

**Population Census of Threatened Caribou Herds
in the South Peace area of British Columbia, 2008**



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Introduction

Woodland caribou (*Rangifer tarandus caribou*) herds in the south Peace area of British Columbia are part of the Nationally Threatened caribou population in the Southern Mountains National Ecological Area. Several herds or sub-populations occur within the South Peace, including Moberly, Burnt-Pine, Quintette, Bearhole/Redwillow, and the Narraway (Figure 1). Recent radio-telemetry work has greatly improved our understanding of the distribution, movements, habitat use, and population status of these herds, but information on the population size was limited. This report summarises the methods and results of caribou population censuses conducted in March, 2008.

Quintette

In winter, Quintette caribou live primarily on windswept alpine ridges in the eastern foothills of the Rocky Mountains, west of the town of Tumbler Ridge. The Quintette herd was censused on March 25, 2008. The census area included the mountains between Kinuseo Creek to the south, and the Sukunka River to the north. We terminated the census at the top ends of watersheds near the height of the Rockies where the topography becomes very rugged and is seldom used by caribou in winter. The flight route (Figure 2) included areas that were most likely to be selected by caribou in winter based on radio-telemetry and caribou habitat modelling (Jones *et al.* 2007, Jones 2008). We did not survey Bullmoose Mountain because previous surveys (Seip 2002) and telemetry data indicated that caribou rarely use that area, and also we were low on fuel at that time.

We flew the alpine zone near treeline in a Bell 206 helicopter searching for caribou and caribou tracks. When a group of caribou was located, we counted the number of adults and calves, and then used the telemetry receiver to determine if any collared caribou were present within the group. There were fourteen radio-collared caribou in the census area at the time of the census. After we had completed surveying an area, we used the telemetry receiver to locate any caribou we had missed, and counted the adults and calves within those groups. One of those collars was in a large group of caribou on Bullmoose Mountain which was not part of the initial survey area.

We used the proportion of collared caribou that were located during the survey to correct the survey count for sightability. The 95% confidence interval for this estimate was calculated using the program Noremark (<http://welcome.warnercnr.colostate.edu/~gwhite/software.html>).

Results

We located and counted 95 caribou without using telemetry to find them (Table 1). These caribou included 8 of the 14 radio-collared caribou (57%). Thus, assuming we saw 57% of the total population, the estimated population size is 166 caribou, with a 95% confidence interval of 99-218. When we used radio-telemetry to locate the remaining collars, we counted an additional 78 caribou for a total minimum count of 173.

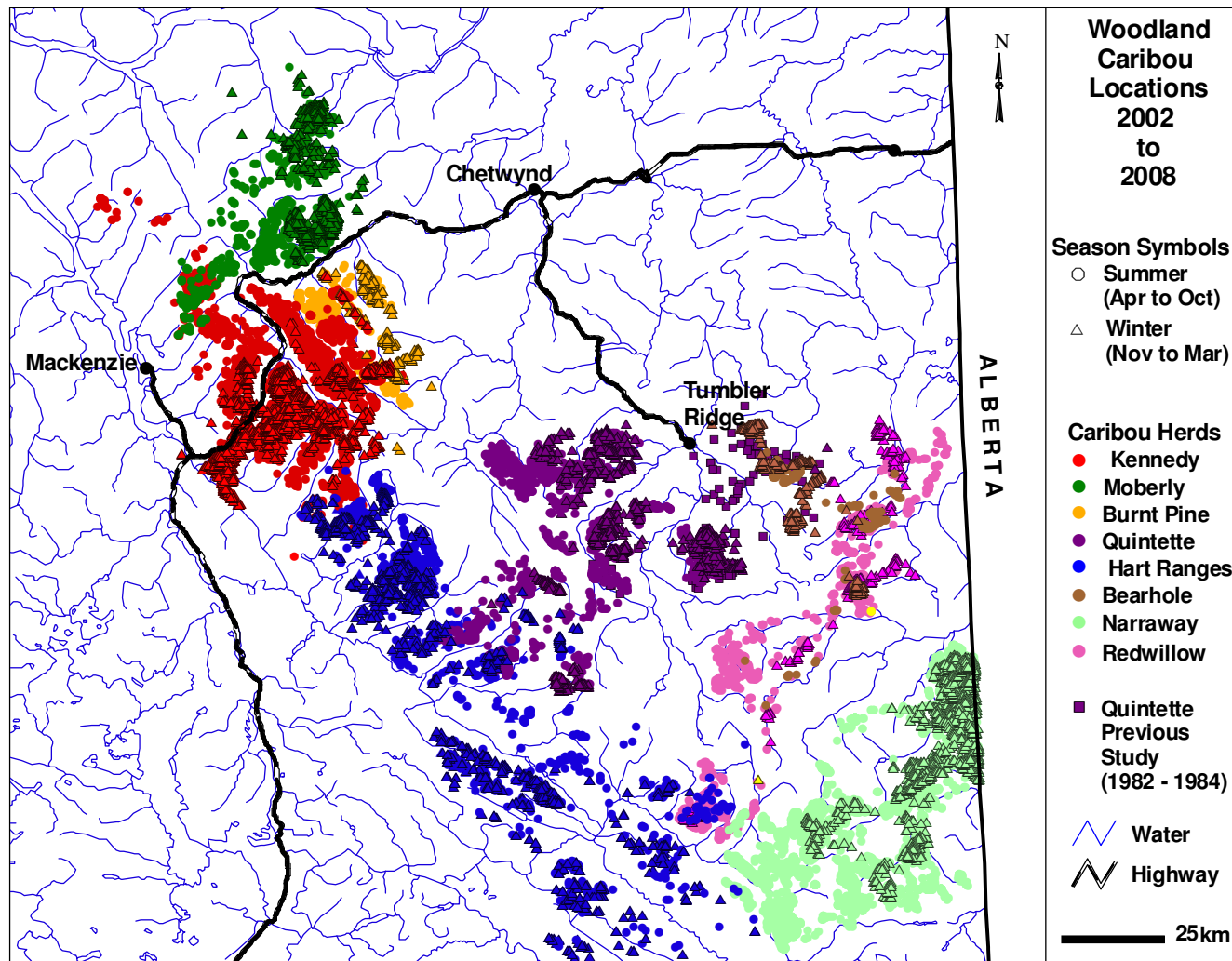


Figure 1. Radio-telemetry and GPS-collar locations of caribou herds in the south Peace area of British Columbia, May 2002 to March 2008.

Table 1. Quintette population census data, March 2008. Location type was defined as “visual” if caribou were located without using telemetry, and “telemetry” if caribou were located using telemetry.

Location Type	Number of Collared Caribou in Group	General Area	Number of Adults	Number of Calves	Total Number of Caribou
Visual	0	Quintette Mountain	2	1	3
Visual	0	Wolverine River	3	0	3
Visual	0	Mt. Spieker	3	1	4
Visual	0	Mt. Spieker	5	2	7
Visual	0	Mt. Spieker	1	1	2
Subtotal	0		14	5	19
Visual	1	Wolverine River	3	2	5
Visual	2	Quintette Mountain	18	3	21
Visual	1	Quintette Mountain	7	3	10
Visual	1	Mt. Spieker	4	1	5
Visual	2	Mt. Spieker	23	2	25
Visual	1	Wolverine River	8	2	10
Subtotal	8		63	13	76
Telemetry	1	Quintette Mountain	4	0	4
Telemetry	1	Quintette Mountain	3	0	3
Telemetry	1	Bullmoose Mountain	21	3	24
Telemetry	1	Mt. Spieker	13	2	15
Telemetry	1	Mt. Spieker	16	1	17
Telemetry	1	Mt. Spieker	13	2	15
Subtotal	6		70	8	78
Total	14		147	26	173

The distribution of the caribou was quite clumped, with 41 caribou on Quintette Mountain, 90 caribou on Mt. Spieker, 24 caribou on Bullmoose Mountain, and the remaining 18 on the ridges between the Wolverine and Murray River (Figure 2). There were a total of 26 calves counted with 147 adults for a ratio of 17.7 calves/100 adults, or 15% calves in the population.

Discussion

The minimum number of caribou within the census area was 173, with an upper estimate of 218. A census in 2002 reported a minimum count of 154 caribou in the same area, but there were no marked animals to estimate sightability (Seip 2002). It is inadvisable to assume that sightability in 2002 was the same as in 2008 because the alpine had more snowcover in 2002, making it easier to see caribou. Consequently, the census data from the two different years cannot be used to make conclusions about any population change during that time.

The census information provides a reasonably good estimate for the Quintette caribou herd, but it must be recognised that this herd is not a completely closed population. In summer, many of the Quintette caribou migrate west into the more rugged core of the Rocky Mountains, often crossing to the west side of the Rockies where they overlap with caribou from the Hart Ranges herd (Figure 1). Although most of the caribou return to the more gentle terrain on the eastern slopes of the Rockies for the winter, in some years Quintette caribou have remained in the more rugged core of the Rockies outside of the census area. In winter 2008, two radio-collared caribou from the Hart Ranges herd migrated to the east side of the Rockies to Mt. Spieker (Doug Heard, pers. comm.). We were not aware of this at the time of the census. Those two caribou, and any other caribou from the Hart Ranges that may have accompanied them, were probably counted as part of the Quintette census. Also during the winter of 2008, one of the collared Quintette caribou migrated to low-elevation winter range in the boreal forests east of the census area. This caribou (and any other Quintette caribou that may have accompanied it) was counted as part of the Bearhole/Redwillow herd (see below). Therefore, the census indicates the number of caribou within the census area, but the actual Quintette caribou herd size may be somewhat different depending on movements of caribou into and out of the census area.

The caribou were not evenly distributed during the census, but rather were concentrated in some core areas including Quintette Mountain, Mt. Spieker, and one large group on Bullmoose Mountain. Telemetry data, however, indicates that other areas are also commonly used by caribou during winter months (Figure 3), so locations of caribou during a single census or survey can be misleading. Both methods, however, demonstrate the major use of Quintette Mountain and Mt. Spieker by caribou during winter.

Calves comprised 15% of the population. This result is comparable to calf recruitment in previous years which has averaged 15% of the population (Table 2). During the past 5 years, 3 collared adult caribou have died during 39 caribou years of

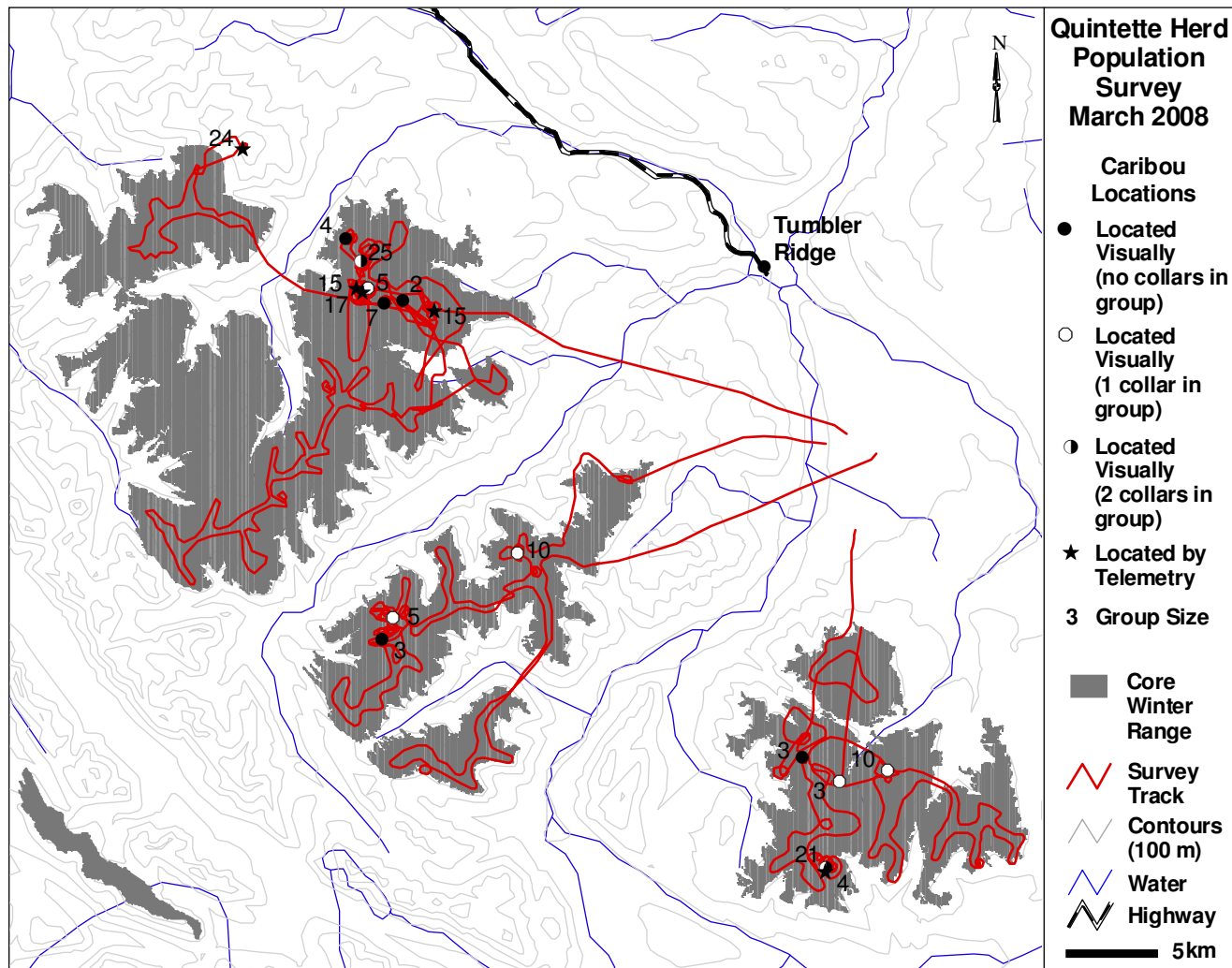


Figure 2. Quintette herd population survey, March 2008. Locations are separated by method of locating caribou (with or without telemetry), and number of collars in group. Number of caribou in each group are shown next to the location symbol.

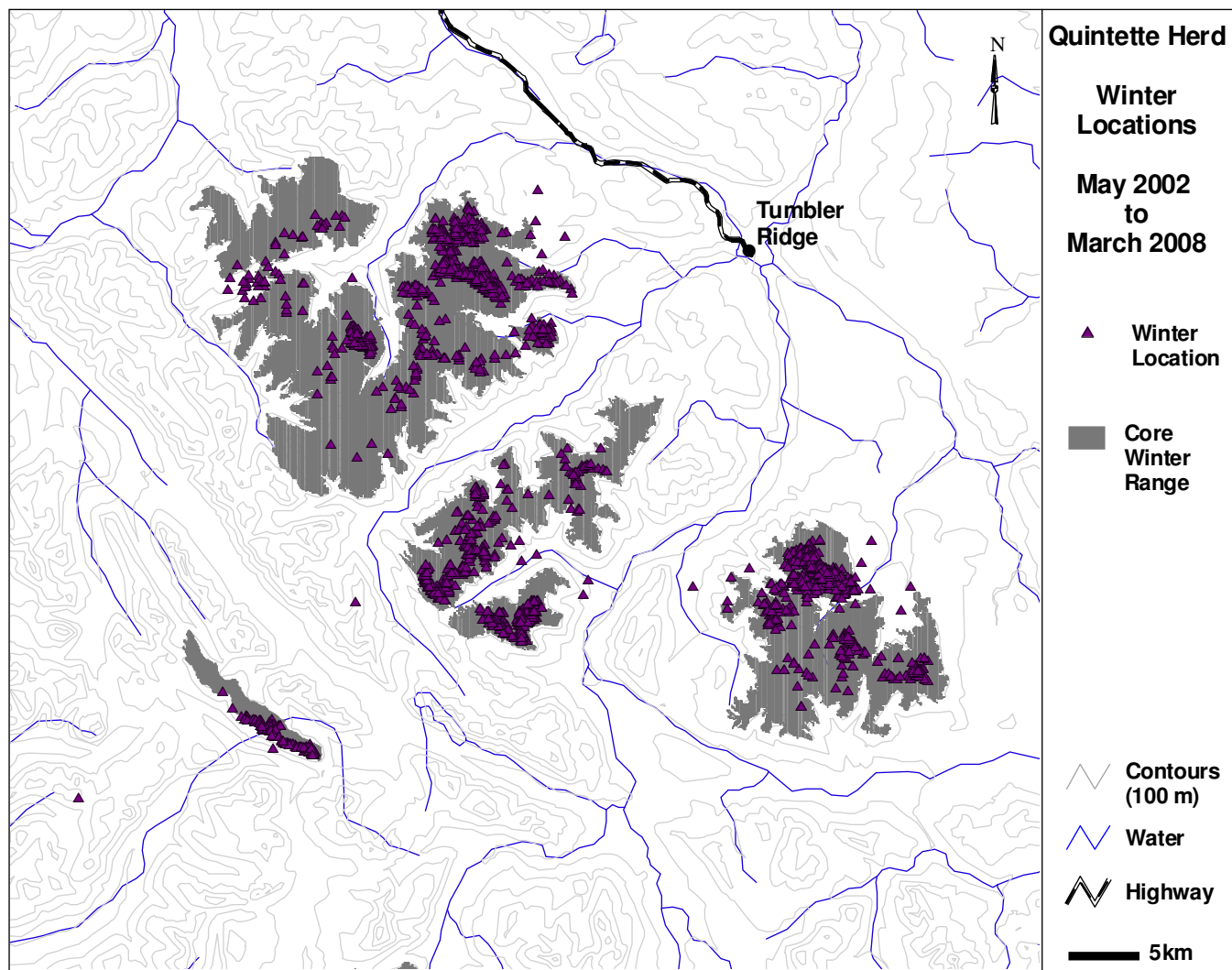


Figure 3. Quintette caribou radio-telemetry and GPS-collar locations in winter, May 2002 to March 2008.

Table 2. Calf recruitment and adult mortality for Quintette caribou, March 2003 to March 2008.

Year	Calf Recruitment				Adult Mortality		
	No. Calves	No. Adults	Calves/ 100 Adults	Percent Calves	No. Collared Caribou	No. Mortalities	Percent Mortality
2003	13	45	29	22	2	1	50
2004	16	81	20	16	2	0	0
2005	8	55	15	13	6	0	0
2006	13	83	16	14	7	0	0
2007	13	92	14	12	6	0	0
2008	26	147	18	15	16	2	13
Total	89	503			39	3	
Average			17.7	15			7.7%

monitoring, for an annual adult mortality rate of 7.7%. That low mortality rate, in combination with the relatively high calf recruitment rate, is indicative of a caribou population that is increasing (Bergerud 1988, Seip & Cichowski 1996). The estimated annual population growth rate is about 7% ($\lambda = 1.07$).

Bearhole/Redwillow Herd

The Bearhole/Redwillow herd represents animals that winter in low-elevation boreal forests, east of the Rocky Mountains, near Bearhole Lake and the Redwillow River. In summer, most of these animals migrate southwest into the Rocky Mountains. Telemetry data on these caribou, however, is still limited and the details of these movements are still being clarified. As discussed above, there is some movement between this herd and the Quintette herd. Also, the seasonal movements and habitat use patterns of these caribou are very similar to the Narraway caribou herd to the south, and there is some range overlap and interchange between these herds. Further monitoring may indicate that these two herds can be considered one herd.

Because these caribou live in forested habitat during the winter, it is very difficult to locate them during aerial surveys. Consequently, we limited our census to counting caribou associated with 7 radio-collared caribou in the herd, while also looking for any uncollared groups.

A total of 49 caribou associated with the collared caribou were counted (Table 3, Figure 4). We did not locate any other groups of caribou. There were only 3 calves in the count, for an estimate of 6.5 calves/100 adults, or 6.1% calves in the population. This low calf count is indicative of a declining caribou population. Adult survival data are still inadequate to provide a reliable estimate of adult mortality for this caribou herd.

We do not know what proportion of the total population was observed. Consequently, we can only conclude that there were at least 49 caribou in the population, and that calf recruitment was quite low.

Narraway

The Narraway caribou herd winters in low-elevation boreal forest south of the Bearhole/Redwillow herd, extending into Alberta. A census on this herd was conducted by staff from the Alberta Fish and Wildlife Division. They counted caribou associated with 15 radio-collared animals on the Narraway caribou range.

A total of 95 caribou were counted on the Narraway range, including 2 calves (Dave Stepinski, pers. comm.). Similar to the Bearhole/Redwillow count, this is a minimum population count, and the actual population is likely somewhat higher.

Table 3. Bearhole population census data, March 2008. All caribou were located by telemetry.

Location Type	Number of Collared Caribou in Group	General Area	Number of Adults	Number of Calves	Total Number of Caribou
Telemetry	1	Bearhole Lake	7	0	7
Telemetry	3	Bearhole Lake	15	1	16
Telemetry	1	Bearhole Lake	10	0	10
Telemetry	1	Bearhole Lake	6	1	7
Telemetry	1	Stony Lake	8	1	9
Total	7		46	3	49

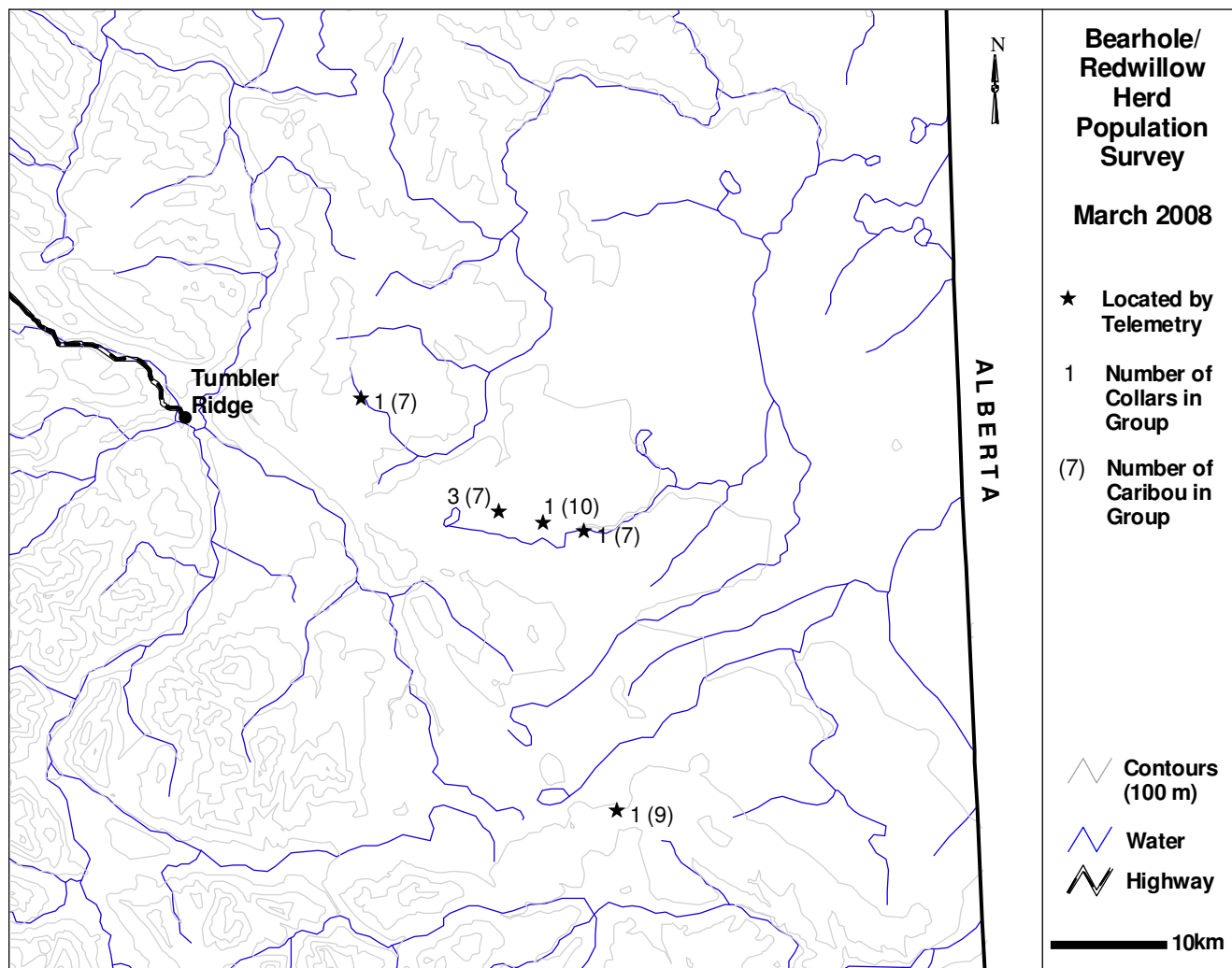


Figure 4. Bearhole/Redwillow herd population survey, March 2008. All caribou were located by telemetry. Number of collars in each group are shown next to the location symbol, and number of caribou in each group are in adjacent brackets.

Burnt-Pine

This small caribou herd lives in the mountains between the Burnt River and Pine River. This herd was previously considered to be part of the Moberly herd, but radio-telemetry monitoring has indicated that there is no movement of caribou (across Highway 97) between these two herds. If anything, the Burnt-Pine caribou have more interaction with the Kennedy Siding caribou on the west side of the Rockies.

To census these caribou, we flew the windswept alpine ridges that caribou have been known to use based on 5 years of radio-telemetry (Figure 5). These areas included the Mt. Le Hudette ridge, Mt. Stephenson ridge, and the ridge south of Brazion Creek. We located two groups of caribou containing a total of 13 caribou (Table 4, Figure 5). There were two calves, for an estimate of 18 calves/100 adults, or 15% calves in the population. The group of 10 caribou contained the only radio-collar that was deployed in this herd.

Up to 37 caribou were counted in this herd in the 1990's (TERA 1997), and minimum counts have ranged from 9 to 16 between 2003 and 2007 (Seip, unpublished data). It is unclear if there has been a population decline, because even in 1995 when TERA consultants counted 37 caribou in early April, they only counted 15 in January and 12 in February. The variation in population counts may simply represent differences in caribou distribution or sightability.

Moberly

The Moberly caribou herd lives in the mountains north of Highway 97 and south of the Peace Arm. Up to 191 caribou were counted in this area in 1995 (TERA 1997), but total counts since that time have generally been lower. The highest recent minimum count was 41 in 2005 (Seip, unpublished data).

There was insufficient funding to attempt a census this year, so we only did a calf count based on caribou associated with the 4 collared caribou in the herd. We counted a total of 42 caribou, which included 8 calves (Table 5). Thus there were 24 calves/100 cows, or 19% calves in the population. Calf recruitment in previous years has ranged from 15 to 28 calves/100 adults (Table 6). Over the past 5 years, 5 collared caribou died during 32 caribou years of monitoring for an annual mortality rate of 16%. Three of those 5 mortalities occurred over the past year. The high recruitment is just sufficient to balance that mortality rate, suggesting that the herd numbers have probably been stable over the past 5 years.

General Conclusions

1. The Quintette caribou herd is between 173-218 caribou.
2. The Bearhole/Redwillow caribou herd contains at least 50 caribou.
3. The Narraway caribou herd contains at least 95 caribou.

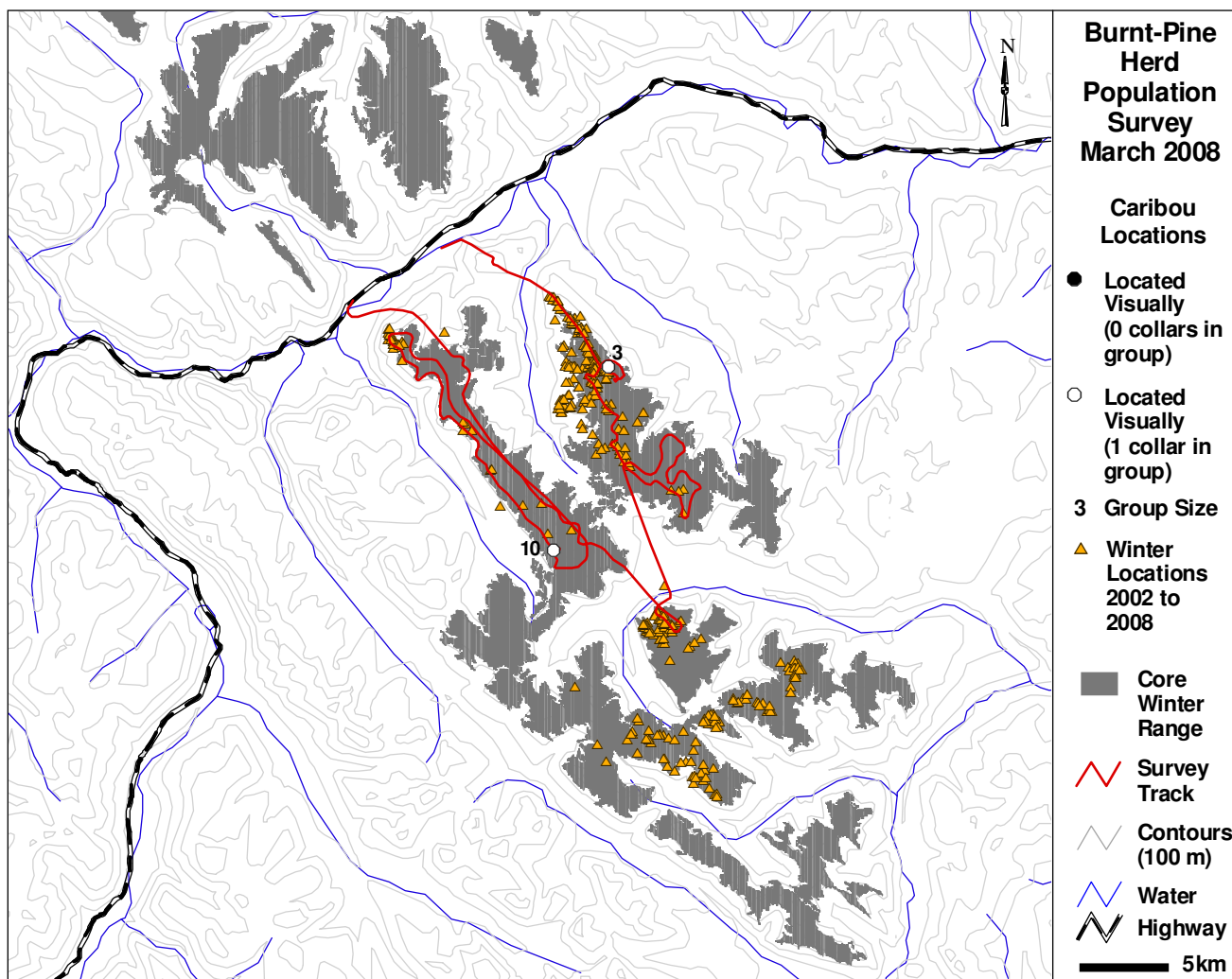


Figure 5. Burnt-Pine herd population survey, March 2008. Locations are separated by method of locating caribou (with or without telemetry), and number of collars in group. Number of caribou in each group are shown next to each location symbol.

Table 4. Burnt-Pine population census data, March 2008. Location type was defined as “visual” if caribou were located without using telemetry, and “telemetry” if caribou were located using telemetry.

Location Type	Number of Collared Caribou in Group	General Area	Number of Adults	Number of Calves	Total Number of Caribou
Visual	0	Mt. Le Hudette	3	0	3
Visual	1	Mt. Stephenson	8	2	10
Total			11	2	13

Table 5. Moberly population census data, March 2008. All caribou were located by telemetry.

Location Type	Number of Collared Caribou in Group	General Area	Number of Adults	Number of Calves	Total Number of Caribou
Telemetry	1		6	2	8
Telemetry	1		15	2	17
Telemetry	1		5	1	6
Telemetry	1		8	3	11
Total			34	8	42

Table 6. Calf recruitment and adult mortality for Moberly caribou, March 2003 to March 2007.

Year	Calf Recruitment				Adult Mortality		
	No. Calves	No. Adults	Calves/ 100 Adults	Percent Calves	No. Collared Caribou	No. Mortalities	Percent Mortality
2003	6	39	15	13	2	0	0
2004	5	28	18	15	7	1	14
2005	11	39	28	22	7	0	0
2006	3	19	16	14	5	1	20
2007	3	12	25	20	5	0	0
2008	8	34	24	19	6	3	50
Total	36	171			32	5	
Average			21.1	17			16%

4. Low calf recruitment (2-6 calves/100 adults) in the Bearhole/Redwillow and Narraway herds suggests that those herds that winter in the boreal forest may be declining.
5. Higher calf recruitment (18-23 calves/100 adults) in the Quintette, Burnt-Pine and Moberly, in combination with the adult survival data, suggests that those herds that winter in the alpine are stable to increasing.

Recommendations

1. Monitoring of collared animals to determine adult survival rates and calf recruitment should continue for all herds. The Moberly herd needs a larger sample size of collared animals to provide reliable data.
2. A population census for the Moberly herd should be conducted next winter to update the population estimate.

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