

**Mountain Caribou Censuses
in the North Columbia Mountains**

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Introduction

Woodland caribou (*Rangifer tarandus caribou*) in southeastern British Columbia feed on arboreal lichen during winter that are most abundant on old trees and thus have been identified as an old-growth dependent species (B.C. Ministry of Environment 1989). Clear-cut harvesting of mature forests has been perceived as being incompatible with maintaining winter habitat for caribou. The relationship between the amount of clear-cutting plus other forms of human intrusion into caribou habitat and actual numbers of caribou is unknown. To develop an understanding of this relationship, the number of caribou must be known and we must have the ability to track their numbers as the condition of their habitat changes. The primary purpose of this report is present information on a caribou census conducted in March 1994. It is hoped that this census can be used as a benchmark for future censuses. In addition, we summarize a caribou census conducted in this area in 1993, and others conducted in the past by the B.C. Hydro Mica and Revelstoke Compensation Programs (MRCP) and by the Ministry of Environment, Lands and Parks (MOELP).

Census areas

In 1993 we divided the north-western part of the Columbia Mountains into 3 census blocks named Revelstoke North, Center, and South (Figure 1). The size of each block was approximately what could be covered in one day and with boundaries selected that almost eliminate the chance of inter-block movements between census days. Because individual animals and groups of caribou shift the areas they use within and between years, a large total census area is required to reduce this influence on estimating among year population changes. Based on preliminary telemetry information, we believe that the 3 blocks combined encompass a large enough area to buffer wintering area shifts, although we know that the area does not encompass a discrete population of caribou.

In 1994, we also censused an area south of Highway 1. MOELP requested we census from Hamling Lakes (east of Nakusp), north to Beaton. We named this block Nakusp. MOELP were also interested in the Silvercup Mountains which are northeast of Trout Lake; or in the Silvercup/Duncan block. Due to our concern in connectivity among known caribou populations, we were also interested in the block between the Nakusp population and caribou north of Highway 1 or the Akolkolex block.

Methods

During February and March of 1992 and 1993, 31 caribou were captured and radio-collared within the 3 Revelstoke census blocks. In February 1994, two additional animals were collared. Since collaring, 1 collar malfunctioned, 1 fell off the animal, and 5 animals died. In 1993, an independent observer located 23 collared animals within the 2 census blocks that were covered that year while in 1994, 26 animals were radio located in the 3 census zones covered. During the census in 1993 there was 205 cm of snow at 1800 m on Mount Revelstoke in 294 cm in 1994.

Censuses both years were conducted from a Bell 206 helicopter with 3 observers plus the pilot. The observer that acted as navigator was not directly involved with the caribou research project so had no prior knowledge of radio-collared caribou locations. In 1994, 2 census flights were flown 3 days after a new snowfall, and the others were 4 and 5 days after snow. The contour near timber line (1800 to 2130 m) was flown and when tracks were seen, they were followed to the animals unless they descended far into mature timber and were lost from our view. Sighting locations were marked and numbered on a 1:250,000 map. Although all male groups were easily identifiable, discriminating between young males and adult females in large groups was difficult and would have required additional harassment, and therefore we limited our classifications to calves, adults, and males in all male groups. In addition, we visually checked for collars and then verified their presence or absence with a radio receiver. Radio collars were not used to locate groups.

The total population size was estimated by the equation derived by Chapman (1951):

$$N = \frac{(M + 1)(n + 1)}{(m + 1)} - 1$$

where N is the total population size, M is the total number of caribou that were marked, n is the total number of caribou seen during the census and of these m are marked. The estimated variance of N as defined by Seber (1982:60) was calculated by the equation:

$$\text{var}(N) = \frac{(M + 1)(n + 1)(M - m)(n - m)}{(m + 1)^2(m + 2)}$$

Information including raw data and reports of other caribou censuses in the North Columbia Mountains were obtained and reviewed.

Results

1994

Data from the 1994 census are presented in Appendix 1. In the 3 blocks north of Highway 1, 347 caribou, including 24 of the 26 marked animals, were observed. In addition to the 347 animals seen and the 2 collared animals not seen, 4 groups of tracks from an unknown number of caribou were seen but the animals were not located. Correcting for the sightability using Chapman's (1951) equation results in an estimate of 375 with 95% confidence limits of 337 to 413.

Of the 347 caribou observed north of Revelstoke, 56 were calves and 291 were adults for a ratio of 19.24 calves/100 adults.

No caribou were radio-collared in the Akolkolex, Nakusp or Silvercup areas so sightability corrections could not be done, however, if we assume sightability is the same as north of Revelstoke, approximations can be made. Although we did not survey the entire Akolkolex block, no caribou or tracks were seen in what we viewed to be the best habitat there. Additionally, no tracks have been seen at any time when crossing this area during standard telemetry flights suggesting little or no use of this area by caribou during late winter. In the Nakusp block, 131 caribou including 13 calves and 118 adults (11.0 calves/100 adults) were seen. Assuming the sightability was the same in the Nakusp block as north of Revelstoke, an estimated 141 caribou would have been in this block. Along Silvercup ridge 17 caribou were seen and an additional 10 animals (including an animal collared approximately 7 years ago) were spotted in the Monashee Mountains near Blanket creek.

1993

Perhaps due to a record low snowpack in 1993 relatively few caribou were in the upper subalpine during the census in March. Because of the low sightability, we only censused 2 of the 3 blocks north of Revelstoke. During this census, 56 caribou were seen including 7 of 23 radio-collared animals in the census areas. The estimated number for these 2 blocks was thus 170 with 95% confidence limits between 85 and 256 animals. In the same 2 blocks in 1994, we saw 244 caribou and 20 of 22 collars for an estimated 267 animals with 95% confidence limits between 236 and 299 animals.

Other Censuses

Simpson and Woods (1987)

Simpson and Woods (1987) report and discuss earlier counts of caribou near Revelstoke (Table 1). They concluded that the population size north of Revelstoke was about 275 animals in 1985, had an average of 27 calves/100 adults and that the population appeared to be increasing.

Table 1. Caribou census results from the north Columbia mountains (Simpson and Woods, 1987)

Counts		Population Estimates			Source
Animals	Tracks	Mean	Min	Max	
		140	110	170	Russell and Demarchi 1975
		150			Environmental Resource Consultants 1976
			95	135	Keller and Berry 1979
		118	67	184	Simpson and Hebert 1982
111	55	200 ^a	111 ^b		Simpson and Woods 1983
140	7	255 ^c	195 ^d		Simpson and Woods 1984
177	53	275	261 ^e	300	Simpson and Woods 1985

^a 5 of 9 radio-collared animals sighted among 111 seen. Therefore total population was $9/5 \times 111 = 200$ animals (Simpson and Woods 1987). This estimator gives a biased estimate. The Chapman estimator gives a mean estimate of 186 animals with 95% confidence limits between 111 and 271.

^b 111 observed plus (55 tracks x 1.5 correction) = 192. The correction factor was generated by the estimated number of caribou in a group from tracks and the actual number in the group once they were observed.

^c 6 of 9 marked animals sighted among 140 seen and thus $9/6 \times 140 = 210$ plus and estimated 45 from an unsurveyed portion = 255. The Chapman estimator for the surveyed area is 200 with 95% confidence limits between 140 and 275.

^d North 1/3 of study area not censused in 1984. Estimated minimum of 45 additional animals in this area from 1983 census. Counts = $140 + 45 + (7 \times 1.5) = 195$

^e Entire area censused March 8-18. South of Bigmouth: 157 animals + 8 tracks; North: 20 animals + 45 tracks. 5 animals seen outside 1982-84 survey area not included.

Mica and Revelstoke Mica Compensation Program 1988 to 1991

The (MRCP) censused caribou north of Revelstoke annually between 1988 and 1991. Raw data from these censuses are in Appendix 3. Because there were no marked animals during these censuses, the estimates could not be corrected for sightability.

In 1988, 98 animals were seen plus 18 groups of tracks in a one day census. From these data, MRCP estimated a total of 197 animals. Two, 1 day censuses were conducted in 1989; one in January and one in April. The January count located 53 animals and 82 were seen in April. In 1990, a 1 day count found 157 animals.

In 1991, MRCP conducted a 2 day census and 190 animals were seen. This census did not cover Mount Revelstoke National Park. The Canadian Parks Service conducted an independent census of Mount Revelstoke National Park one month prior to the MRCP census and found 77 caribou. Because the MRCP census only located 13 animals in the Revelstoke South Block, it is probable that these 2 counts could be safely summed resulting in 267 caribou sightings in 1991.

Group Size

Mean size of 143 groups observed between 1988 and 1994 was 6.52 animals per group (Figure 2). Analysis of variance suggested a significant difference in group size among years ($F=2.27$; 5 df; $P=0.051$). Tukeys HSD test for post hoc comparison only found groups observed in 1990 (mean = 9.8, $n=16$) to be larger than groups in 1993 (mean=4.0, $n=14$).

Population Trend

Although the Revelstoke population of caribou has been censused frequently, the methods used, the intensity of survey, conditions of the particular winter, and conditions of census days have varied greatly so suggested trends must be viewed with caution. The total number of caribou seen (Figure 3) shows highly variable results and not a significant trend ($r^2 = 0.15$, $P=0.312$).

The estimated number of caribou at each census shows less variation (Figure 4) but there was still not a significant relationship ($r^2=0.50$, $P=0.12$). These population estimates that include summing results from different portions of the census areas over different years, and equating tracks to a set number of caribou, should be viewed cautiously. Comparing the estimates with 95% confidence limits between 1983 and 1994 (Figure 5) suggests that there may be more caribou in 1994 than there were a decade before.

Recruitment

The proportion of calves in the population varied from 37 in 1981 to 9.3 during April of 1989 (Table 2). The average over the past 14 years has been about 21 calves/100 adults.

Date of Census	Calves/100 adults	N Caribou seen	Reference
Late Winter 1981	37	139	Simpson and Woods (1987)
Late Winter 1982	26.6	146	Simpson and Woods (1987)
Late Winter 1983	26.6	101	Simpson and Woods (1987)
Late Winter 1984	20.5	164	Simpson and Woods (1987)
March 1988	14.8	98	MRCP
January 1989	25.9	53	MRCP
April 1989	9.3	82	MRCP
March 1990	19.8	157	MRCP
March 1991	15.9	102	MRCP
March 1993	12	56	McLellan, Flaa, Woods
March 1994	19.2	347	McLellan, Flaa, Woods
Mean (wt = n)	21.3	1445	
Mean (wt=census)	20.7	1445	

Discussion

The results of the 1994 census conducted on the Revelstoke caribou population suggests that there are now about 375 animals north of Highway 1 in the 3 census blocks. In addition, there are likely about 140 animals east of Nakusp. No caribou were observed in the Akolkolex during the 1994 census or during any telemetry flights that cross this area.

Comparing the census conducted in 1983 to 1994 suggests that the population may be increasing. This conclusion is supported by average recruitment of 21 calves per 100 adults over the past decade.

Because the reason for censusing caribou is to determine population trend, a census is not needed every year. Counts during years when many animals are in the forest, or when only a portion of the area is covered (i.e. Mount Revelstoke Park excluded) are of little value. Censuses should be conducted during years with deep snowpacks and when a person can walk in the subalpine without sinking past the knee. The census should cover all three blocks north of Revelstoke. It appears that the Nakusp block should not stop at Hamling Lakes as was suggested, but continue to the Nakusp to New Denver road. As is true in almost all circumstances with large mammals, a good census every 5 to 10 years is much more valuable and inexpensive than a relatively poor census every year.

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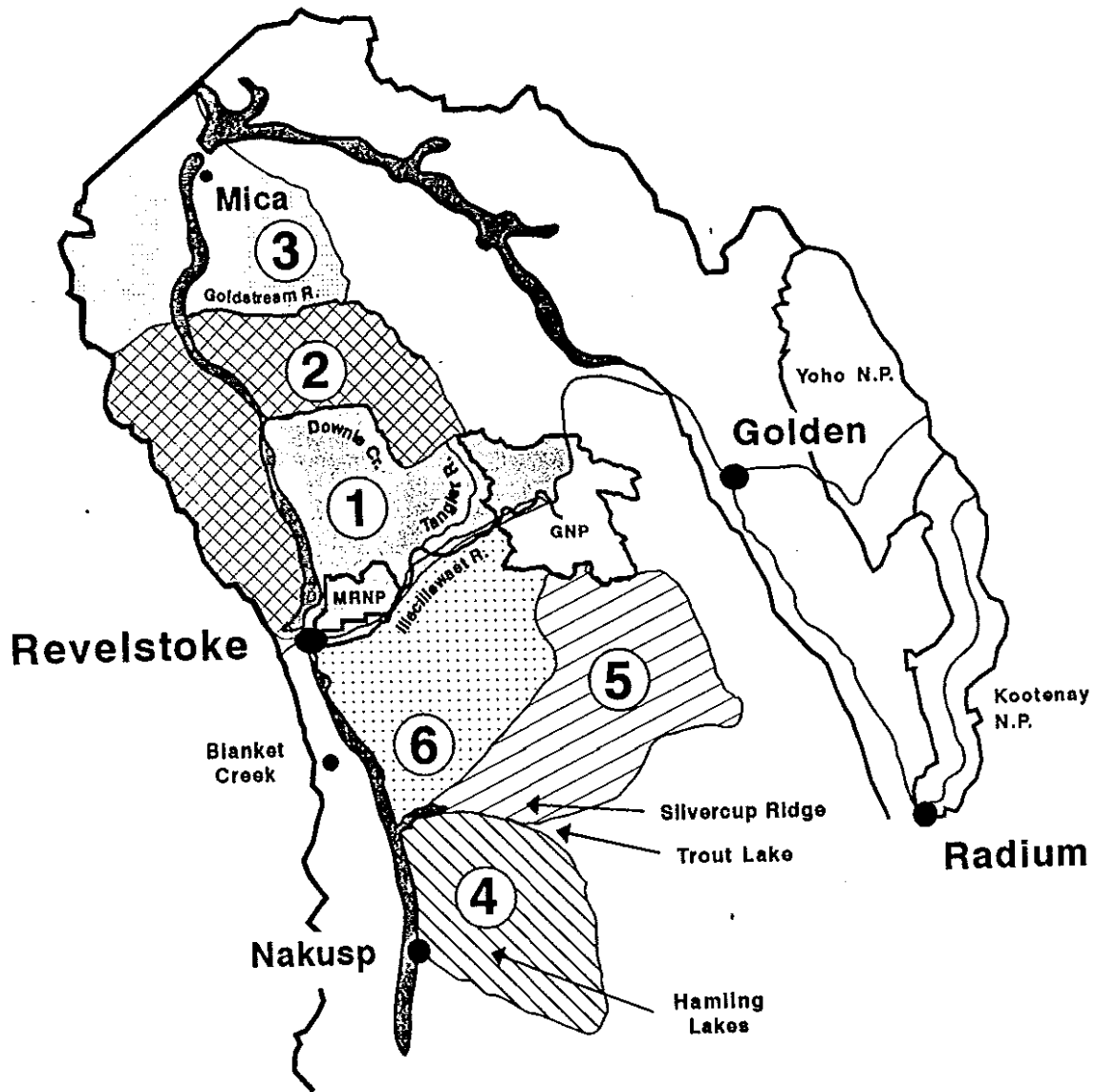
Figure Captions

Figure 1. Census areas delineated in the Revelstoke area.

Figure 2. The total number of caribou observed during censuses north of Revelstoke; 1983 to 1994.

Figure 3. The estimated total number of caribou from censuses conducted north of Revelstoke; 1983 to 1994. Note: the estimate from 1984 required the addition of numbers from other years to cover areas that were not censused.

Figure 4. The estimated number of caribou and 95% confidence limits using marked animals to correct for sightability; 1983 and 1994.



- 1 - Revelstoke South
- 2 - Revelstoke Center
- 3 - Revelstoke North
- 4 - Nakusp
- 5 - Silvercup/Duncan
- 6 - Akolkolex

Figure 1. Census areas delineated in the Revelstoke area.

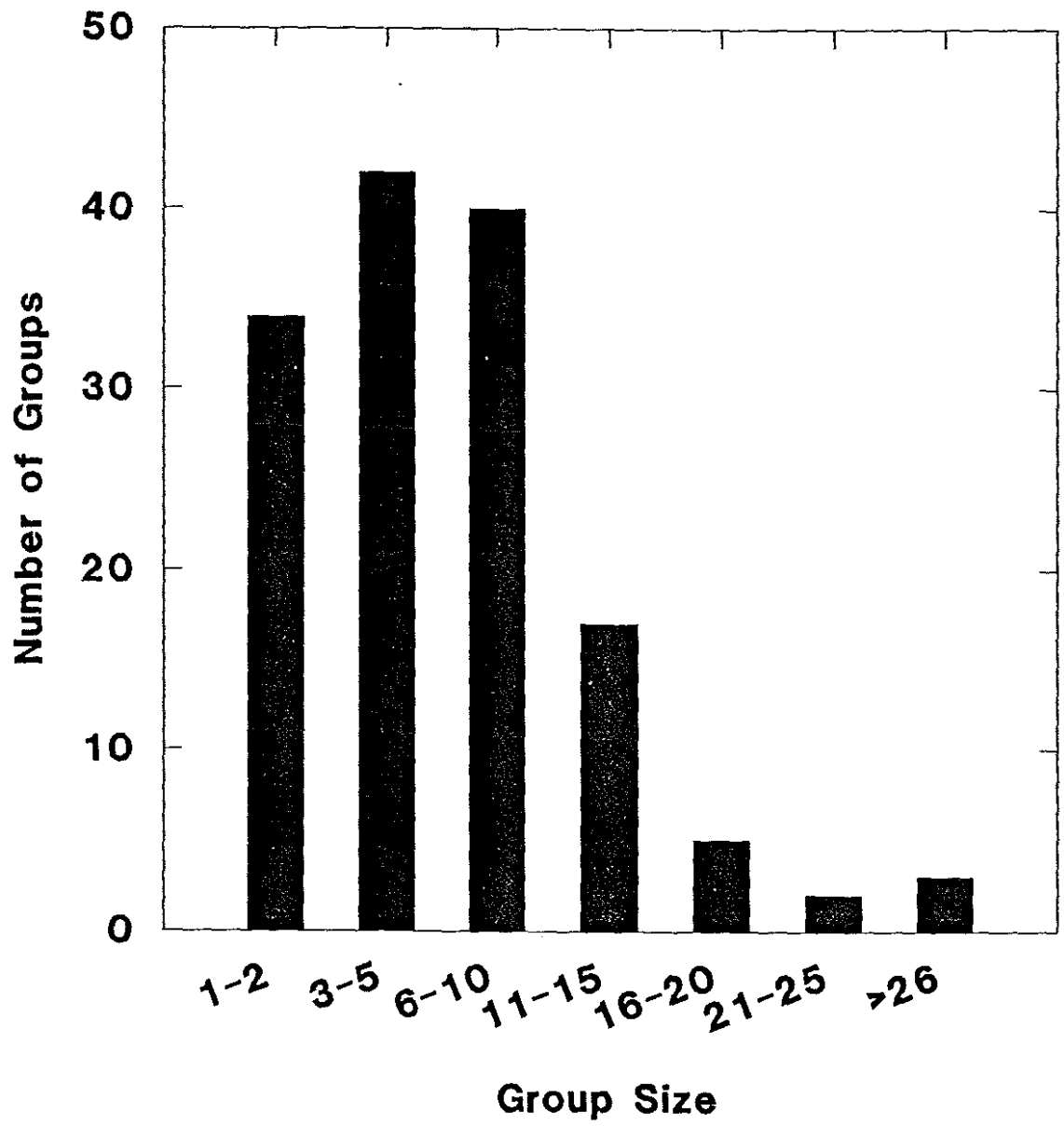


Figure 2. Group sizes of caribou observed on censuses; 1988 to 1994

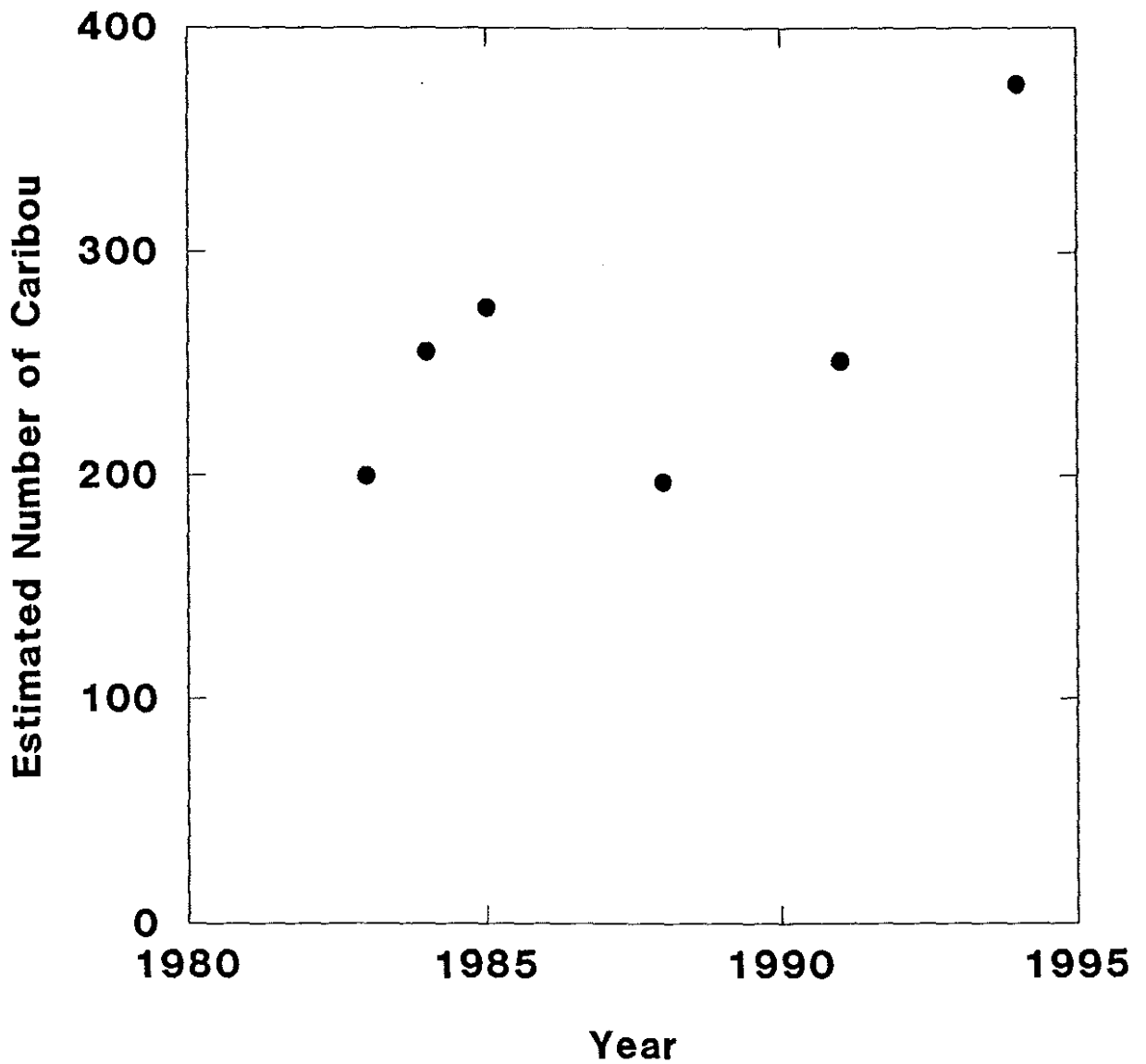


Figure 4. The estimated total number of caribou from censuses conducted north of Revelstoke; 1983 to 1994. Note: the estimate from 1984 required the addition of numbers from other years to cover areas that were not censused.

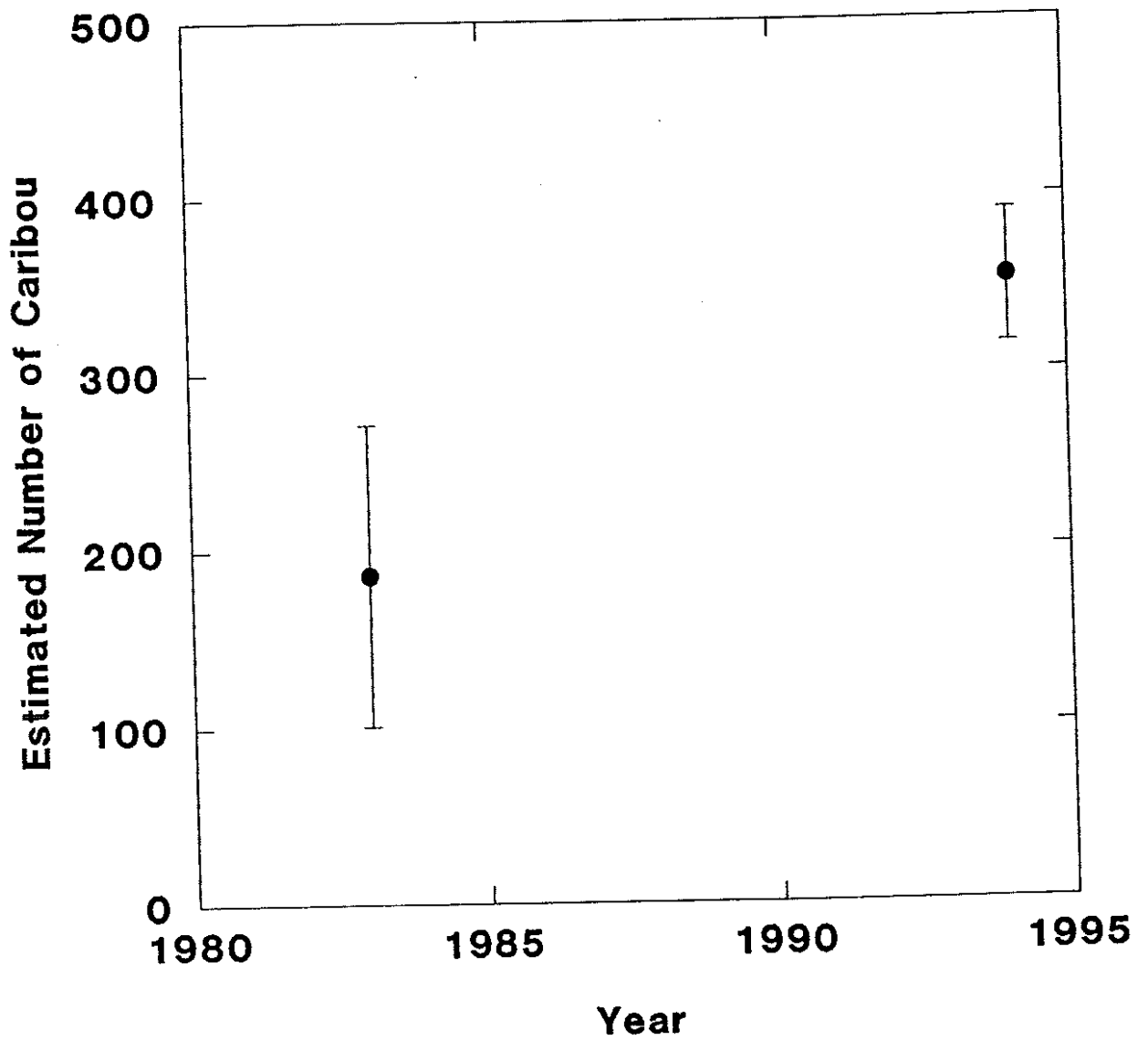


Figure 5. The estimated number of caribou and 95% confidence limits using marked animals to correct for sightability; 1983 and 1994 (Excluding Glacier National Park).

Appendix 3

CARIBOU CENSUS, 1988

DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
88/03/15	REV CENTER	FRISBY RIDGE	1	MG	104	737	6	2	4	0	4	0
88/03/15	REV CENTER	PETTIPIECE	2	MG	889	965	5	1	4	0	4	0
88/03/15	REV CENTER	BREWSTER	9	LH	970	130	21	1	20	10	10	0
88/03/15	REV CENTER	KELLY CREEK	10	MG	140	870	7	0	7	2	5	0
88/03/15	REV CENTER	McKINNON CRK	11	MG	220	845	4	2	2	0	2	0
TOTAL	REV CENTER						43	6	37	12	25	
		CALVES/100 ADULTS					16.2162					
88/03/15	REV NORTH	RUDDOCK	3	LH	815	360	6		6	1	5	0
88/03/15	REV NORTH	HORNE	4	LH	820	430	8	2	6	1	5	0
88/03/15	REV NORTH	MICA	5	LH	980	560	15	2	13	2	11	0
88/03/15	REV NORTH	BIRCH	6	LH	980	510	5	0	5	5	0	0
88/03/15	REV NORTH	LOUIS LEE	7	LH	990	490	5	0	5	1	4	0
88/03/15	REV NORTH	BIG MOUTH	8	LH	930	380	11	2	9	0	9	0
TOTAL	REV NORTH						50	6	44	10	34	
		CALVES/100 ADULTS					13.6364					
88/03/15	REV SOUTH	LAFORME	12	MG	270	760	5					5
1988 TOTAL							98	12	81	22	69	
		CALVES/100 ADULTS					14.8148					
In addition, 18 groups of tracks were seen and from these 99 more animals for a total of 197 was estimated												

CARIBOU CENSUS, 1989												
JANUARY CENSUS												
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
89/01/24	REV CENTER	FRISBY RIDGE	1	MG	110	630	8	2	6	2	3	1
89/01/24	REV CENTER	BIG EDDY	2	MG	30	860	5	0	5	2	1	2
89/01/24	REV CENTER	CARIBOU BASIN	10	LH	970	130	9	4	5	0	5	
TOTAL	REV CENTER						22	6	16	4	9	3
		CALVES/100 ADULTS					37.5					
89/01/24	REV NORTH	HOSKINS	3	LH	800	300	7	1	6	3	1	2
89/01/24	REV NORTH	RUDDOCK	4	LH	810	330	5					5
89/01/24	REV NORTH	PAT	5	LH	890	540	2					2
89/01/24	REV NORTH	PAT	6	LH	890	580	7			2		5
89/01/24	REV NORTH	MICA	7	MH	0	610	1			1		
89/01/24	REV NORTH	LOUIS LEE	8	LH	990	490	3	0	3		3	
89/01/24	REV NORTH	BIG MOUTH	9	LH	940	460	2					2
TOTAL	REV NORTH						27	1	9	6	4	16
		CALVES/100 ADULTS					11.1111					
89/01/24	REV SOUTH	KEYSTONE	11	MG	60	960	2			2		
89/01/24	REV SOUTH	HOLDICH	12	MG	100	900	2		2	2		
TOTAL	REV CENTER						4	0	2	4	0	0
		CALVES/100 ADULTS					0					
JANUARY 1989 TOTAL							53	7	27	14	13	19
							25.9259					

APRIL 1989 CENSUS												
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
89/04/10	REV CENTER	FRISBY CRK	1	MG	40	840	4	0	4	4	0	0
89/04/10	REV CENTER	PARK CRK	2	LG	960	910	9	1	8	2	6	0
89/04/10	REV CENTER	PETTIPIECE	3	LG	900	970	13	1	12	4	8	0
89/04/10	REV CENTER	LIBERTY	4	LH	870	120	7	0	7	1	6	0
89/04/10	REV CENTER	KIRBYVILLE	5	LH	760	200	4	0	4	2	2	0
89/04/10	REV CENTER	CARIBOU BASIN	11	LH	990	100	17	3	14	4	10	0
89/04/10	REV CENTER	BREWSTER	12	LH	970	130	9	1	8	3	5	0
TOTAL	REV CENTER						63	6	57	20	37	0
		CALVES/100 ADULTS					10.5263					
89/04/10	REV NORTH	SIBLEY	6	LH	795	255	2	0	2	2	0	0
89/04/10	REV NORTH	HOSKINS	7	LH	770	250	4	0	4	1	3	0
89/04/10	REV NORTH	FERNIE	8	LH	800	320	6	1	5	2	3	0
89/04/10	REV NORTH	HORNE	9	LH	820	430	5	0	5	1	4	0
89/04/10	REV NORTH	BIG MOUTH	10	LH	950	390	2	0	2	1	1	0
89/04/10	REV NORTH	SCRIPT	14	LH	800	440	3	0	3	0	3	0
TOTAL	REV NORTH						22	1	21	7	14	0
		CALVES/100 ADULTS					4.7619					
89/04/10	REV SOUTH	STANDARD	13	MG	130	940	1	0	1	1	0	0
APRIL 1989 TOTAL												
		CALVES/100 ADULTS					86	7	79	28	51	0
							8.86076					

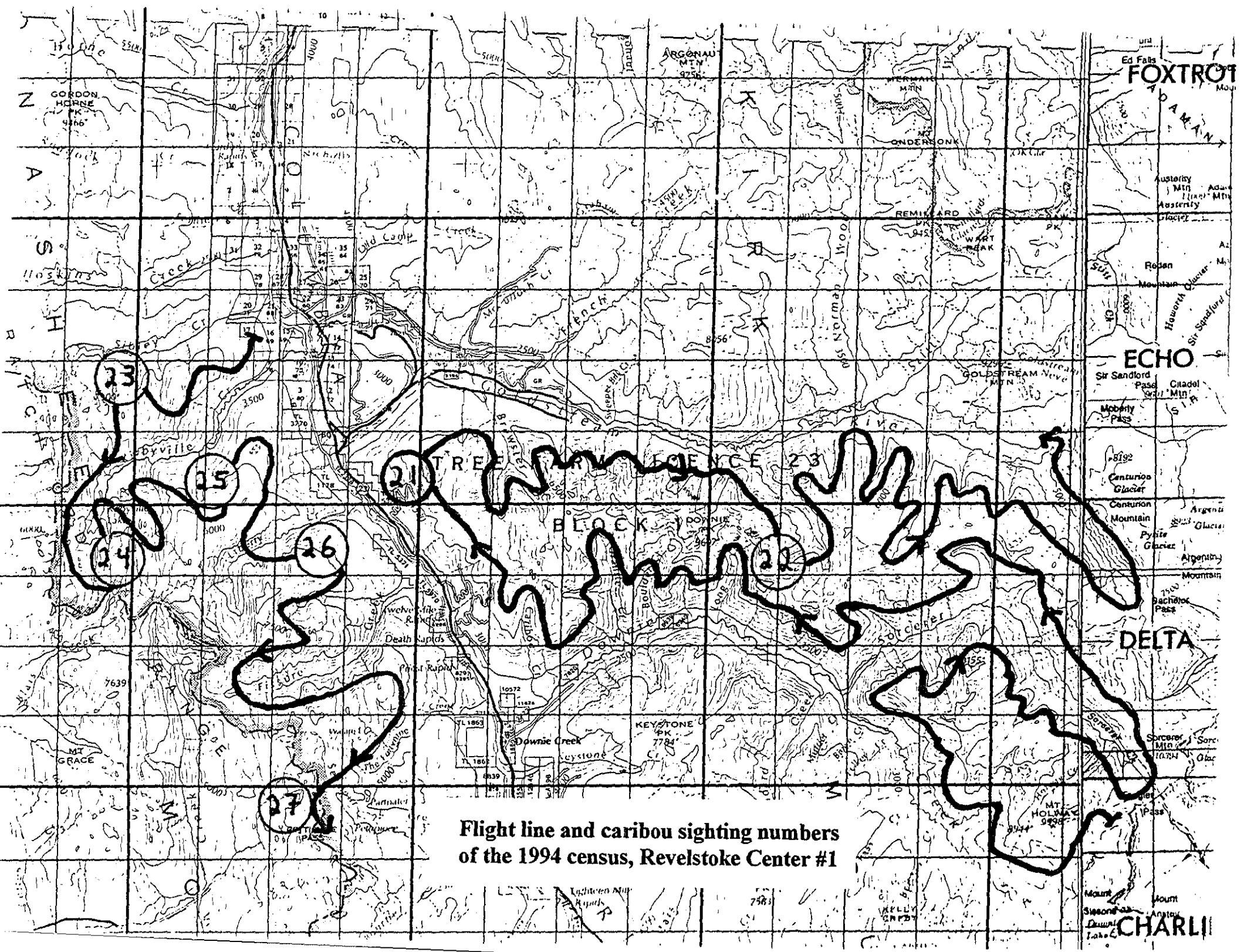
CARIBOU CENSUS, 1990												
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
90/03/12	REV CENTER	FRISBY RIDGE	1	MG	110	690	18	3	15	1	14	0
90/03/12	REV CENTER	BOURNE	2	LG	940	950	12	2	10	3	7	0
90/03/12	REV CENTER	LIBERTY	3	LH	810	130	10	3	7	2	5	0
90/03/12	REV CENTER	KIRBYVILLE	4	LH	760	140	9	1	8	1	6	0
90/03/12	REV CENTER	BREWSTER	9	LH	980	120	29	7	22	5	17	0
TOTAL	REV CENTER						78	16	62	12	49	0
		CALVES/100 ADULTS					25.8065					
90/03/12	REV NORTH	SIBLEY	5	LH	800	220	6	0	6	2	4	0
90/03/12	REV NORTH	RUDDOCK	6	LH	740	330	7	0	7	2	5	0
90/03/12	REV NORTH	MICA	7	LH	990	620	10	1	9	0	9	0
90/03/12	REV NORTH	BIG MOUTH	8	MH	30	400	5	0	5	0	5	0
90/03/12	REV NORTH	SCRIPT	14	LH	860	480	7	0	7	0	7	0
90/03/12	REV NORTH	PAT	15	LH	880	540	2	0	2	0	2	0
TOTAL	REV NORTH						37	1	36	4	32	0
		CALVES/100 ADULTS					2.77778					
90/03/12	REV SOUTH	KEYSTONE	10	MG	70	980	5	0	5	5	0	0
90/03/12	REV SOUTH	CARNES	11	MG	180	790	4	0	4	0	4	0
90/03/12	REV SOUTH	MT REV	12	MG	230	610	7	1	6	2	4	0
90/03/12	REV SOUTH	MT REV	13	MG	290	670	8	3	5	0	5	0
90/03/12	REV SOUTH	MT REV	16	MG	320	580	18	5	13	0	13	0
TOTAL	REV SOUTH						42	9	33	7	26	0
		CALVES/100 ADULTS					27.2727					
TOTAL 1990							157	26	131	23	107	0
		CALVES/100 ADULTS					19.8473					

REV SOUTH												
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
91/03/14	REV SOUTH	MARS	27	MG	60	980	4	0	4	2	2	0
91/03/14	REV SOUTH	KELLY	28	MG	130	890	7	0	7	1	6	0
91/03/14	REV SOUTH	LAFORME	29	MG	260	760	2	0	2	0	0	2
TOTAL	REV SOUTH						13	0	13	3	8	2
		CALVES/100 ADULTS						0				
1991 TOTAL							190	24	166	27	122	17
		CALVES/100 ADULTS						14.46				
CARIBOU 1993 CENSUS												
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	MALES	FEMALE	UNCLASS
93/03/26	REV CENTER	KIRBYVILLE	1	LH	833	162	3	0	3	0	2	1
93/03/26	REV CENTER	KIRBYVILLE	2	LH	774	154	7	0	7	1	6	0
93/03/26	REV CENTER	KIRBYVILLE	3	LH	725	118	3	0	3	0	3	0
93/03/26	REV CENTER	KIRBYVILLE	4	LH	789	209	1	0	1	0	1	0
93/03/26	REV CENTER	DEVIL GARDEN	5	LH	958	165	1	0	1	1	0	0
93/03/26	REV CENTER	DEVIL GARDEN	6	LH	959	173	2	0	2	0	1	1
93/03/26	REV CENTER	CARIBOU BASIN	7	MH	5	108	6	2	4	0	0	4
93/03/26	REV CENTER	DOWNIE LOOP	8	MH	17	75	17	3	14	0	14	0
93/03/26	REV CENTER	SORCERER	9	MH	182	79	2	1	1	0	1	0
93/03/26	REV CENTER	CRAIB	10	MH	224	13	3	0	3	0	3	1
93/03/26	REV CENTER		11	MH	160	95	1	0	1	0	0	1
TOTAL	REV CENTER						46	6	40	2	31	8
		CALVES/100 ADULTS						15				
93/03/26	REV SOUTH	MT REV	12	MG	202	577	3	0	3	3	0	0
93/03/26	REV SOUTH	MARS CRK	13	MG	98	905	6	0	6	1	5	0
93/03/26	REV SOUTH	TANGIER	14	MG	419	905	1	0	1	0	0	1
TOTAL	REV CENTER						10	0	10	4	5	1
		CALVES/100 ADULTS						0				
TOTAL 1993							56	6	50	6	36	9
		CALVES/100 ADULTS						12				

Appendix 1										
MARCH 1994, CARIBOU CENSUS. REVELSTOKE, B.C.										
B. MCLELLAN, J. FLAA, AND J. WOODS										
SOUTH REVELSTOKE BLOCK										
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	#COLLARS
94/03/07	REV SOUTH	MT REV	1	MG	200	570	5	0	5	0
94/03/07	REV SOUTH	HAMILTON	2	MG	247	560	3	0	3	0
94/03/07	REV SOUTH	CLACH	3	MG	260	565	10	1	9	0
94/03/07	REV SOUTH	COURSIER	4	MG	240	610	8	1	7	0
94/03/07	REV SOUTH	LAFORME	5	MG	258	711	4	1	3	0
94/03/07	REV SOUTH	CARNES	6	MG	187	774	8	0	8	1
94/03/07	REV SOUTH	CARNES	7	MG	169	787	3	0	3	0
94/03/07	REV SOUTH	HOLDICH	8	MG	105	909	4	0	4	2
94/03/07	REV SOUTH	STANDARD	9	MG	124	941	3	0	3	0
94/03/07	REV SOUTH	KEYSTONE	10	MG	89	993	5	0	5	0
94/03/07	REV SOUTH	FANG	11	MG	103	786	2	0	2	0
94/03/07	REV SOUTH	TANGIER	12	MG	97	892	1	0	1	0
94/03/07	REV SOUTH	TANGIER	13	MG	442	720	0	0	0	0
94/03/07	REV SOUTH	WOOLSEY	15	MG	309	692	14	3	11	3
94/03/07	REV SOUTH	WOOLSEY	16	MG	293	663	0	0	0	0
94/03/07	REV SOUTH	WOOLSEY	17	MG	283	659	2	0	2	0
94/03/08	REV SOUTH	WOOLSEY	18	MG	320	572	9	3	6	2
94/03/08	REV SOUTH	WOOLSEY	19	MG	320	584	2	0	2	0
94/03/08	REV SOUTH	WOOLSEY	20	MG	332	634	6	1	5	0
94/03/08	REV SOUTH	CLACH	21	MG	260	560	0	0	0	0
94/03/08	REV SOUTH	STANDARD	22	MG	100	950	0	0	0	0
94/03/07	REV SOUTH	MOUNTAIN CK	14	MG	101	960	12	2	10	2
94/03/9	REV SOUTH	TOTAL					101	12	89	10 OF 11
		CALVES/100 ADULTS						13.48		

NORTH REVELSTOKE BLOCK											
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	#COLLARS	
94/03/09	REV NORTH	RUDDOCK	36	LH	672	328	6	1	5	0	
94/03/09	REV NORTH	HORNE	37	LH	793	376	4	0	4	1	
94/03/09	REV NORTH	HORNE	38	LH	804	418	7	0	7	1	
94/03/09	REV NORTH	SCRIPT	39	LH	868	480	12	2	10	0	
94/03/09	REV NORTH	TWENTY-ONE	40	LH	877	511	1	0	1	0	
94/03/09	REV NORTH	PAT	41	LH	848	601	5	1	4	0	
94/03/09	REV NORTH	SOARDS	42	LH	789	717	1	0	1	0	
94/03/09	REV NORTH	NAGLE	43	LH	899	706	3	1	2	0	
94/03/09	REV NORTH	ENCAMPMENT	44	LH	940	771	2	0	2	1	
94/03/09	REV NORTH	FRED LANGE	45	LH	954	687	13	3	10	0	
94/03/09	REV NORTH	MICA	46	LH	968	577	19	4	15	0	
94/03/09	REV NORTH	BIRCH	47	LH	991	529	8	0	8	0	
94/03/09	REV NORTH	BIRCH	48	LH	965	491	1	0	1	0	
94/03/09	REV NORTH	BIGMOUTH	49	LH	948	464	6	0	6	1	
94/03/09	REV NORTH	BIGMOUTH	50	LH	982	410	7	1	6	0	
94/03/09	REV NORTH	BIGMOUTH	51	LH	998	369	1	0	1	0	
94/03/09	REV NORTH	NICHOL	52	LH	935	327	2	1	1	0	
94/03/09	REV NORTH	OLD CAMP	53	LH	960	372	0	0	0	0	
94/03/10	REV NORTH	BIGMOUTH	54	LH	982	410	5	3	2	1	
94/03/1	REV NORTH	TOTAL					103	17	86	4 of 4	
		CALVES/100 ADULTS						19.77			
TOTAL, REVELSTOKE BLOCKS							347	56	291	24 OF 26	
		CALVES/100 ADULTS						19.24			

NAKUSP, DUNCAN, AND MONASHEE BLOCKS										
DATE	BLOCK	DRAINAGE	#SIGHTING	ZONE	EASTING	NORTHING	TOTAL	CALF	ADULTS	#COLLARS
94/03/15	NAKUSP	PAIN	1	MG	490	37	7	1	6	0
94/03/15	NAKUSP	PAIN	2	MG	437	10	7	0	7	0
94/03/15	NAKUSP	HALCYAN	3	MG	423	10	14	1	13	0
94/03/15	NAKUSP	HALFWAY	4	MF	438	988	4	0	4	0
94/03/15	NAKUSP	ST LEON	5	MF	555	866	3	1	2	0
94/03/15	NAKUSP	HALFWAY	6	MF	544	867	5	0	5	0
94/03/15	NAKUSP	HALFWAY	7	MF	530	876	11	0	11	0
94/03/15	NAKUSP	ST LEON	8	MF	420	883	4	2	2	0
94/03/15	NAKUSP	ST LEON	9	MF	520	800	14	0	14	0
94/03/15	NAKUSP	ST LEON	10	MF	406	840	1	0	1	0
94/03/15	NAKUSP	CAPEHORN	11	MF	445	760	2	0	2	0
94/03/15	NAKUSP	GARDNER	12	MF	491	793	8	1	7	0
94/03/15	NAKUSP	KUSKANOX	13	MF	522	766	10	1	9	0
94/03/15	NAKUSP	KUSKANOX	14	MF	600	700	13	2	11	0
94/03/15	NAKUSP	HAMLIN LAKES	15	MF	627	692	19	4	15	0
94/03/15	NAKUSP	KUSKANOX	16	MF	565	687	5	0	5	0
94/03/15	NAKUSP	MT HALL	20	MG	450	173	4	0	4	0
94/03/1	NAKUSP	TOTAL					131	13	118	0
		CALVES/100 ADULTS						11.02		
94/03/15	DUNCAN	SILVER CUP	17	MG	787	5	8	2	6	0
94/03/15	DUNCAN	SILVER CUP	18	MG	780	46	3	1	2	0
94/03/15	DUNCAN	SILVER CUP	19	MG	755	90	6	0	6	0
94/03/1	DUNCAN	TOTAL					17	3	14	0
		CALVES/100 ADULTS						21.43		
94/03/15	MONASHEE	BLANKET	21	MG	147	275	10	3	7	0
		GRAND TOTAL					505	75	430	24 of 26
		CALVES/100 ADULTS						17.44		



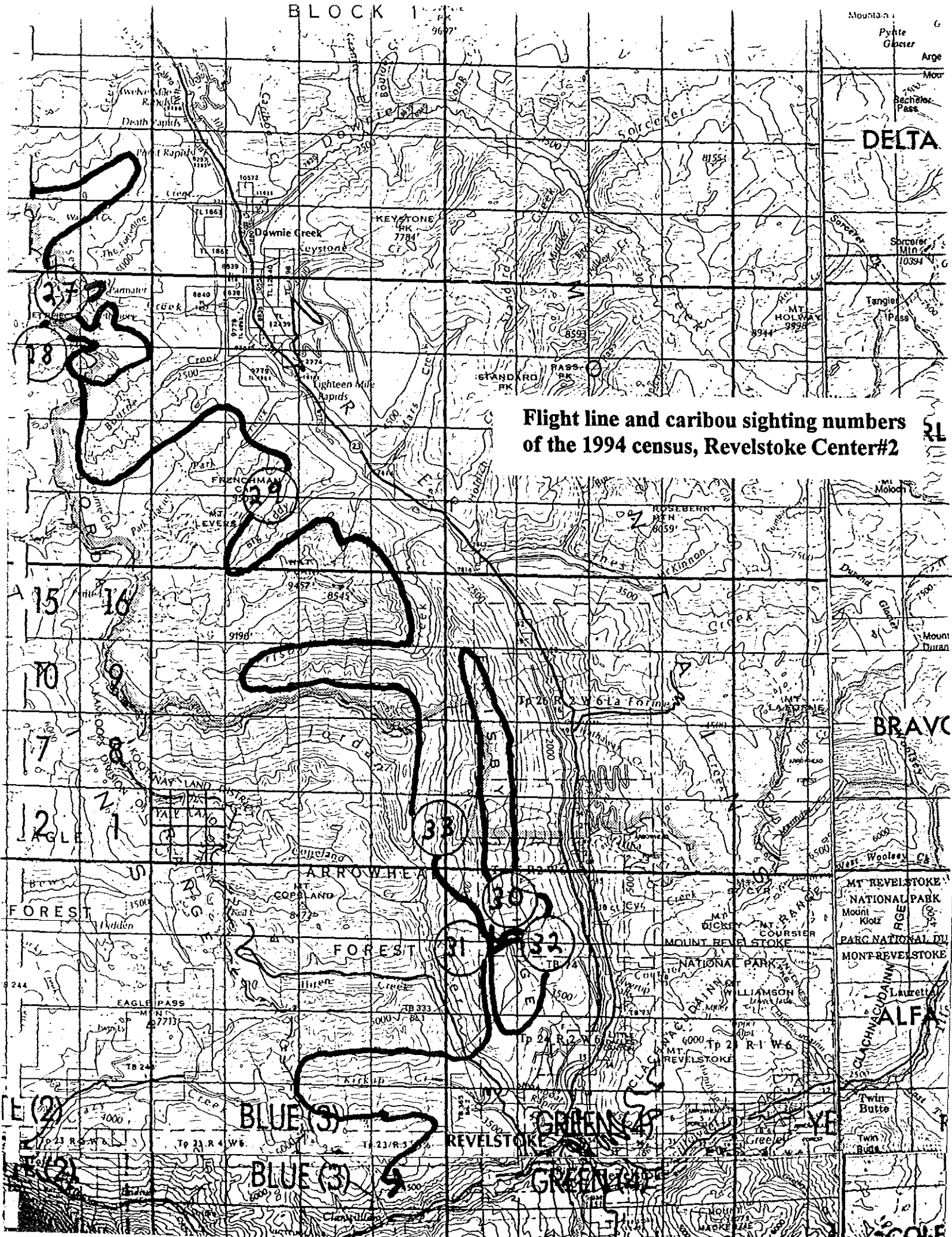
**Flight line and caribou sighting numbers
 of the 1994 census, Revelstoke Center #1**

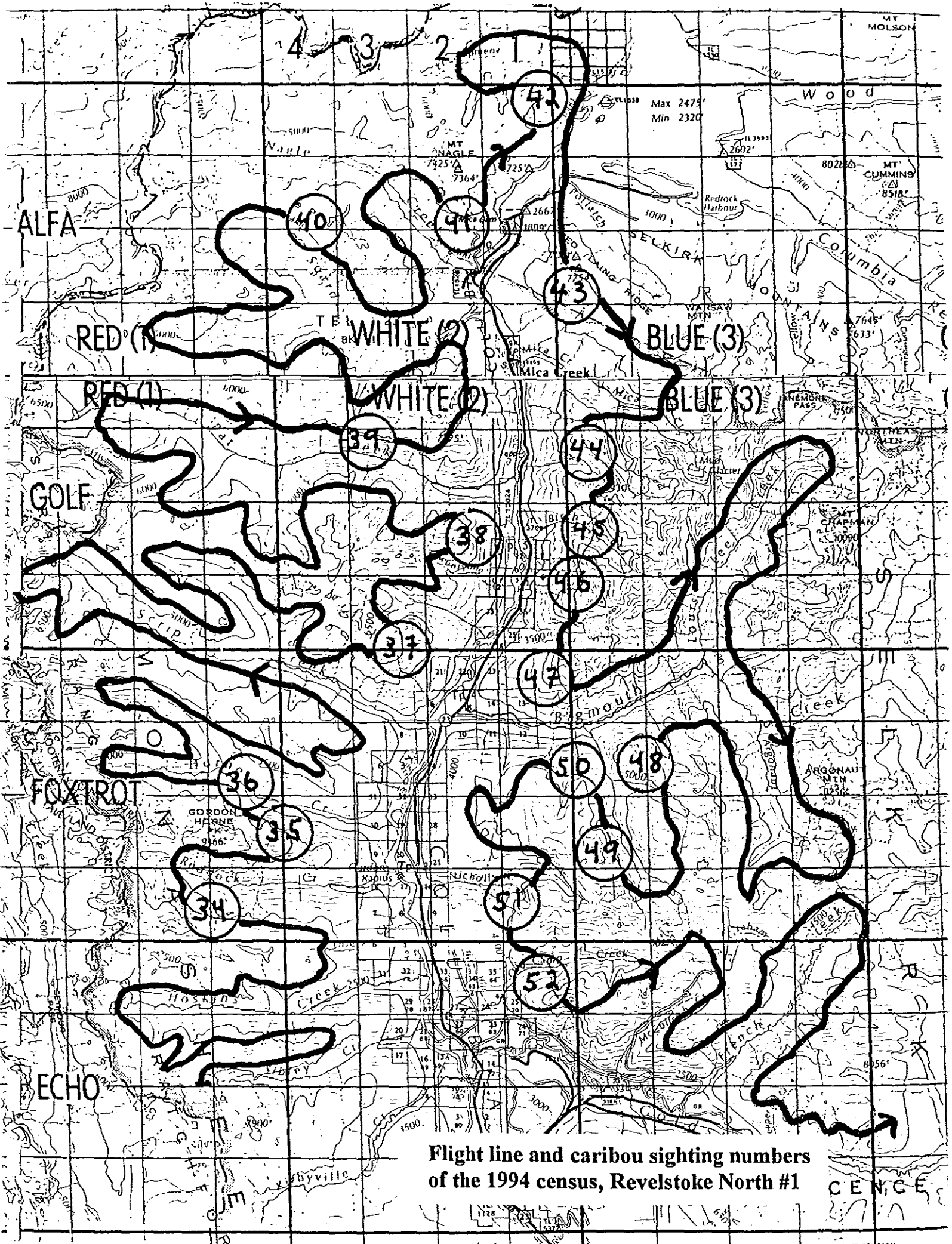
BLOCK 1

Mountain
Pyrite
Glacier
Arge

DELTA

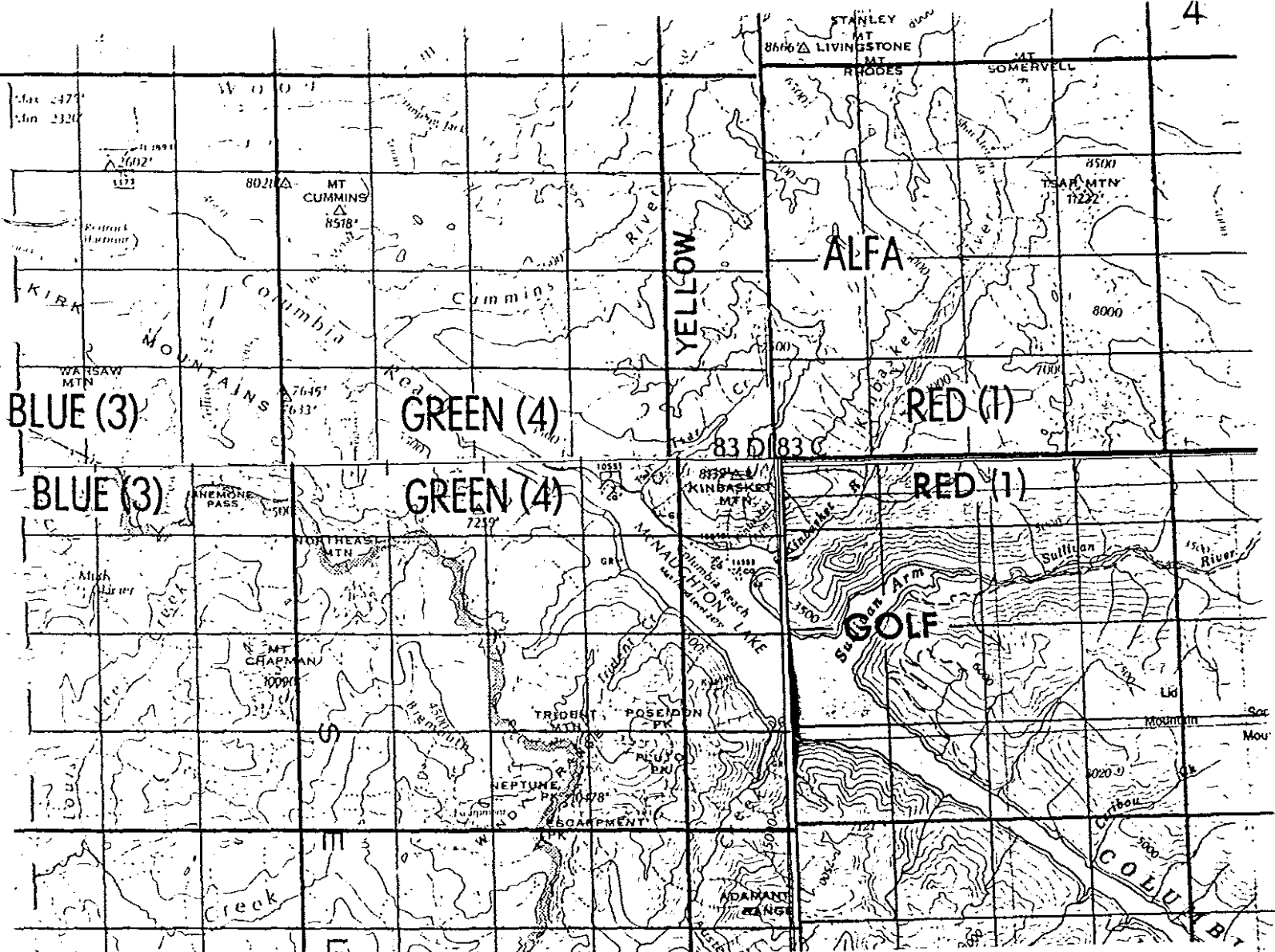
Flight line and caribou sighting numbers
of the 1994 census, Revelstoke Center#2



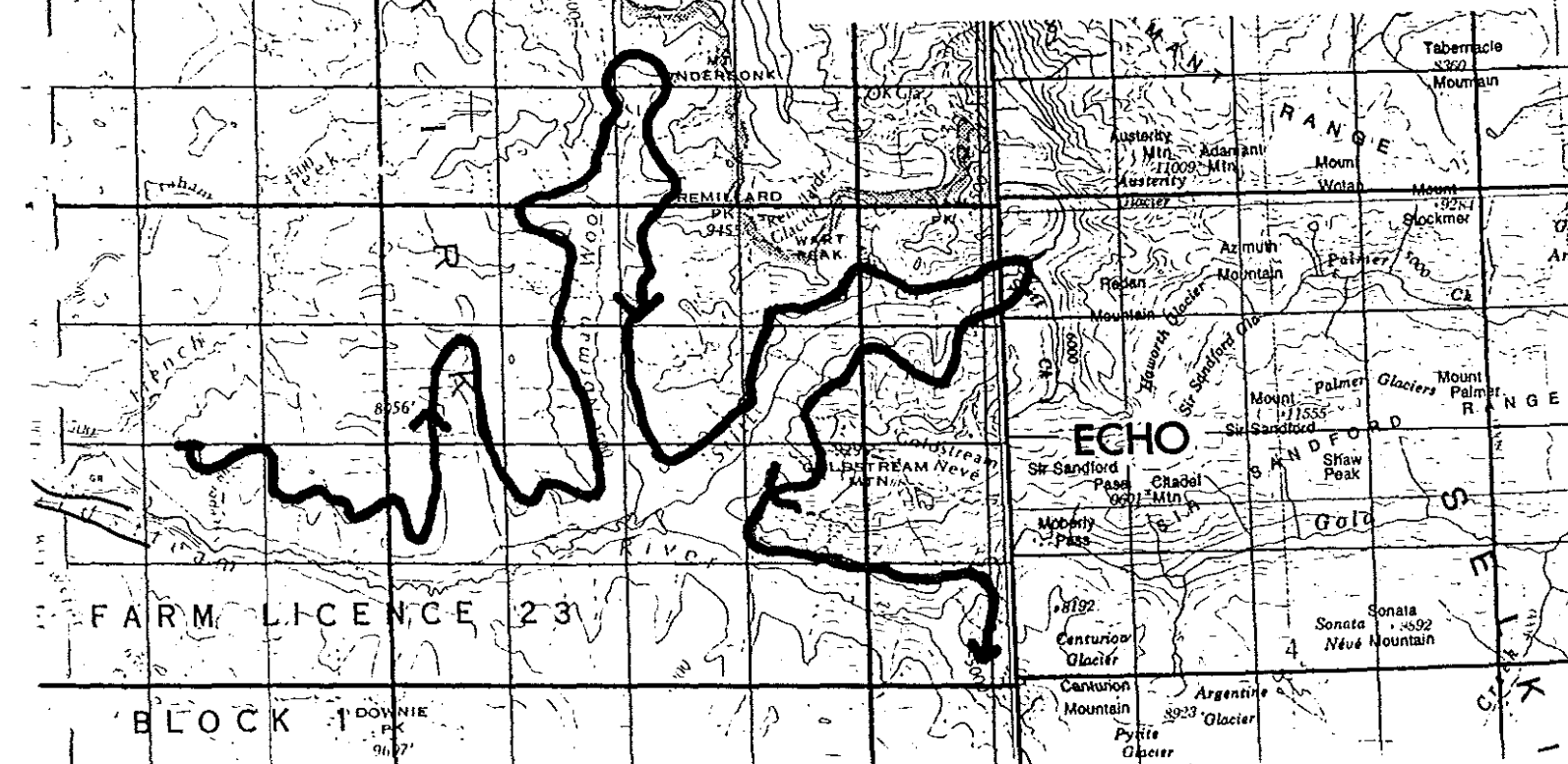


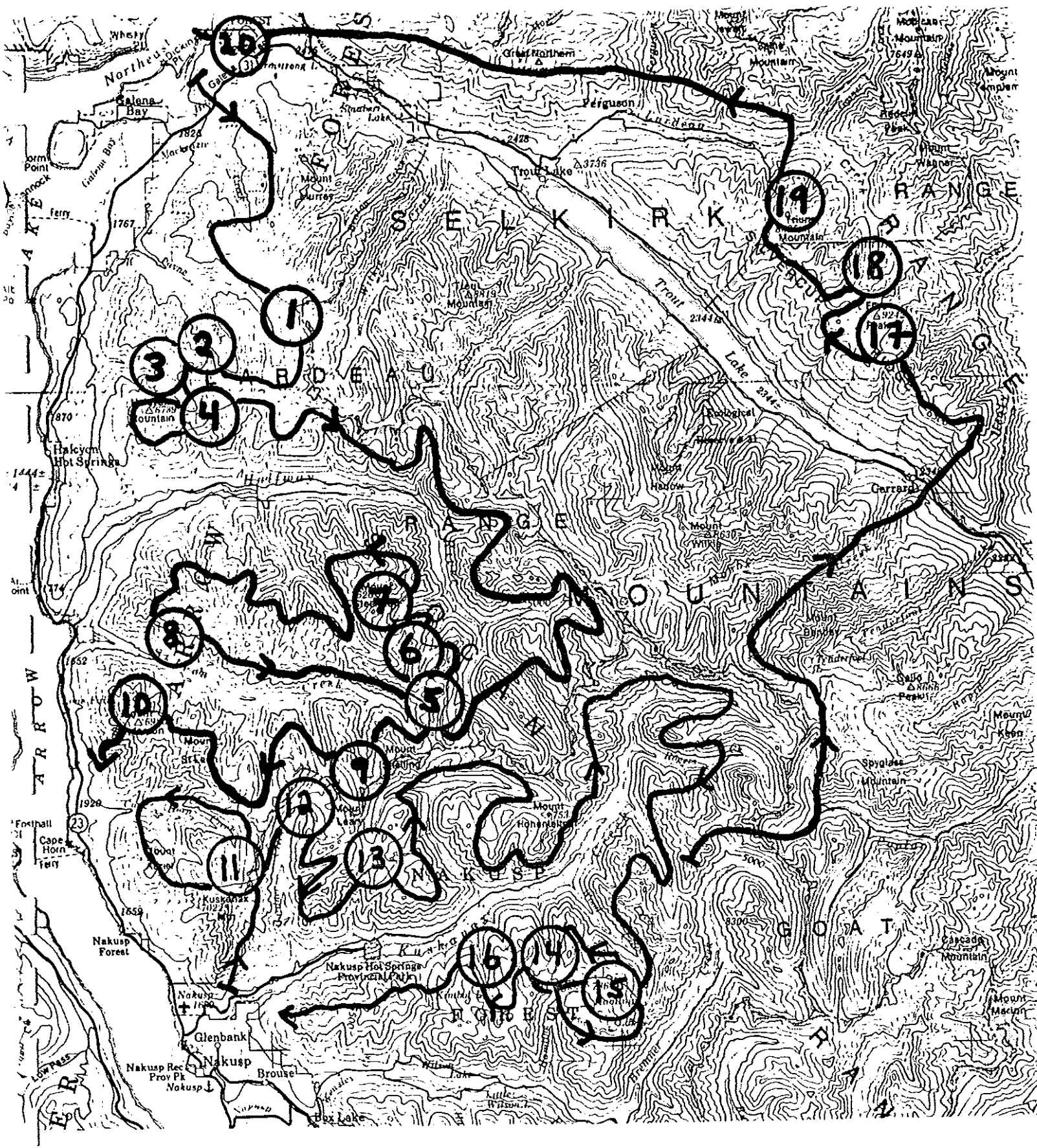
Flight line and caribou sighting numbers of the 1994 census, Revelstoke North #1

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Flight line and caribou sighting numbers of the 1994 census, Revelstoke North #2





Flight line and caribou sighting numbers of the 1994 census, Nakusp