

**BOREAL CARIBOU HABITAT  
STUDY IN  
NORTHEASTERN BRITISH COLUMBIA**

**ANNUAL PROGRESS REPORT – YEAR V  
APRIL 1, 2003 - MARCH 31, 2004**

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## **INTRODUCTION**

In May 2002, the *Committee on the Status of Endangered Wildlife in Canada* re-examined the rank of the Boreal population of woodland caribou (*Rangifer tarandus caribou*) and confirmed the classification of "Threatened" (COSEWIC 2002). This designation is defined as "a species likely to become endangered if limiting factors are not reversed." Within British Columbia, the population is restricted to the northeastern corner of the province. On the provincial scale, woodland caribou are also divided into 3 ecotypes, based on characteristic ecology, with the "boreal ecotype" corresponding to the British Columbian segment of the national "Boreal population." Provincially, the boreal ecotype is blue-listed (CDC 2002).

In 1999, the *Boreal Caribou Habitat Study in Northeastern British Columbia* was initiated as a joint project between the British Columbia Ministry of Environment, Lands & Parks (MoELP) and Slocan Forest Products Ltd. – Fort Nelson Division (Slocan). The primary objective of the project is to describe boreal caribou population dynamics and habitat use within the Snake/Sahtaneh watersheds and Kotcho Lake area, east of Fort Nelson. The study represents a significant step in addressing the lack of understanding of the ecology of boreal caribou in British Columbia and identifying key habitats and limiting factors critical to the long-term persistence of the species.

Since its inception, the project has collected information on caribou habitat use, movements and population dynamics within the Snake/Sahtaneh study area. As preliminary results indicated low calf recruitment, the Year IV program was expanded to include an assessment of local predator populations. Between November 2002 and March 2003, 16 grey wolves (*Canis lupus*) were fitted with telemetry collars (9 GPS and 7 VHF) to collect information on wolf population size and movements within the study area. During Year V, field collection of data on caribou and wolf populations was continued and five GPS collars were deployed on black bears to investigate potential predation of caribou calves.

This report summarizes Years I through IV (April 1999 through March 2003) and describes activities conducted during Year V (2003/2004) of the project.

## **SUMMARY OF YEAR I (1999/2000) TO YEAR IV (2002/2003)**

### **Year I (1999/2000)**

During Year I of the *Boreal Caribou Habitat Study*, 12 GPS collars were purchased from Advanced Telemetry Systems (ATS; Isanti, Minnesota, USA). These collars were fitted on adult female boreal caribou captured by MoELP staff in March 2000. Efforts were made to capture animals within the coverage area of recently completed Terrestrial Ecosystem Mapping (TEM) in the Snake/Sahtaneh study area (Shearwater Mapping Ltd. 1997). The life expectancy of the original 12 collars was approximately six months, at which time they were to be recovered, sent to the manufacturer for refurbishment, then fitted on a new sample of 12 caribou during the following winter (Year II).

### **Year II (2000/2001)**

In Year II, 4 of the original 12 ATS collars were recovered between June and October and sent for refurbishment. A fifth collar was retrieved in November 2000. In January 2001, 4 of the 7 caribou still wearing functioning collars were recaptured and re-fitted with the 4 refurbished collars. Technological advances since the original purchase of the

collars allowed the life expectancy of the refurbished units to be increased to approximately 1 year.

The project was expanded in Year II, with the purchase of 13 Televilt POSREC® C900 GPS collars (Televilt Positioning, Lindesberg, Sweden). These collars, which had an estimated life span of 2.5 years, were fitted on 13 new adult female caribou captured in March 2001.

### **Year III (2001/2002)**

Caribou GPS data collection continued into Year III with 18 GPS collars active in April 2001. In early November 2001, 6 new caribou were captured and fitted with refurbished ATS collars. Later that month, problems with the 13 Televilt collars became evident, with some units transmitting pre-mature low battery signals. The manufacturer acknowledged a software defect and agreed to supply 13 warranty collars, however, 4 of the original Televilt collars had stopped transmitting VHF signals and were lost before the replacement collars could be obtained.

### **Year IV (2002/2003)**

In early April 2002, the 13 warranty replacement Televilt GPS collars were received. On April 11, an attempt was made to locate and re-capture caribou fitted with the failing units. Seven animals were found to be still transmitting VHF signals and were re-captured for collar replacement. The remaining 6 warranty collars were fitted on new caribou. An eighth original collar was located, in low-battery mode, later in the year and replaced with a refurbished ATS collar. Four remaining original Televilt collars are presumed non-functional.

During Year IV, calf survival surveys were conducted in June and October 2002 and March 2003. Results were 20 calves:100 cows, 13 calves:100 cows and 5.5 calves:100 cows, respectively.

Two collared caribou died during Year IV, bringing mortalities to a total of 4 over the course of the project. Mortality site investigations conducted during May 2002 and August 2002 indicated wolf predation and an undetermined cause, respectively.

Nine Televilt POSREC® C600 GPS collars were purchased in November 2002, for use on wolves within the study area. Three wolves from each of 3 packs in the vicinity of the study area were collared in mid-winter to log location data through the denning and rearing periods, which coincides with the caribou calving and neonatal period.

In addition, six Lotek VHF collars were provided by MWLAP-Fort St. John and placed on 2 wolves in each of the three packs containing GPS collars as a means of locating the packs after the scheduled release of the GPS units.

During Year IV, the initial 12 caribou data sets were mapped as a preliminary GIS coverage and appeared to indicate 3 areas of high year-round caribou use within the study area. A copy of this draft map was provided to habitat protection staff at the Oil & Gas Commission, Fort St. John, as supplementary information for considering development applications.

## **SUMMARY OF YEAR V (2002/2003)**

### **Caribou Capture and Telemetry**

The long-term objective has been to maintain 20 active GPS caribou collars through a rotation of recovery, refurbishment, and re-deployment. As of March 31, 2004, 20 GPS caribou collars were active, with the status of 2 additional GPS collars unknown.

Four previously-used Lotek VHF collars, contributed by MWLAP-Fort St. John, were deployed on caribou in order to maximize sample size for proposed calf survival surveys in the final year of the project (Year VI).

Throughout Year V, all capture and handling activities and data collection were conducted in accordance with appropriate Resources Information Standards Committee (formerly Resources Inventory Committee) protocol. Basic morphometric measurements were taken for all caribou captured. Blood samples were collected from all females captured after the fall rut. Blood samples were centrifuged, serum was drawn off and frozen, and shipped to Prairie Diagnostic Services (University of Saskatchewan, Saskatoon, SK) for progesterone analysis. Additional blood samples were collected to contribute to a University of Victoria genetics study on woodland caribou metapopulations. Hair samples were collected from all caribou at the time of first capture. Fecal pellet samples were also collected.

### **Caribou Population Assessment**

A neonatal calf survival survey was conducted on June 28, 2003. All collared caribou were located by helicopter, approximately 4 weeks post-calving, to determine if they were accompanied by newborn calves. Visual contact was made for 15 of the 19 collared caribou. Of these 15 females, 3 had calves (20 calves:100 cows). Collared females were found to be widely dispersed throughout the study area, with no collared female observed in the company of another adult. Progesterone analysis of blood serum from 7 of these females, captured the preceding winter, indicated 6 were pregnant. The apparently low pregnancy rate (85%) may be a function of the low sample size.

On October 29, 2003, a fall calf survival/rutting survey was conducted. Collared females were found in rutting groups throughout the study area and all caribou in each group were classified to sex and age class. A total of 76 caribou were observed during the fall survey, including 60 cows, 8 calves and 8 bulls (13 calves:100 cows; 13 bulls:100 cows). Mean group size was 6.3 animals.

No collared caribou died during Year V.

### **Wolf Capture and Telemetry**

The 9 GPS collars fitted on wolves during Year IV were recovered between August and November 2003. Only 4 of the 9 collars collected data through the caribou calving and neonatal period. The collection of data for the remaining 5 collared wolves was interrupted by bite damage to the GPS antennae inflicted by other pack members.

The nine recovered collars were returned to Televilt and modified to reduce the potential for bite damage. Two additional GPS wolf collars were provided by Televilt in settlement of outstanding warranty issues, making a total of 11 available for re-deployment. In addition to the 3 large packs collared during Year IV (Snake, Kotcho and Kyklo packs), 2

new packs (Clarke and Gunnel packs) were identified in Year V through the establishment of 2 bait stations between the apparent territories of the previously collared packs. Eleven new wolves from these 5 packs were fitted with the modified GPS collars during February and March 2004.

As in Year IV, wolf captures were completed through a combination of aerial net-gunning and aerial darting, conducted from a Bell 206B helicopter. Wolves were immobilized with 300-500 mg of Telazol.<sup>®</sup>

### ***Black Bear Capture and Telemetry***

Five black bears were captured by aerial darting in May 2003, following emergence from denning. The bears were fitted with Televilt POSREC<sup>®</sup> GPS collars to investigate seasonal movements in relation to caribou calving and neonatal habitat use. Three of the 5 collars were recovered during the summer and fall of 2003, 1 collar apparently failed and cannot be located and the fifth collar will be recovered from an occupied bear den during April 2004. Review of the initial data suggests a little overlap between spring habitat use by bears and caribou calving sites.

### ***Data Analysis***

Several digital map bases and habitat attribute layers are available for the study area, including Terrestrial Resource Inventory Mapping (TRIM), TEM, Vegetation Resources Inventory (VRI), and an Earth Cover Classification map base completed by Ducks Unlimited Inc. (January 2003). This habitat information will support the analysis of caribou, wolf and black bear GPS data using ArcView<sup>®</sup> 8 (Vers. 8.3) and ArcGIS Spatial Analyst (ESRI, Redlands, CA). Individual fixed-kernel home ranges will be delineated using the ArcView program extension *Animal Movement* (Hooge and Eichenlaub 1997).

As of March 31, 2004, a total of 41 GPS data sets, representing 65,000 location points, have been downloaded from retrieved collars.

Detailed compilation and analysis of GPS caribou, wolf and black bear data will begin during Year VI of the project.

Table 1 summarizes activities completed to the end of Year V (2003/2004) of the *Boreal Caribou Habitat Study in Northeastern British Columbia* for the caribou, wolf and black bear components of the project. The status of all GPS and VHF collars as of March 31, 2004 is provided in Appendix I.

Table 1. Summary of annual activities completed for the *Boreal Caribou Habitat Study in Northeastern British Columbia* to March 31, 2004.

| Year                         | ACTIVITIES COMPLETED  |
|------------------------------|---|
| <b>YEAR I</b><br>1999/2000   | <ul style="list-style-type: none"> <li>• purchase Advanced Telemetry Solutions (ATS) GPS/VHF collars,</li> <li>• capture and collar 12 adult female caribou in and adjacent to the TEM mapping coverage area (Mar. 2000).</li> </ul>  |
| <b>YEAR II</b><br>2000/2001  | <ul style="list-style-type: none"> <li>• monthly monitoring of radio-collared caribou by Piper PA12 fixed-wing aircraft,</li> <li>• recover active ATS collars as batteries expire and ship for refurbishment,</li> <li>• 1 caribou mortality investigation (June 2000),</li> <li>• purchase 13 Televilt POSREC® 900 GPS/VHF collars (Dec. 2000),</li> <li>• re-deploy 5 refurbished ATS collars – Jan. to Mar. 2001 (4 re-collared caribou &amp; 1 new)</li> <li>• collar 13 new adult female caribou, with new Televilt collars, in and adjacent to the TEM mapping coverage area (Mar. 2001),</li> <li>• locate winter habitat sites, record snow depth.</li> </ul>  |
| <b>YEAR III</b><br>2001/2002 | <ul style="list-style-type: none"> <li>• monthly monitoring of radio-collared caribou by Piper PA12 fixed-wing aircraft,</li> <li>• spring calf survey (June 2001),</li> <li>• fall calf/rutting survey (Oct. 2001),</li> <li>• 1 caribou mortality investigation (Oct. 2001),</li> <li>• re-deploy 6 refurbished ATS collars on new caribou (Nov. 2001).</li> </ul>  |
| <b>YEAR IV</b><br>2002/2003  | <ul style="list-style-type: none"> <li>• deploy 13 warranty replacement Televilt collars (7 re-collared caribou, 6 new) (April 2002),</li> <li>• monthly monitoring of collared caribou by Piper PA12 fixed-wing aircraft,</li> <li>• spring calf survival survey (June 2002),</li> <li>• 2 caribou mortality investigations (May &amp; Aug 2002)</li> <li>• autumn calf survival/rutting survey (Oct. 2002),</li> <li>• purchase 9 Televilt POSREC® 600 GPS/VHF collars to be fitted on wolves (Dec. 2002),</li> <li>• loan of 8 salvaged VHF wolf collars from MWLAP in Fort St. John (Dec. 2002),</li> <li>• collect road-killed moose and deer and establish 3 wolf bait stations (Dec. 2002-Jan. 2003),</li> <li>• capture and radio-collar 16 wolves using 9 GPS collars and 6 VHF collars (Nov. 2002 through Mar. 2003),</li> <li>• continued monitoring of collared caribou and wolves by Piper PA12 fixed-wing aircraft ,</li> <li>• recovered failed Televilt warranty collar and ship for warranty,</li> <li>• replace 2 failed GPS wolf collars with VHF collars (Feb.-Mar. 2003),</li> <li>• re-deploy 8 refurbished ATS collars and 1 warranty Televilt collar (5 re-collared, 1 new caribou) to maintain target sample of approx. 20 caribou (Nov. 2002-Mar. 2003),</li> <li>• conduct late winter calf survival and composition survey (March 2003).</li> </ul> |
| <b>YEAR V</b><br>2003/2004   | <ul style="list-style-type: none"> <li>• monthly monitoring of collared caribou, wolves and bears by Piper PA12 fixed-wing aircraft,</li> <li>• capture and collar 5 black bears (May 2003),</li> <li>• conduct spring calf survival survey (June 2003),</li> <li>• conduct wolf den inspections and scat collection (fall 2003),</li> <li>• conduct autumn calf survival/rutting survey (Oct. 2003),</li> <li>• conduct late-winter calf survival and composition survey (March 2004),</li> <li>• capture and radio-collar 15 wolves (11 GPS collars and 4 VHF collars) (Jan.-March 2004),</li> <li>• continue recovery and redeployment of collars to maintain a minimum of 20 collared caribou.</li> </ul>   |

## **PROPOSED ACTIVITIES FOR YEAR VI (2004/2005)**

Year VI is the final year of the study, with all deployed GPS collars scheduled to be retrieved by December 2004.

During May 2004, 5 new black bears will be captured and fitted with Televilt POSREC® GPS collars. Effort will be made to select bears within areas of moderate to high caribou use. Automatic release mechanisms on these collars will be programmed to activate on October 01, 2004, prior to denning.

Scheduled fixed-wing flights will continue from April through November 2004 to monitor collar status and detect mortality signals.

To gather more information on caribou neonatal mortality and survival, the annual spring calf survival survey will be increased to 3 flights between May 15 and June 30, 2004. A fall calf survival/rutting survey will be conducted in October 2004.

Wolf den sites identified during Year V and new den sites identified during fixed-wing monitoring in Year VI will be inspected after abandonment to collect scat samples for food habit analysis. In the event that wolf GPS data is retrieved prior to snowfall, a sub-sample of kill sites identified from analysis of the data will be inspected in the field to determine prey species composition.

Caribou and wolf collars equipped with programmed release mechanisms are scheduled to activate on November 15, 2004. Following this date, animals whose collars fail to release or are fitted with collars without release mechanisms will be recaptured as soon as snow conditions become favourable.

A preliminary analysis of available caribou movement and habitat use data will be completed early in Year VI, to aid in the identification of important habitats and the development of interim guidelines to mitigate impacts of accelerating oil & gas development on boreal caribou. In addition, analysis of preliminary GPS data from this study will be used to support boreal caribou recovery strategy development recently initiated by MWLAP in response to the federal Species At Risk Act.

Final data compilation and analysis and report preparation will be completed between December 2004 and March 31, 2005.

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## **APPENDIX I**

### **STATUS OF GPS AND VHF COLLARS TO MARCH 31, 2004**

| SLOCAN BOREAL CARIBOU: Updated March 31, 2004 |         |                |                |                                  |  |           |   |
|---|---------|----------------|----------------|----------------------------------|--|-----------|---|
| ID  | Status  | First collared | Orig freq-ser# | Re-collar Date                   | Re-coll freq-ser#                                  | Curr Freq | Comments  |
| S1  | retired | Mar 2000       | a150.600-250   | no                               |  |           | retrieved Oct 31, 2000  |
| S2  | retired | Mar 2000       | a150.660-251   | Jan 2001                         | a150.450-10054                                     |           | recollared Jan 18 2001 as 150.450; retrieved Oct 05 01  |
| S3  | active  | Mar 2000       | a150.560-248   | Jan 2001<br>Oct 2002<br>Dec 2003 | a150.468-10055<br>a150.450-12209<br>t152.191-069   | t152.191  | recollared Jan 18 2001 with refurb ATS 150.468; re-collared Oct 27 2002 with refurb ATS 150.450; re-collared Dec 12 2003 with refurb Televilt 152.191 |
| S4  | mort    | Mar 2000       | a150.710-252   | no                               |  |           | retrieved June 24 2000  |
| S5  | active  | Mar 2000       | a150.540-253   | Jan 2001<br>Feb 2003<br>Mar 2004 | a150.709-10057<br>a150.658-12085<br>a150.430-12119 | a150.430  | recollared Jan 18 2001 with ATS 150.709; recov Jul 02; recollared Feb 06 03 with ATS 150.658; recap/recollared Mar 27 2004 with ATS 150.430           |
| S6  | retired | Mar 2000       | a150.580-249   | Jan 2001<br>Nov 2002             | a150.597-10056<br>t150.770-184                     |           | recollared Jan 18 2001 with refurb ATS 150.597; re-placed Nov 24 2002 with collar from S15 mort; recovered Sep 24, 2003                               |
| S7  | retired | Mar 2000       | a150.456-281   | no                               |  |           | retrieved Aug 27, 2000  |
| S8  | retired | Mar 2000       | a150.490-285   | no                               |  |           | retrieved Feb 01 2001   |
| S9  | retired | Mar 2000       | a150.481-279   | no                               |  |           | retrieved Mar 31, 2001  |
| S10   | retired | Mar 2000       | a150.469-278   | no                               |  |           | retrieved Aug 27, 2001  |
| S11   | retired | Mar 2000       | a150.440-286   | no                               |  |           | retrieved Oct 31, 2000  |
| S12   | retired | Mar 2000       | a150.430-287   | no                               |  |           | retrieved Nov 22, 2000  |
| S13   | lost    | Mar 2001       | t150.500-021   | no                               |  | t150.500  | missing since Dec 23 2001   |
| S14   | retired | Mar 2001       | t150.510-022   | Apr 2002                         | t150.742-022                                       |           | re-collared with warranty replacement, recaptured/retrieved Dec 18 03 (failed transmitter; failed drop-off)   |
| S15   | mort    | Mar 2001       | t150.520-023   | Apr 2002                         | t150.770-184                                       |           | re-collared with warranty replacement; mort retrieved August 2002 - collar re-deployed on S6 Nov 24, 2002   |
| S16   | active  | Mar 2001       | t150.531-024   | Apr 2002<br>Dec 2003             | t150.780-185<br>t152.141                           | t151.141  | re-collared with warranty replacement; recaptured - dead collar replaced with Televilt refurb Dec 12 03   |
| S17   | active  | Mar 2001       | t150.609-025   | Feb 2003                         | a150.467-12323                                     | a150.467  | not found Apr 2002; retrieved and replaced with ATS 150.467 Feb 06 2003   |
| S18   | missing | Mar 2001       | t150.620-026   | Apr 2002                         | t150.720   | t150.720  | re-collared with warranty replacement   |
| S19   | missing | Mar 2001       | t150.629-027   | Apr 2002                         | t150.670   | t150.670  | re-collared with warranty replacement; heard intermittently at Kotcho Dec 11 2003   |
| S20   | lost    | Mar 2001       | t150.640-028   | no                               |  | t150.640  | missing since Nov 19 2001 (recovery beacon)   |
| S21   | active  | Mar 2001       | t150.650-029   | Apr 2002<br>Dec 2003             | t150.760<br>t150.810                               | t150.810  | re-collared with warranty replacement, released and recovered Sep 24, 2003; recollared Dec 11 2003  |
| S22   | mort    | Mar 2001       | t150.670-030   | no                               |  |           | mort retrieved Oct 13 2001  |
| S23   | lost    | Mar 2001       | t150.679-031   | no                               |  | t150.679  | missing since Mar 06 2002 (weak signal)   |
| S24   | lost    | Mar 2001       | t150.690-032   | Apr 2002                         | t150.820   | t150.820  | warranty replacement - last heard found Dec 19 2002 - intermittent signal   |
| S25   | lost    | Mar 2001       | t150.700-033   | no                               |  | t150.700  | not found Apr 2002; last heard Jul 10 2002 (weak signal)  |
| S26   | retired | Mar 2001       | a150.440-10053 | no                               |  |           | retrieved May 2002  |
| S28   | retired | Nov 2001       | a150.489-12081 | no                               |  |           | retrieved June 26 2002  |
| S29   | active  | Nov 2001       | a150.658-12085 | Oct 2002<br>Nov 2003             | a150.430-12119<br>a150.539-12082                   | a150.539  | recollared Oct 27 2002 with ATS refurb; recollared Nov 12, 2003 with ATS refurb   |
| S30   | retired | Nov 2001       | a150.579-12086 | no                               |  |           | retrieved Feb 06 2003   |
| S31   | retired | Nov 2001       | a150.479-12083 | no                               |  |           | retrieved Oct 03 2002   |
| S32   | mort    | Nov 2001       | a150.559-12084 | no                               |  |           | retrieved May 2002  |
| S33   | retired | Nov 2001       | a150.539-12082 | no                               |  |           | Low battery - last heard Nov 2002; signal stopped before collar detached; recovered April 17, 2003 - VHF started up again                             |
| S34   | active  | Dec 02 2003    | a150.597-12365 | no                               |  | a150.597  | refurb ATS collar on new caribou  |
| S35   | active  | Dec 11 2003    | a150.479-12083 | no                               |  | a150.479  | refurb ATS collar on new caribou  |
| S36   | active  | Dec 11 2003    | t152.151-065   | no                               |  | t152-151  | refurb Televilt collar on new caribou   |
| S37   | active  | Dec 11 2003    | t150.800-186   | no                               |  | t150.800  | refurb Televilt collar on new caribou   |
| S38   | active  | Dec 12 2003    | t152.159-066   | no                               |  | t152.159  | refurb Televilt collar on new caribou   |
| S39   | active  | Dec 11 2003    | t150.770-184   | no                               |  | t150.770  | refurb Televilt collar on new caribou   |

| SLOCAN BOREAL CARIBOU: Updated March 31, 2004 |         |                |                |                |                |           |  |
|---|---------|----------------|----------------|----------------|----------------|-----------|--|
| ID  | Status  | First collared | Original freq  | Re-collar Date | Re-collar Freq | Curr Freq | Comments   |
| S40   | retired | Apr 11 2002    | t150.810-187   | no             |                |           | warranty Televilt collar; new caribou; recovered Sep 24, 03  |
| S41   | retired | Apr 11 2002    | t150.800-186   | no             |                |           | warranty Televilt collar; new caribou; recovered Sep 24, 03  |
| S42   | active  | Apr 11 2002    | t150.710-178   | Oct 2003       | a150.489-12081 | a150.489  | warranty Televilt collar - new caribou; last heard Aug 31 2002 - recovered Jan 06 2003 - no VHF not re-collared; re-collared with ATS refurb Oct 30 2003 |
| S43   | retired | Apr 11 2002    | t150.751-182   | no             |                |           | warranty Televilt collar; new caribou; recovered Sep 24, 03  |
| S44   | retired | Apr 11 2002    | t150.830-189   | no             |                |           | warranty Televilt collar; new caribou; recovered Sep 24, 03  |
| S45   | retired | Apr 11 2002    | t150.729-180   | no             |                |           | warranty Televilt collar on new caribou; release failed Aug 2003; recap/recovery Jan 29 2004 on low batt.  |
| S46   | active  | Feb 05 2003    | a150.440-12324 | Mar 2004       | a150.450-12209 | a150.450  | refurb ATS on new caribou; recapt/recollared Mar 27 2004 with ATS 150.450  |
| S47   | retired | Feb 05 2003    | a150.690-12322 | no             |                |           | refurb ATS on new caribou; collar recovered Mar 29 2004  |
| S48   | active  | Feb 06 2003    | a150.559-12084 | Mar 2004       | L150.246       | L150.246  | refurb ATS on new caribou; recollared Mar 27 2004 with Lotek VHF   |
| S49   | active  | Mar 12 2003    | t150.710-178   | no             |                | t150.710  | refurb Televilt on new caribou, drop-off failed Aug 2003.  |
| S50   | active  | Nov 12 2003    | a150.579       | no             |                | a150.579  | ATS refurb on new caribou  |
| S51   | active  | Dec 12 2003    | t152.181-068   | no             |                | t152.181  | refurb Televilt on new caribou   |
| S52   | active  | Dec 12 2003    | t152.080-008   | no             |                | t152.080  | refurb Televilt on new caribou   |
| S53   | active  | Dec 12 2003    | t150.830-189   | no             |                | t150.830  | refurb Televilt on new caribou   |
| S54   | active  | Dec 12 2003    | t150.760-183   | no             |                | t150.760  | refurb Televilt on new caribou   |
| S55   | active  | Mar 29 2004    | 150.261        | no             |                | L150.261  | VHF collar on new caribou  |
| S56   | active  | Mar 29 2004    | 151.580        | no             |                | L151.580  | VHF collar on new caribou  |
| S57   | active  | Mar 29 2004    | 150.681        | no             |                | L150.681  | VHF collar on new caribou  |

**SLOCAN SNAKE/SAHTANEH WOLVES & BEARS: Updated March 31, 2004**

| ID       | Status  | First collared | Original freq | Re-collar Date | Re-collar Freq | Curr Freq | Comments   |
|----------|---------|----------------|---------------|----------------|----------------|-----------|--|
| Wolf W1  | active  | Nov 24 2002    | 153.911       | no             |                | L153.911  | Kyklo Pack - gray female   |
| Wolf W2  | active  | Nov 24 2002    | 152.831       | no             |                | L152.831  | Kyklo Pack - gray female   |
| Wolf W3  | retired | Dec 18 2002    | 150.620       | no             |                |           | Kyklo Pack - gray male; recovered August 2003 (drop-off)                     |
| Wolf W4  | retired | Dec 18 2002    | 150.629       | no             |                |           | Kyklo Pack - gray female; recovered August 2003 (drop-off)                   |
| Wolf W5  | retired | Dec 18 2002    | 150.460       | no             |                |           | Kyklo Pack - gray/brown male; recovered August 2003 (drop-off)               |
| Wolf W6  | retired | Jan 06 2003    | 150.532       | no             |                |           | Kotcho Pack - gray female; recovered Sep 24 03 (drop-off)                    |
| Wolf W7  | active  | Jan 06 2003    | 150.521       | Mar 12 2003    | 152.961        | L152.961  | Kotcho Pack - white male; failed Televilt GPS collar replaced with Lotek VHF |
| Wolf W8  | retired | Jan 06 2003    | 150.570       | no             |                |           | Kotcho Pack - yellow male; recovered Sep 24, 03 (drop-Off)                   |
| Wolf W9  | retired | Jan 09 2003    | 150.511       | no             |                |           | Snake pack - gray female; recovered Oct 29, 2003 (re-capt)                   |
| Wolf W10 | active  | Jan 09 2003    | 150.551       | Feb 06 2003    | 153.210        | L153.210  | Snake pack - gray male; failed Televilt GPS collar replaced with Lotek VHF   |
| Wolf W11 | retired | Jan 29 2003    | 150.591       | no             |                |           | Snake pack - gray female; Oct 29, 2003 (drop-off)                            |
| Wolf W12 | active  | Jan 29 2003    | 150.136       | no             |                | L150.136  | Komie pack   |
| Wolf W13 | active  | Jan 29 2003    | 153.230       | no             |                | L153.230  | Komie pack   |
| Wolf W14 | active  | Feb 05 2003    | 152.880       | no             |                | L152.88   | Kotcho Pack - black male   |
| Wolf W15 | active  | Feb 06 2003    | 153.542       | no             |                | L153.542  | Snake pack - gray male   |
| Wolf W16 | retired | Mar 12 2003    | 150.649       | no             |                |           | Snake Pack - gray female; retrieved Nov 12 2003 (re-capt)                    |
| Wolf W17 | active  | Feb 11 2004    | 150.624       | no             |                | T150.624  | Snake pack - gray male   |
| Wolf W18 | active  | Feb 11 2004    | 150.521       | no             |                | T150.521  | Snake pack - gray female   |
| Wolf W19 | active  | Feb 11 2004    | 150.792       | no             |                | T150.792  | Kotcho pack - gray/white female  |
| Wolf W20 | active  | Feb 11 2004    | 150.620       | no             |                | T150.620  | Kotcho pack - black female   |
| Wolf W21 | active  | Feb 12 2004    | 150.570       | no             |                | T150.570  | Kyklo pack - gray male   |
| Wolf W22 | active  | Feb 12 2004    | 150.460       | no             |                | T150.460  | Kyklo pack - gray male   |
| Wolf W23 | active  | Feb 16 2004    | 150.921       | no             |                | L150.921  | Clarke pack - black male   |
| Wolf W24 | active  | Mar 24 2004    | 150.101       | no             |                | L150.101  | Gunnel pack - old gray male  |
| Wolf W25 | active  | Mar 24 2004    | 150.532       | no             |                | T150.532  | Gunnel pack - gray female  |
| Wolf W26 | active  | Mar 27 2004    | 150.589       | no             |                | T150.589  | Clarke pack - gray female  |
| Wolf W27 | active  | Mar 27 2004    | 150.511       | no             |                | T150.511  | Clarke pack - black male   |
| Wolf W28 | active  | Mar 27 2004    | 151.411       | no             |                | L151.411  | Clarke pack - gray male  |
| Wolf W29 | active  | Mar 27 2004    | 150.832       | no             |                | T150.832  | Gunnel pack - gray/white female  |
| Wolf W30 | active  | Mar 29 2004    | 150.649       | no             |                | T150.649  | Gunnel pack - gray/white female  |
| Wolf W31 | active  | Mar 29 2004    | 150.607       | no             |                | L150.607  | Gunnel pack - gray female  |
| Bear SB1 | active  | May 13, 20003  | 150.550       | no             |                | 150.550   | M - Clarke Lake, to be retrieved from den Apr 2004                           |
| Bear SB2 | missing | May 13, 20003  | 150.850       | no             |                | 150.850   | F - Sierra   |
| Bear SB3 | retired | May 22, 20003  | 150.650       | no             |                | 150.650   | F - Kotcho Lake; retrieved Oct 30, 2003 (re-capt)                            |
| Bear SB4 | retired | May 22, 20003  | 150.792       | no             |                | 150.792   | M - Sextet; retrieved Jun 28, 2003 (slipped)                                 |
| Bear SB5 | retired | May 22, 20003  | 150.832       | no             |                | 150.832   | F - Hoffard Creek; retrieved Oct 30, 2003 (re-capt)                          |