CALF SURVIVAL AND ADULT SEX RATIO IN THE BATHURST HERD OF BARREN-GROUND CARIBOU 2001-2004

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ABSTRACT

Annual monitoring of calf survival is a useful tool to help determine the trend in numbers of barren-ground caribou (*Rangifer tarandus groenlandicus*). Calf survival is an index of the potential for herd increase. We estimated calf survival in the Bathurst herd from classifying caribou into sex and age classes in March/ April 2001-2004 and in November 2000, 2001 and 2004. The fall counts had the additional objective of measuring adult sex ratio. Mean late winter calf survival and the calf-cow ratios have declined by almost half in 2001-2004 compared with 1985-1996. Mean calf survival rate for 2001-2004 was 0.203 (SE 0.011) compared to 0.395 (SE 0.048) for 1985-1996. Using the calf-cow ratios and estimates of female survival (based on satellite-collared cows) allows us to estimate that the Bathurst herd has declined since 1985. The rate of decline (λ = 0.94 SE=0.013) is similar to the rate estimated from successive 1986-2003 surveys of breeding females. Calf survival during the winters was almost twice the rate estimated during the summer from birth to fall as measured in 2000/01 and 2001/02. The proportion of bulls in the Bathurst herd in fall 2004 was low (37%), however similar proportions have been observed in Alaskan caribou herds. There is a tendency for declining herds to have lower sex ratios but it varies between herds according to the interplay of factors affecting herd size.

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INTRODUCTION

Monitoring the abundance and health of barren-ground caribou *Rangifer tarandus groenlandicus* herds in the Northwest Territories includes measuring the trend in the herd size and calf survival (Williams and Fournier 1996, Bathurst Caribou Management Co-management Planning Committee 2004). Assuming that pregnancy rates in barren-ground caribou are relatively constant, then the percent of young animals that survive to reach breeding age (recruitment) determines the potential increase in herd size.

In practice, the only age class reliably recognizable in the field is calves, and by the time the calves are almost a year old, their survival is assumed to approximate the survival rates of older caribou. Thus the ratio of calves to total caribou, herein referred to as the percentage of calves, in late winter is an index of recruitment. In late winter, however, prime and older bull caribou are often distributed and segregated from the cows and younger caribou. We therefore calculate percentage calves and recruitment by measuring the ratio of calves to cows, and adjust the ratio by an assumed average sex ratio.

In the Bathurst herd, calf-cow ratios were measured in 1985, 1987 to 1989 and 1991 to 1995 (Williams and Fournier 1996). Annual monitoring of calf-cow ratios was not completed between 1995 and 2000, and began again in 2001. This report provides calf survival calculated from the calf-cow ratios determined from the March/April surveys for 2001-2004. We also report the results of November 2000, 2001 and October 2004 composition surveys that had the objective of measuring fall sex ratio.

On an annual timescale, adult sex ratio is assumed to be relatively constant. Over longer periods of time (or in very small populations) adult sex ratios can change with a bias to either sex. When herds are increasing and calf survival is high, the proportion of bulls increases. For example, in the Qaminurjuaq herd, pregnancy rates and calf survival were high in the early 1980s, the herd was increasing and in 1981, the sex ratio (I+year) was 83 bulls/100 cows (Heard and Calef 1986). It is most practical to measure adult sex ratio during the rut because this is when mixing between sexes within the herd is at a maximum. However, the rut occurs at freeze-up, which can be a logistically taxing time to conduct surveys.

Prior to 2001, the adult sex ratio for the Bathurst herd had not been measured. We wanted to obtain a representative sample in fall 2001, however the distribution of the caribou was mostly beyond where we had logistical support and so we were not successful. In 2003, we attempted to measure the adult sex ratio in the fall but the emphasis was on responding to community concerns about lame caribou. In fall 2004, we mapped the distribution of the herd during October in support of replacing satellite collars and then we measured the adult sex ratio. The results of all three surveys are included in this report.

METHODS

We used a helicopter to search for caribou groups in the vicinity of satellite-collared cows or radio-tracked wolves. We also used sightings from pilots and hunters to determine where to search for the caribou and we attempted to disperse the flight lines across the known caribou distribution (Figure 1). We classified small groups (<20 caribou) from the air, or landed and walked to within 100-200 m of the caribou and viewed them through a spotting scope. We attempted to classify caribou as we encountered them and we assigned a GPS waypoint to each discrete caribou group, or small lake or bay with caribou. The location (GPS waypoint) is the sample unit in the analyses.

We classified cows based on seeing a darkened vulval patch. Absence of the patch and the presence of a penis were the distinguishing characteristics of bulls. Prime bulls were large bodied with conspicuously convex profiles to their faces and either large antlers (fall) or no antlers (late winter). Young bulls had antlers roughly less than the height of the shoulder to the ground (fall) or still had antlers (late winter). Calves were small-bodied with relatively short faces. We did not consistently classify yearlings as we suspect that classification errors between 22 and 34 month old caribou are likely. We recorded cows with no antlers (probably genetically polled). We also noted wolf sightings and wolf kills. Following Williams and Fournier (1996) we express the wolves as a sighting rate of wolves/1000 hours flown. In November 2001, the survey was partially in

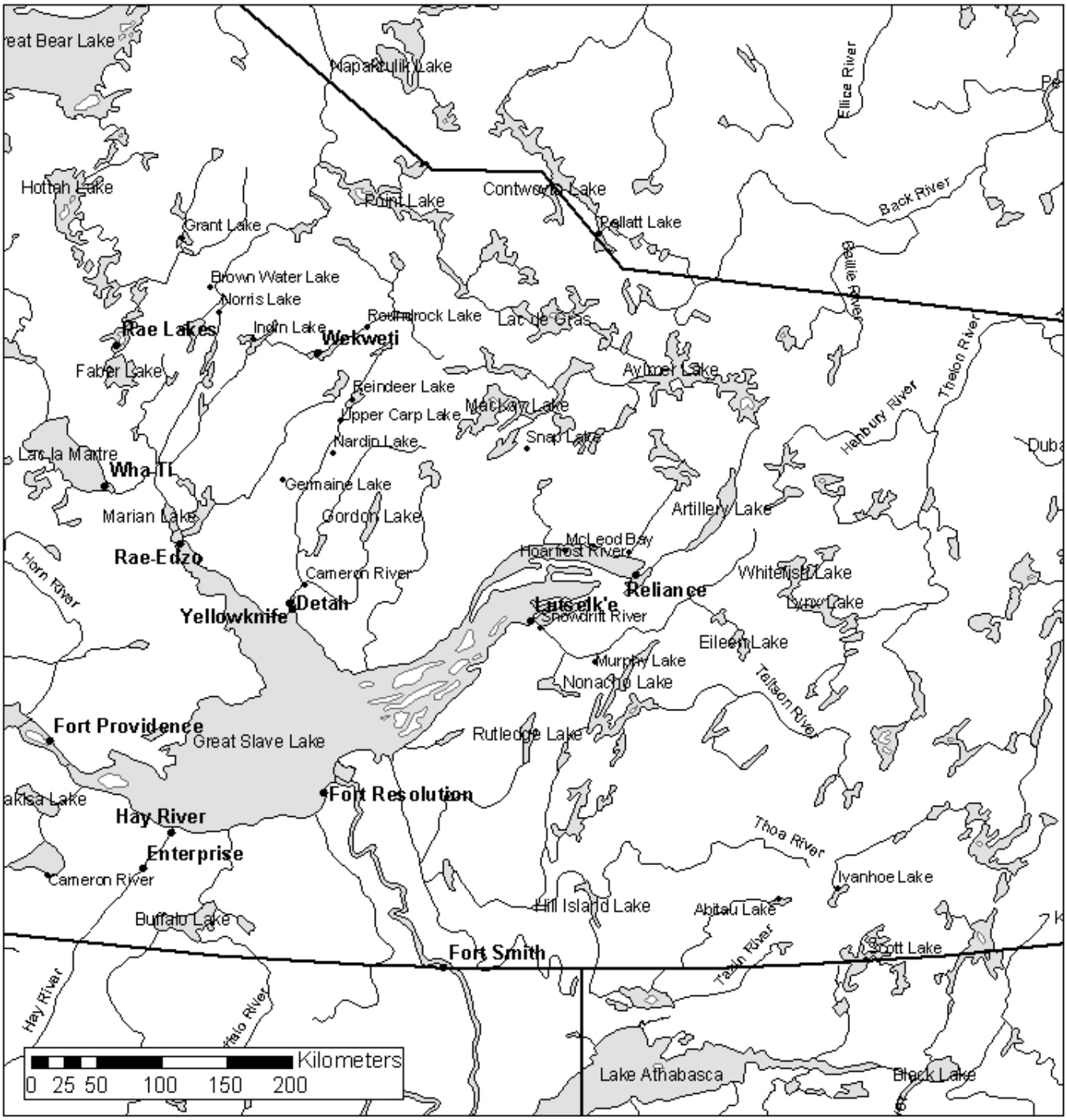

Figure 1. Study area for spring and fall composition surveys conducted on the Bathurst caribou range, March and April 2001-2004 and in November 2000, 2001 and 2004.

response to elder's concerns about the numbers of lame caribou seen during the summer. We looked for, and recorded sightings of, lame caribou in November 2001, and again in 2004.

The maps with the flight lines are based on the track log from the Global Positioning System. We used ESRI ArcMap (version 8.3) and ET GeoWizard (version 8.7) to draw polygons around groups of caribou sightings.

STATISTICAL ANALYSES

Calf-cow ratios:

For each year surveyed, calf-cow ratios were estimated as the total number of calves divided by the total number of cows and yearling females. When unknown sex yearlings were observed, we assigned half of them as females and half as males. We used bootstrap analysis to estimate variances. For this bootstrapping, we re-sampled each yearly data set (using each caribou group surveyed as the sample unit) 1000 times to generate percentile-based confidence limits (Manly 1997).

Weighted least squares regression analysis (Kleinbaum and Kupper 1978) was used to detect trends in ratios using yearly calf-cow ratios and associated variance estimates. Yearly estimates were weighted by the inverse of their variance to account for differences in variances between calf-cow ratios. Trends were modeled using polynomial terms as well as sine and cosine terms (Flury and Levri 1999; Stolwijk et al. 1999) to detect periodicity in productivity.

Calf-cow ratios and population rates of change:

A key question was whether recruitment of calves (as measured by calf-cow ratios) was offsetting mortality. To explore this, population rate of change (λ) was estimated using recruitment, (R) and survival rates, (S) estimates of adult females from Boulanger *et al.* (2004). Population rate of change was estimated using the formula λ=(S/1-R) discussed in McLoughlin et al. (2003) and Hatter and Bergerud (1991). For this method, female recruitment from calf-cow ratios (CC)

was estimated as (CC/2)/(1+CC/2) (Hatter and Bergerud 1991). This analysis assumes that caribou calves experience similar mortality rates to adults after their first spring. It also assumes a 50/50 sex ratio of calves and similar mortality rates of male and female calves. Estimates of λ correspond to the female segment of the population. One problem with this analysis was that caribou were only collared from 1996 on, so that survival rate estimates were not available prior to 1996. For the years prior to 1996, the analysis was conducted on an exploratory level.

Bootstrap analysis was used to obtain confidence intervals for λ. Survival rate estimates were randomly re-sampled under the assumption of logit-based confidence intervals as discussed in White *et al.* (2002). Calf-cow ratio data were also randomly resampled to account for error in both survival rate estimates and calf-cow ratios. The geometric mean of yearly λ estimates and corresponding bootstrap confidence limits were then generated. These estimates were then compared to levels calculated from the analysis of calving ground survey data.

Calf survival rate estimates:

Survival rate was estimated as the change in the successive calf-cow ratios, which reflects the proportion of calves that died per 100 cows. To estimate birth to spring survival, we assumed an average fecundity of 0.76 (CI=0.73 to 0.78) as the birth calf-cow ratio. This initial ratio was then compared

with ratios in the spring and fall. Cows also experienced mortality and therefore the calf-cow ratio in the context of survival also reflects adult female mortality. To account for this, the number of females available was reduced using the estimated annual adult female survival rate of 0.79. The annual survival rate was adjusted for the interval between birth (assumed to be June 10) and the given composition survey, or the interval between fall and spring composition surveys. Calf survival rates between birth and surveys correspond to the survey interval between these two events. To make comparisons possible these rates were adjusted to annual survival rates.

In this analysis, initial fecundity rates, calf-cow ratios, and survival rates all had associated error. To account for this, a bootstrap procedure was employed where each parameter was either randomly sampled from the data (calf-cow ratios) or randomly picked from a distribution of values (fecundity and survival; as determined by the standard error of estimates and associated confidence intervals).

We analyzed data from fall composition surveys to estimate the proportion of adult (1+year) males, females and calves in the population. Of the three fall surveys, we considered the survey in 2004 as the most representative of overall herd composition because we had mapped the herd's distribution before sampling the sex age distribution. Composition estimates were therefore calculated using observed sex ratios, as well as corrected herd totals assuming that the true sex ratio was that observed in 2004. As with previous analyses, bootstrap analysis was used to obtain estimates of error.

RESULTS

April 2001:

We recorded the sex age classes at 240 locations between 6 and 10 April 2001 (Table 1, Appendix A). The calf-cow ratio was 29.0 calves/100 cows (Standard Error SE 1.0). From the distribution of the satellite collars and hunters' reports, we knew that the caribou had wintered southeast of Great Slave Lake so we based our surveys out of Lutselk'e and Stony Rapids. We found the caribou in two areas: immediately south of Lutselk'e, and close to the NWT-Saskatchewan border in the area of Scott Lake (Figure 2). We saw caribou tracks and caribou within about 70 km of the south shore of Great Slave Lake, and then no sign of caribou until we reached Hill Island Lake and flew east toward Abitau Lake (Figure 3). When we flew north on 8 April toward Lutselk'e, we did not see caribou and only saw a few scattered tracks north of Ivanhoe Lake until we reached the Snowdrift River at Murphy Lake (Figure 3). Neither the calf-cow or bull-cow ratios differed between the areas of caribou distribution.

We sampled the caribou based on the distribution of the caribou satellite collars, however, radio-tracking of wolves on 31 March 2001 revealed seven vhf collared wolves southeast of Great Slave Lake (Figure 4). We saw no wolves and only 1 wolf kill around the NWT-Saskatchewan border compared to 5 wolves and 16 wolf kills south of Lutselk'e (Figure 4, Table 2, Appendix A). The sighting rate of wolves was 208 wolves/1000 hours flying time, whereas in 1985-1996 the sighting rate was 714 wolves /1000 hours (Table 2) (Williams and Fournier 1996).

Table 1: Calf-cow ratios, estimated population rate of change (λ), and survival from spring and fall composition surveys conducted on the Bathurst range, 1985 to 2004.

Year	Calf-cow	SE	CI		λ[1]	SE	CI		Survival[2]	SE	CI	
Spring counts												
1985	36.3	10.0	13.8	47.6	0.93	0.06	0.80	1.04	0.32	0.11	0.11	0.46
1987	37.3	3.2	37.4	50.1	0.96	0.05	0.86	1.04	0.37	0.04	0.29	0.47
1988	61.4	12.0	53.7	99.4	1.08	0.07	0.95	1.23	0.77	0.16	0.51	1.13
1989	36.2	2.3	34.7	43.9	0.95	0.05	0.84	1.03	0.34	0.03	0.28	0.40
1990	33.5	2.6	33.5	43.6	0.94	0.05	0.84	1.03	0.32	0.03	0.25	0.39
1991	45.8	3.0	43.3	54.8	0.98	0.05	0.89	1.07	0.44	0.04	0.36	0.53
1992	29.8	1.8	27.9	34.9	0.91	0.05	0.82	1.00	0.25	0.02	0.21	0.30
1993	46.0	2.0	44.9	53.1	0.98	0.05	0.88	1.06	0.44	0.03	0.37	0.51
1994	28.9	2.7	26.0	36.2	0.91	0.05	0.82	1.00	0.25	0.03	0.19	0.32
1995	47.4	4.3	42.3	58.9	0.99	0.05	0.88	1.08	0.45	0.06	0.35	0.57
2001	29.0	1.0	27.2	30.9	0.90	0.04	0.81	0.98	0.25	0.02	0.21	0.28
2002	21.2	1.7	18.3	25.0	0.87	0.04	0.78	0.96	0.16	0.02	0.12	0.20
2003	26.1	1.4	23.3	29.1	0.89	0.04	0.80	0.98	0.22	0.02	0.18	0.26
2004	21.5	1.0	19.7	23.7	0.88	0.04	0.78	0.95	0.16	0.01	0.14	0.19
Fall counts												
2000	39.9	1.3	37.4	42.3	0.95	0.05	0.85	1.03	0.17	0.02	0.14	0.21
2001	32.7	2.3	28.4	37.0	0.92	0.05	0.82	1.00	0.10	0.02	0.07	0.15
2004	18.3	1.6	15.4	21.7	0.86	0.04	0.78	0.94	0.01	0.00	0.01	0.02

[1]λ values for the female segment of the population calculated assuming an adult female survival rate of 0.79 and a 50:50 sex ratio. Estimates were derived from a survival rate estimate corresponding to the time period from 1996 to 2003 and therefore estimates of λ for other years are speculative.

[2]Survival calculated assuming that 76% of cows had calves for all years of study and annual female survival rate was 0.79.

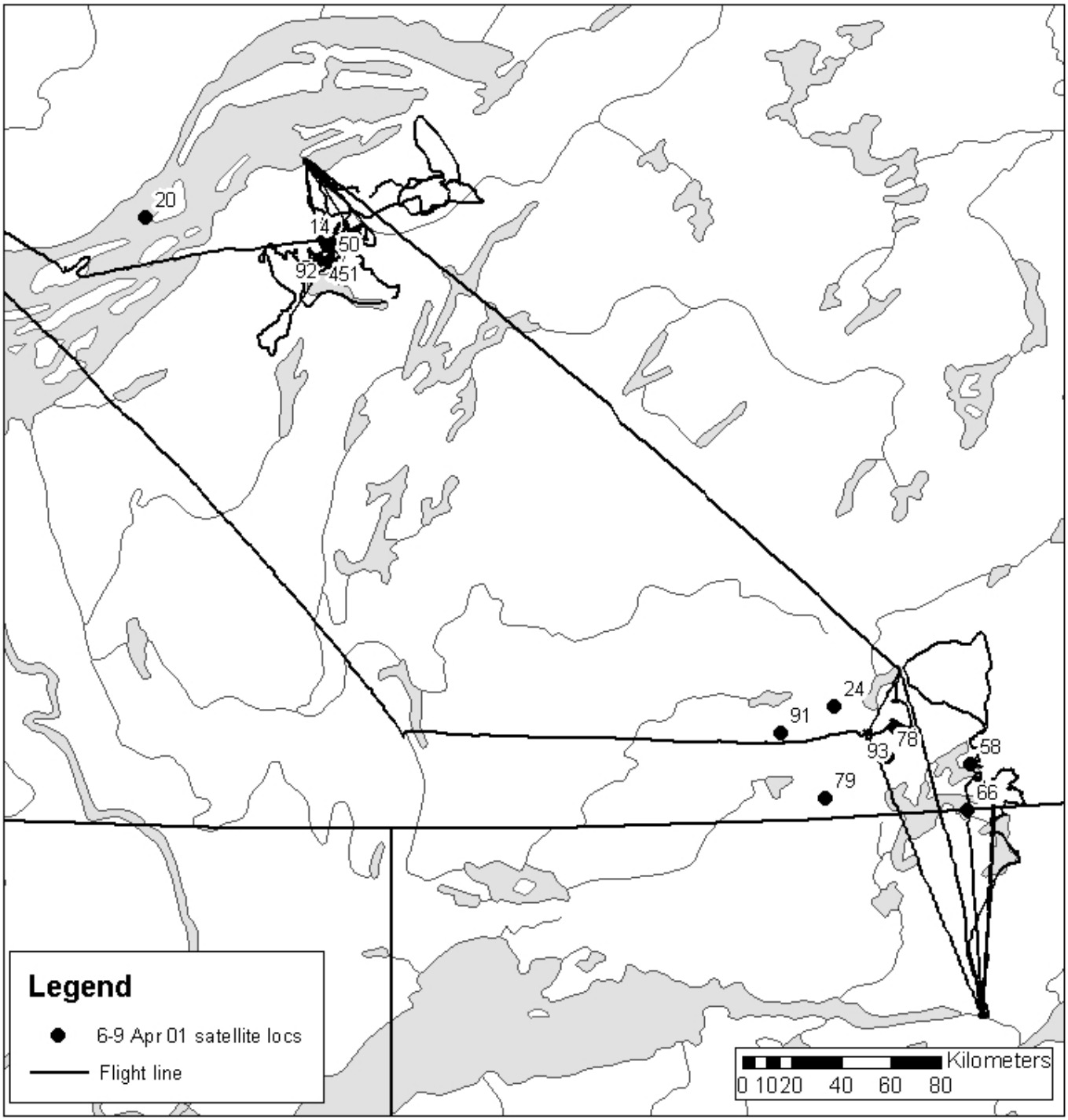

Figure 2. Spring composition survey, 6-10 April 2001 showing flight lines and locations of satellite-collared caribou

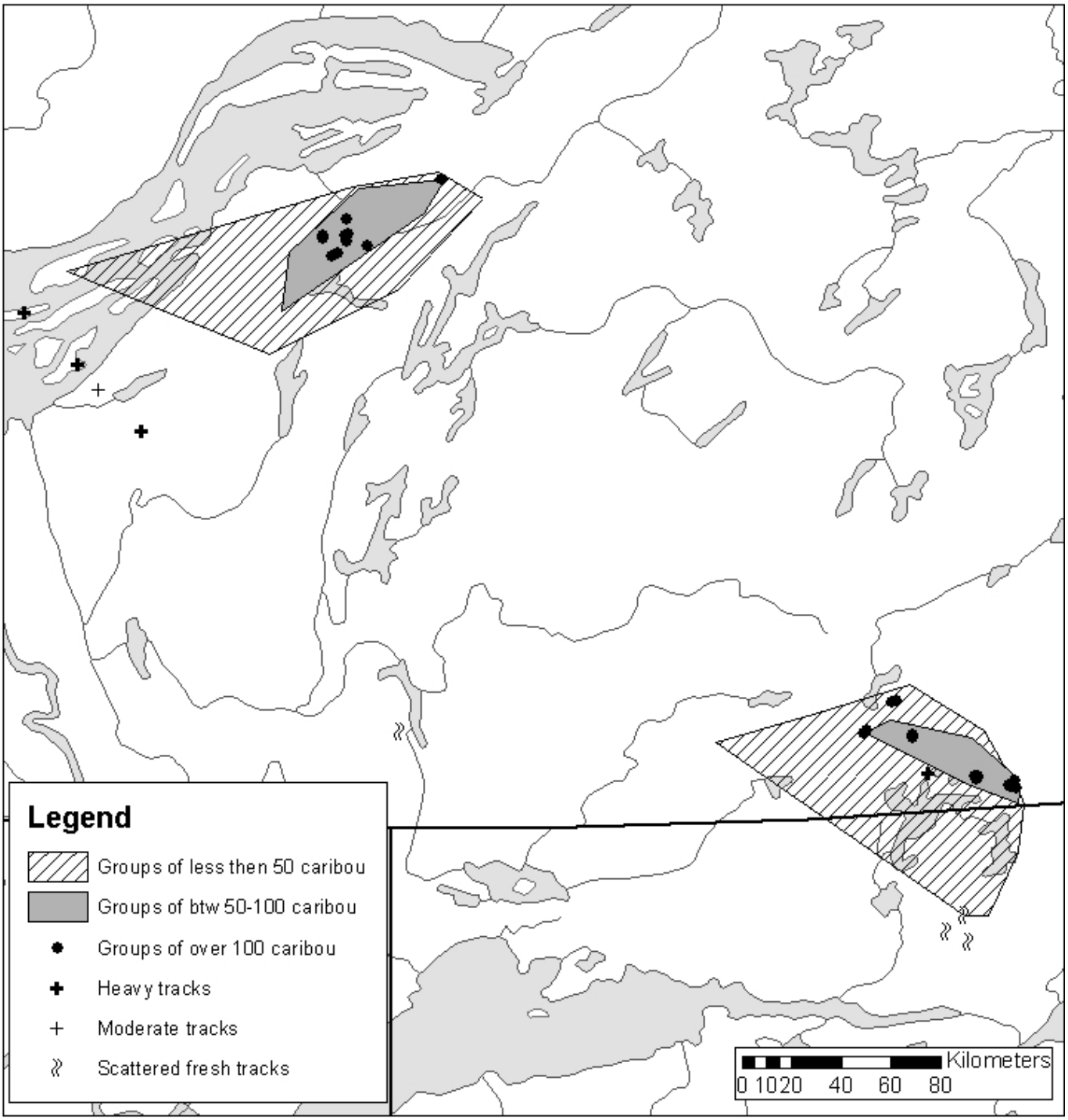

Figure 3. Spring composition survey, 6-10 April 2001 showing caribou groups and sign.

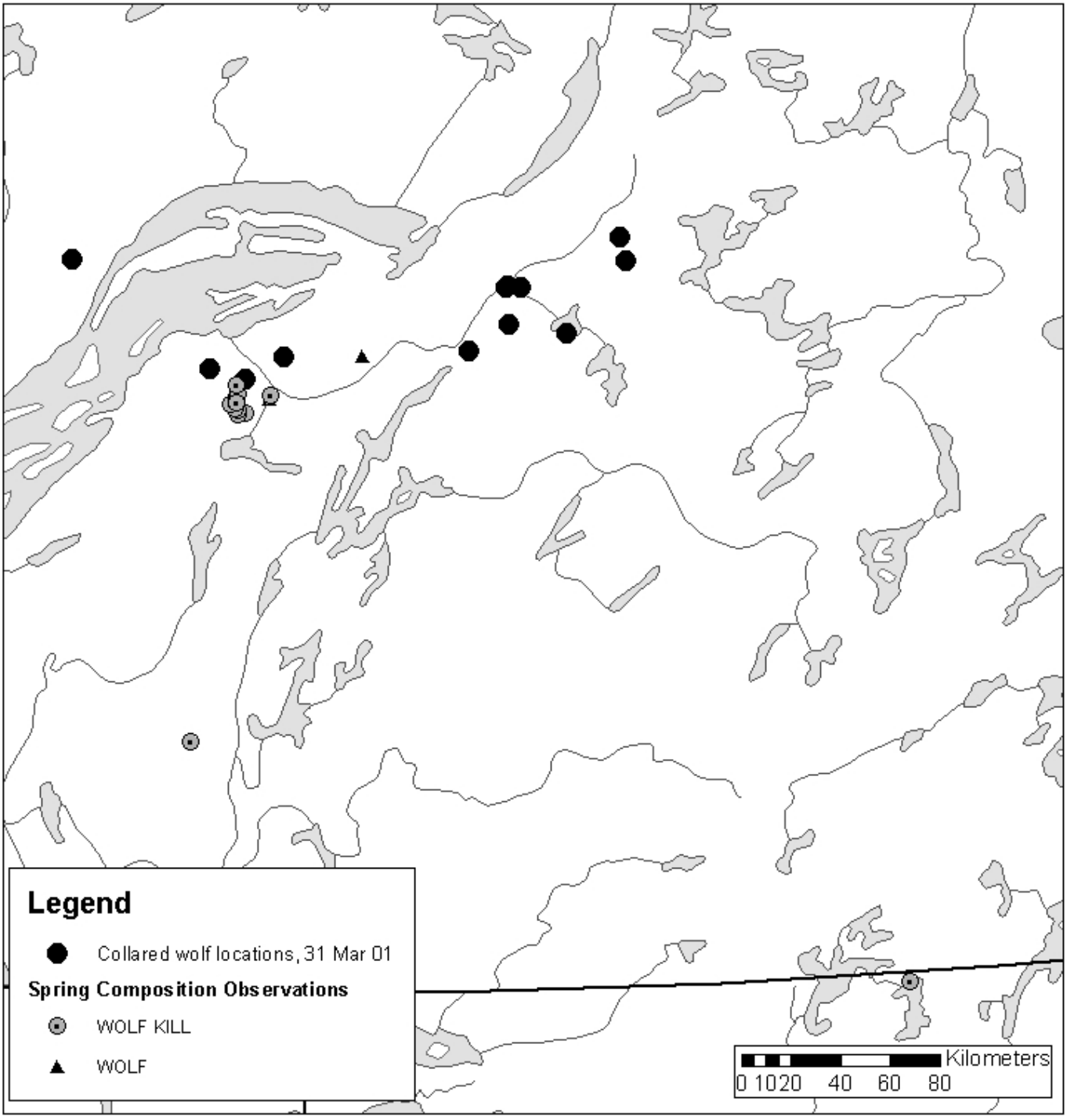

Figure 4. Collared wolf locations and spring composition survey 6-10 Apr 2001 wolf and wolf kill observations.

Table 2. Dates, sampling effort and wolf sightings for monitoring calf survival in the Bathurst herd of barren-ground caribou, NWT, 2000-2004.

Year	Date	Search km	Hours flown	Sampling locations	Number caribou	Wolf kills	Wolves
Spring counts							
2001	6 – 10 April	3831	24	240	11351	17	1, 4
2002	22 – 26 March	2690	17	115	7512	1	4
2003	8 – 14 April	3623	23	123	9571	15	6,7,1,2,7
2004	25 – 30 March	3862	24	247	8488	22	1,1,1,1,2,3,3,5
Fall counts							
2000	11 – 15 Nov	3380	21	207	4693	3	7,10,2,1,5
2001	7 – 14 Nov	2608	16	148	6122	6	4
2004	18-22 Oct	2940	19	185	12444	5	2,8,4,2

March 2002:

We recorded the sex age classes at 61 locations on 22, 25, 26, 28 and 29 March 2002 (Table 1, Appendix B). The calf-cow ratio was 21.2 calves/100 cows (SE 1.7).

The survey area was based on the locations of where satellite-collared cows had wintered between Hottah Lake and Snare Lake in a southwest band to the east of Gordon Lake (Figure 5). On 20 and 21 March we also flew to map caribou distribution in support of collaring 9 additional caribou cows. While flying to our gas cache at Snap Lake, we found thousands of caribou along and above the treeline where we collared two caribou. We also sampled the sex composition of caribou near Snap Lake on 22 and 25 March 2002. On 25 March we flew north of Snap Lake and found few tracks until we reached Pellet Lake where we found groups of hundreds of caribou.

On 28 and 29 March, we flew northwest of Snare Lake towards collared cow #14 and found caribou as far as Grant Lake where we found 100s of caribou. South of Indin Lake toward Germaine Lake we found mostly prime bulls. Unfortunately, we lost the track log for our flights on 26, 28 and 29 March 2002. We saw no wolves on 28 and 29 March, and on 22, 25 and 26 March we saw 4 wolves with a sighting rate of 235 wolves /1000 hours flying time (Table 2).

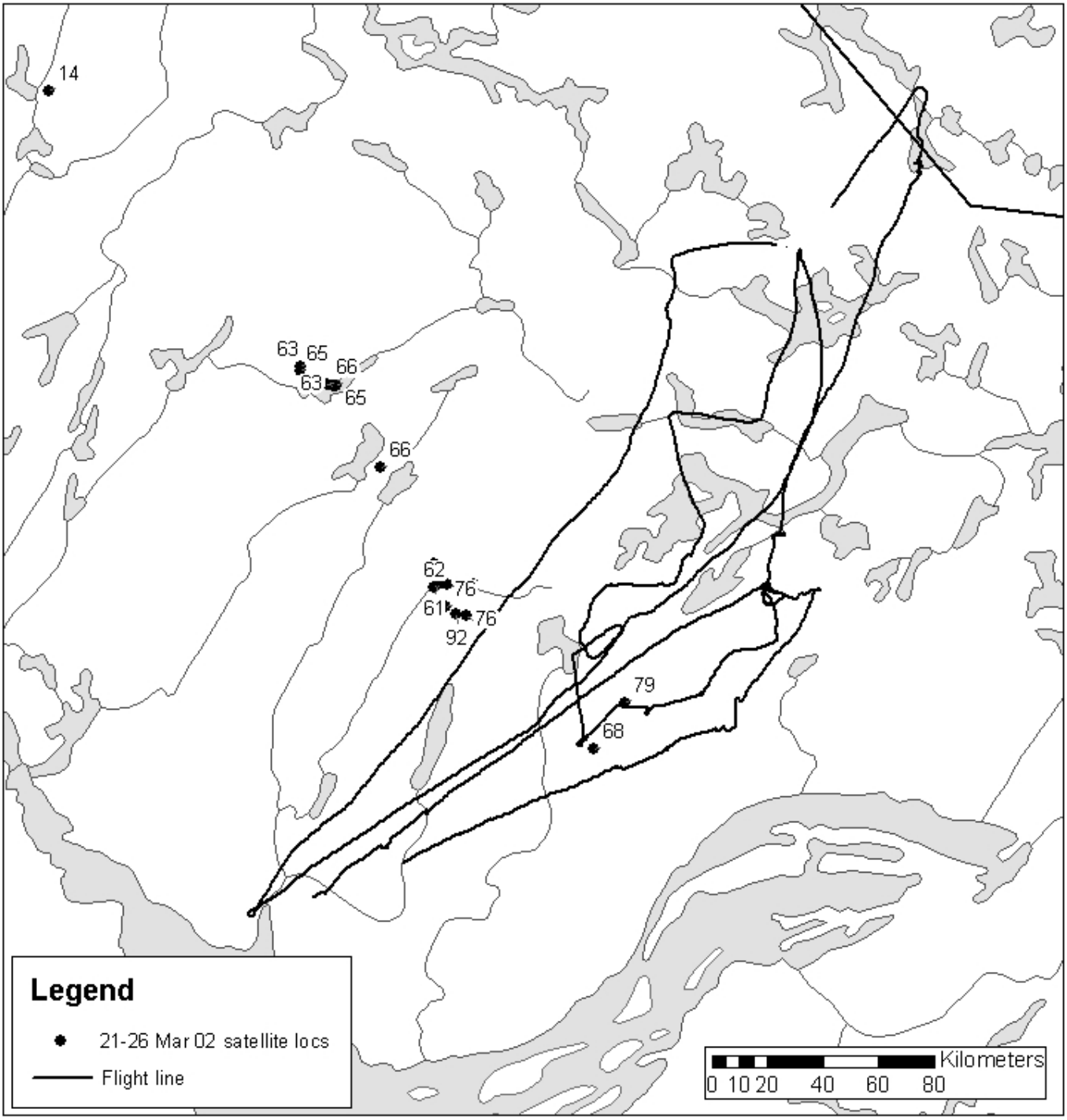

Figure 5. Spring composition survey, 22-29 March 2002 showing flight lines and location of satellite collared caribou. (Flight lines not available for flights taken from 26-29 March 2002).

April 2003:

We recorded the sex age classes at 123 locations on 8, 9, 11, 12 and 14 April 2003 (Tables 1, Appendix C). The calf-cow ratio was 26.1 calves/100 cows (SE 1.4).

The survey area was based on the locations where satellite-collared cows had wintered between Hottah Lake and Snare Lake (Figure 6). We could not reach the vicinity of collar 62 (northeast of Hottah Lake), collar 90 (north of Napaktulik Lake or collar 92 (near Deline) because these caribou were beyond the range of our fuel caching. We sampled in the area where 13 radio-collared wolves had been radio-tracked about 2 weeks earlier (25-27 March) (Figure 7). Four additional wolves were observed southeast of Snare Lake and Reindeer Lake, which was just east of our flight lines where we had seen older tracks (Appendix C). The highest numbers of caribou we saw were located east of Baton Lake towards Norris and Brown Water lakes (Figure 8). We saw 23 wolves on 8,11, 12, and 14 April 2003 with a sighting rate of 1000 wolves /1000 hours flying time (Table 2).

March 2004:

We recorded the sex age classes at 247 locations between 25 and 30 March (Tables 1, Appendix D). The calf-cow ratio was 21.5 calves/100 cows (SE 1.0).

During the late winter, most of the collared caribou were between Wekweti and Gameti, and two collared caribou were south of Lutselk'e (Figure 9). We found more caribou west of Wekweti (5 collared cows), and south of Lutselk'e we

found a relatively narrow band of caribou with many small groups (Figure 10). In between the two groups of collared caribou, we used the March locations of five radio-tracked wolves to search for caribou (Figure 11). Between the north end of Gordon Lake and McKay Lake, there were only scattered tracks and no caribou were seen in the vicinity of one of the radio-tracked wolves (Figure 10). We did find 10s to 100s of caribou in the vicinity of five other radio-collared wolves. Overall, there was a continuous band of caribou from Indin Lake southwest to just south of Lutselk'e (Figure 10). The largest numbers of caribou were in the vicinity of Indin Lake. A large number of caribou were reported to have moved north through the Reliance area (Dave Olsen pers. comm. 30 March 2004) but we only saw scattered fresh tracks along the north shore of MacLeod Bay west of the Hoarfrost River. We saw 17 wolves between 25 and 30 March 2004 with a sighting rate of 708 wolves /1000 hours flying time.

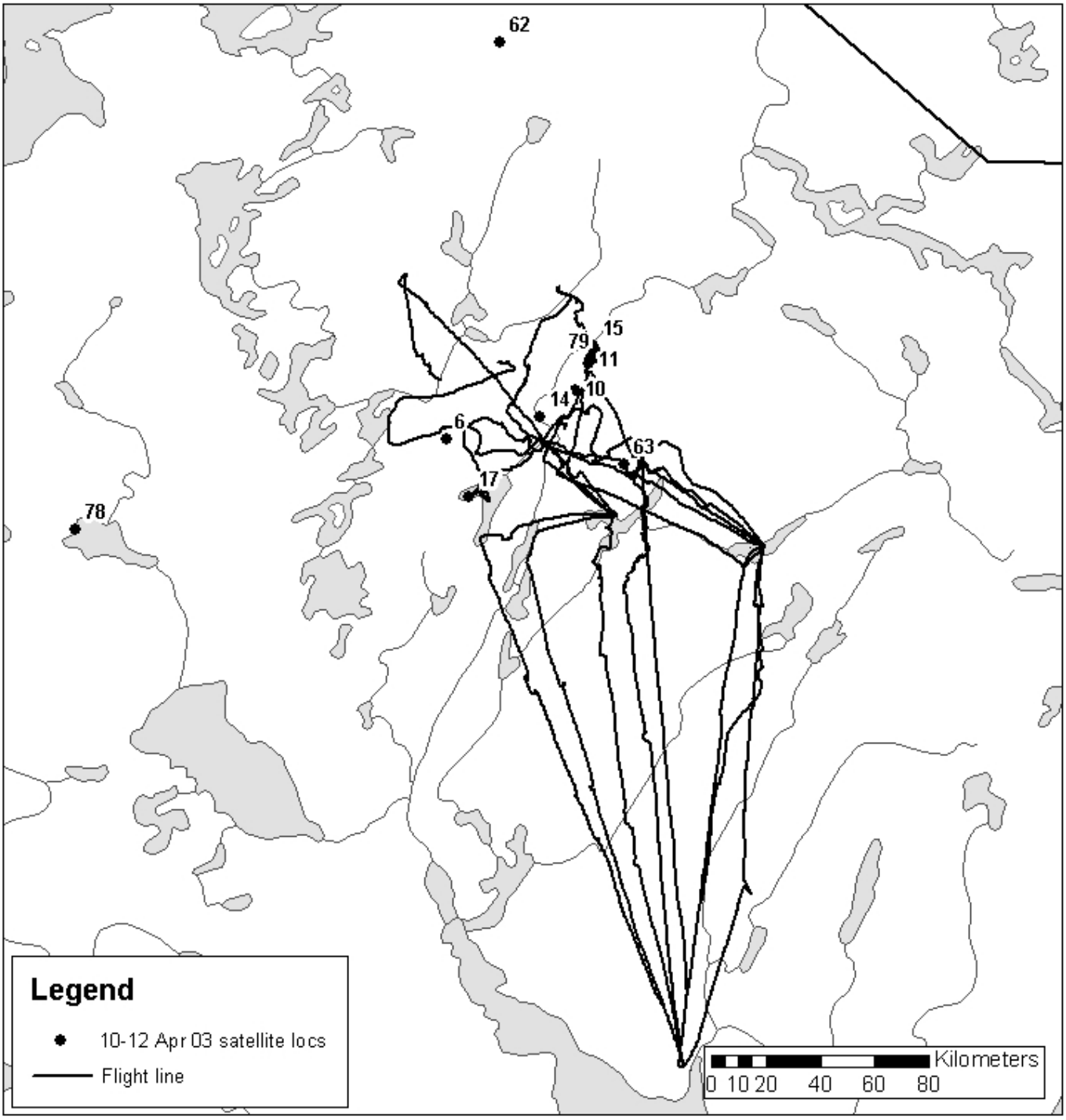

Figure 6. Spring composition survey, 8-14 April 2003 showing flight lines and location of satellite collared caribou.

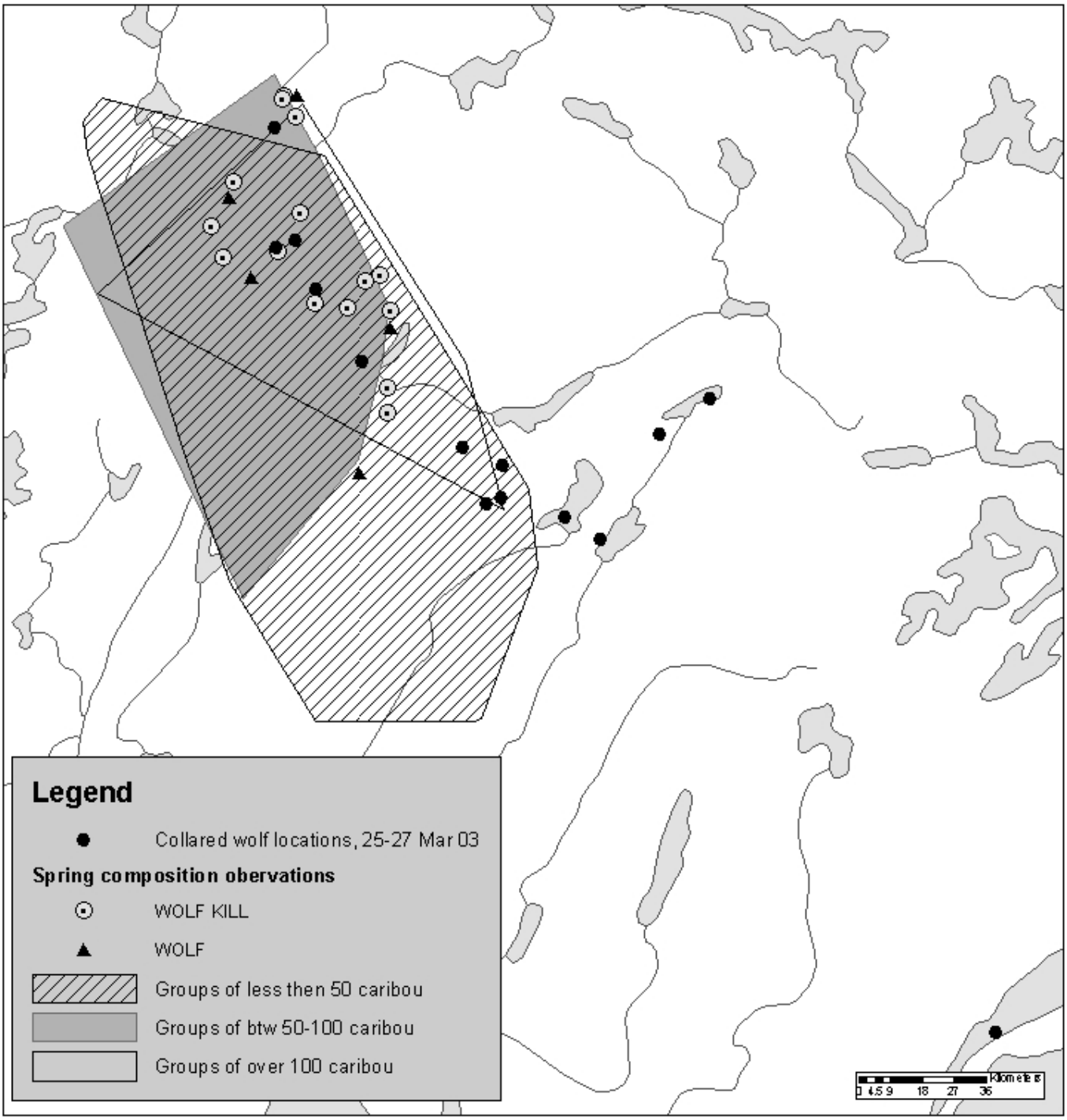

Figure 7. Collared wolf locations and spring composition survey 8-14 Apr 2003 wolf and wolf kill observations.

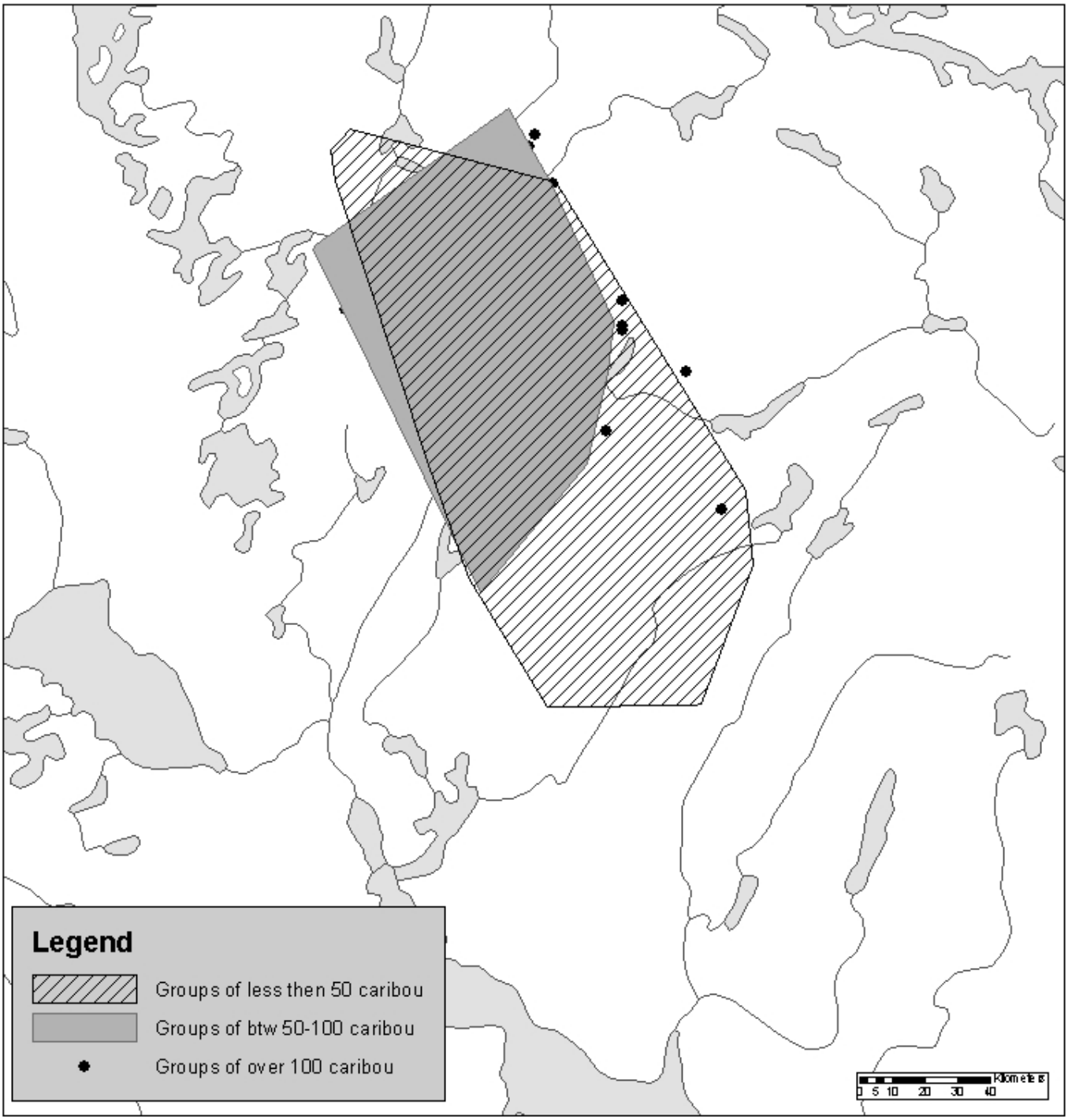

Figure 8. Spring composition survey, 8-14 Apr 2003 showing caribou groups.

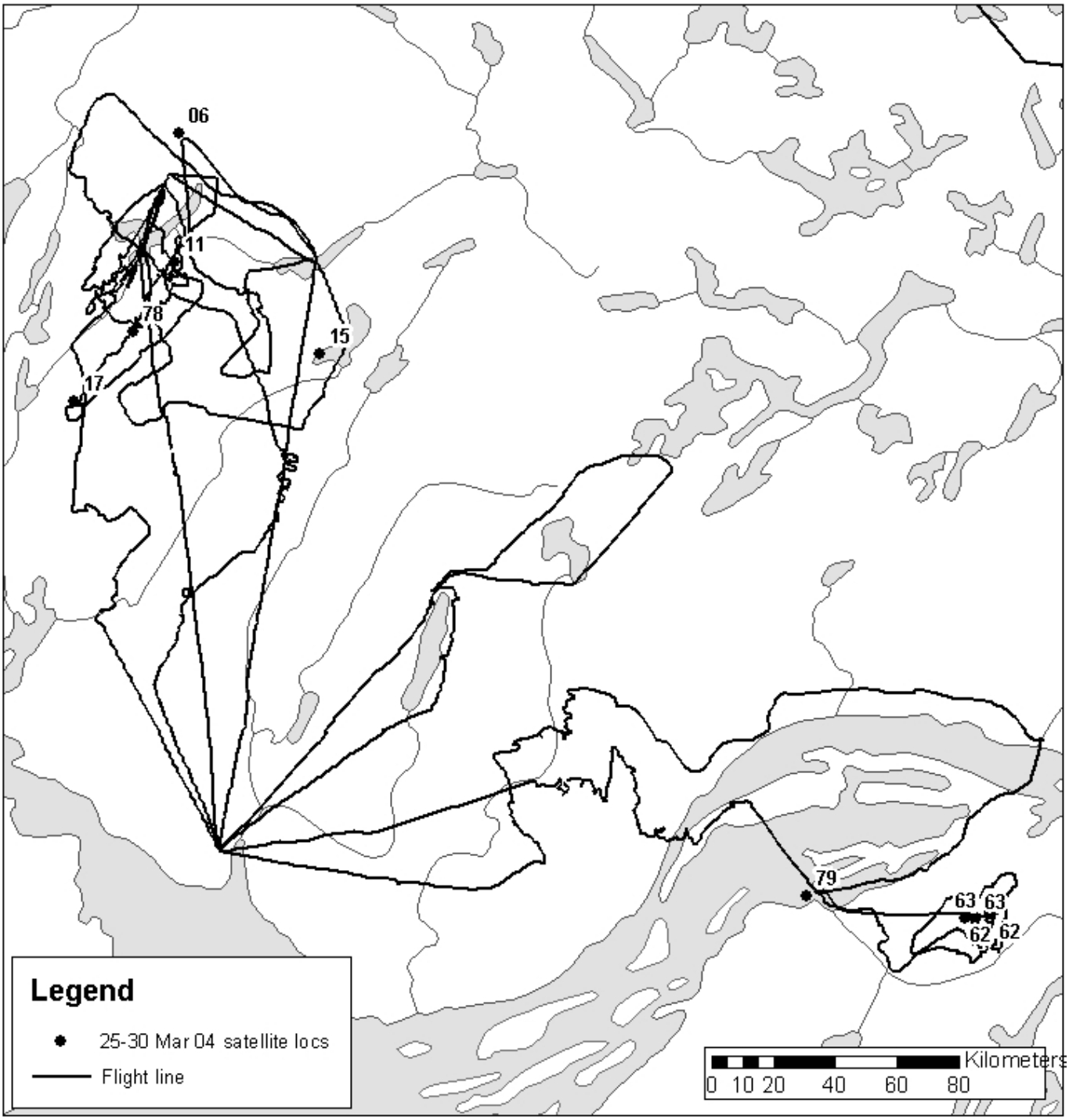

Figure 9. Spring composition survey, 25-30 March 2004 showing flight lines and locations of satellite collared caribou.

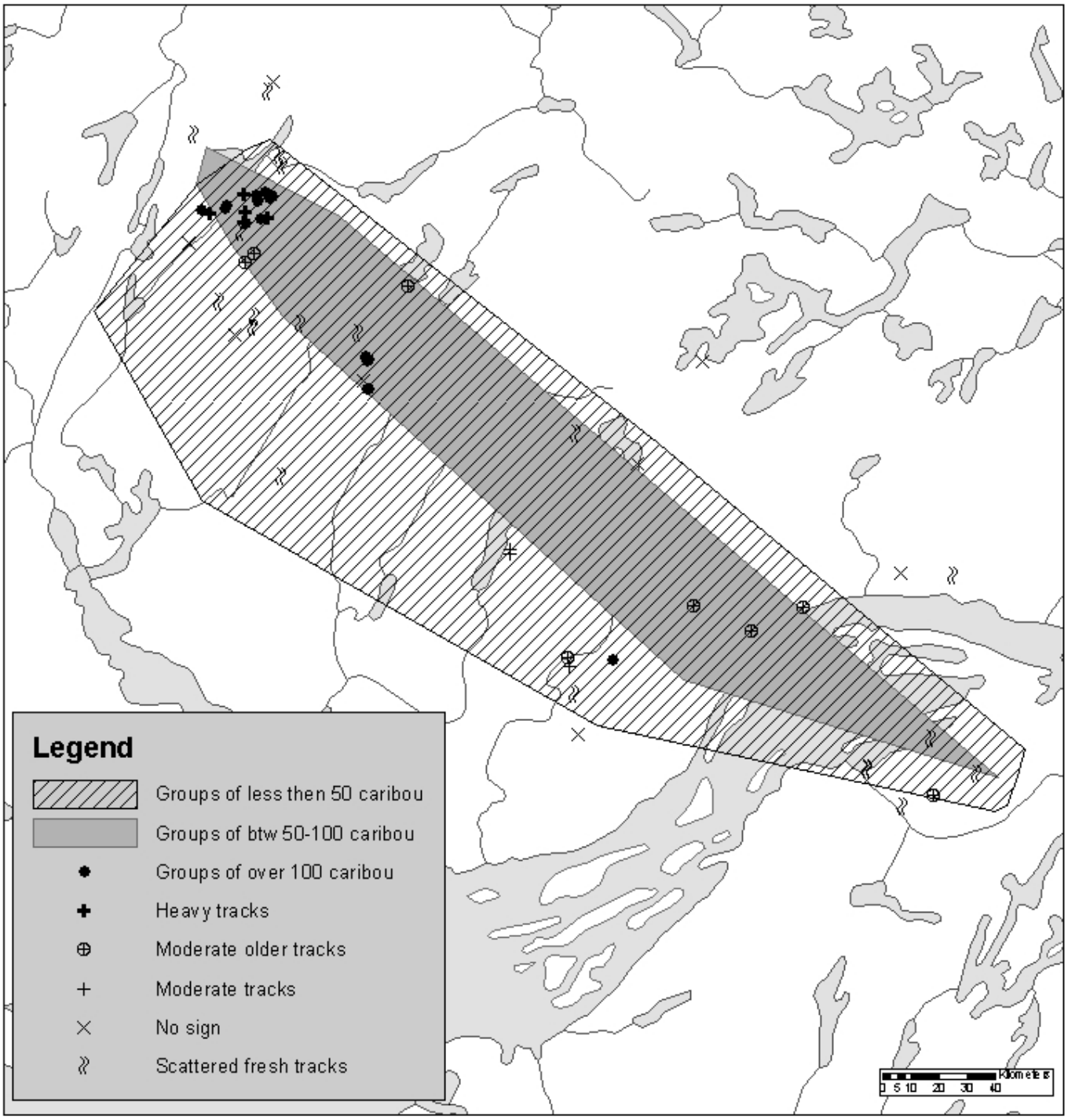

Figure 10. Spring composition survey, 25-30 March 2004 showing caribou groups and sign.

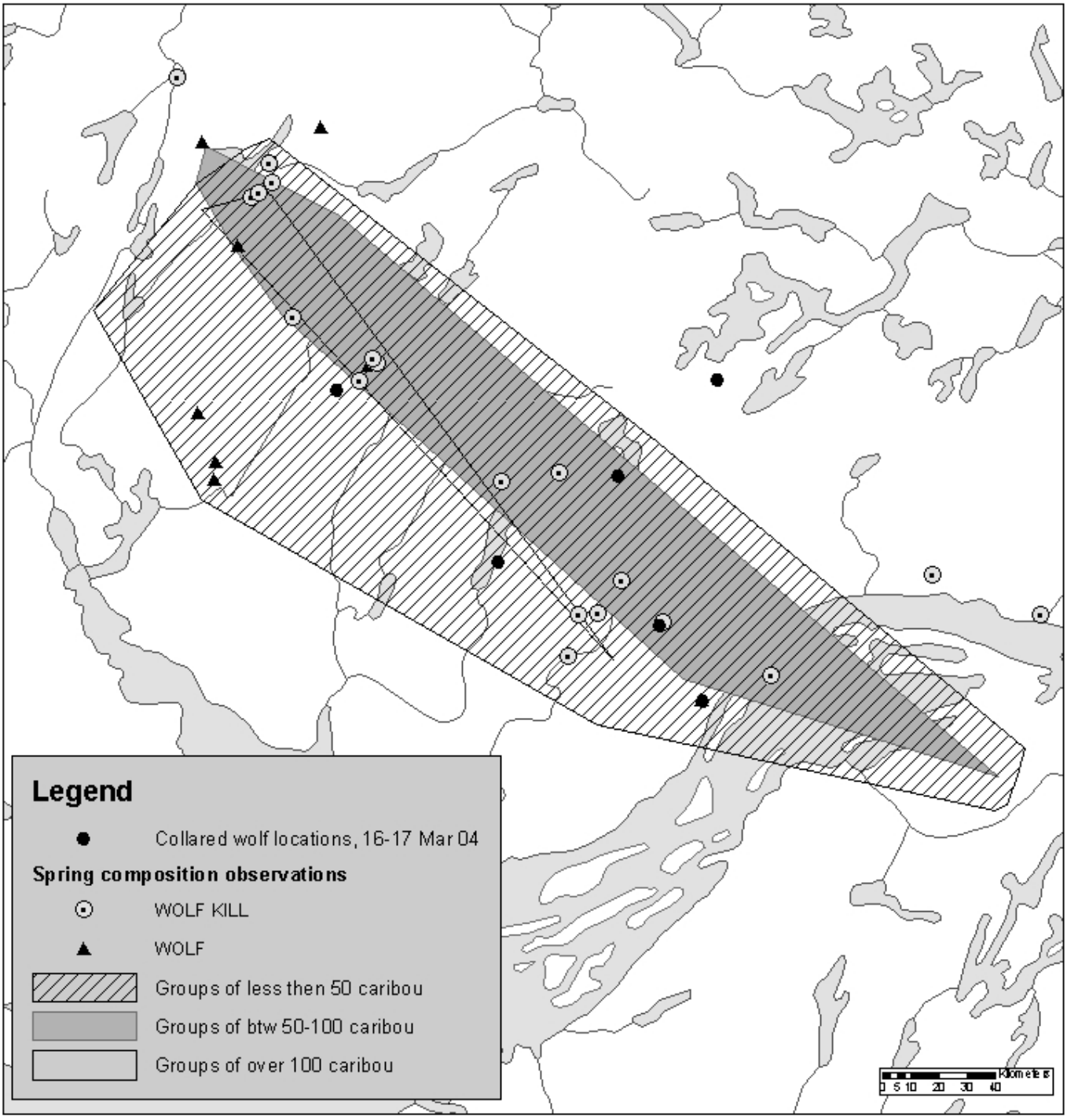

Figure 11. Collared wolf locations and spring composition survey 25-30 April 2004 wolf and wolf kill observations.

November 2000:

We recorded the sex age caribou classes at 207 locations between 11 and 15 November (Tables 1 and 3, Appendix E). The calf- cow ratio was 39.9 calves/100 cows (SE 1.3). We did not see any lame caribou among the 4695 caribou that we classified.

We had the locations of 11 collared caribou but their rapid and extensive movements in November 2000 meant that 6 of the collared cows were beyond our reach relative to our gas caches, or we were restricted by low cloud and icing (Figure 12). We reached the locations of four collared caribou and they were with 10s to 100s of caribou (Figure 13). Overall, the caribou were sampled over an area extending east from the north shore of Great Slave Lake to Artillery Lake, and then south almost to the Saskatchewan border. We could not really gauge the relative numbers of caribou, however, as the caribou were mostly in the trees or on small lakes. There was only a few cm of snow in the bush and the larger lakes were mostly clear ice and only recently frozen. We suspect that we were on the edge of the large migratory movements. We saw 25 wolves but only three caribou kills between 11 and 15 November 2000 with a sighting rate of 1190 wolves /1000 hours flying time (Table 2).

Table 3: Estimated proportion of calves in the population and sex ratios from fall composition surveys.

Year	Proportion Calves	SE	CI		$Calves_{adj}$[1]	SE	CI		Sex ratio Bulls:cows	SE	CI	
2000	0.21	0.01	0.19	0.21	0.23	0.01	0.21	0.23	0.53	0.05	0.45	0.63
2001	0.17	0.01	0.15	0.18	0.19	0.01	0.17	0.21	0.63	0.07	0.50	0.78
2004	0.12	0.01	0.10	0.14					0.37	0.03	0.31	0.43

[1]Adjusted using adjusted total population size assuming sex ratio from 2004 surveys.

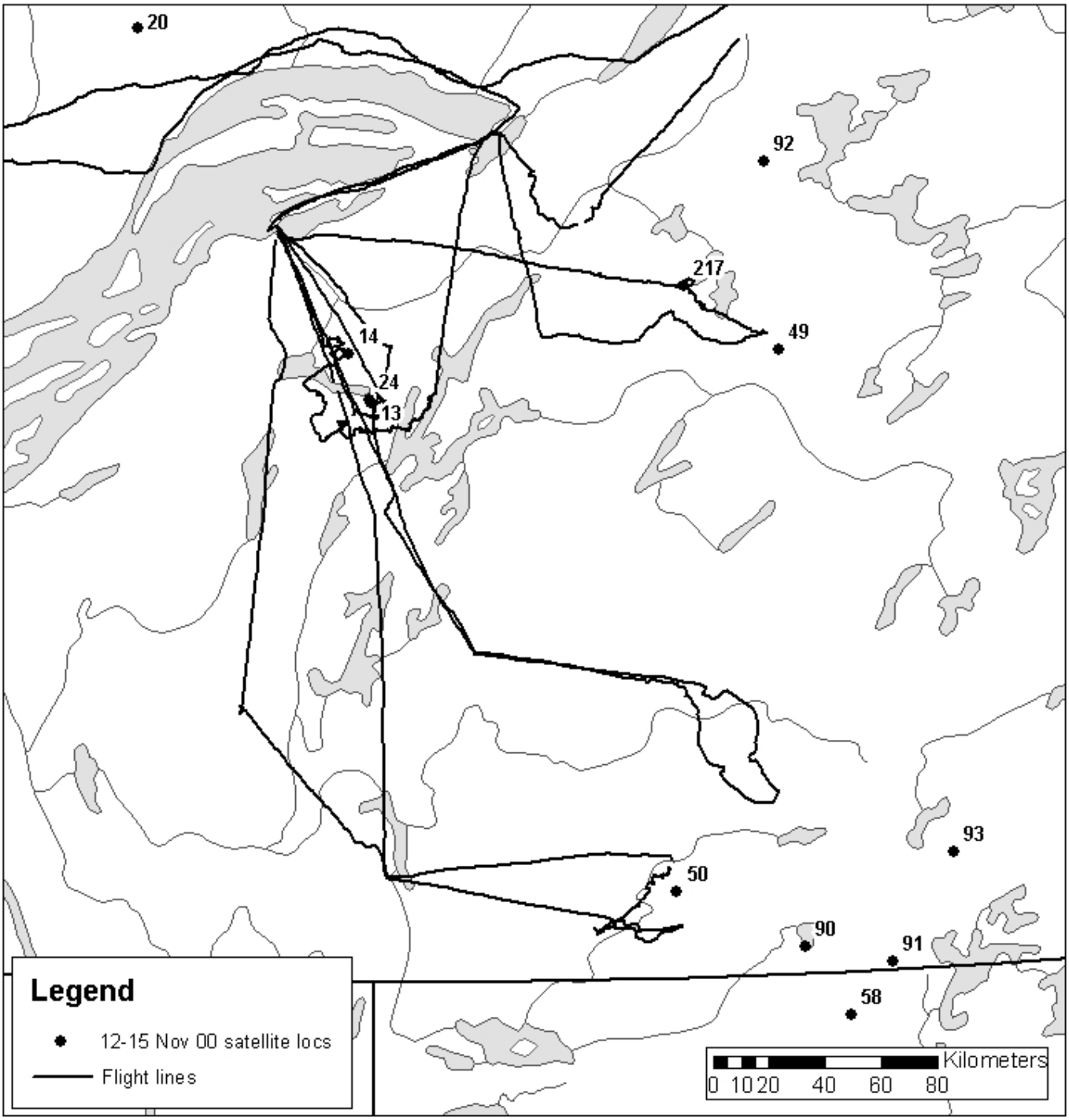

Figure 12. Fall composition survey, 11-15 November 2000 showing flight lines and location of satellite collared caribou.

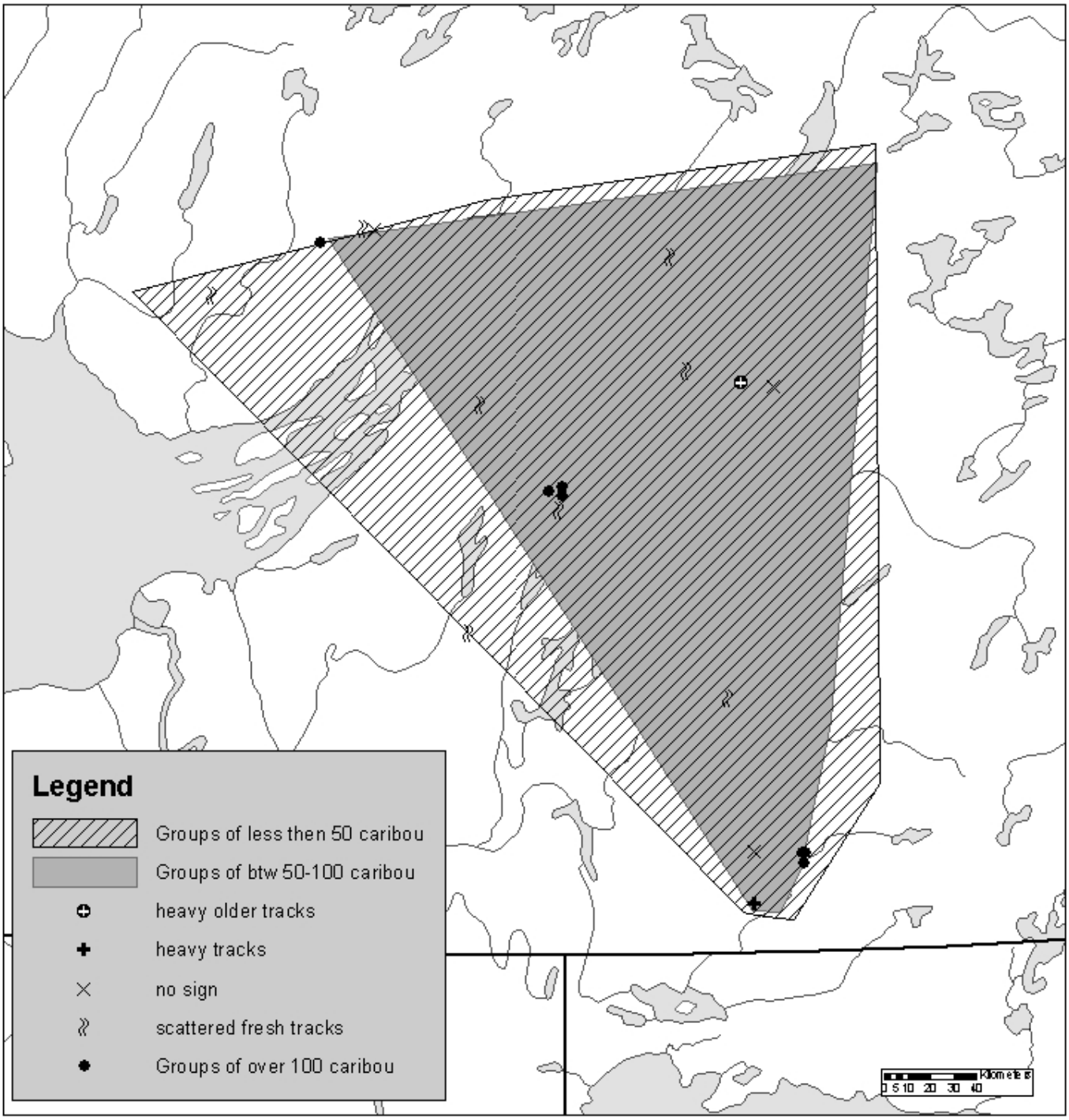

Figure 13. Fall composition survey, 11-15 November 2000 showing caribou groups and sign.

November 2001:

We recorded the sex age classes at 148 locations on 7, 10, and 14 November (Tables 1 and 3, Appendix F). The calf-cow ratio was 32.7 calves/100 cows (SE 2.3). We saw 17 lame caribou (0.3%) among the 6122 caribou that we looked at. Two caribou were lame in a front shoulder, one had a broken front leg and the other 14 appeared to have a lame hoof. The six caribou killed by wolves had normal looking hooves.

The 14 collared caribou were spaced out east of Gordon Lake northwest to Snare Lake (Figure 14). We sampled caribou in the vicinity of 12 of the collared caribou. Major corridors were from the north end of Gordon Lake to Tarp Lake, and then moving west between Nardin Lake and Upper Carp Lake. Snow depths were 15-25 cm on the lakes and some caribou were bedding on the lakes. Caribou were cratering and scraping snow on the ice and licking the overflow. Many caribou were in groups of 10s and 50s and trailing through the trees (Figure 15).

In November 2001, we saw 4 wolves and 6 wolf kills with a sighting rate of 250 wolves /1000 hours flying time (Table 2).

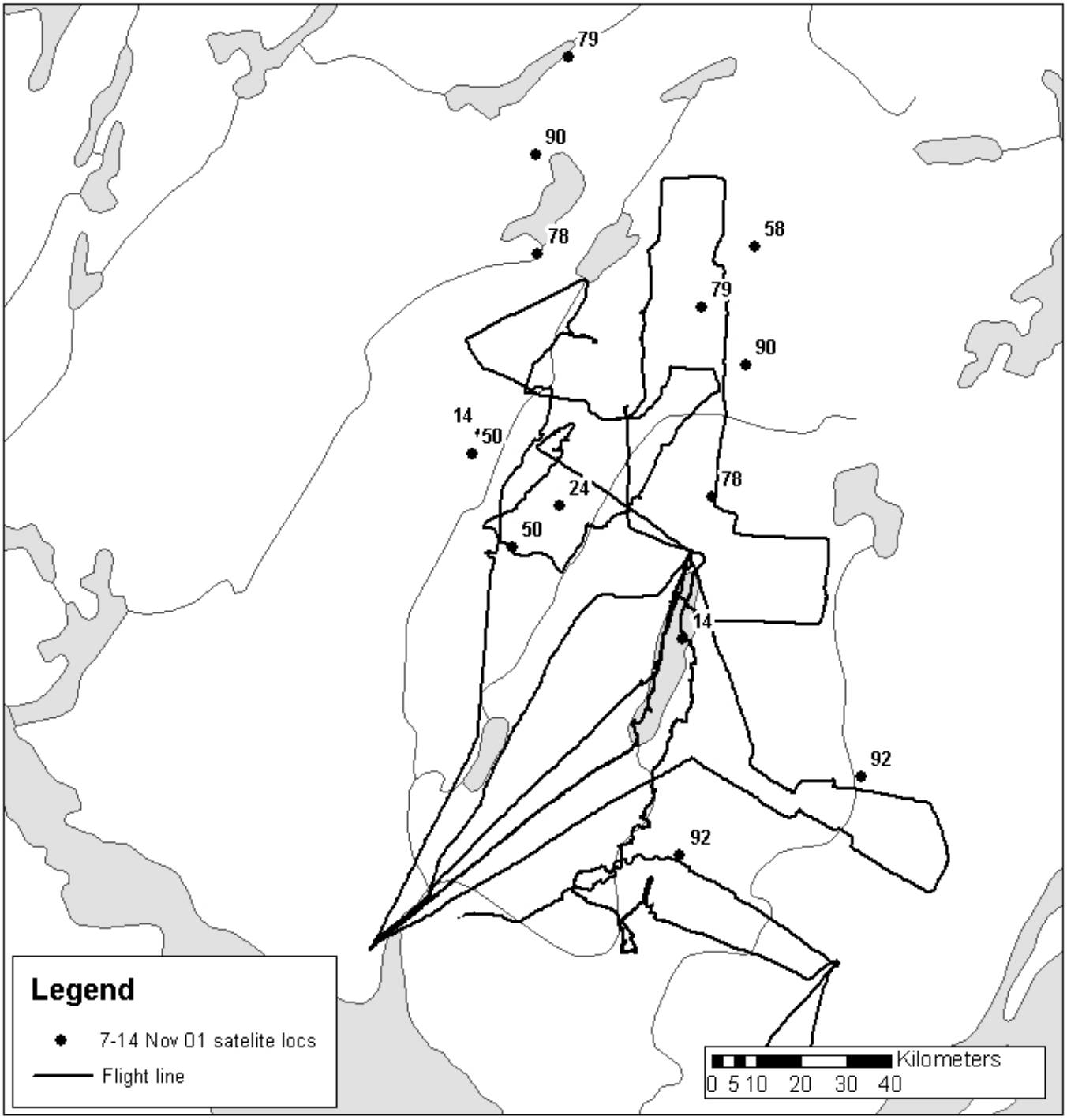

Figure 14. Fall composition survey, 7-14 November 2001 showing flight lines and location of satellite collared caribou.

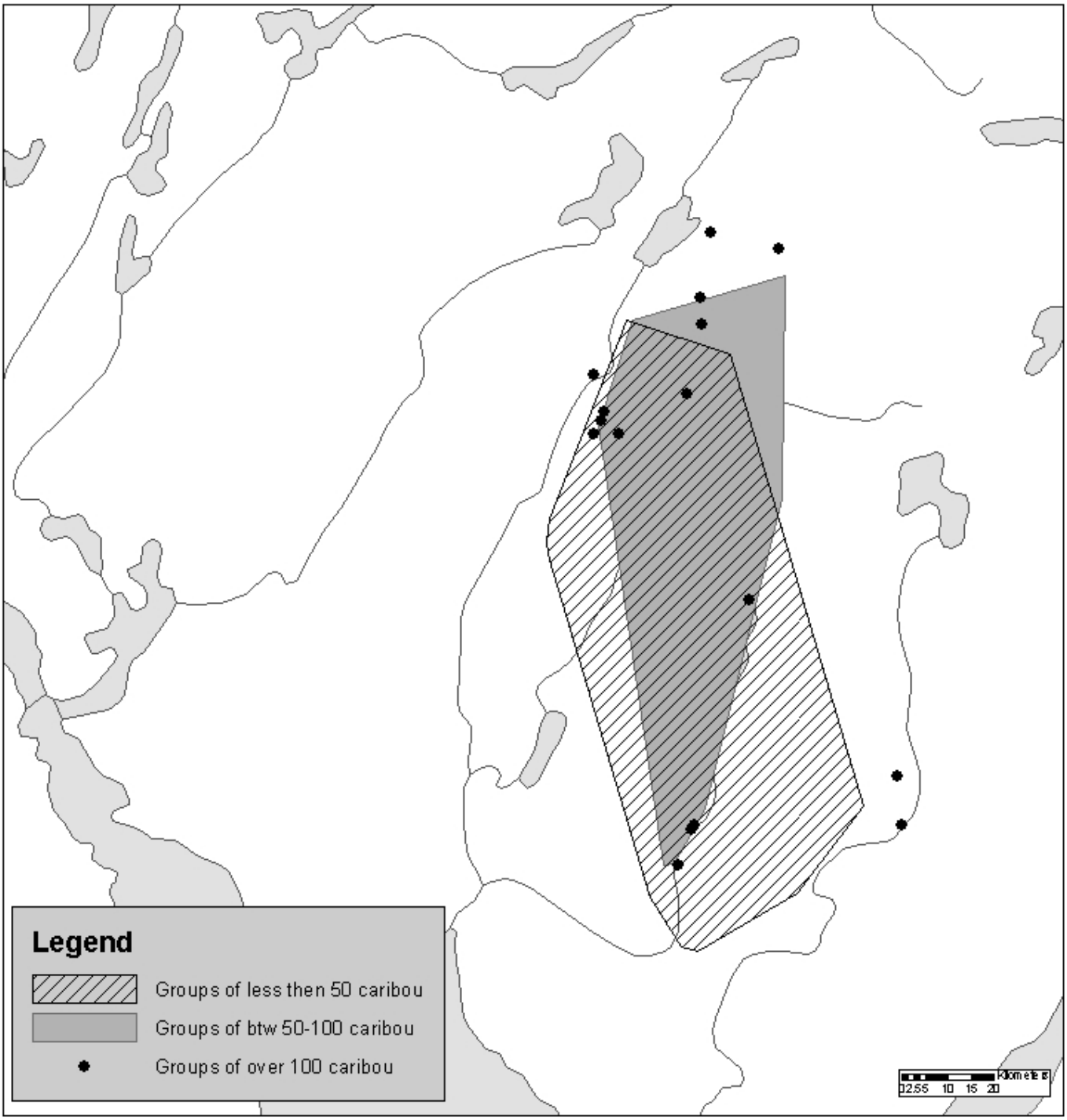

Figure 15. Fall composition survey, 7-14 November 2001 showing caribou groups.

October 2004:

We recorded the sex age classes at 185 locations between 18 and 22 October 2004 (Tables 1 and 3, Appendix G). We saw 2 lame caribou (<0.01. %) among 12,444 caribou observed. In October 2004, we saw 16 wolves and 5 wolf kills with a sighting rate of 842 wolves/1000 hours flying time (Table 2). The overall calf-cow ratio was 18.3 calves/100 cows (SE 1.6) but we found differences in the age sex composition between three segments of caribou distribution (Tables 1 and 4). The northern segment which had the greatest number of migrating caribou had low calf-cow ratios and a low proportion of prime bulls relative to cows. The Great Bear Lake segment and the southern segments had similar and higher calf-cow and bull-cow ratios but there were proportionally more young bulls in the southern segment.

Table 4: Calf-cow and bull cow ratios in three segments, Bathurst herd, fall composition, October 2004.

Segment	No. of sampling locations	Total caribou	Calf-Cow	Bull-Cow	Young-prime bulls
Northern	76	9739	0.14	0.32	0.9
Southern	74	1989	0.35	0.56	1.49
Great Bear Lake	33	716	0.39	0.59	0.88

We had flown extensively with a Husky fixed-wing aircraft in early October to map caribou distribution for collaring 11 caribou between 16 and 18 October. We found a large migration of caribou that approached the north end of Gordon Lake from the east (Figure 16). A crew in a mineral exploration helicopter reported seeing 300 caribou swimming across the northern end of Gordon Lake on 14

October. By 19 October, the north end of Gordon Lake was frozen and we could see six channels where caribou had broken through although there were no bodies. Most caribou passed north of Gordon Lake (14 October) near the Reindeer Lake area (16 October) and we saw the lead edge of the movement and thousands of caribou crossing Roundrock Lake (20 October). We sampled those caribou as the 'northern segment' north of Roundrock and Snare Lakes as they filed northwest. We saw 10s of 1000s of caribou across the lakes and feeding on hillsides (20-22 October).

A relatively minor movement of caribou (low thousands) had turned south at the north end of Gordon Lake and traveled south along the east shore feeding heavily in sedges on the shoreline and along Cameron River (Figure 17). We sampled those caribou as the "southern segment" around Gordon Lake and at the south end of Gordon Lake extending to the Ingraham Trail. We saw smaller groups (10s to 50s) and few migratory files that were 10s to a few hundred caribou.

We identified a third segment north of Wekweti at Wopmay Lake that was distinct and with no apparent connection (caribou or trails) to the northern and southern segments. We had checked this area with the Husky fixed wing on 17 October based on the movements of collared Bathurst caribou in October 2002. In early October 2002, most collared caribou had moved west along the north shore of Great Slave Lake, swung northwest passing north of Gordon Lake and crossed Roundrock and Snake lakes which was almost identical to what we were seeing in 2004. But also in October 2002, two collared caribou (92, 78) were

separate from the other collared caribou and were north of Wekweti. When we flew there on 17 October 2004 we found a band of caribou tracks and trails aligned east-west about 35 km wide with groups of 20 to 50 caribou moving west. We flew to the area on 18 October and collared two caribou and then sampled caribou for composition as the ‘Great Bear Lake segment’. The caribou were migrating west in files of 10s to 50s.

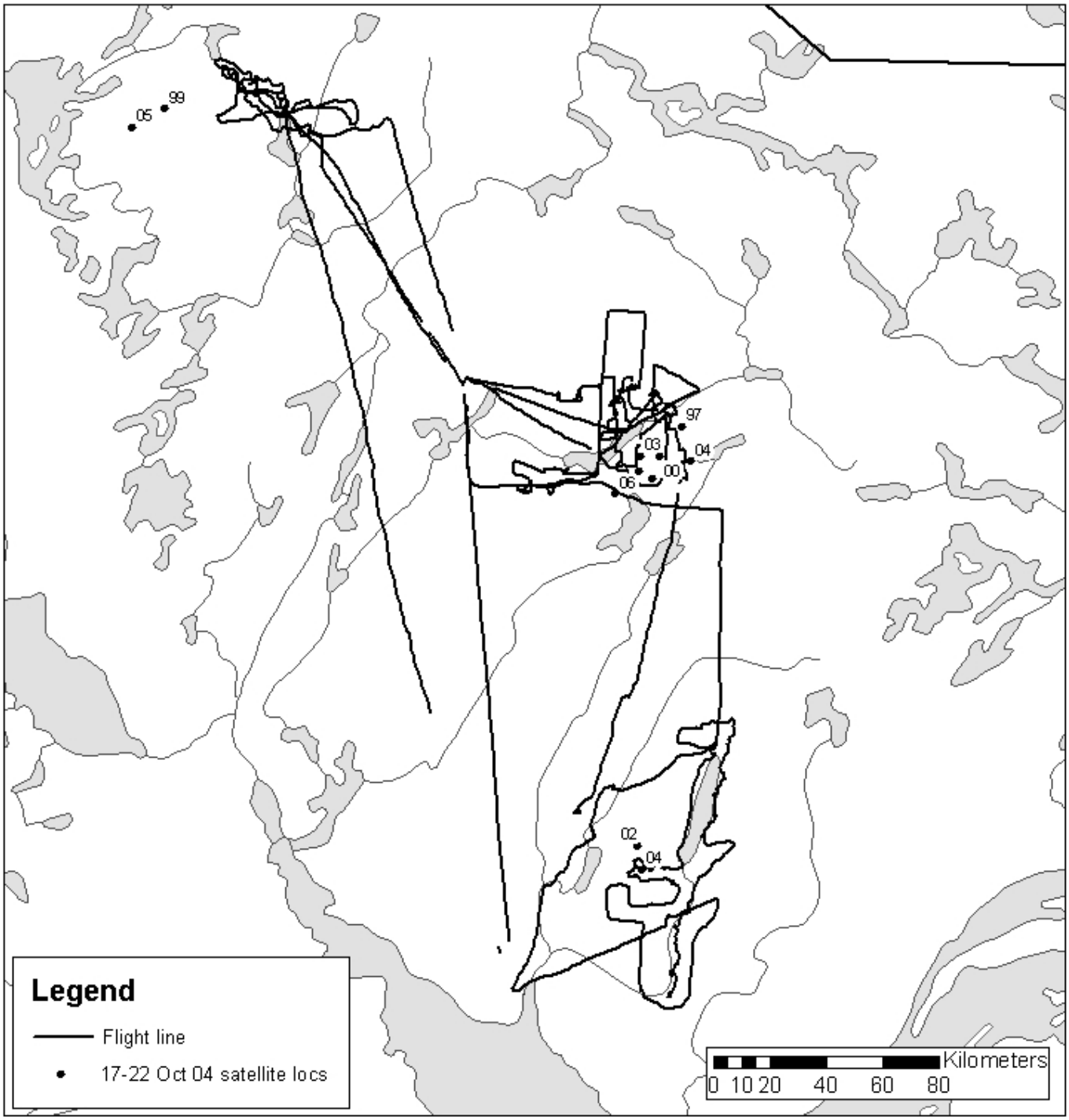

Figure 16. Fall composition survey, 18-22 October 2004 showing flight lines and locations of satellite-collared caribou.

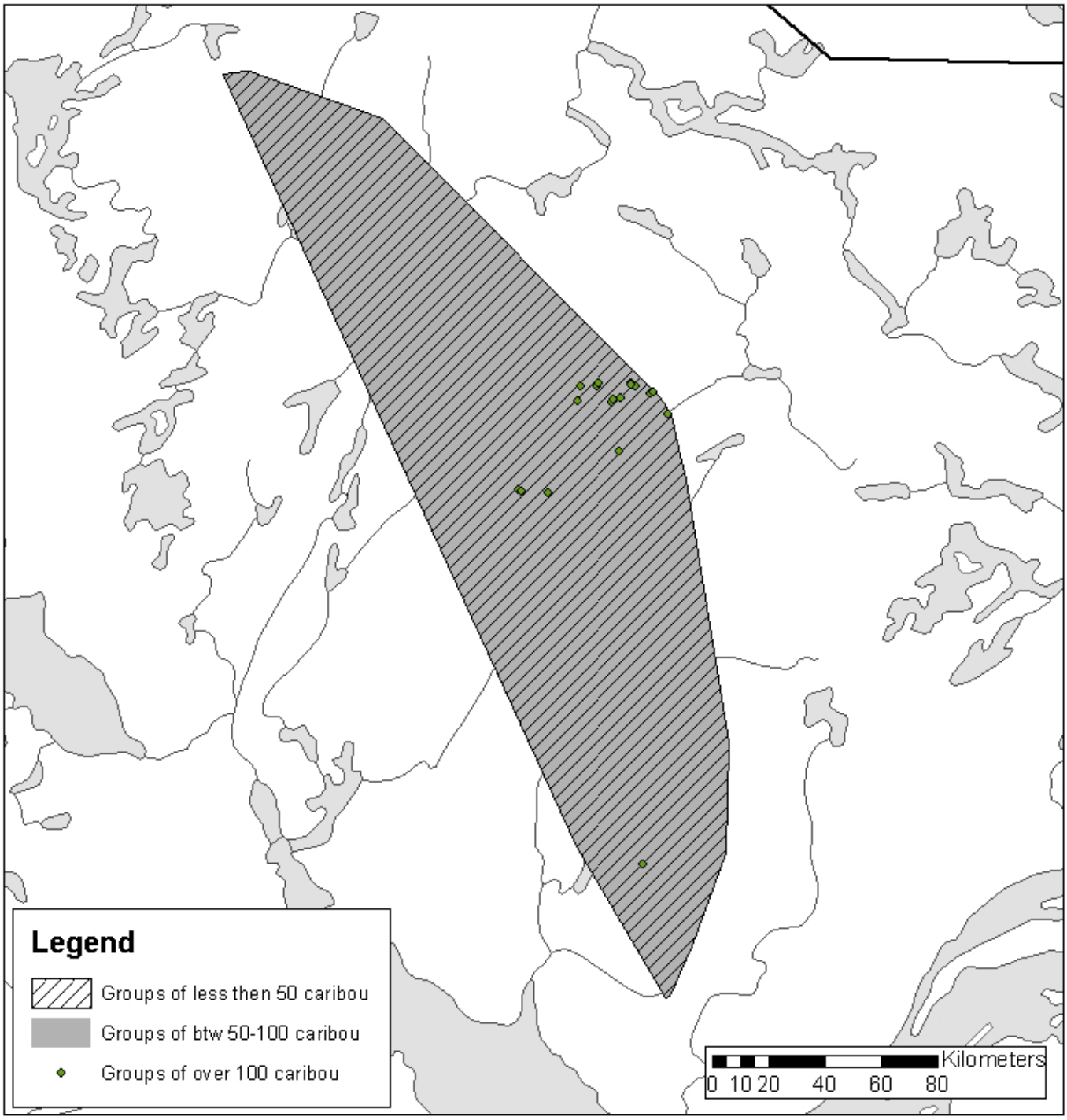

Figure 17. Fall composition survey, 18-22 October 2004 showing caribou groups.

Trend in calf survival:

The calf-cow ratios were annually variable especially during the period of 1985-1995. Calf-cow ratios were lower between 2001 and 2004 than during the period from1985 to 1995 (Figure 18).

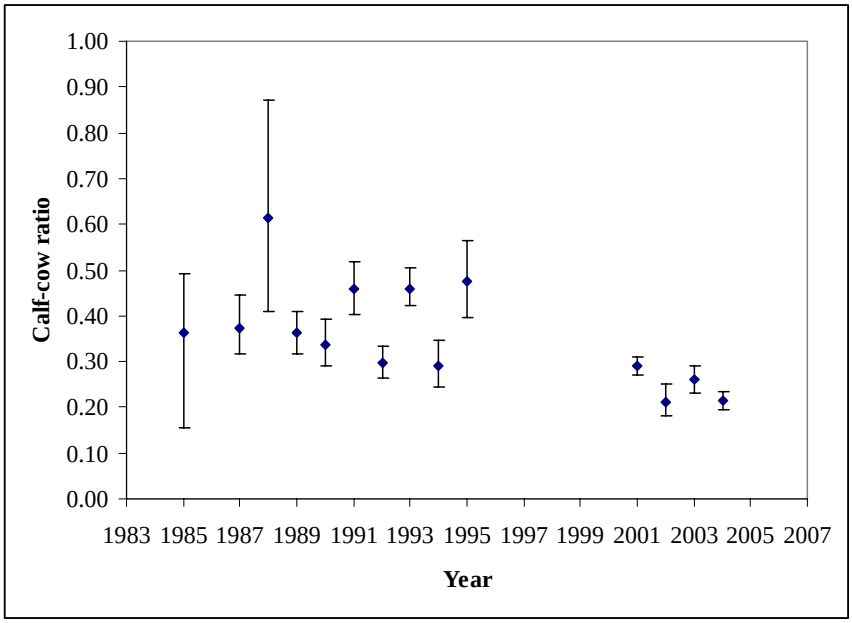

Figure 18. Calf-cow ratios as a function of year. Percentile-based bootstrap confidence intervals are shown as error bars.

Using weighted least squares regression, no significant overall trend in cow-calf ratios could be detected ($F=0.52$, $df=1$, $p=0.48$). However, an odd-year trend could be detected suggesting that productivity varied every other year ($F=22.93$, $df=1$, $p=0.001$) (Figure 19). The degree to which calf-cow ratios varied on alternate years was also a function of whether the surveys occurred prior to 1996 or after 2004 ($F=3.94$, $p=0.059$). Sine and cosine terms were also attempted as a means of modeling periodic trend, but were not significant.

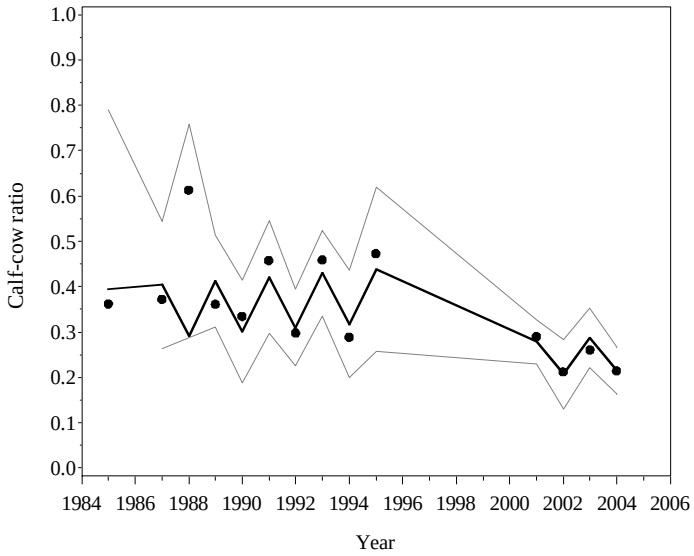

Figure 19. Predicted calf-cow ratios from weighted least square regression. Confidence intervals (grey lines) were influenced by the variance of individual estimates and are therefore irregular. Odd-year trends in ratio were modeled which created the irregular shape of the predicted line. Data points are shown as black dots.

Estimates of rate of change from calf-cow ratios and survival estimates:

We have estimated a survival rate of 0.79 (SE=0.03, CI=0.71-0.85) for adult female collared caribou. Model selection results suggested that survival rates were constant for the period in which caribou were monitored. Using this estimate of survival, the finite rate of change λ was calculated for the observed calf/cow ratios (Figure 20).

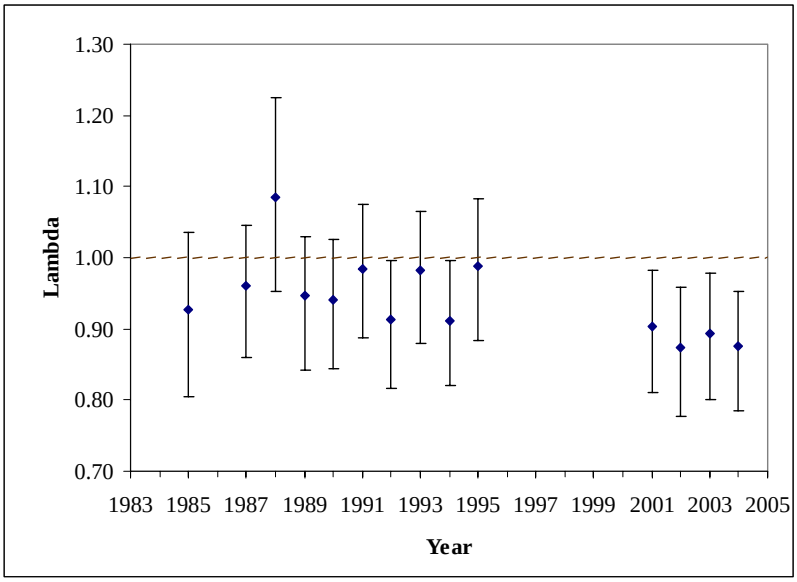

Figure 20. Estimates of λ assuming a female adult survival rates of 0.79 and a 50:50 sex ratio. The estimates of λ most directly apply to data points after 1996. Estimates of λ before 1996 are speculative given that survival rate was not estimated for caribou during this period.

Estimates of λ were 0.94 (SE=0.013,CI=0.91 to 0.96) using estimated survival and calf-cow ratios for the period of 1985 to 2004 (assuming survival rates were similar for the period of 1996 to 2003, when survival was estimated from the period of 1985 to 2004). This calculation also assumed that λ was 0.94 for 1996-2000 when no composition surveys were conducted. The estimate of λ from 1985 to 2003 was also 0.94 (CI=0.92 to 0.98) from successive calving ground surveys. Estimates of λ for 2001-2003 (the period in which survival rate and recruitment surveys overlapped) was 0.89 (SE=0.026, CI=0.83 to 0.94).

Estimation of calf survival rate:

The estimated yearly calf survival displayed similar trends to calf-cow ratios (Figure 21). As discussed later, this highlights one of the key assumptions of survival rate estimation of calves from calf-cow ratios, namely that variation in

calf-cow ratios is due to changes in calf survival and not because of changes in fecundity (which was assumed to be constant). The mean survival rate for the years monitored (1985-2004) was 0.31 (SE=0.012, CI=0.28 to 0.33). The mean survival rate for 2001-2004 was 0.203 (SE=0.011, CI=0.18 to 0.22).

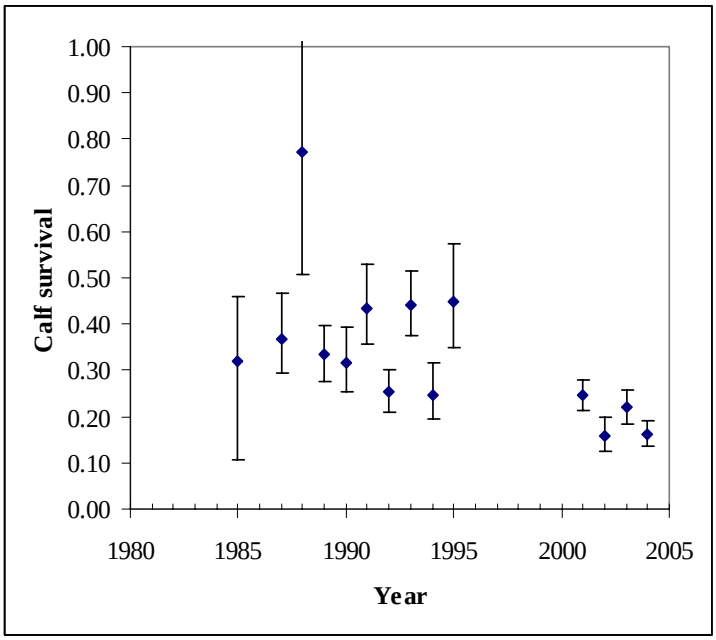

Figure 21. Annual calf survival estimates from spring composition surveys. These estimates assume a constant fecundity rate of 0.76 and constant adult survival of 0.79.

A comparison of annual survival rates for the intervals from birth-to-fall, and fall-to-spring, suggest that survival rates were approximately twice as high for the fall-to-spring interval than for the birth-to-fall interval (Figure 22).

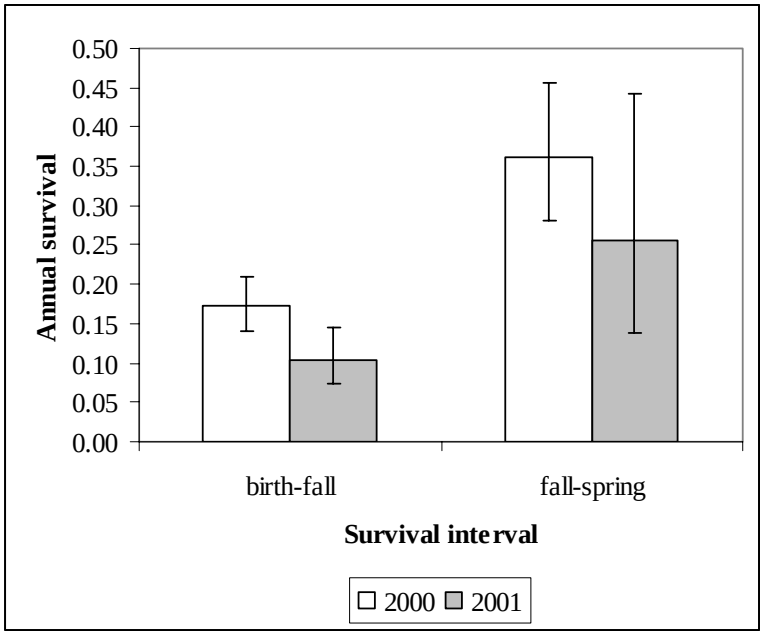

Figure 22. Calf survival rates for the intervals between birth and fall surveys and fall and spring surveys.

Proportion of calves and sex ratios from fall composition counts:

The proportion of calves in surveys declined from 2001 to 2004 (Figure 23). The estimated sex ratio in 2004 (1+male/ 1+female ratio=0.37 SE=0.03, CI=0.31 to 0.43) was considered to be most representative of the true sex ratio of the herd. The adjusted proportion of calves using the 2004 sex ratio for 2001 and 2000 was slightly higher but not significantly different than the unadjusted proportion of calves in the population. Observed fall ratios of males to females were higher in the 2000 and 2001 surveys than in the 2004 survey (Table 3).

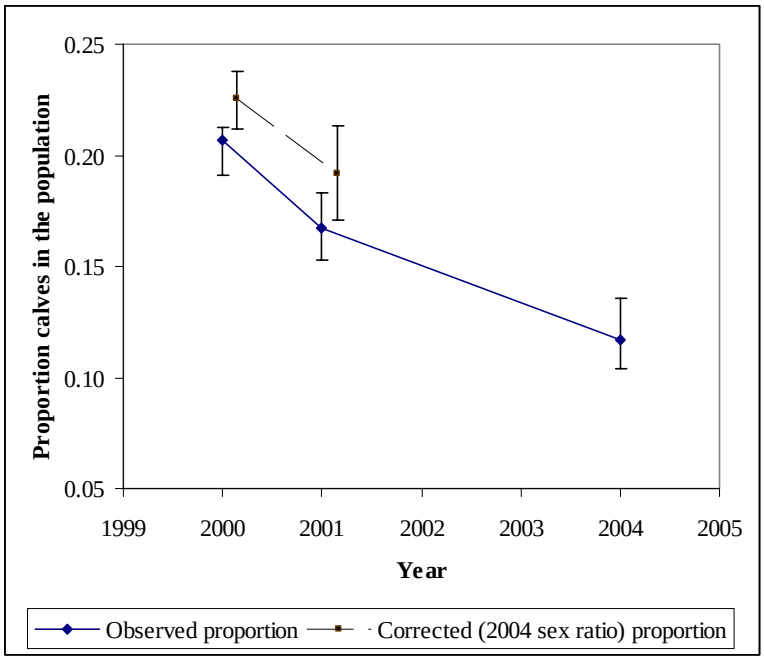

Figure 23. Estimated proportion of calves in the population from fall composition surveys. Observed proportion and proportion using 2004 sex ratios are shown. 95% confidence limits are shown as error bars. Points are staggered to allow interpretation of error bars.

DISCUSSION

The mean late winter calf survival and the calf-cow ratios for 2001-2004 have declined by almost 50% from the 1985-1996 levels: mean calf survival rate for 2001-2004 was 0.203 (SE 0.011) compared to 0.395 (SE 0.048) for 1985-1996. Using the calf-cow ratios and estimates of female survival (based on satellite-collared cows) we are able to estimate that the Bathurst herd has declined since 1985. That rate of decline (λ = 0.94 SE=0.013) is similar to the rate estimated from successive 1986-2003 surveys of breeding females (Gunn *et al.* In Prep.). Calf survival during the winters was almost twice the rate estimated during the summer (from birth to fall) as measured in 2000/01 and 2001/02.

The mean estimates of calf survival since 2000 are precise (low standard errors) as we sampled at many locations (mean 180 ± 20 SE). We assume that observer bias is relatively constant as the same observer did the classifications from 2000 to 2004. The question of how representative the distribution of the classification locations was of the overall herd distribution, is less easily answered. We relied on the locations of the satellite-collared cows, sightings from aircraft pilots and hunters, and locations of radio-collared wolves. As far as practical, we spaced ferry flights to check areas for caribou or tracks. Previously, late winter classification surveys were preceded by a fixed-wing reconnaissance to cover the expected (at the time) winter range of the Bathurst herd (Williams and Fournier 1996).

Nonetheless, the fixed-wing flights only cover the areas where we expect the caribou to be. Satellite telemetry has revealed larger winter ranges than

expected and, in some winters, an overlap in wintering range with neighboring herds. Since 1996, data from the satellite collars on cows has revealed that the Bathurst herd's winter range extends into the southern NWT. It has also provided information on the extent of overlap during late winter with neighboring East Bluenose, Ahiak and Beverly herds (Gunn *et al*. 2001, Gunn and D'Hont 2002). An overlap in winter distribution can occur within the same winter with caribou from neighboring herds within kilometers of each other: for example, Ahiak and Bathurst in late winter 2001 (Gunn and D'Hont 2002). Additionally, use of the same area but in different years is also a type of overlap: for example south of Great Bear Lake was the winter range of the East Bluenose collared caribou in 2003 and the Bathurst herd in 2002.

During the classification surveys in late winter 2001, it is possible that we were classifying caribou from both the Bathurst and Ahiak herds, however, the wide dispersion of the Ahiak collared cow locations suggest that most of the sampled caribou would have been Bathurst caribou. In March/April 2003 and 2004, we observed considerable geographic separation between the two Ahiak collars, the three East Bluenose collars and the eight Bathurst collared cows.

Although we have detected lower calf survival in late winter for the period from 2001 to 2004 than for the period from 1985 to 1995, we have not detected a trend in the number of wolves sighted during the late winter caribou classifications. We have no way of telling how the numbers of wolves seen during the caribou classifications indexes total wolf numbers. The number of wolf kills seen on lakes is highly variable and probably not useful even as a minimal

index. For example, in April 2004, one of us found 5 caribou kills within about 1 km^2 of open and closed canopy black spruce, none of which were visible from the air and we watched six wolf chases of caribou (one successful) which were within patchy tree cover.

During the period 1985 to 2000, fall composition was not observed and so we cannot determine if there is either a trend in calf survival over the 6 months of life or in the number of males relative to females. The sex ratio became strongly skewed toward females in fall 2004 compared to in 2000 and 2001 (Table 3). However, in 2000 we were likely sampling on the edge of the caribou distribution. We were more certain that our sampling was more representative of the herd distribution in 2001 (based on satellite collar distribution) and even more so in 2004 because of the extensive fixed-wing reconnaissance. Calf survival and the relative proportions of bulls and cows differed between the areas sampled (Table 4). In the southern segment, we found smaller groups and proportionately more calves and more bulls. In the northern segment there were many more caribou (although we sampled a similar number of locations) and a higher proportion of cows without calves. A possible explanation is that snowmelt in 2004 was delayed and cows were in poor shape in June 2004: consequently, calf survival was low during the summer. Those cows that lost their calves early gained weight more rapidly than lactating cows. The cows with calves were not in as good condition and possibly were coming into oestrus on a second cycle hence they were being tended by bulls. The cows in the rapidly migrating northern segment may have been those cows which lost their calves earlier, were in better

shape and had been bred on their first oestrus cycle. This is conjecture but it does seem as though there were either two male breeding strategies (fewer bulls moving rapidly with many cows while other bulls tended fewer cows in groups that did not appear to be migrating so rapidly), or, that the cows behavior or physiological status was imposing segregation of cows with calves and cows without calves. In other species, competition for mates has led to the evolution of two breeding strategies – dispersers and non-dispersers (Bunnell and Harestad 1983, Forchhammer and Boomsma 1998).

Despite the segregation within the fall 2004 sample, we have no reason not to accept the data. We sampled across the herd distribution and in proportion to the caribou numbers. However, our finding of differences between segments does suggest the need for reconnaissance before fall composition to ensure that all segments are sampled.

Calf survival was also relatively low during summer 2001 (calf-cow 0.33) but we suspect the reason for that might have been that it was a warm summer and insect harassment was severe. In July and August 2001, RWED staff received reports of skinny and lame caribou with lower leg lesions from the Ekati Diamond Mine Environment Department staff, a caribou outfitting camp, Dean Cluff and the Lutselk'e Lands and Environment Committee. Foot rot was diagnosed in the five submitted samples and we saw a higher proportion of lame caribou in November 2001 than in 2000 or 2004. Warm sunny weather causes the caribou to aggregate, which churns up wetter ground and soil bacteria, and to stampede in response to warble flies. This can cause calves to become

separated from their cows and to be more susceptible to predation. Additionally, the caribou spend less time foraging which decreases their overall health.

In Alaskan caribou herds, delayed springs and increased predation have been associated with fall calf survival as low (or lower) as we recorded for the Bathurst herd in 2004 (Valkenburg *et al.* 1996). Relative forage shortage and predation contribute to low calf survival.

In the Bathurst herd, Aboriginal elders have frequently mentioned observations of fewer bulls in the herd (although more in the context of the effect on outfitted hunting for bulls). The proportion of bulls in the Bathurst herd in fall 2004 was low (37 bulls:100 cows), however, similar proportions have been observed in Alaskan caribou herds. There is a tendency for declining herds to have lower sex ratios, but it varies between herds according to the interplay of factors affecting herd size. Sex-selective hunting can play a role particularly in smaller herds: during the 1990s the Nelchina herd was declining about 10% per year (50 281 – 29 601 from 1995 to 2000), and the selective hunting of large bulls (annually about 2600 bulls; 53-82% of total harvest) for 6 years reduced the sex ratio to 28 bulls:100 cows, which was below the management objective of 40 bulls/100 cows (Tobey 2001).

In the Western Arctic herd, the fall sex ratio during a period of decline (1970-76) was similar to that recorded when the herd was increasing- about 52 bulls/100 cows (Dau 2002). When the Mulchatna, Fortymile and Delta herds where increasing, the fall sex ratio was about 40 bulls/100 cows. When the Delta herd was decreasing, the fall sex ratio average declined to 30 bulls/100 cows.

The concurrence between the decline estimated from calf survival and from estimates of herd size does not necessarily validate the assumptions of population change estimates based on calf-cow ratio, such as constant survival of females. It does show, however, that decreases in the Bathurst caribou herd could potentially be caused by reduced recruitment even with constant survival of adult females (Gunn et al. In prep.). The method of estimating population change used is simplistic as it assumes that survival of females is similar after their first year of life, that survival rates of male and females calves are equal, and that the sex ratio of calves is 50:50. The literature on other caribou herds does not support either equal survival rates or equal sex ratios but in the absence of specific information for the Bathurst herd, we kept the assumptions. Some assumptions of the calf survival analysis should be explored further. For example, the assumption of constant fecundity of females may not be valid and the trends in calf survival (Figure 4) could be due to changes in fecundity rather actual survival of calves. However, on the calving grounds in 1996 and in 2003, the pregnancy rates were within the expected range (Gunn et al. 1996, Gunn et al. In prep.).

The pattern of annual alternating higher and lower survival is more marked before 1995 which could be related to patterns in female fecundity. Reproductive pauses for the individual cow (typically every 4 to 5 years - Cameron 1994) reflect the cow's nutritional status and a single year's pause is usual. However, the mechanism that would entrain the individual reproductive pauses is not obvious. In the Nelchina herd (Alaska) which has declined (1996-2000), fall calf-

cow ratios in 1999 and 2000 were 23 and 20 calves:100 cows, respectively. Previously, the ratios were 38-48 calves:100 cows (Tobey 2001). Tobey (2001) attributed the decline in calf survival to a decrease in calf production as reproductive pauses in adult cows and a delay in the age of first reproduction increased. The body condition of the Nelchina herd caribou is less than in other Alaskan interior herds. Tobey (2001) attributed the poorer condition to overstocking. This could be an over-simplification, however, as discrimination between causes of changes in condition is difficult (Loison et al. 1999). The Alaskan weather trend is toward higher temperatures and more snow which is also associated with years when the cows are in poor condition (Tobey 2001).

The lower calf survival during summer than winter, and the decline in the herd indicate that caribou resilience to changes on the calving to fall ranges is reduced. The change in the herd status since the late 1990s should be included into modeling the potential for cumulative effects of industrial activities. Typically, barren-ground caribou herds numbers fluctuate in size on a 40-60 year cycle (Gunn 2003, Griffith et al. 2002). Although large herbivore population dynamics are usually sensitive to changes in the survival of adult females, changes in recruitment are also important in determining the trend in numbers (Gaillard et al. 2000). For the Bathurst herd, the decline in calf survival and herd size for the period 2001-2004 compared to 1985-1996, and the decline in herd size since 1986 are strong evidence that the herd has declined during the 1990s and early 2000s.

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Appendix A: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 6-10 March 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS WITH ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS MALE	YEARLINGS FEMALE	YEARLINGS UNK	YEARLINGS TOTAL	TOTAL
61.834	-112.808	6-Apr-01	001	Heavy/old tracks on Simpson Is.							0					0
61.653	-112.378	6-Apr-01	002	25 caribou. Lakes well used							0					0
61.565	-112.214	6-Apr-01	003	64 caribou. Moderate use							0					0
61.456	-111.951	6-Apr-01	004	30 caribou							0					0
61.423	-111.879	6-Apr-01	005	15 caribou. Heavy use							0					0
60.903	-110.853	6-Apr-01	006	Gut piles							0					0
60.349	-109.940	6-Apr-01	007	Start of fresh tracks							0					0
60.290	-107.646	6-Apr-01	008						1	8	9					9
60.276	-107.335	6-Apr-01	009		36		36	11			0			2	2	49
60.275	-107.304	6-Apr-01	010		30		30	14	3	1	4			1	1	49
60.276	-107.159	6-Apr-01	011		1		1	1			0					2
60.292	-106.574	6-Apr-01	012		21		21	6	8	4	12	.		1	1	40
60.297	-106.568	6-Apr-01	013		65	2	67	15	14	2	16	5	2		7	105
60.299	-106.553	6-Apr-01	014		64	1	65	12	7		7	2	1	1	4	88
60.305	-106.539	6-Apr-01	015		77	1	78	28	5		5		2		2	113
60.308	-106.532	6-Apr-01	016		55	1	56	21	4		4		1		1	82
60.311	-106.516	6-Apr-01	017		27		27	6	7	2	9					42
60.285	-106.546	6-Apr-01	018		28	2	30	14			0					44
60.277	-106.526	6-Apr-01	019		7		7	2	2		2					11
60.324	-106.377	6-Apr-01	020		28		28	11	7	4	11	1			1	51
60.338	-106.371	6-Apr-01	021		38	2	40	9	17	2	19					68
60.330	-106.350	6-Apr-01	022						4	1	5					5
60.324	-106.333	6-Apr-01	023		6		6	3			0					9
60.311	-106.238	6-Apr-01	024		18	1	19	6	2	3	5					30
60.302	-106.223	6-Apr-01	025		45		45	18	8		8		1		1	72
60.282	-106.230	6-Apr-01	026		27		27	10	2	2	4					41
60.283	-106.226	6-Apr-01	027		61		61	20	14	1	15	3			3	99
60.281	-106.214	6-Apr-01	028		73	1	74	22	16	6	22					118
60.274	-106.226	6-Apr-01	029		30		30	10	22	4	26					66
60.274	-106.216	6-Apr-01	030		11		11	5	2		2					18
60.270	-106.218	6-Apr-01	031		77		77	21	12		12					110
60.274	-106.216	6-Apr-01	032		11		11	3	1		1					15
60.297	-106.192	6-Apr-01	033		32		32	12	9		9					53
60.403	-106.347	6-Apr-01	034		113		113	26	13	2	15			1	1	155
60.409	-106.319	6-Apr-01	035		175	2	177	46	12	2	14		1		1	238
59.566	-106.052	7-Apr-01	036	Tracks again - some fresh, most old							0					0
59.524	-105.902	7-Apr-01	037	Fresh tracks							0					0
59.800	-105.506	7-Apr-01	038	Headed NW							0					0
59.835	-105.514	7-Apr-01	039	Caribou headed into trees							0					0
59.829	-105.529	7-Apr-01	040	Caribou headed into trees							0					0
59.909	-105.695	7-Apr-01	041		26		26	5	3	2	5					36
59.962	-105.645	7-Apr-01	042	Wolf kill							0					0
59.975	-105.580	7-Apr-01	043		9		9	2			0					11
60.015	-105.577	7-Apr-01	044		7	1	8	3	3	1	4					15
60.019	-105.570	7-Apr-01	045		10		10	4	17	4	21					35
60.009	-105.486	7-Apr-01	046		56		56	10	11	6	17		1		1	84
60.006	-105.447	7-Apr-01	047		12	3	15	3	12	9	21					39
60.007	-105.437	7-Apr-01	048		7	1	8	3	7	8	15					26
60.039	-105.457	7-Apr-01	050		12		12	3	7	5	12					27
60.050	-105.463	7-Apr-01	051		29		29	8	17	13	30					67
60.063	-105.492	7-Apr-01	052		71	4	75	25	48	26	74	3	5	2	10	184

Appendix A: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 6-10 March 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS WITH ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS MALE	YEARLINGS FEMALE	YEARLINGS UNK	YEARLINGS TOTAL	TOTAL
60.065	-105.490	7-Apr-01	053		36	1	37	11	25	12	37					85
60.072	-105.542	7-Apr-01	054		22		22	3	28	3	31					56
60.065	-105.541	7-Apr-01	055		6	1	7	2	3		3					12
60.074	-105.532	7-Apr-01	056		44	1	45	15	31	13	44					104
60.078	-105.537	7-Apr-01	057		58		58	19	28	4	32			3	3	112
60.094	-105.495	7-Apr-01	058		61		61	16	26	4	30					107
60.121	-105.506	7-Apr-01	059		33		33	10	29	2	31			3	3	77
60.102	-105.659	7-Apr-01	060		27		27	13	28	14	42		1	3	4	86
60.093	-105.659	7-Apr-01	061		44		44	9	23	12	35			3	3	91
59.614	-105.756	7-Apr-01	065						1	27	28					28
60.006	-105.844	7-Apr-01	066						3	3	6					6
60.091	-105.844	7-Apr-01	067		29		29	9	10	12	22			1	1	61
60.117	-105.790	7-Apr-01	068		48	2	50	12	14	1	15					77
60.113	-105.784	7-Apr-01	069		42	1	43	15	18	4	22			1	1	81
60.116	-105.779	7-Apr-01	070		58		58	21	39	4	43			3	3	125
60.115	-105.767	7-Apr-01	071		186	4	190	44	67	20	87	8	1		9	330
60.105	-105.770	7-Apr-01	072		51		51	16	37	4	41			1	1	109
60.128	-105.779	7-Apr-01	073		23		23	5	8		8					36
60.462	-106.207	7-Apr-01	074		25		25	3	10		10			1	1	39
60.280	-105.694	7-Apr-01	075		13		13	2	11		11					26
60.278	-105.711	7-Apr-01	076		23		23				0					23
60.264	-105.747	7-Apr-01	077		16		16	4	2		2					22
60.259	-105.778	7-Apr-01	078		56		56	10	18	2	20					86
60.256	-105.797	7-Apr-01	079		27	1	28	4	9	1	10			1	1	43
60.218	-105.723	7-Apr-01	080		25		25	7	7		7			1	1	40
60.174	-105.739	7-Apr-01	081	Cow and calf moose	15		15	2	2		2					19
60.170	-105.789	7-Apr-01	082		8		8	2	4		4					14
60.170	-105.789	7-Apr-01	082		15		15	7	3		3					25
60.170	-105.789	7-Apr-01	082		8		8	1	9	2	11					20
60.119	-105.761	8-Apr-01	083		119	2	121	23	30	7	37			1	1	182
60.111	-105.758	8-Apr-01	084		121	2	123	24	36	15	51			7	7	205
60.101	-105.764	8-Apr-01	085		26		26	7	9	6	15					48
60.081	-105.734	8-Apr-01	086		30		30	11	8		8					49
60.071	-105.697	8-Apr-01	087		48		48	12	11	3	14					74
60.067	-105.682	8-Apr-01	088		15		15	6	4	2	6					27
60.070	-105.661	8-Apr-01	089		14		14	6	5	4	9					29
60.080	-105.658	8-Apr-01	090		20		20	10	11	4	15			4	4	49
59.619	-105.918	8-Apr-01	091	Fresh tracks and few caribou							0					0
60.138	-106.106	8-Apr-01	092	Heavy tracks/use, no caribou							0					0
62.203	-110.350	8-Apr-01	093		87		87	19	13	2	15					121
62.196	-110.378	8-Apr-01	094		19		19	6	6	6	12					37
62.184	-110.370	8-Apr-01	095		36		36	3	6	2	8					47
62.160	-110.392	8-Apr-01	096		28		28	9	6	1	7					44
62.158	-110.453	8-Apr-01	097		24		24	8	8		8					40
62.171	-110.436	8-Apr-01	098		25	1	26	5	1	1	2					33
62.177	-110.428	8-Apr-01	099		33	1	34	5	3	4	7					46
62.112	-110.498	8-Apr-01	100		26		26	4	1		1			1	1	32
62.103	-110.489	8-Apr-01	101		14		14	10	4	2	6					30
62.086	-110.628	8-Apr-01	102		17		17	5	1		1					23
62.098	-110.640	8-Apr-01	103		30		30	8	10	2	12					50
62.074	-110.642	8-Apr-01	104		25		25	9	5	2	7					41

Appendix A: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 6-10 March 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS WITH ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS MALE	YEARLINGS FEMALE	YEARLINGS UNK	YEARLINGS TOTAL	TOTAL
62.051	-110.722	8-Apr-01	105		17		17	3	3	3	6					26
62.055	-110.742	8-Apr-01	106		9		9	3	1		1					13
62.063	-110.755	8-Apr-01	107		10		10	2	2		2			1	1	15
62.079	-110.752	8-Apr-01	108		26		26	6	3	2	5					37
62.087	-110.744	8-Apr-01	109		21		21	9	4	6	10			1	1	41
62.080	-110.798	8-Apr-01	110		21		21	8	13	14	27					56
62.063	-110.836	8-Apr-01	111		2		2	2	3	7	10					14
62.085	-110.896	8-Apr-01	112		8		8	2	1	2	3					13
62.103	-110.972	8-Apr-01	113						2	7	9					9
62.084	-110.977	8-Apr-01	114		8		8	5	7	8	15					28
62.079	-110.992	8-Apr-01	115		6		6		2	3	5					11
61.888	-110.774	8-Apr-01	116					1	2	8	10					11
61.868	-110.807	8-Apr-01	117		1		1	2	1	1	2					5
61.869	-110.840	8-Apr-01	118		30		30	16	17	1	18					64
61.849	-110.867	8-Apr-01	119		3		3	2			0					5
61.827	-110.906	8-Apr-01	120		23		23	3	2		2					28
61.815	-110.936	8-Apr-01	121		7		7	6	12	16	28					41
61.797	-110.981	8-Apr-01	122		1		1		19	19	38			1	1	40
61.791	-110.995	8-Apr-01	123		4		4	4	7	3	10					18
61.778	-111.020	8-Apr-01	124							6	6					6
61.766	-111.026	8-Apr-01	125		5		5	6	21	18	39					50
61.733	-110.949	8-Apr-01	126						2	7	9					9
61.738	-110.941	8-Apr-01	127		1	1	2	3	8	4	12			4	4	21
61.721	-110.944	8-Apr-01	128		3		3	2	2	5	7					12
61.709	-110.927	8-Apr-01	129		2		2	3	5		5					10
61.714	-110.902	8-Apr-01	130		13		13	2	9	10	19					34
61.745	-110.891	8-Apr-01	131		9		9	6	2		2					17
61.757	-110.886	8-Apr-01	132		7		7	6	8	3	11			1	1	25
61.844	-110.784	8-Apr-01	133		6		6	2	6		6					14
62.014	-110.533	8-Apr-01	134		10	3	13	9	10	15	25			1	1	48
62.055	-110.434	8-Apr-01	135		21		21	9	16	1	17			4	4	51
62.061	-110.416	8-Apr-01	136		2		2	2	7	4	11			1	1	16
62.070	-110.404	8-Apr-01	137		25	1	26	12	9		9			1	1	48
62.078	-110.413	8-Apr-01	138		52	1	53	26	23	6	29	3	1		4	112
62.090	-110.390	8-Apr-01	139		11		11	5	12	1	13			2	2	31
62.093	-110.387	8-Apr-01	140		10		10	6	7	3	10			2	2	28
62.098	-110.359	8-Apr-01	141		39	3	42	19	18	5	23			3	3	87
62.108	-110.326	8-Apr-01	142		15		15	7	4		4			1	1	27
62.117	-110.344	8-Apr-01	144		31	3	34	4	13	3	16			4	4	58
62.124	-110.337	8-Apr-01	145		1		1	1	2	1	3			1	1	6
62.122	-110.331	8-Apr-01	146		19	1	20	9	2		2			1	1	32
62.126	-110.282	8-Apr-01	147		3		3	1	2		2					6
62.123	-110.272	8-Apr-01	148		10	2	12	2	8	1	9					23
62.145	-110.282	8-Apr-01	149	1 wolf on kill							0					0
62.150	-110.289	8-Apr-01	150		55	3	58	17	16	6	22			3	3	100
62.160	-110.271	8-Apr-01	151	Wolf kill	10		10	2	3	2	5					17
62.169	-110.274	8-Apr-01	152		49	2	51	11	17	2	19			4	4	85
62.172	-110.251	9-Apr-01	153		10		10	9	4		4					23
62.178	-110.217	9-Apr-01	154		36		36	20	18	2	20			1	1	77
62.135	-110.211	9-Apr-01	155		27	1	28	10	12	4	16					54
62.127	-110.209	9-Apr-01	156		25	1	26	10	20		20			1	1	57

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LAT	LON	DATE	GPS	OBSERVATIONS	COWS WITH ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS MALE	YEARLINGS FEMALE	YEARLINGS UNK	YEARLINGS TOTAL	TOTAL
62.116	-110.227	9-Apr-01	157		32	2	34	10	9	1	10			2	2	56
62.112	-110.204	9-Apr-01	158		49	1	50	15	7		7					72
62.103	-110.191	9-Apr-01	159		140	2	142	27	35	6	41			5	5	215
62.105	-110.167	9-Apr-01	160		29		29	4	6	1	7					40
62.317	-110.309	9-Apr-01	161		2		2		7	8	15					17
62.311	-110.261	9-Apr-01	162		24		24	4	18	24	42			3	3	73
62.302	-110.276	9-Apr-01	164		24		24	4	4	3	7					35
62.280	-110.177	9-Apr-01	165		10		10	2	3		3			1	1	16
62.280	-110.177	9-Apr-01	166		18		18	9	7		7					34
62.295	-110.150	9-Apr-01	167		12	1	13	4	2		2			2	2	21
62.324	-109.943	9-Apr-01	168		16		16	4			0					20
62.331	-109.820	9-Apr-01	169		9		9	1	1	4	5					15
62.343	-109.760	9-Apr-01	170		5		5	2	2	4	6					13
62.347	-109.726	9-Apr-01	171		10		10	1	1	1	2					13
62.357	-109.675	9-Apr-01	172		22		22	11	2	1	3					36
62.352	-109.652	9-Apr-01	173		5		5	1	2	2	4					10
62.348	-109.613	9-Apr-01	174		63		63	19	20	8	28			4	4	114
62.347	-109.594	9-Apr-01	175		49		49	6	3	1	4			1	1	60
62.333	-109.630	9-Apr-01	176		19		19	8	7	2	9			1	1	37
62.338	-109.519	9-Apr-01	177		19		19	6	5	3	8					33
62.372	-109.641	9-Apr-01	178		11		11	2	4	1	5					18
62.347	-109.728	9-Apr-01	179		2		2	1	1	1	2					5
62.340	-109.743	9-Apr-01	180		2		2	3	5	6	11					16
62.235	-109.688	9-Apr-01	181		25	2	27	7	7	1	8			1	1	43
62.305	-109.560	9-Apr-01	182	4 wolves on kill							0					0
62.316	-109.584	9-Apr-01	183		18		18	6	2		2			2	2	28
62.272	-109.296	9-Apr-01	184		22		22	5		1	1					28
62.249	-109.697	9-Apr-01	185		19		19	4	3	1	4					27
62.227	-109.709	9-Apr-01	186		7		7	5	2	5	7			1	1	20
62.220	-109.756	9-Apr-01	187		32	1	33	7	9	5	14					54
62.289	-109.782	9-Apr-01	188		7		7	4	1	1	2					13
62.273	-109.873	9-Apr-01	189		1		1		4	5	9			1	1	11
62.264	-109.919	9-Apr-01	190		11		11	3			0					14
62.232	-110.099	9-Apr-01	191		19		19	8	1	2	3					30
62.211	-110.464	9-Apr-01	192		13	1	14	2	10	2	12					28
62.278	-110.509	9-Apr-01	193		1		1		4	2	6					7
62.281	-110.487	9-Apr-01	194		8		8	1	16	20	36			1	1	46
62.148	-110.341	9-Apr-01	195		74	3	77	31	22	5	27			1	1	136
62.135	-110.350	9-Apr-01	196		44	2	46	14	19	4	23					83
62.119	-110.350	9-Apr-01	197		83	1	84	24	16	3	19			2	2	129
62.113	-110.353	9-Apr-01	198		33		33	18	10	2	12					63
62.065	-110.263	9-Apr-01	199		11		11	3	1		1			1	1	16
62.048	-110.216	9-Apr-01	200		19	3	22	12	10	3	13			1	1	48
62.033	-110.225	9-Apr-01	201		6		6	5	2		2					13
62.017	-110.193	9-Apr-01	202		6		6	5	7	6	13					24
62.008	-110.157	9-Apr-01	203		6		6	4			0					10
61.954	-109.979	9-Apr-01	204		28		28	18	1	2	3			1	1	50
61.965	-109.944	9-Apr-01	205					3	3	2	5					8
61.947	-109.950	9-Apr-01	206						3	1	4					4
61.938	-110.702	9-Apr-01	207		7	2	9	4			0					13
61.970	-110.686	9-Apr-01	208		4		4	1			0					5

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LAT	LON	DATE	GPS	OBSERVATIONS	COWS WITH ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS MALE	YEARLINGS FEMALE	YEARLINGS UNK	YEARLINGS TOTAL	TOTAL
62.037	-110.503	9-Apr-01	209		17		17	4	1		1			1	1	23
62.048	-110.471	9-Apr-01	210		33	1	34	9	13	6	19			6	6	68
62.065	-110.464	9-Apr-01	211		45	2	47	23	27	6	33			1	1	104
62.087	-110.433	9-Apr-01	212		15		15	5	6		6					26
62.086	-110.419	9-Apr-01	213		36	1	37	8	5	1	6			2	2	53
62.100	-110.417	9-Apr-01	214		8	1	9	1	2	1	3					13
62.107	-110.417	9-Apr-01	215		12		12	7	4	1	5					24
62.121	-110.407	9-Apr-01	216		10		10	4		2	2			1	1	17
62.128	-110.389	9-Apr-01	217		3		3	2	1	6	7			1	1	13
62.137	-110.364	9-Apr-01	218		16		16	3	4		4					23
62.140	-110.357	9-Apr-01	219		58		58	23	13	7	20					101
62.149	-110.334	9-Apr-01	220		88	1	89	15	32	8	40					144
62.156	-110.315	9-Apr-01	221		7		7	2	3		3					12
62.157	-110.288	9-Apr-01	222		19		19	7	6	1	7			2	2	35
62.167	-110.249	9-Apr-01	223		20		20	8	1		1					29
62.165	-110.331	9-Apr-01	224		6		6	1			0			1	1	8
62.166	-110.325	9-Apr-01	225		15		15	2	17	7	24					41
62.122	-110.455	9-Apr-01	227		51		51	20	5	2	7			2	2	80
62.108	-110.427	9-Apr-01	228		34		34	10	6	3	9					53
62.102	-110.438	9-Apr-01	229		38	2	40	6	5	1	6					52
62.085	-110.449	9-Apr-01	230		5		5	3	5	1	6			1	1	15
62.092	-110.467	9-Apr-01	231	Wolf kill	49	1	50	8	9	3	12			2	2	72
62.084	-110.461	9-Apr-01	232		9		9	8	3	7	10			1	1	28
62.082	-110.495	9-Apr-01	233		3		3		3		3					6
62.087	-110.516	9-Apr-01	234	Wolf kill	7		7	7	2		2					16
62.105	-110.519	9-Apr-01	235	2 wolf kills	7		7	1	2	1	3					11
62.111	-110.511	9-Apr-01	236		8		8		4	3	7			1	1	16
62.110	-110.539	9-Apr-01	237	Wolf kill	16		16	6	2	4	6			3	3	31
62.113	-110.550	9-Apr-01	238		5		5	2	5	3	8					15
62.118	-110.543	9-Apr-01	239		36		36	6	9	2	11			3	3	56
62.130	-110.534	9-Apr-01	240		82		82	18	18	6	24			2	2	126
62.133	-110.533	9-Apr-01	241		136	5	141	19	37	13	50			7	7	217
62.142	-110.526	10-Apr-01	243	Wolf kill	133	3	136	39	28	24	52			4	4	231
62.143	-110.537	10-Apr-01	244		20	1	21	1	3	1	4					26
62.126	-110.542	10-Apr-01	245		53	2	55	8	3		3			2	2	68
62.133	-110.556	10-Apr-01	246		36	1	37	9	10	8	18			2	2	66
62.123	-110.554	10-Apr-01	247		16		16	9	3	1	4					29
62.124	-110.582	10-Apr-01	248	Wolf kill	20		20	2	3	9	12					34
62.136	-110.585	10-Apr-01	249		6		6	3	1		1					10
62.137	-110.568	10-Apr-01	250		7		7	2	11	13	24			2	2	35
62.153	-110.532	10-Apr-01	251	Wolf kill	1		1	2			0					3
62.161	-110.522	10-Apr-01	252	Wolf kill	20		20	7	26	9	35			1	1	63
62.154	-110.549	10-Apr-01	253		9		9	3	2	2	4					16
62.144	-110.586	10-Apr-01	254		5		5	2	8	11	19					26
62.171	-110.581	10-Apr-01	255						4	12	16					16
62.196	-110.531	10-Apr-01	256	2 wolf kills	16	1	17	2	6	14	20					39
62.128	-110.528	10-Apr-01	257	2 wolf kills	74	2	76	14	15	10	25			4	4	119
62.012	-112.029	10-Apr-01	258							5	5					5
61.993	-112.501	10-Apr-01	259						1	4	5					5

APPENDIX B: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 22-29 March 2002.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
63.140	-112.143	22-Mar-02	22		87	2	89	17	9	0	9		115
63.203	-111.909	22-Mar-02	23		19	0	19	3	2	0	2		24
63.197	-111.671	22-Mar-02	24		51	1	52	5	8	2	10		67
63.238	-111.375	22-Mar-02	25		22	1	23	1	6	2	8		32
63.247	-111.303	22-Mar-02	26	drill camp	185	3	188	31	14	3	17		236
63.272	-111.266	22-Mar-02	27		355	2	357	53	70	17	87		497
63.532	-110.787	22-Mar-02	28	scattered fresh tracks	96	2	98	12	19	2	21		131
63.580	-110.743	22-Mar-02	29		52	3	55	4	29	8	37		96
63.527	-111.160	22-Mar-02	30		212	0	212	28	35	0	35		275
63.249	-112.100	22-Mar-02	31		94	2	96	10	8	1	9		115
62.839	-113.215	22-Mar-02	32		0	0	0	0	3	6	9		9
63.522	-112.748	25-Mar-02	33	10+ caribou			0				0		0
62.737	-113.470	22-Mar-02	33		0	0	0	0	4	15	19		19
62.737	-113.470	22-Mar-02	33		0	0	0	0	4	5	9		9
62.737	-113.470	22-Mar-02	33		0	0	0	0	2	24	26		26
63.673	-111.455	25-Mar-02	34		4	0	4	1	0	5	5		10
64.975	-109.746	25-Mar-02	35				0				0		0
64.975	-109.746	25-Mar-02	35		41	0	41	7	11	2	13		61
64.975	-109.746	25-Mar-02	35		31	0	31	2	18	3	21		54
64.975	-109.746	25-Mar-02	35		33	0	33	5	21	6	27		65
64.975	-109.746	25-Mar-02	35		18	0	18	6	8	2	10		34
63.982	-110.667	25-Mar-02	36		35	0	35	7	25	5	30		72
63.777	-110.745	25-Mar-02	37		5	0	5	1	0	0	0		6
63.756	-110.788	25-Mar-02	38		80	2	82	9	30	3	33		124
63.580	-110.727	25-Mar-02	39		0	0	0	0	2	6	8		8
63.589	-110.499	25-Mar-02	40		260	4	264	60	127	0	127		451
63.303	-110.903	25-Mar-02	41	scattered fresh tracks			0				0		0
63.234	-111.025	25-Mar-02	42	heavy trails			0				0		0
63.135	-111.101	25-Mar-02	43		41	0	41	1	4	20	24		66
63.135	-111.101	25-Mar-02	43		0	0	0	0	3	11	14		14
63.121	-111.325	25-Mar-02	44		4	0	4	1	7	5	12		17
63.066	-111.534	25-Mar-02	45		24	0	24	7	3	5	8		39
63.003	-111.833	25-Mar-02	46		6	0	6	2	2	35	37		45
62.918	-112.329	25-Mar-02	47	scattered fresh tracks			0				0		0
62.822	-112.786	25-Mar-02	48		10	0	10	2	3	2	5		17
62.774	-112.989	25-Mar-02	49		0	0	0	9	3	12	15		24
63.950	-113.142	26-Mar-02	52		28	1	29	6	17	1	18		53
63.922	-113.611	26-Mar-02	55		17	0	17	3	5	0	5		25
63.909	-113.597	26-Mar-02	56		0	0	0	0	1	7	8		8
63.909	-113.597	26-Mar-02	56		4	1	5	4	10	6	16		25
63.930	-113.677	26-Mar-02	57		59	0	59	4	17	3	20		83
63.927	-113.683	26-Mar-02	58		8	0	8	0	9	2	11		19
63.926	-113.685	26-Mar-02	59		52	3	55	8	18	0	18		81
63.927	-113.687	26-Mar-02	60		91	2	93	23	13	1	14		130
63.928	-113.691	26-Mar-02	61		21	0	21	6	7	0	7		34
63.938	-113.706	26-Mar-02	62		9	0	9	4	4	7	11		24
64.064	-113.857	26-Mar-02	63		59	0	59	15	20	0	20		94

APPENDIX B: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 22-29 March 2002.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
64.096	-113.892	26-Mar-02	64		17	0	17	4	4	0	4		25
64.105	-114.034	26-Mar-02	65		36	0	36	5	12	1	13		54
64.115	-114.154	26-Mar-02	66		39	0	39	9	16	1	17		65
64.115	-114.226	26-Mar-02	67		224	3	227	65	57	1	58		350
64.081	-114.426	26-Mar-02	70		106	3	109	46	37	1	38		193
64.110	-114.543	26-Mar-02	71		82	3	85	36	18	8	26		147
64.083	-114.666	26-Mar-02	72		45	1	46	5	13	1	14		65
64.251	-114.300	26-Mar-02	74		52	0	52	19	17	0	17		88
64.258	-114.304	26-Mar-02	75		121	2	123	26	40	1	41		190
64.245	-114.320	26-Mar-02	76		81	0	81	19	19	1	20		120
64.231	-114.349	26-Mar-02	77		93	1	94	25	28	2	30		149
64.031	-115.153	26-Mar-02	78		70	0	70	18	25	0	25		113
63.307	-114.561	26-Mar-02	82		18	0	18	17	7	0	7		42
63.307	-114.561	26-Mar-02	82		25	2	27	7	0	0	0		34
63.259	-114.542	26-Mar-02	83		8	0	8	4	1	0	1		13
63.251	-114.498	26-Mar-02	84		24	2	26	8	15	1	16		50
63.232	-114.471	26-Mar-02	85		7	1	8	2	0	0	0		10
63.182	-114.504	26-Mar-02	86		15	0	15	4	3	1	4		23
63.182	-114.504	26-Mar-02	86		6	0	6	1	0	0	0		7
63.026	-114.404	26-Mar-02	87		19	0	19	5	2	0	2		26
63.013	-114.419	26-Mar-02	88		48	0	48	18	10	0	10		76
N/A		28-Mar-02			17		17	4	7		7		28
N/A		28-Mar-02			24		24	11	5		5		40
N/A		28-Mar-02			136	4	140	33	33	9	42		215
N/A		28-Mar-02			13		13	2		2	2		17
N/A		28-Mar-02			30	2	32	12	6	2	8		52
N/A		28-Mar-02			36	3	39	23	21		21		83
N/A		28-Mar-02			38		38	12	23	3	26		76
N/A		28-Mar-02					0		2	13	15		15
N/A		28-Mar-02			3		3	3	5	13	18		24
N/A		28-Mar-02			30	6	36	13	19	2	21		70
N/A		28-Mar-02			26		26	9	4		4		39
N/A		28-Mar-02			40	1	41	8	8	1	9		58
N/A		28-Mar-02			31	1	32	12	9		9		53
N/A		28-Mar-02		wolf kill	13	1	14	4			0		18
N/A		28-Mar-02			54	1	55	24	23	1	24		103
N/A		28-Mar-02			8	1	9	5			0		14
N/A		28-Mar-02			14	2	16	5			0		21
N/A		28-Mar-02			49		49	11		8	8		68
N/A		28-Mar-02			17		17	4			0		21
N/A		28-Mar-02			8		8	3			0		11
N/A		28-Mar-02			19	3	22	6	13	6	19		47
N/A		28-Mar-02			21	2	23	8	3	2	5		36
N/A		28-Mar-02			21	2	23	8	1		1		32
N/A		28-Mar-02			10	1	11	3	2		2		16
N/A		28-Mar-02					0		5	5	10		10
N/A		28-Mar-02			2		2	2			0		4

APPENDIX B: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 22-29 March 2002.

LAT	LON	DATE	GPS OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
N/A		28-Mar-02		15	1	16	7	4	9	13		36
N/A		28-Mar-02		30	1	31	10	8	24	32		73
N/A		28-Mar-02				0		4	16	20		20
N/A		29-Mar-02				0			17	17		17
N/A		29-Mar-02				0			5	5		5
N/A		29-Mar-02		1		1		2	5	7		8
N/A		29-Mar-02		1		1	3			0		4
N/A		29-Mar-02		4	2	6	2	2		2		10
N/A		29-Mar-02		9		9	8			0		17
N/A		29-Mar-02		12		12	4	1		1		17
N/A		29-Mar-02		15	1	16	2	28		28		46
N/A		29-Mar-02		32	2	34	14	9	4	13		61
N/A		29-Mar-02		8		8	2	6	3	9		19
N/A		29-Mar-02		24	1	25	3	20	2	22		50
N/A		29-Mar-02		8	1	9	3	2		2		14
N/A		29-Mar-02		8		8	3		2	2		13
N/A		29-Mar-02		8		8	3	4		4		15
N/A		29-Mar-02		8		8	3			0		11
N/A		29-Mar-02		5		5	3	2		2		10
N/A		29-Mar-02		9		9	3	17	8	25		37
N/A		29-Mar-02		4		4	2			0		6
N/A		29-Mar-02		8		8	3	2	3	5		16
N/A		29-Mar-02		5		5		2	5	7		12
N/A		29-Mar-02		8	1	9	1			0		10
N/A		29-Mar-02		2		2	2	3	4	7		11
N/A		29-Mar-02		37	3	40	13	13		13		66
N/A		29-Mar-02		6		6	4	5	4	9		19
N/A		29-Mar-02		23	1	24	4			0		28
N/A		29-Mar-02		6		6	4	1		1		11
N/A		29-Mar-02		35	1	36	9	13	1	14		59
N/A		29-Mar-02		10		10	6			0		16
N/A		29-Mar-02				0		1	2	3		3
N/A		29-Mar-02		8		8	2	1		1		11
N/A		29-Mar-02		5		5	2	2	20	22		29
N/A		29-Mar-02		21		21	1	11	19	30		52
N/A		29-Mar-02		35	1	36	13	33	1	34		83
N/A		29-Mar-02				0			8	8		8
N/A		29-Mar-02		5		5	2	2	7	9		16
N/A		29-Mar-02				0			6	6		6
N/A		29-Mar-02				0			3	3		3
N/A		29-Mar-02		3		3	1	2		2		6
N/A		29-Mar-02				0			2	2		2
N/A		29-Mar-02				0		6	10	16		16
N/A		29-Mar-02				0			6	6		6
N/A		29-Mar-02				0			10	10		10
N/A		29-Mar-02				0		1	11	12		12
N/A		29-Mar-02				0		3	3	6		6

APPENDIX B: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 22-29 March 2002.

LAT	LON	DATE	GPS OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
N/A		29-Mar-02				0		1	4	5		5
N/A		29-Mar-02				0			14	14		14
N/A		29-Mar-02				0		2	15	17		17
N/A		29-Mar-02				0	1	3	16	19		20
N/A		29-Mar-02				0			11	11		11
N/A		29-Mar-02				0		1	18	19		19
N/A		29-Mar-02				0			4	4		4
N/A		29-Mar-02				0		2	22	24		24
N/A		29-Mar-02				0		1	18	19		19
N/A		29-Mar-02				0			11	11		11
N/A		29-Mar-02				0			2	2		2
N/A		29-Mar-02				0			9	9		9
N/A		29-Mar-02				0			6	6		6

APPENDIX C: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 8-14 April 2003.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALES TOTAL	YEARLINGS TOTAL	TOTAL
63.399	-114.322	08-Apr-03	1	few bulls			0				0		0
63.554	-114.299	08-Apr-03	2	few bulls			0				0		0
63.939	-114.243	08-Apr-03	3	10s caribou			0				0		0
64.504	-114.962	08-Apr-03	5		105	4	109	36	35	2	37		182
64.486	-114.960	08-Apr-03	6		15	0	15	6	8	8	16		37
64.493	-114.961	08-Apr-03	7		9	0	9	1	1	0	1		11
64.515	-115.045	08-Apr-03	8		77	0	77	28	12	2	14		119
64.511	-115.067	08-Apr-03	9	wolf killed calf			0				0		0
64.459	-115.298	08-Apr-03	10		29	0	29	9	1	2	3		41
64.453	-115.309	08-Apr-03	11	1 moose	20	0	20	8	2	0	2		30
64.451	-115.331	08-Apr-03	12		15	0	15	9	2	1	3		27
64.424	-115.417	08-Apr-03	13		230	8	238	75	55	3	58		371
64.433	-115.406	08-Apr-03	14		161	8	169	45	47	1	48		262
64.459	-115.413	08-Apr-03	15		18	0	18	12	4	0	4		34
64.478	-115.431	08-Apr-03	16	overflow			0				0		0
64.517	-115.410	08-Apr-03	18		7	0	7	4	3	0	3		14
64.592	-115.486	08-Apr-03	19		33	1	34	11	6	7	13		58
64.592	-115.509	08-Apr-03	20		13	1	14	7	3	1	4		25
64.593	-115.528	08-Apr-03	21		36	2	38	21	17	3	20		79
64.587	-115.622	08-Apr-03	22		31	0	31	11	2	1	3		45
64.570	-115.667	08-Apr-03	23		69	3	72	27	8	1	9		108
64.556	-115.697	08-Apr-03	24		54	2	56	16	18	9	27		99
64.557	-115.713	08-Apr-03	25		11	0	11	4	3	5	8		23
64.557	-115.681	08-Apr-03	26		76	0	76	25	27	10	37		138
64.549	-115.682	08-Apr-03	27		54	1	55	25	22	13	35		115
64.549	-115.680	08-Apr-03	28	wolf kill			0				0		0
64.547	-115.647	08-Apr-03	29		83	1	84	26	20	1	21		131
64.545	-115.638	08-Apr-03	30	cow nursing	115	4	119	51	28	2	30		200
64.601	-115.614	08-Apr-03	32		16	1	17	7	0	0	0		24
64.608	-115.599	08-Apr-03	33		14	0	14	5	1	1	2		21
64.618	-115.589	08-Apr-03	34		2	0	2	2	0	0	0		4
64.650	-115.564	08-Apr-03	35	wolf kill			0				0		0
64.680	-115.534	08-Apr-03	37	overflow			0				0		0
64.719	-115.521	08-Apr-03	38		114	1	115	40	35	3	38		193
64.379	-114.979	09-Apr-03	40	6 wolves			0				0		0
64.421	-114.987	09-Apr-03	50	wolf kill			0				0		0
64.414	-114.950	09-Apr-03	51		153	5	158	47	29	6	35		240
63.405	-114.290	11-Apr-03	53		0		0	0	0	5	5		5
63.763	-114.052	11-Apr-03	54		19	0	19	4	6	4	10		33

APPENDIX C: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 8-14 April 2003.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALES TOTAL	YEARLINGS TOTAL	TOTAL
63.792	-114.042	11-Apr-03	55		22	1	23	8	5	0	5		36
63.792	-114.042	11-Apr-03	55		7	1	8	0	0	0	0		8
63.797	-114.028	11-Apr-03	56		8	1	9	4	1	0	1		14
63.797	-114.028	11-Apr-03	56		13	0	13	5	3	1	4		22
63.797	-114.028	11-Apr-03	56		5	0	5	0	0	0	0		5
63.797	-114.028	11-Apr-03	56		7	0	7	1	0	0	0		8
63.996	-114.106	11-Apr-03	57		18	0	18	2	2	0	2		22
64.310	-114.527	11-Apr-03	58		3	0	3	1	0	0	0		4
64.352	-114.688	11-Apr-03	59		72	4	76	18	8	1	9		103
64.355	-114.703	11-Apr-03	60		7	2	9	1	1	0	1		11
64.412	-114.946	11-Apr-03	62		29	2	31	7	3	5	8		46
64.412	-114.946	11-Apr-03	62		70	7	77	25	17	3	20		122
64.426	-114.948	11-Apr-03	61		68	2	70	15	22	8	30		115
64.409	-114.952	11-Apr-03	63		110	2	112	29	21	0	21		162
64.435	-115.008	11-Apr-03	64		24	1	25	4	7	2	9		38
64.467	-115.095	11-Apr-03	66		57	1	58	10	16	1	17		85
64.459	-115.096	11-Apr-03	67		28	1	29	11	4	2	6		46
64.493	-115.150	11-Apr-03	68	wolf kill			0				0		0
64.719	-115.521	11-Apr-03	69		148	10	158	51	46	3	49		258
64.739	-115.504	11-Apr-03	72		58	0	58	22	6	0	6		86
64.782	-115.525	11-Apr-03	73	overflow	139	6	145	37	25	4	29		211
64.787	-115.508	11-Apr-03	74		51	1	52	30	7	0	7		89
64.799	-115.471	11-Apr-03	75		15	0	15	1	6	4	10		26
64.801	-115.453	11-Apr-03	76		220	9	229	51	30	6	36		316
64.797	-115.477	11-Apr-03	77	overflow with caribou			0				0		0
64.893	-115.642	11-Apr-03	78	wolf kill	43	1	44	7	7	5	12		63
64.926	-115.612	11-Apr-03	79		524	9	533	91	120	9	129		753
64.950	-115.643	11-Apr-03	80	7 wolves			0				0		0
64.995	-115.801	11-Apr-03	81		79	6	85	28	18	1	19		132
64.943	-115.720	11-Apr-03	83	wolf kill			0				0		0
64.935	-115.732	11-Apr-03	84	wolf kill			0				0		0
64.712	-115.975	11-Apr-03	85	wolf kill	51	1	52	11	6	0	6		69
64.674	-115.995	11-Apr-03	86	1 wolf			0				0		0
64.596	-116.064	11-Apr-03	87	overflow			0				0		0
64.597	-116.083	11-Apr-03	88	wolf kill			0				0		0
64.518	-115.992	11-Apr-03	89	wolf kill			0				0		0
64.479	-115.817	11-Apr-03	90	2 wolves			0				0		0
64.425	-115.429	11-Apr-03	91	wolf kill			0				0		0
64.418	-115.273	11-Apr-03	93	overflow			0				0		0

APPENDIX C: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 8-14 April 2003.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALES TOTAL	YEARLINGS TOTAL	TOTAL
64.421	-115.238	11-Apr-03	94	wolf kill			0				0		0
64.225	-114.970	11-Apr-03	96	wolf kill			0				0		0
64.161	-114.955	11-Apr-03	97	wolf kill			0				0		0
63.555	-114.859	12-Apr-03	1		0	0	0	0	0	8	8		8
64.008	-115.091	12-Apr-03	2	7 wolves	7	0	7	1	0	0	0		8
64.040	-115.102	12-Apr-03	3		6	0	6	0	2	0	2		8
64.047	-115.086	12-Apr-03	4		62	1	63	16	10	0	10		89
64.099	-115.041	12-Apr-03	5		17	0	17	2	4	3	7		26
64.131	-115.014	12-Apr-03	6		28	1	29	9	2	0	2		40
64.132	-114.997	12-Apr-03	7		2	0	2	0	3	9	12		14
64.133	-114.977	12-Apr-03	8		171	9	180	39	57	8	65		284
64.193	-114.999	12-Apr-03	9		0	0	0	0	0	6	6		6
64.293	-115.026	12-Apr-03	11		7	2	9	4	1	5	6		19
64.297	-115.017	12-Apr-03	12		12	1	13	6	0	0	0		19
64.365	-115.077	12-Apr-03	13		34	4	38	12	4	0	4		54
64.404	-115.134	12-Apr-03	14		76	3	79	24	14	2	16		119
64.449	-115.503	12-Apr-03	15		104	5	109	21	33	5	38		168
64.454	-115.571	12-Apr-03	16		58	1	59	4	9	0	9		72
64.451	-115.583	12-Apr-03	17		27	0	27	10	7	9	16		53
64.473	-115.665	12-Apr-03	18		19	1	20	3	0	0	0		23
64.461	-115.816	12-Apr-03	19		45	1	46	13	10	4	14		73
64.439	-115.899	12-Apr-03	22		0	0	0	0	3	7	10		10
64.443	-115.921	12-Apr-03	23		49	0	49	20	5	1	6		75
64.438	-115.897	12-Apr-03	24		0	0	0	0	3	7	10		10
64.382	-116.029	12-Apr-03	26		2	0	2	0	7	27	34		36
64.293	-116.286	12-Apr-03	27		68	2	70	18	14	2	16		104
64.305	-116.231	12-Apr-03	28		60	1	61	19	3	0	3		83
64.289	-116.249	12-Apr-03	29		22	2	24	7	2	0	2		33
64.271	-116.178	12-Apr-03	30		55	0	55	16	5	0	5		76
64.423	-116.349	12-Apr-03	31		23	2	25	8	0	0	0		33
64.522	-116.138	12-Apr-03	32		16	0	16	3	1	0	1		20
64.497	-116.093	12-Apr-03	33		5	0	5	1	5	3	8		14
64.488	-115.951	12-Apr-03	34		46	1	47	18	9	10	19		84
64.471	-115.812	12-Apr-03	37		30	1	31	11	8	4	12		54
64.477	-115.773	12-Apr-03	39		55	2	57	24	10	2	12		93
64.396	-115.595	12-Apr-03	40		74	2	76	20	47	20	67		163
64.388	-115.517	12-Apr-03	41		152	2	154	31	65	10	75		260
64.231	-115.491	12-Apr-03	44		0	0	0	0	0	7	7		7
63.367	-115.231	12-Apr-03	45		0	0	0	0	0	3	3		3

APPENDIX C: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 8-14 April 2003.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALES TOTAL	YEARLINGS TOTAL	TOTAL
64.053	-115.285	14-Apr-03	2		2	0	2	0	3	1	4		6
64.094	-115.297	14-Apr-03	3		3	15	18	17	10	0	10		45
64.083	-115.311	14-Apr-03	4		4	8	12	9	9	0	9		30
64.107	-115.343	14-Apr-03	5		5	14	19	4	1	0	1		24
64.151	-115.236	14-Apr-03	6		6	4	10	4	5	0	5		19
64.219	-115.273	14-Apr-03	7		7	0	7	1	12	0	12		20
64.222	-115.264	14-Apr-03	8		8	0	8	1	9	0	9		18
64.347	-115.507	14-Apr-03	9		9	68	77	33	7	0	7		117
64.399	-115.596	14-Apr-03	11		11	6	17	8	2	1	3		28
64.409	-115.599	14-Apr-03	12		12	17	29	4	1	1	2		35
64.415	-115.627	14-Apr-03	13		13	18	31	7	0	1	1		39
64.399	-116.707	14-Apr-03	14		14	3	17	1	0	0	0		18
64.426	-115.666	14-Apr-03	18		18	89	107	26	8	2	10		143
64.894	-116.808	14-Apr-03	22		22	7	29	2	2	1	3		34
64.829	-116.912	14-Apr-03	23		23	1	24	1	1	0	1		26
64.746	-116.864	14-Apr-03	24		24	5	29	0	0	0	0		29
64.726	-116.801	14-Apr-03	25		25	21	46	4	0	0	0		50
64.690	-116.739	14-Apr-03	26		26	17	43	4	1	1	2		49
64.650	-116.643	14-Apr-03	27		27	0	27	2	5	0	5		34
64.566	-116.946	14-Apr-03	28		28	7	35	3	4	0	4		42
64.556	-116.956	14-Apr-03	29		29	15	44	8	12	0	12		64
64.496	-116.579	14-Apr-03	30		30	43	73	0	0	1	1		74
64.421	-116.291	14-Apr-03	31		31	29	60	11	1	0	1		72
64.432	-115.968	14-Apr-03	32		32	85	117	67	8	0	8		192
64.491	-115.815	14-Apr-03	33		33	72	105	25	6	1	7		137
64.561	-115.682	14-Apr-03	35		35	15	50	2	0	1	1		53
64.568	-115.687	14-Apr-03	36		36	56	92	14	1	2	3		109
64.239	-115.630	14-Apr-03	38		38	0	38	2	2	0	2		42
64.155	-115.984	14-Apr-03	39		39	5	44	3	0	0	0		47
64.008	-116.106	14-Apr-03	40		40	28	68	1	7	0	7		76
63.699	-115.782	14-Apr-03	41	wolverine	41	0	41	0	1	0	1		42
63.663	-115.697	14-Apr-03	42		42	0	42	0	3	0	3		45
63.331	-115.332	14-Apr-03	44		44	0	44	0	8	0	8		52

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
62.98791	-113.492	25-Mar-04	1						1	8	9		9
63.03054	-113.084	25-Mar-04	2	moderate tracks							0		0
63.04902	-113.081	25-Mar-04	3	moderate tracks							0		0
63.06316	-113.08	25-Mar-04	5						3	1	4		4
63.06399	-113.101	25-Mar-04	6		20		20				0		20
63.11838	-113.045	25-Mar-04	8		4		4	1			0		5
63.23768	-113.024	25-Mar-04	9		9		9				0		9
63.29889	-112.756	25-Mar-04	11	wolf kill			0				0		0
63.29564	-112.55	25-Mar-04	12	wolverine			0				0		0
63.28834	-112.503	25-Mar-04	14		4	1	5	1			0		6
63.33921	-112.2	25-Mar-04	15	no sign			0				0		0
63.4077	-112.07	25-Mar-04	16		20		20				0		20
63.67604	-111.759	25-Mar-04	18	no sign			0				0		0
63.42598	-112.657	25-Mar-04	19	scattered fresh tracks			0				0		0
63.25971	-113.172	25-Mar-04	20	2 wolf kills			0				0		0
63.23425	-113.185	25-Mar-04	21		16		16	3			0		19
63.46346	-114.231	26-Mar-04	1	50+ caribou			0				0		0
63.46446	-114.231	26-Mar-04	2	30+ caribou			0				0		0
63.5619	-114.196	26-Mar-04	3	no sign			0				0		0
63.62935	-114.188	26-Mar-04	4	10+ caribou			0				0		0
64.50033	-115.022	26-Mar-04	6	no sign			0				0		0
64.26476	-114.936	26-Mar-04	7	scattered fresh tracks			0				0		0
64.2191	-114.985	26-Mar-04	9		30		30	1	3		3		34
64.23563	-115.003	26-Mar-04	11	wolf kill	22	2	24	3	1		1		28
64.21147	-114.994	26-Mar-04	12		5		5	1			0		6
64.23526	-114.911	26-Mar-04	13	scattered fresh tracks			0				0		0
64.17523	-114.97	26-Mar-04	14	wolf kill			0				0		0
64.14736	-114.971	26-Mar-04	15		9	1	10	4	1		1	3	18
64.13316	-114.977	26-Mar-04	16		262	4	266	37	39	1	40		343
64.13179	-114.992	26-Mar-04	18		67	3	70	11	1		1		82
64.14455	-115.017	26-Mar-04	19		119	2	121	20	16	3	19		160
64.1267	-115.04	26-Mar-04	20		78	3	81	14	4		4		99
64.1183	-115.042	26-Mar-04	21		48		48	7	2		2		57
64.1111	-115.054	26-Mar-04	22		23	2	25	14			0		39
64.11394	-115.067	26-Mar-04	23		91	1	92	12	7	2	9	2	115
64.11787	-115.115	26-Mar-04	24	wolf kill			0				0		0
64.05268	-115.179	26-Mar-04	25		9		9	2	1	3	4		15
64.02395	-115.195	26-Mar-04	26		34		34				0		34
63.95894	-115.245	26-Mar-04	27		20		20	2	4		4		26
63.93569	-115.28	26-Mar-04	28		5		5	1			0		6
63.78984	-115.517	26-Mar-04	29		19	1	20	4	3	6	9		33
63.73954	-115.562	26-Mar-04	30		16		16	3	6		6		25
63.72467	-115.581	26-Mar-04	31		26	1	27	3	5	1	6		36
63.72795	-115.603	26-Mar-04	32		13		13	2	6	2	8		23
63.7165	-115.535	26-Mar-04	33		25		25	1	4	2	6		32
63.73009	-115.534	26-Mar-04	34		14		14	2			0		16
63.72844	-115.541	26-Mar-04	35		22		22	2	1		1		25

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
63.64885	-115.643	26-Mar-04	36		22		22	2			0		24
64.14989	-115.013	26-Mar-04	37		35	1	36	7	38	3	41		84
64.2548	-115.136	26-Mar-04	38	gut piles, hunters, animals			0				0		0
64.21798	-114.909	26-Mar-04	39		20	1	21	5	1		1	1	28
64.09936	-114.633	26-Mar-04	40				0			4	4		4
64.08638	-114.46	26-Mar-04	41		50	1	51	5		1	1		57
64.02531	-114.387	26-Mar-04	42	20 gut piles			0				0		0
64.03137	-114.465	26-Mar-04	43		22		22	2	2		2		26
63.87361	-113.924	27-Mar-04	46	moderate old use			0				0		0
63.82819	-113.974	27-Mar-04	47		22	1	23	4			0		27
63.71323	-114.27	27-Mar-04	48	scattered fresh. Moderate old			0				0		0
63.73035	-114.692	27-Mar-04	49	scattered fresh. Moderate old			0				0		0
63.74736	-114.74	27-Mar-04	50	wolf kill			0				0		0
63.74981	-114.835	27-Mar-04	51		54	4	58	6	21	4	25		89
63.70661	-115.028	27-Mar-04	52	scattered fresh. Moderate old			0				0		0
63.6808	-115.155	27-Mar-04	53	no sign			0				0		0
63.77754	-115.292	27-Mar-04	54	scattered fresh tracks			0				0		0
63.80157	-115.22	27-Mar-04	55		7		7		2		2		9
63.94724	-115.067	27-Mar-04	56	moderate old use			0				0		0
64.00989	-115.147	27-Mar-04	57		4		4	4			0		8
64.03806	-115.149	27-Mar-04	59		179	5	184	19	68		68		271
64.04005	-115.158	27-Mar-04	60	Heavy trails			0				0		0
64.07627	-115.154	27-Mar-04	61	Heavy trails			0				0		0
64.07715	-115.154	27-Mar-04	62	Heavy trails			0				0		0
64.13095	-115.174	27-Mar-04	63	Heavy trails			0				0		0
64.26567	-115.183	27-Mar-04	64	50+ caribou			0				0		0
64.27909	-115.176	27-Mar-04	65	10+ caribou			0				0		0
64.36751	-114.645	27-Mar-04	66	3 wolves			0				0		0
64.46857	-115.059	27-Mar-04	67	scattered fresh tracks			0				0		0
64.4847	-115.739	27-Mar-04	68	wolf kill			0				0		0
64.38617	-115.661	27-Mar-04	69	wolverine			0				0		0
64.31092	-115.579	27-Mar-04	70	scattered fresh tracks			0				0		0
64.29022	-115.512	27-Mar-04	71	wolf			0				0		0
64.27262	-115.486	27-Mar-04	72		43		43	6	3		3		52
64.1544	-115.532	27-Mar-04	73		36	3	39	5	2		2		46
64.15249	-115.534	27-Mar-04	74		47	6	53	15	1		1		69
64.13834	-115.539	27-Mar-04	75		5		5	2			0		7
64.12987	-115.533	27-Mar-04	76		14		14	5	2	1	3		22
64.07285	-115.537	27-Mar-04	78		1	1	2				0		2
64.07019	-115.48	27-Mar-04	79		51	2	53	13	26	13	39		105
64.08332	-115.475	27-Mar-04	80		7		7	4	4	1	5		16
64.09447	-115.441	27-Mar-04	81		9	1	10	2	1	5	6		18
64.10175	-115.417	27-Mar-04	82		5	1	6	1	2	2	4		11
64.1118	-115.416	27-Mar-04	83		18		18				0		18
64.11665	-115.394	27-Mar-04	84		4		4	1	2		2		7
64.11895	-115.367	27-Mar-04	85		12		12	3			0		15
64.13921	-115.336	27-Mar-04	86		32	3	35	8	1		1		44

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
64.10853	-115.333	27-Mar-04	87		8	1	9	1	2		2		12
64.11308	-115.327	27-Mar-04	88		38	3	41	9	2	1	3		53
64.1121	-115.319	27-Mar-04	89		8		8	2			0		10
64.11756	-115.292	27-Mar-04	90		17	1	18	4	10	2	12		34
64.12079	-115.284	27-Mar-04	91		37		37	5	3		3		45
64.09019	-115.296	27-Mar-04	92		108	1	109	16	3		3		128
64.07883	-115.302	27-Mar-04	93		129	3	132	24	37	2	39		195
64.14137	-115.227	27-Mar-04	95	50+ caribou			0				0		0
64.10893	-115.215	27-Mar-04	96	50+ caribou			0				0		0
64.08335	-115.202	27-Mar-04	97	<50+ caribou			0				0		0
64.0454	-115.19	27-Mar-04	98	50+ caribou			0				0		0
64.00851	-115.167	27-Mar-04	99	scattered fresh tracks			0				0		0
63.91309	-115.116	27-Mar-04	100	moderate old use			0				0		0
63.74049	-115.029	27-Mar-04	101	scattered fresh tracks			0				0		0
63.7085	-114.99	27-Mar-04	102		1	1	2	1	4		4		7
63.58532	-114.918	27-Mar-04	103	50+ caribou			0				0		0
63.54793	-114.894	27-Mar-04	104	50+ caribou			0				0		0
63.54341	-114.904	27-Mar-04	105		1	1	2		10	5	15	1	18
63.54238	-114.886	27-Mar-04	106				0			5	5		5
63.53745	-114.874	27-Mar-04	107	50-100 caribou			0				0		0
63.51354	-114.862	27-Mar-04	108	Eagle. No sign			0				0		0
63.23235	-114.74	27-Mar-04	109	scattered fresh tracks			0				0		0
63.06457	-114.812	28-Mar-04	110				0		3	5	8		8
63.08555	-114.806	28-Mar-04	111				0			9	9		9
63.14066	-114.797	28-Mar-04	112	kill site - lynx			0				0		0
63.16594	-114.788	28-Mar-04	113		3		3		3		3		6
63.47092	-114.229	28-Mar-04	114		2	1	3				0		3
63.48565	-114.215	28-Mar-04	118		3		3		3	4	7		10
63.51229	-114.21	28-Mar-04	119		9		9	6	1		1		16
63.53571	-114.175	28-Mar-04	120		92	4	96	25	11	4	15		136
63.5346	-114.163	28-Mar-04	121		79	2	81	27	6		6		114
63.54222	-114.158	28-Mar-04	122		10		10	3	7		7		20
63.54323	-114.15	28-Mar-04	123		2	4	6	3			0		9
63.55207	-114.205	28-Mar-04	124		22	1	23	5	5		5		33
63.55845	-114.23	28-Mar-04	125	2 wolf kills			0				0		0
63.58436	-114.159	28-Mar-04	126		7		7		4	2	6		13
63.58011	-114.14	28-Mar-04	127		4		4		1	4	5		9
63.59168	-114.118	28-Mar-04	128		17		17	3	3		3		23
63.59997	-114.16	28-Mar-04	129		4	1	5	1			0		6
63.60984	-114.169	28-Mar-04	130	wolf kill, wolverine, wolf			0				0		0
63.60886	-114.144	28-Mar-04	131		14	1	15	7			0		22
63.61145	-114.121	28-Mar-04	132		12	1	13	5	5		5		23
63.61687	-114.111	28-Mar-04	133	wolf kill			0				0		0
63.62719	-114.128	28-Mar-04	134		51	1	52	12	10		10		74
63.62148	-114.131	28-Mar-04	135		40	2	42	14	16	3	19		75
63.63224	-114.145	28-Mar-04	136	wolf kill			0				0		0
63.62819	-114.181	28-Mar-04	137		103		103	30	63	5	68		201

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
63.62601	-114.182	28-Mar-04	138		113	1	114	26	15		15		155
63.62937	-114.211	28-Mar-04	139		45		45	15	28	5	33		93
63.62835	-114.216	28-Mar-04	140		33	1	34	2			0		36
63.63444	-114.201	28-Mar-04	142		235		235	50	92	2	94		379
63.638	-114.199	28-Mar-04	144		149	2	151	42	69		69		262
64.04112	-114.811	28-Mar-04	145	gut piles <10			0				0		0
64.06519	-114.986	28-Mar-04	146	Heavy trails and caribou			0				0		0
64.08982	-115.056	28-Mar-04	147	15 ravens, 1 caribou			0				0		0
64.11947	-115.064	28-Mar-04	148	<50 caribou			0				0		0
64.13459	-115.064	28-Mar-04	149	wolf kill			0				0		0
64.14996	-115.053	28-Mar-04	150	<50 caribou, killsite			0				0		0
64.31475	-115.016	28-Mar-04	151	<50 caribou			0				0		0
64.13451	-115.106	28-Mar-04	152		43		43	12	3	2	5		60
64.13238	-115.087	28-Mar-04	153		38	1	39	9			0		48
64.13135	-115.082	28-Mar-04	154		121		121	10	19		19		150
64.10695	-115.029	28-Mar-04	155		30		30	8	3	3	6		44
64.11435	-115.025	28-Mar-04	156		73		73	13	6		6		92
64.12026	-114.997	28-Mar-04	157		54	3	57	11	5		5		73
64.12368	-114.985	28-Mar-04	159		117	2	119	20	21	3	24		163
64.12778	-114.969	28-Mar-04	161		88	1	89	16	52	2	54		159
64.12822	-114.947	28-Mar-04	162		4		4				0		4
64.12421	-114.93	28-Mar-04	163		39		39	10	1		1		50
64.11089	-114.913	28-Mar-04	164		24		24	4			0		28
64.09857	-115.02	28-Mar-04	165		72	2	74	12	6	5	11		97
64.08286	-115.02	28-Mar-04	166		71	2	73	13	4		4		90
64.07307	-115.023	28-Mar-04	167		15	1	16	2	2		2		20
64.05384	-115.037	28-Mar-04	168		94	1	95	14	24		24		133
64.05193	-115.038	28-Mar-04	169		23		23	3			0		26
64.04374	-115.079	28-Mar-04	170				0		1	1	2		2
64.02846	-115.094	28-Mar-04	171		18		18	7	5		5		30
64.02799	-115.097	28-Mar-04	172		30	2	32	6	2		2		40
64.02752	-115.131	28-Mar-04	173		24	2	26	8	6		6		40
64.02837	-115.158	28-Mar-04	174		35		35	2	2		2		39
63.99592	-115.212	28-Mar-04	175		27	1	28				0		28
63.98637	-115.233	28-Mar-04	176		69	1	70	14	1		1		85
63.9765	-115.231	28-Mar-04	177		46	2	48	2	4		4		54
63.96588	-115.19	28-Mar-04	178	3 wolves			0				0		0
63.96866	-115.239	28-Mar-04	179		36	1	37	6	26		26		69
64.01486	-115.449	28-Mar-04	180				0	2	4	12	16		18
64.02364	-115.445	28-Mar-04	181		19		19	6	2		2		27
64.02863	-115.472	28-Mar-04	182		16		16	3	9	13	22		41
64.05168	-115.512	28-Mar-04	183				0			3	3		3
64.0624	-115.409	28-Mar-04	184	Heavy trails			0				0		0
64.08627	-115.348	28-Mar-04	185		33	3	36	7	2		2		45
64.1617	-115.38	28-Mar-04	186		37	1	38	11	2		2		51
64.1591	-115.385	28-Mar-04	187		14		14	5	2	1	3		22
64.14586	-115.363	28-Mar-04	188		26	1	27	6	4		4		37

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
64.08752	-115.392	28-Mar-04	189		18		18	1			0		19
64.04913	-115.388	28-Mar-04	190		12	2	14	2			0		16
63.95955	-115.541	28-Mar-04	191	no sign			0				0		0
63.77417	-115.535	28-Mar-04	192		27		27	6	2	2	4		37
63.42288	-115.464	28-Mar-04	193		9		9	4	2		2		15
63.41829	-115.375	28-Mar-04	194	5 wolves			0				0		0
63.41127	-115.355	28-Mar-04	195		4		4	4	5	2	7		15
63.40984	-115.339	28-Mar-04	196		1		1	10	3	15	18		29
63.40356	-115.327	28-Mar-04	197				0	1			0		1
63.71383	-116.201	28-Mar-04	198				0			3	3		3
63.26324	-115.217	28-Mar-04	199	1 wolf			0			4	4		4
63.21371	-115.226	28-Mar-04	200				0			1	1		1
63.20749	-115.215	28-Mar-04	201	1 wolf			0			9	9		9
63.19928	-115.218	28-Mar-04	202				0		1	17	18		18
63.16672	-115.235	28-Mar-04	203				0		1	11	12		12
63.13718	-115.298	28-Mar-04	204				0			29	29		29
62.71516	-112.468	29-Mar-04	206		3		3	3	3	2	5		11
62.71234	-112.431	29-Mar-04	207				0		2	3	5		5
62.71837	-112.338	29-Mar-04	208		9		9	2	15	1	16		27
62.70548	-112.325	29-Mar-04	210		47	3	50	11	26	26	52		113
62.69259	-112.299	29-Mar-04	211		8		8	3	1	2	3		14
62.70526	-112.267	29-Mar-04	212		13	1	14	3	1		1		18
62.7308	-112.239	29-Mar-04	213		7	1	8	1	1		1		10
62.72632	-112.178	29-Mar-04	214				0		2	9	11		11
62.71423	-112.181	29-Mar-04	215		2		2	2	2		2		6
62.72928	-112.153	29-Mar-04	216		5		5	1	1		1		7
62.72128	-112.119	29-Mar-04	217		17	1	18	6			0		24
62.71228	-112.109	29-Mar-04	218		15		15	5	2	7	9		29
62.70234	-112.096	29-Mar-04	219		1		1			4	4		5
62.69963	-112.105	29-Mar-04	220		17	2	19	6	2		2		27
62.70113	-112.083	29-Mar-04	221		6		6	3	2	1	3		12
62.69919	-112.072	29-Mar-04	222		6		6	3			0		9
62.68855	-112.061	29-Mar-04	223		22		22	9	6		6		37
62.67271	-112.044	29-Mar-04	224		9		9	2	5	2	7		18
62.67328	-112.019	29-Mar-04	225		5		5	2	2	3	5		12
62.69677	-112.026	29-Mar-04	226	20 caribou			0				0		0
62.74695	-112.003	29-Mar-04	227	20 caribou			0				0		0
62.77227	-112	29-Mar-04	228	50 caribou			0				0		0
62.78997	-111.998	29-Mar-04	229	20 caribou			0				0		0
62.80647	-111.996	29-Mar-04	230	10 caribou			0				0		0
62.82629	-111.98	29-Mar-04	231	wolf kill			0				0		0
62.80617	-111.955	29-Mar-04	232	10 caribou			0				0		0
62.79902	-111.939	29-Mar-04	233		5		5	4	4	20	24		33
62.77219	-111.897	29-Mar-04	234		2		2	4			0		6
62.76438	-111.871	29-Mar-04	235		3	1	4	2	1		1		7
62.76295	-111.855	29-Mar-04	236		4		4		3		3	1	8
62.75883	-111.858	29-Mar-04	237		9		9	2	1		1		12

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
62.74469	-111.857	29-Mar-04	239		1		1		3		3		4
62.71282	-111.83	29-Mar-04	240	wolverine			0				0		0
62.67948	-111.824	29-Mar-04	241				0		1	8	9		9
62.6755	-111.814	29-Mar-04	242		7	1	8				0		8
62.66739	-111.83	29-Mar-04	243		2		2	2	2	4	6		10
62.65106	-111.84	29-Mar-04	244		33	2	35	12	7	3	10		57
62.62972	-111.828	29-Mar-04	245		9		9	1			0	1	11
62.62171	-111.829	29-Mar-04	246				0		3	4	7		7
62.60647	-111.817	29-Mar-04	247		13	1	14	10	10	5	15		39
62.59701	-111.809	29-Mar-04	248		2		2	2			0		4
62.58753	-111.8	29-Mar-04	249		11	1	12	5	6	1	7		24
62.58387	-111.805	29-Mar-04	250		4		4				0		4
62.57602	-111.773	29-Mar-04	251				0			1	1		1
62.60864	-111.664	29-Mar-04	252		1		1		2	1	3		4
62.57097	-111.729	29-Mar-04	253		5		5				0		5
62.57944	-111.713	29-Mar-04	254		6		6	2	6	4	10		18
62.58167	-111.698	29-Mar-04	255	2 wolves			0				0		0
62.59157	-111.68	29-Mar-04	256		2		2	1	3	8	11		14
62.58789	-111.671	29-Mar-04	257		8		8	1	2	5	7		16
62.59281	-111.698	29-Mar-04	258		12		12	1	3	6	9		22
62.58384	-111.707	29-Mar-04	259		5		5	2			0		7
62.56852	-111.671	29-Mar-04	260		5		5	1	8	7	15		21
62.55969	-111.64	29-Mar-04	261		4		4	2			0		6
62.5685	-111.58	29-Mar-04	262		5		5	1			0		6
62.55915	-111.472	29-Mar-04	263		18		18	3	3		3		24
62.66538	-111.214	29-Mar-04	264	wolf kill			0				0		0
62.66879	-111.226	29-Mar-04	265	wolverine			0				0		0
62.37443	-110.534	29-Mar-04	266	scattered fresh tracks			0				0		0
62.356	-109.776	29-Mar-04	267	scattered fresh tracks			0				0		0
62.34804	-109.726	29-Mar-04	268	50+ caribou in trees @ collar	1	1	2	2			0		4
62.35047	-109.669	29-Mar-04	269		3		3	1			0		4
62.34589	-109.673	29-Mar-04	270		17		17	3			0		20
62.34481	-109.631	29-Mar-04	271		33		33	15	9		9		57
62.33621	-109.624	29-Mar-04	272		7		7	2	6		6		15
62.3293	-109.61	29-Mar-04	273		2		2	1			0		3
62.34563	-109.582	29-Mar-04	274		8		8	3			0		11
62.35393	-109.606	29-Mar-04	275		31	3	34	13	2		2		49
62.35808	-109.623	29-Mar-04	277		10	1	11	2			0		13
62.37351	-109.64	29-Mar-04	278		34	1	35	8			0		43
62.37219	-109.62	29-Mar-04	279				0			2	2		2
62.29701	-109.64	29-Mar-04	280				0		1	4	5		5
62.27545	-109.619	29-Mar-04	281		14		14	7	6	7	13		34
62.27112	-109.572	29-Mar-04	282				0			4	4		4
62.259	-109.591	29-Mar-04	283				0		3		3		3
62.25542	-109.576	29-Mar-04	284	100+ in trees	16	1	17	7	4	1	5		29
62.35287	-109.505	29-Mar-04	285		20		20	6	6	1	7		33
62.42754	-109.473	29-Mar-04	287				0			1	1		1

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
62.43603	-109.454	29-Mar-04	288		2		2				0		2
62.4352	-109.447	29-Mar-04	289		1	1	2				0	1	3
62.44793	-109.589	29-Mar-04	290		2		2				0		2
62.28854	-110.08	29-Mar-04	292	moderate old use			0				0		0
62.2497	-109.804	29-Mar-04	293	wolverine and gut piles			0				0		0
62.23658	-109.658	29-Mar-04	295		5		5	6	5	7	12		23
62.23937	-109.661	29-Mar-04	296		14		14	6	5	5	10		30
62.24452	-109.641	29-Mar-04	297		1		1	1			0		2
62.2681	-109.646	29-Mar-04	298		10		10	6	4	6	10		26
62.26002	-109.659	29-Mar-04	299		13	1	14	13	2		2		29
62.26145	-109.676	29-Mar-04	300		2	1	3	3	1	6	7		13
62.3111	-109.799	29-Mar-04	301	wolverine			0				0		0
62.25232	-110.289	29-Mar-04	302	scattered fresh tracks			0				0		0
62.31502	-110.263	29-Mar-04	303		26		26	7	3	1	4		37
62.31901	-110.274	29-Mar-04	304		4		4	2			0		6
62.36877	-110.54	29-Mar-04	305	scattered fresh tracks			0				0		0
62.47297	-110.093	29-Mar-04	306	scattered fresh tracks			0				0		0
62.48176	-110.012	29-Mar-04	307		6		6	3			0		9
62.86586	-109.322	30-Mar-04	308	wolf kill			0				0		0
62.99635	-109.945	30-Mar-04	309	scattered fresh tracks			0				0		0
62.99609	-110.086	30-Mar-04	312	wolf kill			0				0		0
63.00479	-110.304	30-Mar-04	313	no sign			0				0		0
62.89319	-110.998	30-Mar-04	314	moderate old use			0				0		0
62.81295	-111.357	30-Mar-04	315	moderate old use			0				0		0
62.89034	-111.769	30-Mar-04	316	moderate old use			0				0		0
62.94935	-111.952	30-Mar-04	317		9		9	6	2		2		17
62.97073	-112.256	30-Mar-04	318		2	1	3	2	3		3		8
62.95888	-112.287	30-Mar-04	319	wolf kill	11	1	12	2	2		2		16
62.9379	-112.309	30-Mar-04	320		14	2	16	3	7	2	9		28
62.92341	-112.307	30-Mar-04	321	30+ in trees	24	2	26	10	2		2		38
62.92072	-112.286	30-Mar-04	322		16	1	17	6	3		3		26
62.91941	-112.269	30-Mar-04	323		7		7	2	2		2		11
62.90395	-112.292	30-Mar-04	325		14	1	15	3	8		8		26
62.89017	-112.295	30-Mar-04	326		9		9	1	13	6	19		29
62.88438	-112.3	30-Mar-04	327		11		11	4			0		15
62.88067	-112.302	30-Mar-04	328		15		15	6		9	9		30
62.8757	-112.284	30-Mar-04	329		5	1	6		2	4	4		10
62.87063	-112.284	30-Mar-04	330		5		5		6		6		11
62.87043	-112.268	30-Mar-04	331		27	1	28	6			0		34
62.85131	-112.296	30-Mar-04	332		14		14	2	7	3	10		26
62.84781	-112.311	30-Mar-04	333		10		10	5	6	2	8		23
62.86151	-112.295	30-Mar-04	334		12	1	13	4	1		1		18
62.86391	-112.314	30-Mar-04	335				0		1		1		1
62.86742	-112.328	30-Mar-04	336		2		2	1	2	8	10		13
62.86738	-112.314	30-Mar-04	337		2		2	1	9		9		12
62.86921	-112.33	30-Mar-04	338		5		5	1	3		3		9
62.85019	-112.45	30-Mar-04	339	wolf kill			0			3	3		3

APPENDIX D: Observations from spring composition surveys conducted on the range of the Bathurst caribou herd, 25-30 March 2004.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	MALE TOTAL	YEARLINGS TOTAL	TOTAL
62.84061	-112.579	30-Mar-04	340	wolf kill			0				0		0
62.82213	-112.627	30-Mar-04	341				0		2	1	3		3
62.81966	-112.588	30-Mar-04	342		10		10	3	2		2		15
62.813	-112.598	30-Mar-04	343		1		1	1			0		2
62.70918	-112.639	30-Mar-04	344	wolf kill, moderate older use			0				0		0
62.6791	-112.631	30-Mar-04	345	moderate fresh tracks			0				0		0
62.66007	-112.616	30-Mar-04	346		4		4	1			0		5
62.6542	-112.642	30-Mar-04	347		6	2	8	4		6	6		18
62.61799	-112.624	30-Mar-04	348		2		2	1			0		3
62.5969	-112.613	30-Mar-04	349		2		2	5			0		7
62.58961	-112.59	30-Mar-04	350	scattered fresh tracks			0				0		0
62.56096	-112.518	30-Mar-04	351				0		1	10	11		11
62.53947	-112.449	30-Mar-04	352				0			6	6		6
62.51151	-112.411	30-Mar-04	353				0			3	3		3
62.49058	-112.427	30-Mar-04	354				0		1	5	6		6
62.46061	-112.55	30-Mar-04	355	no sign			0				0		0

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.572	-113.021	11-Nov-00	1	scattered fresh tracks						0	0		0
62.608	-112.509	11-Nov-00	2		7		7	3	3	0	3		13
62.588	-111.902	11-Nov-00	3		6		6	2	2	0	2		10
62.577	-111.823	11-Nov-00	4		3		3	3		0	0		6
62.577	-111.759	11-Nov-00	5		1		1	1		9	9		11
62.963	-110.776	11-Nov-00	6	7 wolves									
62.974	-110.646	11-Nov-00	7		1		1	2		0	0		3
62.997	-110.432	11-Nov-00	8		9		9	3	2	1	3		15
62.988	-110.229	11-Nov-00	9		2		2	2	1	0	1		5
62.914	-109.487	11-Nov-00	10	bull moose									
63.179	-107.280	11-Nov-00	11		31		31	11	1	3	4	2	48
63.174	-107.255	11-Nov-00	12	26 muskox									
63.104	-107.278	11-Nov-00	13		28		28	11	5	5	10	2	51
62.993	-107.448	11-Nov-00	14	2 muskox									
62.903	-107.610	11-Nov-00	15	10 muskox									
62.863	-107.676	11-Nov-00	16	1 muskox									
62.504	-108.423	11-Nov-00	17		12		12	5	2	1	3	1	21
62.465	-108.489	11-Nov-00	18		23		23	11	4	4	8	1	43
62.428	-108.534	11-Nov-00	19		18		18	8	3	1	4		30
62.423	-108.548	11-Nov-00	20		24		24	4	9	1	10		38
62.421	-108.600	11-Nov-00	21		1		1	0	1	0	1		2
62.411	-108.658	11-Nov-00	22		3		3	0	1	0	1		4
62.437	-108.788	11-Nov-00	23	10 wolves									
62.433	-108.798	11-Nov-00	24		18		18	5	2	2	4	2	29
62.452	-108.842	11-Nov-00	25		2		2	1		1	1	1	5
62.470	-108.871	11-Nov-00	26		2		2	2	2	0	2		6
62.490	-108.890	11-Nov-00	27		4		4	2	1	0	1		7
62.517	-108.911	11-Nov-00	28		6		6	2	1	1	2		10
62.535	-108.911	11-Nov-00	29		9		9	2	2	0	2		13
62.551	-108.894	11-Nov-00	30		26		26	10	4	5	9	2	47
62.576	-108.902	11-Nov-00	31		5		5	2	2	2	4		11
62.578	-108.922	11-Nov-00	32		0		0	0		1	1		1
62.578	-108.922	11-Nov-00	32	wolf kill									
62.587	-108.921	11-Nov-00	33		23		23	6	5	3	8	1	38
62.622	-108.974	11-Nov-00	34		0		0	0	2	0	2		2
62.028	-110.294	12-Nov-00	35	few caribou									
61.902	-110.206	12-Nov-00	36	cow moose									
61.816	-110.150	12-Nov-00	37		2		2	2	2	5	7	1	12
61.828	-110.137	12-Nov-00	38		3		3	1	1	0	1	1	6
61.831	-110.130	12-Nov-00	39		23		23	18	13	71	84	2	127
61.815	-110.052	12-Nov-00	40		2		2	1	3	5	8		11
61.809	-110.025	12-Nov-00	41		22		22	13	19	12	31	3	69
61.815	-110.020	12-Nov-00	42		64		64	32	19	31	50		146
61.816	-110.008	12-Nov-00	43		12		12	8	11	4	15		35
61.806	-109.979	12-Nov-00	44		3		3	3		1	1		7
61.812	-109.999	12-Nov-00	45		25		25	6	11	1	12	1	44
61.845	-110.025	12-Nov-00	46		48		48	14	21	19	40	3	105

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
61.849	-110.028	12-Nov-00	47		18		18	8	7	0	7		33
61.859	-109.959	12-Nov-00	48		47		47	14	6	4	10	1	72
61.856	-109.923	12-Nov-00	49		34		34	15	7	5	12	1	62
61.915	-109.965	12-Nov-00	50		11		11	5	4	3	7		23
61.938	-109.955	12-Nov-00	51		11		11	3		2	2		16
61.939	-109.947	12-Nov-00	52		3		3	1	1	0	1		5
61.949	-109.930	12-Nov-00	53		29		29	12	5	3	8	1	50
61.995	-109.905	12-Nov-00	54		3		3	1	1	0	1		5
61.754	-110.043	13-Nov-00	55	scattered fresh tracks									
61.002	-108.671	13-Nov-00	56	scattered fresh tracks									
60.929	-107.843	13-Nov-00	57		25		25	5	2	4	6		36
60.924	-107.831	13-Nov-00	58		23		23	4	1	1	2		29
60.907	-107.844	13-Nov-00	59		44		44	9	4	0	4		57
60.708	-107.543	13-Nov-00	60		10		10	2	4	0	4		16
60.686	-107.521	13-Nov-00	61		6		6	2	2	0	2		10
60.650	-107.469	13-Nov-00	62		13		13	4		0	0		17
60.631	-107.722	13-Nov-00	63		0		0	1	1	4	5		6
60.658	-107.732	13-Nov-00	64		6		6	3		0	0		9
60.670	-107.775	13-Nov-00	65		12		12	3	1	3	4		19
60.845	-107.882	13-Nov-00	66		11		11	6	2	5	7		24
60.869	-107.895	13-Nov-00	67		5		5	2	1	0	1	1	9
60.897	-107.951	13-Nov-00	68		4		4	2	2	0	2		8
60.930	-107.997	13-Nov-00	69		7		7	4		5	5		16
60.947	-108.209	13-Nov-00	70		4		4	1		8	8		13
60.984	-108.510	13-Nov-00	71		0		0	0	2	2	4		4
61.014	-108.815	13-Nov-00	72	cow moose									
62.372	-109.965	14-Nov-00	73	few caribou									
62.367	-109.733	14-Nov-00	74	bull moose									
62.301	-108.969	14-Nov-00	75	scattered fresh tracks									
62.283	-108.809	14-Nov-00	76	wolf kill									
62.255	-108.503	14-Nov-00	77		0		0	0	1	0	1		1
62.255	-108.503	14-Nov-00	77	heavy older use									
62.251	-108.446	14-Nov-00	78		2		2	1		0	0	1	4
62.247	-108.421	14-Nov-00	79	2 wolves									
62.243	-108.383	14-Nov-00	80		0		0	0		2	2		2
62.233	-108.223	14-Nov-00	81	no sign									
62.226	-108.138	14-Nov-00	82		12		12	3	7	2	9	1	25
62.206	-107.913	14-Nov-00	83		31		31	16		4	4		51
62.213	-107.920	14-Nov-00	84		10		10	4	5	2	7		21
62.213	-107.920	14-Nov-00	84	large groups in trees									
62.226	-107.882	14-Nov-00	85		9		9	6	5	4	9		24
62.231	-107.838	14-Nov-00	86		25		25	7	3	3	6	3	41
62.233	-107.824	14-Nov-00	87		11		11	5	1	1	2		18
62.218	-107.826	14-Nov-00	88	wolf and wolf kill									
62.212	-107.843	14-Nov-00	89		10		10	2	2	0	2		14
62.187	-107.837	14-Nov-00	90		3		3	2		0	0	1	6
62.160	-107.776	14-Nov-00	91		5		5	3		0	0		8

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.153	-107.765	14-Nov-00	92		20		20	2		0	0	1	23
62.144	-107.748	14-Nov-00	93		11		11	2	2	1	3		16
62.130	-107.700	14-Nov-00	94		11		11	3	4	1	5		19
62.059	-107.429	14-Nov-00	95		1		1	1		0	0		2
62.056	-107.404	14-Nov-00	96		2		2	0		0	0		2
62.048	-107.389	14-Nov-00	97		4		4	2		0	0		6
62.054	-107.367	14-Nov-00	98		10		10	2	2	0	2		14
62.036	-107.484	14-Nov-00	99		1		1	1		3	3	1	6
62.035	-107.713	14-Nov-00	100		4		4	1		2	2		7
62.058	-107.799	14-Nov-00	101		5		5	5		0	0		10
62.062	-107.811	14-Nov-00	102		13		13	7		1	1	2	23
62.097	-107.913	14-Nov-00	103		0		0	0	1	0	1		1
62.108	-107.951	14-Nov-00	104	few caribou									
62.088	-108.119	14-Nov-00	105		0		0	0		4	4		4
62.062	-108.776	14-Nov-00	106		3		3	0		0	0		3
62.295	-108.953	14-Nov-00	107		2		2	1	2	0	2		5
62.304	-108.970	14-Nov-00	108		0		0	0	1	1	2		2
62.375	-109.005	14-Nov-00	109		10		10	2		0	0		12
62.405	-109.017	14-Nov-00	110		2		2	0		0	0		2
61.869	-109.633	14-Nov-00	111		4		4	2	4	0	4		10
61.850	-109.634	14-Nov-00	112		3		3	1		1	1		5
61.821	-109.672	14-Nov-00	113		2		2	2		2	2		6
61.801	-109.730	14-Nov-00	114		9		9	5	2	1	3	4	21
61.773	-109.758	14-Nov-00	115		5		5	4		1	1		10
61.763	-109.778	14-Nov-00	116		15		15	5	17	7	24	4	48
61.766	-109.801	14-Nov-00	117		8		8	4	2	4	6		18
61.775	-109.856	14-Nov-00	118		1		1	1		0	0		2
61.779	-109.878	14-Nov-00	119		3		3	1	1	0	1		5
61.760	-109.896	14-Nov-00	120		4		4	2	2	3	5	3	14
61.760	-109.896	14-Nov-00	120	10+ caribou									
61.771	-109.980	14-Nov-00	121		6		6	1	1	3	4		11
61.759	-109.996	14-Nov-00	122		8		8	2	1	2	3	3	16
61.754	-110.007	14-Nov-00	123		2		2	0		0	0		2
61.765	-110.038	14-Nov-00	124		8		8	1	2	0	2		11
61.760	-110.062	14-Nov-00	125		2		2	1	5	3	8		11
61.758	-110.086	14-Nov-00	126		6		6	4	2	2	4		14
61.767	-110.079	14-Nov-00	127		11		11	4	5	0	5	2	22
61.769	-110.100	14-Nov-00	128		1		1	1		0	0		2
61.770	-110.126	14-Nov-00	129		1		1	1		0	0		2
61.764	-110.137	14-Nov-00	130		0		0	0	1	4	5		5
61.752	-110.144	14-Nov-00	131		1		1	3	5	7	12		16
61.741	-110.184	14-Nov-00	132		0		0	0	2	0	2		2
61.773	-110.218	14-Nov-00	133		2		2	2		0	0		4
61.779	-110.209	14-Nov-00	134	5 wolves									
61.787	-110.198	14-Nov-00	135		1		1	1	4	1	5		7
61.799	-110.191	14-Nov-00	136		16		16	6	5	1	6	2	30
61.799	-110.186	14-Nov-00	137		11		11	5	2	0	2		18

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
61.794	-110.190	14-Nov-00	138		17		17	9	8	4	12	1	39
61.791	-110.208	14-Nov-00	139		17		17	3	4	3	7		27
61.795	-110.239	14-Nov-00	140		10		10	6	1	3	4		20
61.788	-110.234	14-Nov-00	141		11		11	4	1	11	12		27
61.781	-110.226	14-Nov-00	142		7		7	4	3	2	5		16
61.765	-110.233	14-Nov-00	143		2		2	0	3	11	14	2	18
61.762	-110.264	14-Nov-00	144		0		0	0	3	0	3	1	4
61.752	-110.298	14-Nov-00	145		3		3	3	8	3	11		17
61.740	-110.320	14-Nov-00	146		4		4	1	5	18	23		28
61.815	-110.404	14-Nov-00	147		0		0	0		7	7		7
61.814	-110.399	14-Nov-00	148		18		18	7	16	8	24	1	50
61.860	-110.341	14-Nov-00	149		6		6	4	4	0	4	1	15
61.867	-110.349	14-Nov-00	150		21		21	12	14	3	17		50
61.882	-110.370	14-Nov-00	151		5		5	2	4	0	4		11
61.883	-110.382	14-Nov-00	152		21		21	10		10	10	1	42
61.891	-110.403	14-Nov-00	153		10		10	5	3	12	15		30
61.934	-110.441	14-Nov-00	154		2		2	1		0	0		3
61.936	-110.435	14-Nov-00	155		2		2	1	1	0	1		4
61.938	-110.425	14-Nov-00	156		2		2	0		0	0		2
61.944	-110.398	14-Nov-00	157		0		0	0	2	0	2		2
61.973	-110.271	14-Nov-00	158		5		5	1	2	0	2	5	13
62.018	-110.171	14-Nov-00	159		4		4	0	1	1	2		6
62.019	-110.221	14-Nov-00	160		1		1	1	2	0	2		4
62.026	-110.215	14-Nov-00	161		4		4	2	1	0	1		7
62.023	-110.219	14-Nov-00	162		4		4	2	2	2	4		10
62.027	-110.235	14-Nov-00	163		2		2	1		1	1		4
62.023	-110.253	14-Nov-00	164		0		0	0	2	1	3		3
62.013	-110.275	14-Nov-00	165		2		2	1		1	1		4
62.006	-110.289	14-Nov-00	166		1		1	1		0	0		2
62.014	-110.291	14-Nov-00	167		0		0	0	1	0	1		1
62.030	-110.285	14-Nov-00	168		13		13	5	4	0	4		22
62.032	-110.268	14-Nov-00	169		9		9	6	4	0	4		19
62.041	-110.223	14-Nov-00	170		1		1	1		0	0		2
62.048	-110.237	14-Nov-00	171		1		1	0		0	0		1
62.050	-110.247	14-Nov-00	172		20		20	6		0	0		26
62.068	-110.247	14-Nov-00	173		3		3	1		1	1		5
62.059	-110.291	14-Nov-00	174		1		1	0		0	0		1
62.058	-110.318	14-Nov-00	175		4		4	3		4	4		11
62.049	-110.315	14-Nov-00	176		0		0	0	2	0	2	1	3
62.039	-110.326	14-Nov-00	177		4		4	2	1	0	1		7
62.166	-110.715	15-Nov-00	178	scattered fresh tracks									
61.857	-110.691	15-Nov-00	179	1 caribou									
61.265	-110.792	15-Nov-00	180	scattered fresh tracks									
60.206	-108.577	15-Nov-00	182	3 caribou									
60.195	-108.497	15-Nov-00	183	heavy trails									
60.175	-108.396	15-Nov-00	184		37		37	8	10	2	12	2	59
60.157	-108.303	15-Nov-00	185		38		38	12	2	4	6		56

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
60.128	-108.196	15-Nov-00	186		3		3	2	4	3	7		12
60.132	-108.319	15-Nov-00	187		13		13	5	2	1	3		21
60.140	-108.325	15-Nov-00	188		10		10	6	3	2	5	1	22
60.146	-108.326	15-Nov-00	190		7		7	5	1	3	4		16
60.158	-108.336	15-Nov-00	191		0		0	0		1	1		1
60.171	-108.460	15-Nov-00	192		9		9	4	3	1	4	1	18
60.166	-108.522	15-Nov-00	193		33		33	15	7	6	13		61
60.156	-108.532	15-Nov-00	194		16		16	6	2	4	6		28
60.161	-108.589	15-Nov-00	195		2		2	2		0	0	1	5
60.152	-108.552	15-Nov-00	196		6		6	2	3	4	7		15
60.177	-108.500	15-Nov-00	197		17		17	7	6	5	11		35
60.184	-108.457	15-Nov-00	198		16		16	9	2	1	3		28
60.200	-108.406	15-Nov-00	199		13		13	5	4	7	11	1	30
60.200	-108.406	15-Nov-00	199	10+ in trees									
60.210	-108.384	15-Nov-00	200		43		43	20	9	2	11	1	75
60.233	-108.319	15-Nov-00	201		9		9	4	4	1	5	1	19
60.230	-108.312	15-Nov-00	202		8		8	4		0	0		12
60.242	-108.300	15-Nov-00	203		27		27	8	5	3	8	2	45
60.252	-108.289	15-Nov-00	204		14		14	3	3	6	9	1	27
60.264	-108.265	15-Nov-00	205		10		10	5	3	1	4	1	20
60.269	-108.260	15-Nov-00	206		2		2	1		0	0		3
60.276	-108.241	15-Nov-00	207		2		2		3	0	3		5
60.290	-108.242	15-Nov-00	208		3		3	2		0	0		5
60.305	-108.244	15-Nov-00	209		42		42	15	8	12	20	5	82
60.307	-108.228	15-Nov-00	210		8		8	5	7	3	10		23
60.303	-108.204	15-Nov-00	211		5		5	2	6	2	8		15
60.311	-108.207	15-Nov-00	212		3		3	3	1	1	2		8
60.315	-108.212	15-Nov-00	213		8		8	5	1	0	1	1	15
60.321	-108.210	15-Nov-00	214		13		13	8	9	5	14		35
60.327	-108.193	15-Nov-00	215		13		13	9	12	8	20	2	44
60.326	-108.204	15-Nov-00	216		13		13	3	3	1	4		20
60.322	-108.177	15-Nov-00	217		3		3	1		0	0		4
60.329	-108.163	15-Nov-00	218		32		32	15	11	11	22	3	72
60.329	-108.141	15-Nov-00	219		10		10	2	3	2	5		17
60.329	-108.128	15-Nov-00	220		38		38	19	7	3	10		67
60.332	-108.110	15-Nov-00	221		11		11	6	2	1	3		20
60.339	-108.106	15-Nov-00	222		21		21	11	7	5	12		44
60.342	-108.096	15-Nov-00	223		18		18	5	3	0	3	1	27
60.349	-108.097	15-Nov-00	224		72		72	34	10	7	17	6	129
60.386	-108.086	15-Nov-00	225		85		85	32	21	6	27	2	146
60.386	-108.086	15-Nov-00	226		83		83	28	28	5	33	8	152
60.389	-108.105	15-Nov-00	227		111		111	39	28	11	39	5	194
60.401	-108.482	15-Nov-00	228	no sign									
61.465	-109.994	15-Nov-00	229	3 caribou									
61.574	-110.057	15-Nov-00	230							5	5		5
61.720	-110.148	15-Nov-00	231	10+ caribou									
62.237	-110.319	16-Nov-00	232	10+ caribou									

APPENDIX E: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 11-15 November 2000.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.243	-110.319	16-Nov-00	233	10+ caribou									
62.230	-110.305	16-Nov-00	234	10+ caribou									
62.289	-110.398	16-Nov-00	235	cow and calf moose									
62.751	-109.086	16-Nov-00	237	scattered fresh tracks									
62.917	-109.575	16-Nov-00	238					4	2	5	7		11
62.985	-110.695	16-Nov-00	239		20		20	3		0	0		23
62.886	-111.229	16-Nov-00	240		24		24	11	1	9	10		45
62.858	-111.638	16-Nov-00	241		6		6	1	1	0	1		8
62.858	-111.638	16-Nov-00	241	no sign									
62.857	-111.743	16-Nov-00	242	scattered fresh tracks									
62.816	-112.054	16-Nov-00	243		26		26	5	7	11	18	1	50
62.800	-112.112	16-Nov-00	244	100+ caribou									
62.567	-113.709	16-Nov-00	245		1		1			0	0		1
62.570	-113.716	16-Nov-00	246		1		1			0	0		1
62.487	-114.301	16-Nov-00	247	cow moose									

APPENDIX F: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 7-14 November 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.7915	-112.5870	08-Nov-01	1		7		7	4	3	8	11		22
62.7573	-112.4199	08-Nov-01	2		21		21	11	47	40	87		119
62.8507	-112.4460	08-Nov-01	3		49	1	50	14	36	10	46		110
63.1839	-113.1168	08-Nov-01	5		47	1	48	14	25	30	55		117
63.1830	-113.1979	08-Nov-01	7		6		6	2	1	3	4		12
63.1959	-113.1988	08-Nov-01	8		21		21	9	3	1	4		34
63.3871	-112.9989	08-Nov-01	10	1 cow	35	1	36	7	5	3	8		51
63.8211	-113.0332	08-Nov-01	11		37		37	23	10	1	11		71
63.8721	-113.0627	08-Nov-01	12		155	1	156	21	29	9	38		215
63.8983	-113.3685	08-Nov-01	13		256	4	260	31	9	31	40		331
63.7692	-113.3992	08-Nov-01	14		174	3	177	46	23	13	36		259
63.7162	-113.3903	08-Nov-01	15		64	5	69	15	11	6	17		101
63.5679	-113.4423	08-Nov-01	16		48	2	50	7	22	5	27		84
63.5792	-113.4375	08-Nov-01	17	1 yg bull, 1 cow	103	2	105	31	10	16	26		162
63.3356	-113.3832	08-Nov-01	18		34		34	7	8	18	26		67
63.2382	-113.9947	10-Nov-01	19		9		9	2	5	8	13		24
63.2509	-113.9940	10-Nov-01	20		2		2	1	0	1	1		4
63.2522	-113.9883	10-Nov-01	21		2		2	1	0	3	3		6
63.2623	-114.0032	10-Nov-01	22		8		8	4	3	0	3		15
63.2623	-114.0032	10-Nov-01	22		4		4	6	6	7	13		23
63.2727	-114.0117	10-Nov-01	23		3		3	1	4	11	15		19
63.2727	-114.0117	10-Nov-01	23		7		7	4	5	3	8		19
63.2957	-113.9643	10-Nov-01	24		6		6	3	5	9	14		23
63.2957	-113.9643	10-Nov-01	24	pbull lame	10		10	6	7	3	10		26
63.4721	-113.8878	10-Nov-01	25		0		0	0	0	10	10		10
63.5082	-113.8176	10-Nov-01	26		34		34	20	16	18	34		88
63.5161	-113.8065	10-Nov-01	27		157	4	161	41	63	32	95		297
63.5363	-113.7956	10-Nov-01	28		66	3	69	12	22	6	28		109
63.6068	-113.8512	10-Nov-01	29		61	3	64	27	17	5	22		113
63.7175	-113.7202	10-Nov-01	30		22		22	8	5	7	12		42
63.7169	-113.6475	10-Nov-01	31		47	3	50	10	10	5	15		75
63.7169	-113.6475	10-Nov-01	32		32	1	33	12	3	2	5		50
63.7165	-113.6964	10-Nov-01	33		43		43	8	25	13	38		89
63.5633	-113.5764	10-Nov-01	34		42	1	43	11	11	1	12		66
63.5576	-113.4763	10-Nov-01	35	cow lame	33	1	34	8	13	8	21		63
63.6618	-113.2568	10-Nov-01	36		9		9	2		0	0		11
63.5968	-113.0975	10-Nov-01	37		38	1	39	11	4	3	7		57
63.3993	-113.3676	10-Nov-01	38		16		16	7	2	0	2		25
63.3826	-113.4066	10-Nov-01	39		9		9	6	3	1	4		19
63.3734	-113.4020	10-Nov-01	40		6		6	0	5	0	5		11
63.3411	-113.4989	10-Nov-01	41		18	1	19	7	5	3	8		34
63.3429	-113.5828	10-Nov-01	42	cow lame	11		11	3	0	0	0		14
63.2700	-113.7369	10-Nov-01	43		0		0	0	0	4	4		4
63.2709	-113.8776	10-Nov-01	44		3		3	1	2	1	3		7
63.2709	-113.8776	10-Nov-01	44		1		1	1	2	1	3		5
63.2926	-113.9409	10-Nov-01	45		4		4	2	0	0	0		6
63.2926	-113.9409	10-Nov-01	45		2		2	2	4	2	6		10

APPENDIX F: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 7-14 November 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
63.2926	-113.9409	10-Nov-01	45		0		0	0	1	2	3		3
63.3214	-114.0042	10-Nov-01	46		10		10	3	3	2	5		18
63.3751	-113.9006	10-Nov-01	47		5		5	3	2	1	3		11
63.3943	-113.8674	10-Nov-01	48		6		6	3	2	1	3		12
63.4117	-113.8376	10-Nov-01	49	calf lame	10		10	5	8	2	10		25
63.4117	-113.8376	10-Nov-01	49		12		12	7	2	4	6		25
63.4473	-113.7675	10-Nov-01	50		36		36	5	7	3	10		51
63.4642	-113.7259	10-Nov-01	51	2 cows lame	42	2	44	15	15	3	18		77
63.4703	-113.7279	10-Nov-01	52		44	1	45	15	16	11	27		87
63.4831	-113.7444	10-Nov-01	53		36		36	13	14	7	21		70
63.4815	-113.7490	10-Nov-01	54		11		11	5	3	8	11		27
63.4931	-113.7238	10-Nov-01	55		176	2	178	66	43	22	65		309
63.5143	-113.6937	10-Nov-01	56		38		38	16	7	8	15		69
63.5273	-113.7320	10-Nov-01	57		41		41	8	10	4	14		63
63.5146	-113.7514	10-Nov-01	58		28	1	29	9	12	4	16		54
63.4908	-113.8318	10-Nov-01	59	cow lame	88	2	90	28	17	9	26		144
62.6000	113.4833	14-Nov-01	60	pbull lame	0		0	0	3	6	9		9
62.6000	113.4833	14-Nov-01	60		4		4	4	0	3	3		11
62.6183	113.4250	14-Nov-01	61		0		0	0	4	1	5		5
62.6417	113.3767	14-Nov-01	62	pbull lame	5		5	4	5	5	10		19
62.6417	113.3767	14-Nov-01	62		7		7	1	6	7	13		21
62.6683	113.3800	14-Nov-01	63		11		11	7	6	25	31		49
62.6667	113.3217	14-Nov-01	64		14		14	6	5	2	7		27
62.6783	113.2167	14-Nov-01	65		2		2	2	0	0	0		4
62.6783	113.2167	14-Nov-01	65		7		7	4	1	1	2		13
62.6867	113.1533	14-Nov-01	66		10		10	5	0	0	0		15
62.6667	113.0633	14-Nov-01	67		2	1	3	2	0	0	0		5
62.6133	112.8583	14-Nov-01	68		9		9	2	5	4	9		20
62.5700	113.1900	14-Nov-01	69		3		3	3	0	0	0		6
62.5850	113.2083	14-Nov-01	70		3		3	3	0	0	0		6
62.5950	113.2367	14-Nov-01	71		5		5	2	2	0	2		9
62.6200	113.2300	14-Nov-01	72		6		6	3	0	0	0		9
62.5950	113.2367	14-Nov-01	73		5		5	2	2	0	2		9
62.5700	113.2983	14-Nov-01	74		0		0	0	0	10	10		10
62.5483	113.3500	14-Nov-01	75		15		15	3	1	2	3		21
62.5483	113.3500	14-Nov-01	75		13		13	5	4	14	18		36
62.5450	113.3483	14-Nov-01	75		11		11	1	12	13	25		37
62.5333	113.3500	14-Nov-01	75		4		4	2	0	3	3		9
62.5333	113.3500	14-Nov-01	75		3		3	2	0	0	0		5
62.5333	113.3500	14-Nov-01	75		3		3	1	1	2	3		7
62.5117	113.3200	14-Nov-01	76		18		18	8	10	12	22		48
62.4983	113.3333	14-Nov-01	77		0		0	0	4	8	12		12
62.4917	113.2650	14-Nov-01	77		0		0	0	2	0	2		2
62.5233	113.2867	14-Nov-01	78		8		8	3	2	0	2		13
62.5800	113.4300	14-Nov-01	79		7		7	5	0	0	0		12
62.5833	113.4633	14-Nov-01	80		1		1	0	1	0	1		2
62.5833	113.4633	14-Nov-01	80		0		0	0	4	2	6		6

APPENDIX F: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 7-14 November 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.6550	113.4583	14-Nov-01	81		0		0	0	3	7	10		10
62.6567	113.4267	14-Nov-01	82		24		24	7	8	20	28		59
62.6550	113.4217	14-Nov-01	83		4		4	1	0	1	1		6
62.6550	113.4217	14-Nov-01	83		2		2	1	1	4	5		8
62.6600	113.3833	14-Nov-01	84		26		26	10	9	6	15		51
62.6567	113.3667	14-Nov-01	85		79	1	80	27	14	28	42		149
62.7033	113.3650	14-Nov-01	86	calf lame	15		15	7	27	22	49		71
62.7033	113.3650	14-Nov-01	86		9		9	5	5	3	8		22
62.7050	113.3400	14-Nov-01	87		9		9	5	11	4	15		29
62.7067	113.3167	14-Nov-01	87		14		14	6	3	1	4		24
62.7167	113.3083	14-Nov-01	88		3		3	2	4	4	8		13
62.7283	113.3150	14-Nov-01	89	Ybull lame	16	1	17	7	6	11	17		41
62.7283	113.3150	14-Nov-01	90	Ybull lame	53	1	54	22	45	36	81		157
62.7383	113.3067	14-Nov-01	91		74	3	77	34	53	41	94		205
62.7400	113.2733	14-Nov-01	92		8		8	5	3	3	6		19
62.7417	113.2467	14-Nov-01	93		6		6	5	6	9	15		26
62.7517	113.2400	14-Nov-01	94		5	1	6	3	3	5	8		17
62.7650	113.2750	14-Nov-01	95		19		19	12	13	9	22		53
62.7700	113.2617	14-Nov-01	96		22	4	26	11	22	3	25		62
62.8117	113.2317	14-Nov-01	97		6		6	3	8	4	12		21
62.8250	113.2383	14-Nov-01	98		15		15	9	12	7	19		43
62.9267	113.1617	14-Nov-01	99		5		5	2	2	0	2		9
62.0383	113.0850	14-Nov-01	100		1		1	1	0	5	5		7
63.0600	113.0850	14-Nov-01	101		0		0	0	1	2	3		3
63.0733	113.0700	14-Nov-01	102		4		4	1	3	2	5		10
63.1133	113.0967	14-Nov-01	103		7	1	8	2	5	1	6		16
63.1267	113.1000	14-Nov-01	104	Ybull broken leg	0		0	0	2	6	8		8
63.1317	113.1367	14-Nov-01	105		0		0	0	3	4	7		7
63.1317	113.1367	14-Nov-01	105		1		1	2	1	1	2		5
63.1600	113.1500	14-Nov-01	106		3		3	1	1	0	1		5
63.2283	113.1050	14-Nov-01	107		4		4	2	0	2	2		8
63.2533	113.0983	14-Nov-01	108		4		4	2	1	0	1		7
62.2100	113.1750	14-Nov-01	109		7		7	3	1	0	1		11
62.2100	113.1750	14-Nov-01	109		4		4	2	4	0	4		10
63.1783	113.1867	14-Nov-01	110		3		3	1	1	0	1		5
63.1783	113.1867	14-Nov-01	110		1		1	1	0	0	0		2
63.0717	113.2383	14-Nov-01	111		2		2	1	0	0	0		3
63.0717	113.2383	14-Nov-01	111		4		4	2	3	1	4		10
63.0617	113.2517	14-Nov-01	112		7		7	4	9	1	10		21
63.0617	113.2517	14-Nov-01	112		21	1	22	4	14	3	17		43
63.0517	113.2417	14-Nov-01	113		4		4	3	0	0	0		7
63.0517	113.2417	14-Nov-01	113		2		2	2	1	3	4		8
63.0367	113.2517	14-Nov-01	114	Pbull lame	1		1	1	0	5	5		7
63.0200	113.2567	14-Nov-01	115	Cow lame	17		17	7	14	5	19		43
62.9733	113.2533	14-Nov-01	116		6	1	7	3	6	0	6		16
62.9733	113.2533	14-Nov-01	116		9	2	11	6	3	3	6		23
62.9500	113.3233	14-Nov-01	117		7		7	5	2	0	2		14

APPENDIX F: Observations from fall composition surveys conducted on the range of the Bathurst caribou herd, 7-14 November 2001.

LAT	LON	DATE	GPS	OBSERVATIONS	COWS W/ANTLER	COWS W/O ANTLER	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS W/O ANTLER	BULLS TOTAL	YEARLINGS TOTAL	TOTAL
62.9467	113.3367	14-Nov-01	118		5		5	6	3	2	5		16
62.9383	113.3233	14-Nov-01	119		2		2	2	1	0	1		5
62.9383	113.3233	14-Nov-01	119		8		8	7	0	2	2		17
62.9250	113.3150	14-Nov-01	120		8	1	9	5	7	6	13		27
62.9200	113.3100	14-Nov-01	121		2		2	2	1	0	1		5
62.9100	113.3050	14-Nov-01	122		6		6	5	0	0	0		11
62.9083	113.3217	14-Nov-01	123		6		6	6	8	6	14		26

APPENDIX G: Observations from fall composition surveys conducted on the range of teh Bathurst caribou herd, 18-22 October 2004.

LAT	LONG	DATE	WAYPOINT	COMMENTS	COWS W/ ANTLERS	COWS W/O ANTLERS	COWS TOTAL	CALVES	YOUNG BULLS	PRIME BULLS WITH ANTLER	PRIME BULLS W/O ANTLERS	BULLS TOTAL	YEARLINGS TOTAL	TOTAL CLASSIFIED
65.147	-116.409	18-Oct-04	14		4		4	4		5		5		13
65.157	-116.430	18-Oct-04	15		3		3		1	2		3		6
65.163	-116.428	18-Oct-04	33				0			2		2		2
65.155	-116.512	18-Oct-04	34		4		4	1	1	5		6		11
65.151	-116.581	18-Oct-04	35		1		1	1	2			2		4
65.159	-116.638	18-Oct-04	36		3		3	2	13	4		17		22
65.141	-116.672	18-Oct-04	37		8		8	4	2	3		5		17
65.209	-116.844	18-Oct-04	39		9		9	5	2	3		5		19
65.212	-116.889	18-Oct-04	40		7		7	3		4		4		14
65.218	-116.900	18-Oct-04	41		3	1	4	3				0		7
65.252	-116.934	18-Oct-04	42		28		28	8	9	5		14		50
65.283	-117.013	18-Oct-04	43		6		6	2	2	1		3		11
65.307	-117.024	18-Oct-04	44		15		15	5	6	8		14		34
65.292	-117.079	18-Oct-04	45		9		9	3	3	1		4		16
65.299	-117.132	18-Oct-04	46		20		20	8	1	5		6		34
65.316	-116.959	18-Oct-04	47		11		11	5	2	1		3		19
65.316	-116.947	18-Oct-04	48		7	1	8	4		2		2		14
65.318	-116.935	18-Oct-04	49		14		14	4	3	2		5		23
65.288	-116.909	18-Oct-04	50		4		4	3	1	2		3		10
65.285	-116.920	18-Oct-04	51	1 calf w/0 antler	5	1	6	5	1			1		12
65.287	-116.925	18-Oct-04	53		27		27	8	8	6		14		49
65.296	-116.880	18-Oct-04	54		5		5	2	3	1		4		11
65.304	-116.804	18-Oct-04	55		4		4	3		1		1		8
65.304	-116.802	18-Oct-04	56				0		2			2		2
65.304	-116.797	18-Oct-04	57		16		16	6	8	2		10		32
65.305	-116.798	18-Oct-04	58		10		10	3	7	4		11		24
65.291	-116.674	18-Oct-04	59	Bull with 1 antler	5		5	2	1	3		4		11
65.216	-116.653	18-Oct-04	60		42		42	14	6	12		18		74
65.205	-116.609	18-Oct-04	61		5		5		1	2		3		8
65.156	-116.447	18-Oct-04	62		6		6	3		4		4		13
65.140	-116.375	18-Oct-04	63		14		14	7	3	7		10		31
65.142	-116.360	18-Oct-04	64		12		12	6	3	5		8		26
65.186	-115.940	18-Oct-04	65				0			1		1		1
65.210	-115.887	18-Oct-04	66		51	1	52	16	9	11		20		88
62.478	-113.379	19-Oct-04	1		26		26	6	16	5		21		53
62.479	-113.378	19-Oct-04	2		43		43	11	13	7		20		74
62.480	-113.346	19-Oct-04	3		4		4	2	2			2		8
62.494	-113.353	19-Oct-04	4		44		44	14	16	11		27		85
62.563	-113.349	19-Oct-04	5		26	2	28	9	4			4		41
62.548	-113.347	19-Oct-04	6		12		12	7	4	1		5		24
62.590	-113.309	19-Oct-04	7		5		5	1	1			1	1	8
62.590	-113.308	19-Oct-04	8		6		6		5	3		8		14
62.627	-113.312	19-Oct-04	9				0			1		1		1
62.626	-113.327	19-Oct-04	10		1		1	1	2			2		4
62.654	-113.332	19-Oct-04	11		10		10	5	3	2		5		20
62.702	-113.344	19-Oct-04	12		7		7	3		3		3		13
62.702	-113.335	19-Oct-04	13		20		20	11	7	2		9		40

APPENDIX G: Observations from fall composition surveys conducted on the range of teh Bathurst caribou herd, 18-22 October 2004.

62.743	-113.300	19-Oct-04	14		4		4	3	2		2	9
62.947	-113.009	19-Oct-04	15		21		21	1	7	2	9	31
62.992	-113.166	19-Oct-04	17		13		13	8	2	1	3	24
62.993	-113.191	19-Oct-04	18		41		41	8	16	9	25	74
63.012	-113.170	19-Oct-04	19		5		5	1	2	2	4	10
63.023	-113.156	19-Oct-04	20		21		21	8	8	3	11	40
63.026	-113.146	19-Oct-04	21		13		13	1	5	4	9	23
63.037	-113.145	19-Oct-04	22		22		22	9	8	5	13	44
63.063	-113.104	19-Oct-04	23		18		18	4	7	4	11	33
63.107	-113.098	19-Oct-04	24		4		4	2			0	6
63.111	-113.102	19-Oct-04	25		14		14	4	3	2	5	23
63.131	-113.115	19-Oct-04	26		15		15	8	3	3	6	29
63.147	-113.098	19-Oct-04	27		1		1	2	1		1	4
63.299	-113.027	19-Oct-04	30		4		4	1	1		1	6
63.344	-113.228	19-Oct-04	31		9		9	4	2	1	3	16
63.342	-113.255	19-Oct-04	32		6		6	2	5	3	8	16
63.274	-113.156	19-Oct-04	34		7		7	4		1	1	12
62.897	-113.312	19-Oct-04	35		9		9	2	3	4	7	18
62.885	-113.394	19-Oct-04	36	1 lame cow	7		7	5	2	2	4	16
62.885	-113.396	19-Oct-04	37		15		15	4	4	3	7	26
62.900	-113.482	19-Oct-04	38		4		4	2	2	2	4	10
62.884	-113.519	19-Oct-04	39		13		13	3	1	1	2	18
62.878	-113.538	19-Oct-04	40		14		14	5	11	9	20	39
62.887	-113.560	19-Oct-04	41		5		5		3	2	5	10
62.898	-113.584	19-Oct-04	42		61		61	21	11	16	27	109
62.895	-113.576	19-Oct-04	43		18		18	6	12	3	15	39
62.904	-113.535	19-Oct-04	44		17		17	4	3	2	5	26
62.901	-113.530	19-Oct-04	45		8		8	3	2	1	3	14
62.913	-113.575	19-Oct-04	46		7		7	3	3	1	4	14
62.911	-113.606	19-Oct-04	47		26		26	8	4	6	10	44
62.885	-113.622	19-Oct-04	48		35		35	16	18	12	30	81
62.859	-113.635	19-Oct-04	50		29		29	9	10	9	19	57
62.840	-113.583	19-Oct-04	51		15		15	9	10	3	13	37
62.847	-113.542	19-Oct-04	52		24		24	6	9	3	12	42
62.851	-113.474	19-Oct-04	53				0			1	1	1
62.841	-113.376	19-Oct-04	54		22		22	6	5	4	9	37
62.768	-113.521	19-Oct-04	55		5		5	4	5	2	7	16
62.646	-113.216	19-Oct-04	56		9		9	3		2	2	14
62.773	-113.198	19-Oct-04	59		5		5	1	2		2	8
62.751	-113.241	19-Oct-04	60		9		9	2	3		3	14
62.725	-113.402	19-Oct-04	61		35		35	6	13	12	25	66
62.715	-113.405	19-Oct-04	62		13		13	4	3	2	5	22
63.043	-114.059	20-Oct-04	1		20	1	21	10	14	8	22	53
63.047	-114.058	20-Oct-04	2		11		11	2	3	2	5	18
63.057	-114.055	20-Oct-04	3		3		3	1	3	1	4	8
63.055	-114.075	20-Oct-04	4		24	1	25	6	8	3	11	42
63.065	-114.066	20-Oct-04	5		1		1	2	1	1	2	5
63.094	-114.014	20-Oct-04	6		8	1	9	4	3		3	16
63.102	-113.976	20-Oct-04	7		10		10	5	8	2	10	25

APPENDIX G: Observations from fall composition surveys conducted on the range of teh Bathurst caribou herd, 18-22 October 2004.

63.329	-113.859	20-Oct-04	8				0			1		1	1
63.430	-113.765	20-Oct-04	9		17	3	20	7	5	5		10	37
63.429	-113.755	20-Oct-04	10		7		7	1	2	2		4	12
63.472	-113.730	20-Oct-04	12		13		13	5	6	5		11	29
63.928	-113.518	20-Oct-04	13		1	1	2	1	1			1	4
64.134	-113.431	20-Oct-04	14		5		5	2	1	1		2	9
64.176	-113.455	20-Oct-04	16		12		12	3	4	2		6	21
64.228	-113.491	20-Oct-04	17		9		9	2	3	4		7	18
64.295	-113.597	20-Oct-04	18		57		57	7	12	12		24	88
64.336	-113.566	20-Oct-04	19	2 wolves	10	1	11	2				0	13
64.376	-113.618	20-Oct-04	21		14	3	17	1	6	6		12	30
64.359	-113.613	20-Oct-04	22		16	1	17	1	4	2		6	24
64.336	-113.586	20-Oct-04	23		73	2	75	11	14	7		21	107
64.326	-113.691	20-Oct-04	24		25	1	26	3	13	4		17	46
64.344	-113.707	20-Oct-04	25		23		23	2	7	4		11	36
64.357	-113.692	20-Oct-04	26		52	3	55	8	19	12		31	94
64.382	-113.648	20-Oct-04	27		5		5	1	3	2		5	11
64.397	-113.673	20-Oct-04	28		51	3	54	6	12	8		20	80
64.398	-113.729	20-Oct-04	29	3 calves w/o antler	495	31	526	83	149	142		291	900
64.396	-113.721	20-Oct-04	30		18	1	19	2	1			1	22
64.398	-113.701	20-Oct-04	31		16		16	1	2	2		4	21
64.403	-113.707	20-Oct-04	32	1 lame young bull	527	23	550	72	92	143		235	857
64.419	-113.841	21-Oct-04	6	1 prime bull with ripped rt flank	562	24	586	30	43	85		128	744
64.366	-114.000	21-Oct-04	7	4 wolves	1010	19	1029	134	66	171		237	1400
64.375	-113.996	21-Oct-04	8	1 calf w/o antler, collar 630	710	27	737	95	72	84	1	157	989
64.338	-113.996	21-Oct-04	10		33	2	35	4	5	5		10	49
64.332	-113.963	21-Oct-04	11		38	2	40	6	5	5		10	56
64.325	-113.985	21-Oct-04	12		34	4	38	7	3	4		7	52
64.311	-114.002	21-Oct-04	13		8		8	4	2	0		2	14
64.307	-114.032	21-Oct-04	14		12		12	2	5	1		6	20
64.269	-114.057	21-Oct-04	15		43		43	11	5	8		13	67
64.282	-113.925	21-Oct-04	16		8		8	2	2			2	12
64.309	-113.868	21-Oct-04	17		29		29	2	2	4		6	37
64.381	-113.937	21-Oct-04	18		338	11	349	42	39	39		78	469
64.402	-113.967	21-Oct-04	19		37	1	38	4	9	1		10	52
64.419	-113.934	21-Oct-04	20		3		3	1	2			2	6
64.431	-113.871	21-Oct-04	21		140	3	143	8	20	24		44	195
64.422	-113.874	21-Oct-04	22		83	3	86	8	12	12		24	118
64.412	-113.899	21-Oct-04	23		10		10	0	1			1	11
64.389	-113.897	21-Oct-04	24		35	3	38	5	8	7		15	58
64.362	-113.706	21-Oct-04	25		44	1	45	3	5	7		12	60
64.358	-113.615	21-Oct-04	28	8 wolves on bull carcass	1		1	1				0	2
64.283	-113.995	21-Oct-04	29		16		16	4	7	1		8	28
64.382	-114.404	22-Oct-04	1		8		8	2	6	1		7	17
64.366	-114.411	22-Oct-04	2		11		11	4	4	7		11	26
64.364	-114.286	22-Oct-04	3		3		3	3	2			2	8
64.361	-114.259	22-Oct-04	4	1 calf w/o antler	61	3	64	17	13	15		28	109
64.372	-114.274	22-Oct-04	5		13	1	14	5	2	4		6	25
64.373	-114.275	22-Oct-04	6		74		74	3	9	13		22	99

APPENDIX G: Observations from fall composition surveys conducted on the range of teh Bathurst caribou herd, 18-22 October 2004.

64.367	-114.247	22-Oct-04	7		13		13		4	1	5	18
64.369	-114.229	22-Oct-04	8		32		32	5	7	8	15	52
64.378	-114.246	22-Oct-04	9		4	1	5	2	3		3	10
64.376	-114.270	22-Oct-04	10		34	1	35	2	11	2	13	50
64.376	-114.283	22-Oct-04	11		20	1	21	5	4	6	10	36
64.400	-114.268	22-Oct-04	12		24	2	26	9	10	1	11	46
64.407	-114.245	22-Oct-04	13		377	18	395	58	78	82	160	613
64.411	-114.124	22-Oct-04	14		135	5	140	14	15	17	32	186
64.424	-114.106	22-Oct-04	15		192	9	201	12	22	14	36	249
64.446	-114.045	22-Oct-04	16				0			1	1	1
64.367	-113.994	22-Oct-04	19				0			1	1	1
64.209	-113.922	22-Oct-04	22		66	3	69	15	7	10	17	101
64.167	-113.938	22-Oct-04	23		6		6	2	2	1	3	11
64.150	-113.915	22-Oct-04	24		20	1	21	3	4	5	9	33
64.230	-113.802	22-Oct-04	28		8		8	1	3		3	12
64.131	-114.326	22-Oct-04	29		36		36	10	5	5	10	56
64.133	-114.322	22-Oct-04	30		42	1	43	6	4	4	8	57
64.140	-114.351	22-Oct-04	31		4		4		2		2	6
64.142	-114.393	22-Oct-04	32		46	2	48	15	10	7	17	80
64.136	-114.468	22-Oct-04	33		29		29	9	8	7	15	53
64.130	-114.476	22-Oct-04	34		3	1	4		1	1	2	6
64.129	-114.496	22-Oct-04	35		29	2	31	10	11	9	20	61
64.079	-114.600	22-Oct-04	36		24	2	26	10	5	6	11	47
64.065	-114.639	22-Oct-04	37		101	4	105	40	27	22	49	194
64.059	-114.620	22-Oct-04	38		108	3	111	39	22	18	40	190
64.065	-114.563	22-Oct-04	39		1		1	1			0	2
64.082	-114.539	22-Oct-04	40		16		16	4	4	2	6	26
64.094	-114.433	22-Oct-04	41	1 calf w/o antler	54	3	57	17	10	2	12	86
64.064	-114.422	22-Oct-04	42		153	5	158	30	36	19	55	243
64.080	-114.399	22-Oct-04	43		15	2	17	5		9	9	31
64.087	-114.421	22-Oct-04	44	2 wolves	17		17	3	3	4	7	27
64.092	-114.403	22-Oct-04	45		32		32	10	2	7	9	51
63.131	-113.834	22-Oct-04	46		10		10	4	1	2	3	17
63.141	-113.819	22-Oct-04	47		7		7	5		1	1	13
63.140	-113.859	22-Oct-04	48		11	1	12	7	2	3	5	24
63.006	-113.963	22-Oct-04	49		1		1	1			0	2
62.999	-113.947	22-Oct-04	50		5		5	3	2	2	4	12
62.987	-113.948	22-Oct-04	51		6		6	4		2	2	12
62.980	-113.934	22-Oct-04	52		11	2	13	7	2	3	5	25
62.972	-113.963	22-Oct-04	53		22	3	25	12	3	10	13	50
62.945	-114.036	22-Oct-04	55		7		7	3	1	2	3	13
62.940	-114.058	22-Oct-04	56		5		5	3	1	3	4	12