

# **2004 POPULATION CENSUS OF MOUNTAIN CARIBOU IN THE COLUMBIA FOREST DISTRICT**

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## **EXECUTIVE SUMMARY**

Mountain caribou in the Columbia Forest District were studied using radiotelemetry from 1992 to 1999. Censuses conducted in 1994, 1995, 1996, and 1997 indicated a relatively stable population of between 290 to 373 animals. In 2002, census efforts were coordinated throughout the range of mountain caribou in British Columbia and resulted in a population estimate of 211 animals for the Revelstoke area, or a decline to 64% of the 1997 estimate. A downward trend occurred in most mountain caribou subpopulations in southern B.C. However, because there were only 5 radiocollared animals remaining in the Revelstoke area in 2002, the sightability of the population (proportion of the total population actually observed) could not be well estimated, resulting in a wide confidence interval of 176-269 animals. The decline was confirmed during the 2004 census, with a population estimate of 176. The 90% confidence interval for the 2004 census was 167-210 animals, based on sighting 14 of the 15 radiocollars available.

## **INTRODUCTION**

Woodland caribou (*Rangifer tarandus caribou*) in southeastern British Columbia are commonly referred to as mountain caribou. They are a unique ecotype of caribou distinguished from others by their use of the deep wet-belt snowpack (>2m) as a platform to access arboreal lichens in the canopy of subalpine forests during winter. Because of their low numbers, decreasing population trend, and shrinking geographic distribution, these caribou are considered threatened by COSEWIC (Committee on the Status of Endangered Wildlife in Canada) and, in the fall of 2002, were added to the red-list (species at risk of extinction or extirpation) by the British Columbia Conservation Data Centre.

Mountain caribou habitat is contiguous in British Columbia from north of Prince George to the Columbia Forest District (CFD). Four small, isolated subpopulations are found south of the CFD with one, the southern Selkirks subpopulation, extending below the international border. Population characteristics of caribou on the Revelstoke Reservoir side of the CFD were examined from 1981 to 1985 by Simpson and Woods (1987) and from 1992 to 1999 (McLellan and Flaa 1993, McLellan et al. 1994*a, b*, Flaa and McLellan 2000). Although more intensive research on this population ended in 1999, limited work

continues to investigate the relationship of mountain caribou to snowmobiling (Hooge and McLellan 2001).

In the past, research efforts were subject to jurisdictional limitations such as forest district or regional boundaries. Delineation of populations was often based on inadequate knowledge of caribou distribution and movements. These arbitrary geographic boundaries have made population comparisons among years difficult because animals could easily move in and out of census areas. Recently, Wittmer (2004) determined that there are four separate subpopulations (Columbia North, Columbia South, Kinbasket, and Frisby-Boulder-Queest) (*Figure 1*) inhabiting the region north of the TransCanada Highway and bounded by the Adams River in the west and the Rocky Mountains in the east. Although animals were known to move between the Frisby-Boulder-Queest and the Columbia South subpopulations in the early 1980s (K. Simpson unpubl. data), there has been no known occurrences of movement between these areas since. Censuses are now conducted over the complete ranges of the populations of interest (Columbia North, Columbia South, Kinbasket, Frisby-Boulder-Queest and Monashee South). The population most affected by these changes in census coverage is the Columbia North population. It would have been underestimated in previous censuses since areas on the periphery of its range were outside the CFD, and therefore outside the scope of the original project.

## **CENSUS AREA**

The CFD was created in 1996 by the amalgamation of the Golden and Revelstoke forest districts. Historically, caribou censuses were conducted in these two districts separately and sometimes not during the same year (*Figure 1*). Although we now know that caribou move between the two districts at their northern extremities, enumeration by the previous district boundaries will be included in this report to enable comparisons to previous reports.

Before 1993, caribou censuses on the Revelstoke side of the CFD did not cover the entire area and effort was inconsistent among years, reflecting inconsistent budgets. To ensure more complete coverage and systematic effort over time, the area was divided into 3 census blocks in 1993: Revelstoke North, Center, and South. The size of each block enabled coverage in one day, with boundaries selected to virtually eliminate the chance of inter-block movements during the census. Radiotracking caribou in the area (summarised in Wittmer, 2004) has indicated that there are four subpopulations in the Revelstoke portion of the census area with little or no movement among them. These subpopulations vary greatly in both numbers and areal extent. The ranges of the subpopulations do not coincide with the census blocks. Although members of these subpopulations are usually within the Revelstoke portion of the CFD and would have been counted during censuses conducted in the 1990s, some animals in the Columbia North

subpopulation move into the Rocky Mountains and some cross the height of land in the Monashees into the Okanagan-Shuswap Forest District. An additional subpopulation is found adjacent to the southern (from Stitt-Windy creeks south) portion of the Kinbasket Reservoir on the Golden side of the CFD. The Kinbasket subpopulation was censused in 1995, 1997, and 2002 and the Okanagan-Shuswap Forest District was first censused in 2002.

## **METHODS**

Between 1992 and 2004, 96 caribou were captured by net-gunning from a helicopter in subalpine habitat in the CFD and adjacent portions of the Okanagan/Shuswap Forest District. All caribou were fitted with mortality/motion sensitive radiocollars. Caribou were censused during late winter when they were in open subalpine parkland (Simpson and Woods 1987, McLellan et al. 1995, Seip 1992). Censuses in 1993, 1994, 1995, 1996, 1997, 2002 and 2004 were conducted shortly after new snowfalls using a Bell 206 helicopter with 3 experienced observers plus the pilot. A contour near treeline (1800–2130 m) was flown including all suitable habitat within the study area, and tracks were followed until animals were sighted, unless the tracks descended into mature timber and were lost from view. An estimate of the number of caribou in these unsighted groups was based on separate tracks and/or beds. The location of each group was marked and numbered on a 1:250,000 map and recorded with a GPS. Although all male groups were easily identifiable, discrimination of young males from adult females in large groups was difficult and would have required additional harassment. We therefore limited our classes to calves and adults in these larger mixed groups.

During the census, radiocollars were used as marks for mark-resight calculations only and not to locate animals. Population estimates were calculated using the program NOREMARK, using the maximum likelihood joint hypergeometric estimator for closed populations and 90% confidence intervals (White 1996).

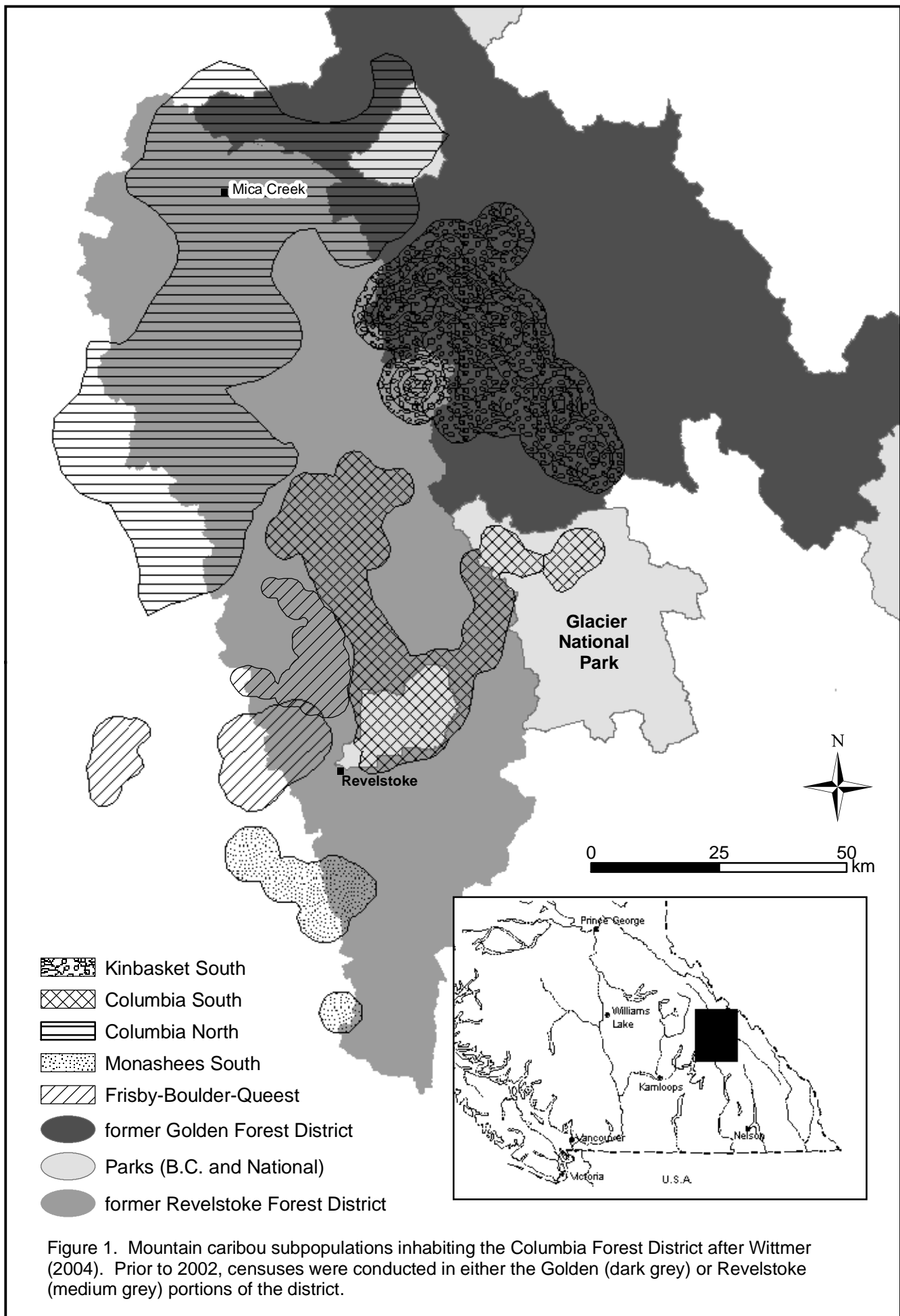
## RESULTS

During the 1994, 1996, 1997, 2002 and 2004 censuses, 347, 268, 308, 176 and 165 caribou were observed and the populations in the Revelstoke side of the CFD estimated to be 373, 290, 331, 211 and 176 with upper 90% CI of 407, 316, 357, 269 and 211 respectively (Table 1, Figure 2). The 1993 census, conducted in a low-snowpack year, was aborted due to low sightability. During all censuses, 91 of 99 radiocollared animals were seen for an average sightability of 92%.

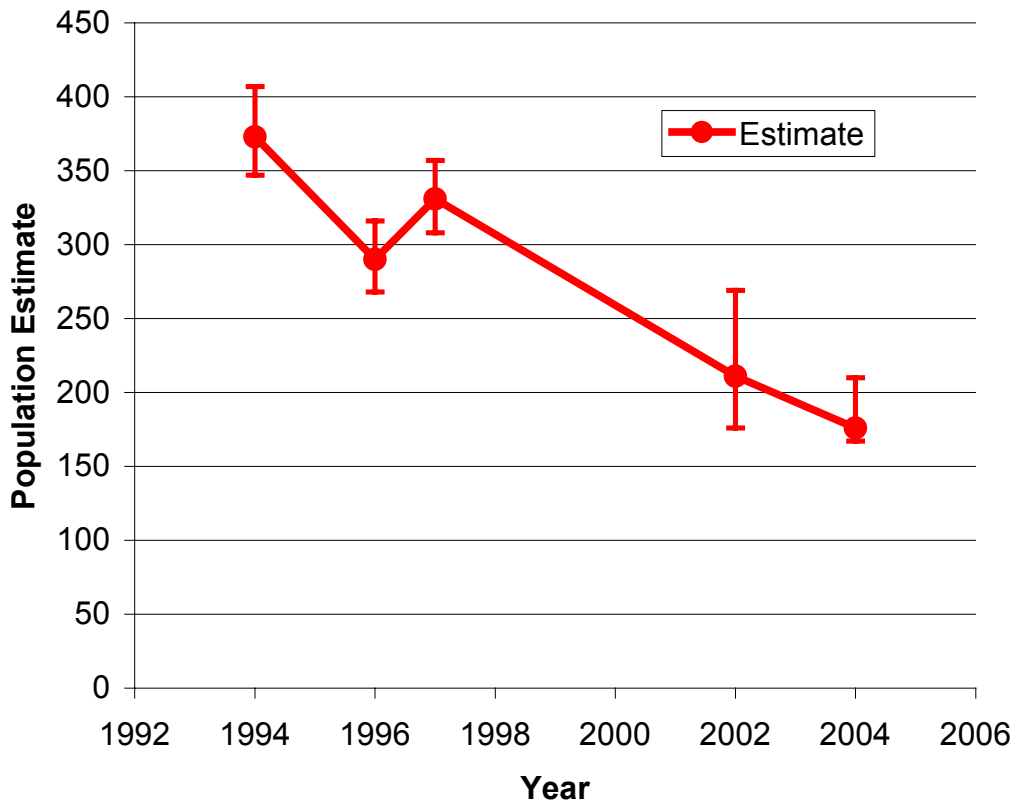
**Table 1.** Revelstoke Reservoir portion of the Columbia Forest District caribou census results: 1994- 2004.

Year	Number Observed	Estimated from Tracks	Tracks plus Observed	Number Collared	Number Collared Observed	Calculated Estimate	90% CL
1994	347	15	362	26	24	373	347-407
1996	268	39	307	25	23	290	268-316
1997	308	1	309	28	26	331	308-357
2002	176	12	188	5	4	211	176-269
2004	165	16	181	15	14	176	167-210

Because the intensive research on caribou in this area ended in 1999, only 5 radiocollars were active during the 2002 census resulting in a wide confidence interval in the NOREMARK estimate. For the 2004 census, there were 19 radiocollared caribou in the entire area and 18 were observed for a sightability of 95% (Table 1). In the south Monashees, (Blanket Creek area) 10 animals were observed in 1994, 4 in 2002, a maximum of 6 were seen during telemetry flights in 2003, and 7 during the census in 2004.



**Figure 2.** Trend of the caribou population inhabiting the Revelstoke portion of the Columbia Forest District, 1994 to 2004



**Table 2.** Total number of caribou observed, estimates from tracks, and percent calves of the subpopulations in the Columbia Forest District. Includes NOREMARK estimates for populations with sufficient numbers of collared animals, 1994 to 2004.

<b>Columbia South</b>	<b>Observed (%calves)</b>	<b>Estimated from Tracks</b>	<b>Tracks plus Observed</b>	<b>Number Collared</b>	<b>Collars Observed</b>	<b>Calculated Estimate</b>	<b>90% CL</b>
1994	101 (12)	12	113	12	10	121	106-161
1996	75 (12)	19	94	10	9	83	76-108
1997	93 (14)	0	93	9	9	93	93-107
2002	20 (10)	5	25	3	2	30	21-86
2004	38 (16)	2	40	3	3	38	38-59

<b>Columbia North</b>	<b>Observed (%calves)</b>	<b>Estimated from Tracks</b>	<b>Tracks plus Observed</b>	<b>Number Collared</b>	<b>Collars Observed</b>	<b>Calculated Estimate</b>	<b>90% CL</b>
1994	206 (19)	3	209	13	13	206	206-227
1996	167 (19)	26	193	11	11	167	167-188
1997	195(13)	13	208	17	15	237	217-290
2002	145 (12)	7	152	1	1	145	145-171
2004	129 (14)	7	136	12	12	129	129-143

<b>Frisby</b>	<b>Observed (%calves)</b>	<b>Estimated from Tracks</b>	<b>Tracks plus Observed</b>	<b>Number Collared</b>	<b>Collars Observed</b>	<b>Calculated Estimate</b>	<b>90% CL</b>
1994	36 (8)	0	36	2	1	NA	NA
1996	20 (25)	0	20	4	3	NA	NA
1997	30 (10)	0	30	4	4	NA	NA
2002	10 (10)	0	10	2	2	NA	NA
2004	5 (20)	0	5	1	0	NA	NA

<b>Kinbasket</b>	<b>Observed (%calves)</b>	<b>Estimated from Tracks</b>	<b>Tracks plus Observed</b>	<b>Number Collared</b>	<b>Collars Observed</b>	<b>Calculated Estimate</b>	<b>90% CL</b>
1995	8 (13)	11	18	3		NA	NA
1997	17 (0.06)	4	21	5	5	NA	NA
2002	5 (0)	0	5	0	0	NA	NA
2004	0*	0	0	0	0	NA	NA

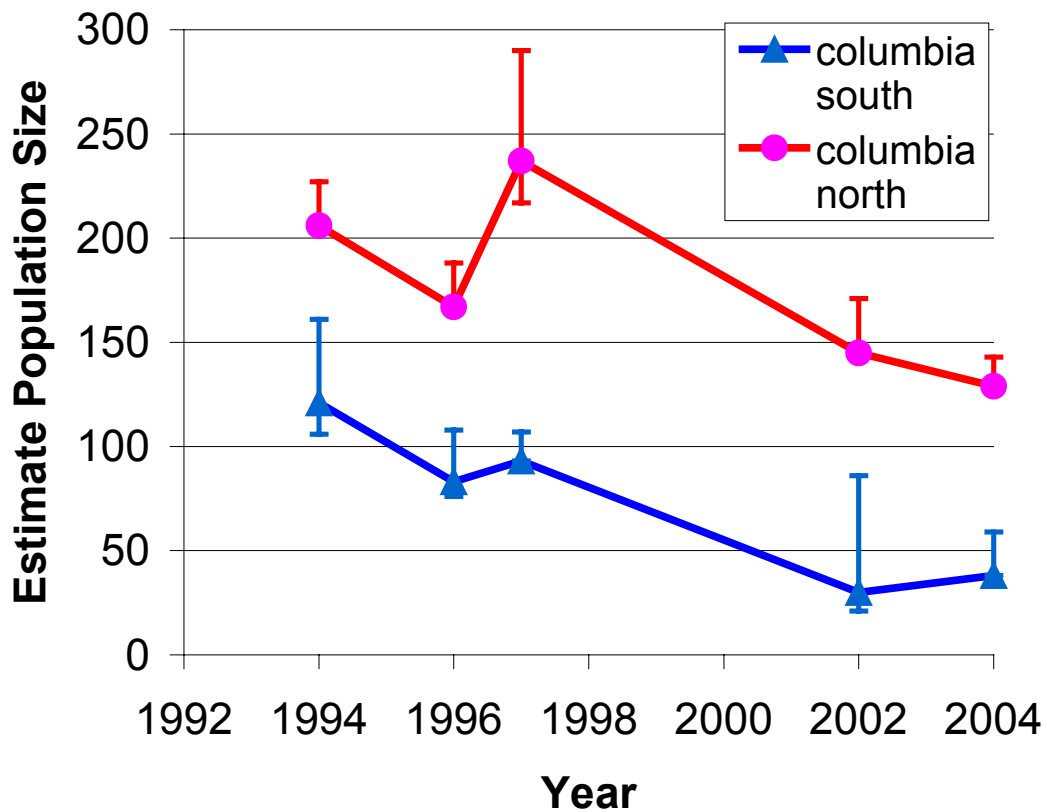
\* one small group was observed in this area two weeks prior, but was missed during the census in 2004

Table 2 (continued)

Boulder-Queest	Observed (%calves)	Estimated from Tracks	Tracks plus Observed	Number Collared	Collars Observed	Calculated Estimate	90% CL
2002	10 (40)	0	0	3	3	NA	NA
2004	11 (36)	0	11	1	1	NA	NA

Monashees South	Observed (%calves)	Estimated from Tracks	Tracks plus Observed	Number Collared	Collars Observed	Calculated Estimate	90% CL
1994	10 (30)	0	10	0	0	NA	NA
2002	4 (0)	0	4	0	0	NA	NA
2004	7 (14)	0	7	2	2	NA	NA

Figure 3: NOREMARK estimates for two subpopulations in the Columbia Forest District.





## DISCUSSION

The census results indicate that the overall caribou population in the CFD remained relatively stable between 1994 and 1997 but by 2002 had decreased by 64% of what it was in 1997. If the population declined consistently over the 5-year interval, this would indicate an annual decline of 11%, a rate that apparently continues to the estimate of 176 animals in 2004. Based on the 2004 census estimate, the number of caribou in this area had been reduced to 53% of the 1994 estimate. A similar decrease in population size was noted in the Central Selkirks where the number of caribou observed during the census in 2004 was only a third of the number observed in 1997 (Hamilton 2004).

Estimates from the 2002 census increased concern for the population in the CFD, however, without a larger sample of marked animals, there was a low level of certainty in the estimate. The 2004 census confirmed the decline and suggests that the decline has continued. The subpopulations did not change at the same rate and the declines appear to have started earlier in some subpopulations than in others. The Columbia South population may have begun to decline earlier in the 1990s than the Columbia North. In 2002, the estimated number of animal in the Columbia South subpopulation had decreased to 25% of the 1994 estimate but appears to have stabilized or even increased slightly by 2004. Similarly, the number of animals or their tracks seen in the area used by the subpopulation centered on Frisby Ridge in 2002 had decreased to 28% of the number recorded in 1994 but they have continued a gradual decline since. The estimated Columbia North population in 2004 was 63% of what it was in 1994. The proportion of the entire population that consisted of calves decreased from an average of 16.1 % (1994) and 17.5% (1996) to 12.4 (1997) and 11.6 (2002) (Table 2). The proportion of calves was slightly higher in 2004 at 14.6%.

Since 1992, the leading causes of death of caribou in the CFD have included predation and accidents including avalanches (Flaa and McLellan 2000) and these likely remain the significant factors that have influenced the population size. Dynamics in the large mammal predator-prey system, particularly changes in moose and deer numbers and related changes and time lags in changes in wolf and cougars may have adversely affected caribou. It is probable that cougar numbers increased with deer numbers in the mid-1990s until the deer population rapidly declined due to the deep-snow winter of 1996/1997. This dynamic of the predator/prey system, if true, may have influenced the earlier decline in the Columbia South population. This population has the largest potential for overlap with deer and cougars and would thus have been more likely to be affected by cougar predation.

Since the 2002 census, 7 radiocollared caribou have died – predators killed 6: grizzly (2), cougar (1), wolf (1) and unknown (2). However, without monitoring mortality rates and causes of a sufficient sample of radiocollared caribou, we cannot be confident in a true change in predation rate. An increase in avalanche

mortality due to unstable snow conditions and displacement from more subdued terrain by winter recreation activities may also have caused an increase in caribou mortality.

Caribou censuses conducted in the Revelstoke portion of the CFD between 1983 and 1985 indicated a population size of 200 to 261 (Simpson and Woods 1987). During this period > 20% of the population was calves, suggesting an increasing population. Although the censuses in the 1980s may not have been as thorough as recent censuses, the presence of 9 marked animals enabled correction for reduced sightability. It is possible that the caribou population increased from between 200-261 animals in the early 1980s to the estimated 373 animals in 1994 and has now decreased to below 200 animals. The apparent decline in population size without a clear indication of factors responsible indicates that the more extensive monitoring that ended in 1999 should be resumed in order to identify the factors involved.

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