10	615567	6458911	normal
SCEK213	Caribou	Chinchaga	RRA-A	Vectr-VertexTD	42 ppm	11/27/2016	10	607597	6452305	normal
SCEK214	Caribou	Chinchaga	RRA-A	Vectr-VertexTD	42 ppm	11/27/2016	10	640245	6465611	normal
SCEK215	Caribou	Chinchaga	RRA-A	Vectr-VertexTD	42 ppm	11/27/2016	10	620684	6447965	normal
SCEK236	Caribou	Chinchaga	RRA-A	Vectr-VertexTD	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data May 15, 16
SCEK009b	Caribou	Fort Nelson	Fort Nelson	Vectr-VertexTD	42 ppm	11/28/2016	10	521058	6552258	normal
SCEK166	Caribou	Fort Nelson	Fort Nelson	Vectr-VertexTD	42 ppm	11/28/2016	10	515373	6555309	normal
SCEK167	Caribou	Fort Nelson	Fort Nelson	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Aug 29,16
BC1014	Caribou	Maxhamish	Capot-Blanc	Lotek VHF	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected
SCEK007b	Caribou	Maxhamish	Capot-Blanc	Vectr-VertexTD	42 ppm	11/28/2016	10	460387	6579065	normal
SCEK066b	Caribou	Maxhamish	Capot-Blanc	Vectr-VertexTD	42 ppm	11/28/2016	10	470442	6580889	normal
SCEK076	Caribou	Maxhamish	Capot-Blanc	Lotek VHF	60 ppm	11/28/2016	10	469415	6581065	normal
SCEK225	Caribou	Maxhamish	Capot-Blanc	Vectr-VertexTD	42 ppm	11/28/2016	10	475040	6627042	normal
BC1033	Caribou	Maxhamish	Fortune	Lotek VHF	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected
SCEK085	Caribou	Maxhamish	Fortune	Vectr-Vertex	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Feb 27, 16
SCEK086	Caribou	Maxhamish	Fortune	Lotek VHF	60 ppm	11/28/2016	10	545061	6626706	normal
SCEK128	Caribou	Maxhamish	Fortune	Lotek VHF	60 ppm	11/28/2016	10	529438	6631461	normal
SCEK129	Caribou	Maxhamish	Fortune	Lotek VHF	60 ppm	11/28/2016	10	536035	6631125	normal
SCEK164	Caribou	Maxhamish	Fortune	Lotek VHF	60 ppm	11/28/2016	10	542066	6618201	normal
SCEK175	Caribou	Maxhamish	Fortune	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Sep 18, 16
SCEK176	Caribou	Maxhamish	Fortune	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Aug 08, 16
SCEK177	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	530331	6633828	normal
SCEK178	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	539202	6633993	normal
SCEK205	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	542000	6627321	normal
SCEK206	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	539744	6622330	normal
SCEK208	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	483930	6625509	normal
SCEK221	Caribou	Maxhamish	Fortune	Vectr-VertexTD	42 ppm	11/28/2016	10	540655	6625572	normal
SCEK004	Caribou	Maxhamish	Kiwigana	Lotek VHF	60 ppm	11/28/2016	10	494200	6628135	normal
SCEK062	Caribou	Maxhamish	Kiwigana	Lotek VHF	60 ppm	11/28/2016	10	523776	6566011	normal
SCEK064	Caribou	Maxhamish	Kiwigana	Lotek VHF	60 ppm	11/28/2016	10	526812	6566704	normal
SCEK168	Caribou	Maxhamish	Kiwigana	Vectr-VertexTD	42 ppm	11/28/2016	10	530446	6569128	normal
SCEK169b	Caribou	Maxhamish	Kiwigana	Vectr-VertexTD	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 03, 16
SCEK211	Caribou	Maxhamish	Kiwigana	Vectr-VertexTD	42 ppm	11/28/2016	10	529710	6568032	normal
SCEK231	Caribou	Maxhamish	Kiwigana	Vectr-VertexTD	42 ppm	11/28/2016	10	529671	6568656	normal
SCEK232	Caribou	Maxhamish	Kiwigana	Vectr-VertexTD	42 ppm	11/28/2016	10	525088	6569087	normal
SCEK010	Caribou	Parker	Parker	Lotek VHF	60 ppm	11/28/2016	10	478317	6515111	normal
SCEK012	Caribou	Parker	Parker	Lotek VHF	60 ppm	11/28/2016	10	489160	6519374	normal
SCEK015	Caribou	Parker	Parker	Lotek VHF	60 ppm	11/28/2016	10	490375	6519549	normal
SCEK016b	Caribou	Parker	Parker	Vectr-VertexTD	42 ppm	11/28/2016	10	488595	6524949	normal
SCEK194	Caribou	Parker	Parker	Vectr-VertexTD	42 ppm	11/28/2016	10	488907	6525907	normal
SCEK237	Caribou	Parker	Parker	Vectr-VertexTD	42 ppm	11/28/2016	10	482664	6517821	normal
SCEK238	Caribou	Parker	Parker	Vectr-VertexTD	42 ppm	11/28/2016	10	488291	6519277	normal
SCEK045	Caribou	Prophet	Prophet	Lotek VHF	60 ppm	11/27/2016	10	555377	6450196	normal
SCEK049	Caribou	Prophet	Prophet	Lotek VHF	60 ppm	11/27/2016	10	550365	6454802	normal
SCEK051	Caribou	Prophet	Prophet	Lotek VHF	60 ppm	11/27/2016	10	547900	6459271	normal
SCEK161b	Caribou	Prophet	Prophet	Vectr-VertexTD	42 ppm	11/27/2016	10	616816	6460717	normal
SCEK217	Caribou	Prophet	Prophet	Vectr-VertexTD	42 ppm	11/27/2016	10	548616	6456150	normal
SCEK019	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	576265	6502458	normal
SCEK020b	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	600984	6479202	normal

Table 1 cont. VHF signal status and location of boreal caribou and wolf collars detected during the Nov 27-28, 2016 OGRIS fixed-wing telemetry monitoring flight.

ID	Species	Range	Core	Collar Type	Status	Date	Zone	East	North	Comments
SCEK024	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	573709	6502249	normal
SCEK025	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	562344	6500639	normal
SCEK068	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	557135	6505037	normal
SCEK070	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	556552	6507608	normal
SCEK145	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/28/2016	10	608252	6557670	normal
SCEK148	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	547394	6460018	normal
SCEK149	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	577227	6502702	normal
SCEK150	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	603832	6483909	normal
SCEK152	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	603832	6485909	normal
SCEK156	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	559369	6508644	normal
SCEK157	Caribou	Snake-Sahtaneh	Clarke	Lotek VHF	60 ppm	11/27/2016	10	566971	6501365	normal
SCEK191	Caribou	Snake-Sahtaneh	Clarke	Lotek-Lifecycle	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Sep 17, 16
SCEK192	Caribou	Snake-Sahtaneh	Clarke	Lotek-Lifecycle	not heard	11/27/2016	n/a	n/a	n/a	VHF signal not detected; last data Sep 23, 16
SCEK193	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	561544	6506322	normal
SCEK218	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	568462	6501205	normal
SCEK220	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	606087	6485018	normal
SCEK239	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	557867	6503690	normal
SCEK240	Caribou	Snake-Sahtaneh	Clarke	Vectr-VertexTD	42 ppm	11/27/2016	10	583244	6488522	normal
SCEK103	Caribou	Snake-Sahtaneh	East Kotcho	Lotek VHF	60 ppm	11/28/2016	10	633611	6559334	normal
SCEK105	Caribou	Snake-Sahtaneh	East Kotcho	Lotek VHF	60 ppm	11/28/2016	10	639920	6573258	normal
SCEK088	Caribou	Snake-Sahtaneh	North Kotcho	Lotek VHF	60 ppm	11/28/2016	10	616399	6567834	normal
SCEK089	Caribou	Snake-Sahtaneh	North Kotcho	Lotek VHF	60 ppm	11/28/2016	10	608228	6555921	normal
SCEK090	Caribou	Snake-Sahtaneh	North Kotcho	Lotek VHF	60 ppm	11/28/2016	10	614274	6573670	normal
SCEK092	Caribou	Snake-Sahtaneh	North Kotcho	Lotek VHF	60 ppm	11/28/2016	10	615815	6574315	normal
SCEK097b	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	614045	6566840	normal
SCEK100b	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	610271	6558904	normal
SCEK111	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-Vertex	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jul 10, 16
SCEK186	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	604228	6557867	normal
SCEK187	Caribou	Snake-Sahtaneh	North Kotcho	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jul 24, 16
SCEK204	Caribou	Snake-Sahtaneh	North Kotcho	Lotek-Lifecycle	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jun 26, 16
SCEK228	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	not heard	11/28/2016	n/a	n/a	n/a	VHF signal not detected; last data Jul 09, 16
SCEK229	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	610169	6568119	normal
SCEK230	Caribou	Snake-Sahtaneh	North Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	606157	6565098	normal
SCEK096	Caribou	Snake-Sahtaneh	Paradise	Lotek VHF	60 ppm	11/27/2016	10	563689	6501560	normal
BC1028	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	558345	6603923	normal
SCEK079b	Caribou	Snake-Sahtaneh	Tsea	Vectr-VertexTD	42 ppm	11/28/2016	10	561106	6589885	normal
SCEK081	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	554446	6606206	normal
SCEK082	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	560095	6592236	normal
SCEK127	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	555529	6608396	normal
SCEK131	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	558021	6598484	normal
SCEK132	Caribou	Snake-Sahtaneh	Tsea	Lotek VHF	60 ppm	11/28/2016	10	555918	6597248	normal
SCEK233	Caribou	Snake-Sahtaneh	Tsea	Vectr-VertexTD	42 ppm	11/28/2016	10	558167	6593944	normal
SCEK071	Caribou	Snake-Sahtaneh	West Kotcho	Vectr-Vertex	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; no data since June 27, 15
SCEK091	Caribou	Snake-Sahtaneh	West Kotcho	Lotek VHF	60 ppm	11/28/2016	10	615367	6561764	normal
SCEK173	Caribou	Snake-Sahtaneh	West Kotcho	ATS-Irid	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; no data since July 28, 15
SCEK209	Caribou	Snake-Sahtaneh	West Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	531301	6571873	normal
SCEK219	Caribou	Snake-Sahtaneh	West Kotcho	Vectr-VertexTD	42 ppm	11/28/2016	10	552515	6607567	normal

Table 1 cont. VHF signal status and location of boreal caribou and wolf collars detected during the Nov 27-28, 2016 OGRIS fixed-wing telemetry monitoring flight.

ID	Species	Range	Core	Collar Type	Status	Date	Zone	East	North	Comments
BW034	Wolf	Calendar	July	Lotek VHF	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected
BW043nex	Wolf	Calendar	July	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; last data June 14, 16
BW044nex	Wolf	Calendar	July	Lotek Iridium	50 ppm	11/28/2016	10	629312	6639154	VHF normal; last data Apr 10, 16
BW045nex	Wolf	Calendar	July	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; GPS data normal
BW046nex	Wolf	Calendar	July	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; GPS data ceased Dec 21, 15
BW002	Wolf	Chinchaga	Big Arrow	Lotek VHF	60 ppm	11/28/2016	10	633281	6350914	normal
BW053	Wolf	Chinchaga	Kahntah	Lotek Iridium	not heard	11/27/2016	n/a	n/a	n/a	VHF not detected; GPS data normal
BW038	Wolf	Clarke	Elleh	Lotek Iridium	50 ppm	11/27/2016	10	555863	6480302	VHF normal; GPS data normal
BW039	Wolf	Clarke	Elleh	Lotek Iridium	not heard	11/27/2016	n/a	n/a	n/a	VHF not detected; last GPS data Sep 29, 16
BW040	Wolf	Clarke	Elleh	Lotek Iridium	50 ppm	11/27/2016	10	555863	6480302	VHF normal; GPS data normal
BW051	Wolf	Fort Nelson	Tsimeh	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; battery assumed expired
BW032	Wolf	Fortune/Tsea	Petitot	Lotek VHF	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected
BW033	Wolf	Fortune/Tsea	Petitot	Lotek Iridium	double 50	11/28/2016	10	554476	6614657	VHF low batt signal detected; last data Nov 23, 15
BW047nex	Wolf	Fortune/Tsea	Petitot	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; last data Oct 30, 15
BW049nex	Wolf	Fortune/Tsea	Petitot	Lotek Iridium	50 ppm	11/28/2016	10	554476	6614657	VHF normal; GPS data normal
BW050	Wolf	Fortune/Tsea	Petitot	Lotek Iridium	50 ppm	11/28/2016	10	554476	6614657	VHF normal; last data Nov 06, 15
BW035	Wolf	Maxhamish	Fortune	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; Last GPS data Nov 22, 15
BW036	Wolf	Maxhamish	Fortune	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; last GPS data Jan 20, 16
BW024	Wolf	Snake-Sahtaneh	Kwokullie	Lotek Iridium	50 ppm	11/28/2016	10	611197	6580114	VHF detected; last data Nov 17, 16
BW026	Wolf	Snake-Sahtaneh	Kwokullie	Lotek VHF	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected
BW052	Wolf	Snake-Sahtaneh	Kwokullie	Lotek Iridium	not heard	11/28/2016	n/a	n/a	n/a	VHF not detected; last data Nov 23, 16

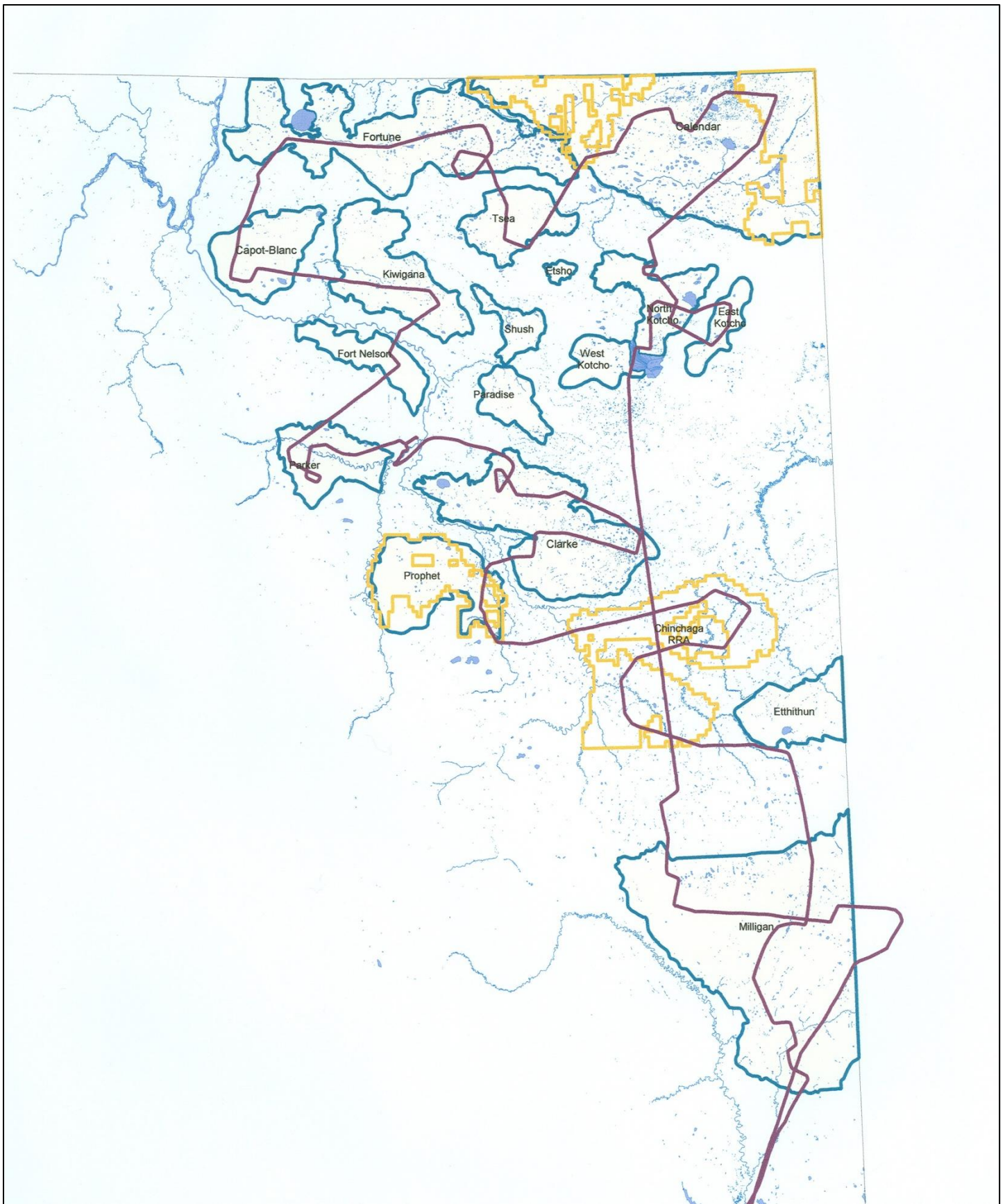


Figure 1. Flight paths flown during the November 27-28, 2016 OGRIS boreal caribou and wolf fixed-wing telemetry monitoring flight.