Satellite Collaring and Calf Survival in the Bathurst Herd of Barren-ground Caribou 2003-2005

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2013

Manuscript Report No. 228

ABSTRACT

The co-management plan for the Bathurst herd of barren-ground caribou (*Rangifer tarandus groenlandicus*) requires monitoring calf survival, movements and seasonal distribution. To monitor movements and seasonal distribution, Environment and Natural Resources (ENR) tries to maintain between 10 and 20 satellite collars on cows. In March 2003, ten cows were fit with satellite collars that had automatic drop-offs programmed for 15 September 2004. In October 2004, we flew reconnaissance surveys before capturing and fitting ten barren-ground caribou with satellite collars. In March 2005 we aimed to collar a further ten Bathurst cows and ten cows from the Ahiak herd. After fixed-wing reconnaissance flights to cover the possible winter ranges of the Bathurst and neighbouring herds (Bluenose-East, Bluenose-West, Cape Bathurst and Ahiak), we spread the capture and collaring of ten caribou from the Lac Grandin area southeast to Gordon Lake. We also caught and collared five cows at Nonacho Lake and five east of Artillery Lake. Based on the distribution of the collared cows in June 2005, we assigned the satellite collared cows to different herds based on their return to traditional calving grounds. From the distribution of collared cows, in June 2005, the distribution of the Bathurst and Bluenose-East herds overlapped in the area of Lac Grandin north to Great Bear Lake. Also Ahiak herd and Bathurst herd overlapped their winter ranges at Nonacho Lake. Measured calf-cow ratios were low (mean was 14 calves:100 cows) which is consistent with the poor calf survival during summer 2004. Extrapolated summer temperatures and wind were used to develop an index of insect harassment severity. Information from hunter harvest samples revealed that pregnancy rates were low to moderate across the winter range in March 2005. If the lower than average pregnancy rate and low calf survival persist, the Bathurst herd is unlikely to reverse its current decline in abundance.

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INTRODUCTION

Monitoring the distribution and health of the Bathurst herd of barren-ground caribou (*Rangifer tarandus groenlandicus*) includes monitoring distribution using satellite collars (Bathurst Caribou Co-management Planning Committee 2004). The objective for this collaring study was to annually maintain between ten and 20 cows fitted with satellite collars. Previous reports on collaring of the Bathurst herd between 1996 and 2002 have been filed (Gunn et al. 2001, Gunn and D'Hont 2002, Boulanger et al. 2004). This report describes caribou collaring between 2003 and 2005 (Figure 1).

In October 2004 and March 2005, caribou distribution was mapped during fixed-wing aircraft reconnaissance surveys before capturing and fitting cows with satellite collars. The October 2004 reconnaissance surveys were to locate caribou collared between 2002-2004 that were fitted with drop-off mechanisms that released in mid-September 2004. The March 2005 surveys were to cover the Bathurst herd's winter range and the western winter range of the Ahiak herd. In March 2005, we coordinated with the Sahtu and Inuvik regions, who were also mapping caribou distribution in preparation for collaring caribou. Their intent was to fit 10 satellite and 50 VHF collars in each of the Bluenose-East, Bluenose-West and Cape Bathurst herds (J. Nagy pers. comm. 2005). Neighbouring barren-ground caribou herds can, in some winters, overlap their ranges (Heard 1984, Gunn and D'Hont 2002). The March 2005 reconnaissance surveys and collaring were also an opportunity to describe, if any, winter range overlap.

Barren-ground caribou occur as geographic populations (herds) that are defined from the fidelity of cows to specific calving grounds (Thomas 1969). The June distribution of calving cows is the criteria used to determine which herd is using which winter range.

The management plan for the Bathurst herd refers to monitoring trends in calf survival (Bathurst Caribou Co-management Planning Committee 2004). Previous reports have noted a decline in calf:cow ratios and calf survival calculated from the calf:cow ratios in late winter and fall 2000-2004 compared to 1985-95 (Williams and Fournier 1996, Gunn et al. 2005a). Monitoring calf survival gives a basis for interpreting changes in herd size and, when combined with the survival of the satellite collared cows, is a method to estimate trend in herd size and measure the numbers of breeding females (Gunn et al. 2005b).

A decline in calf:cow ratios can be caused by an increase in calf deaths, a change in pregnancy rates, or both. Distinguishing between the two effects contributes to diagnosing causes of declines. Pregnancy rates for adult Porcupine herd cows averaged 81% (71 – 92%) and rates were similar during the herd's size increase and decrease, although more variable during the decrease (Griffith et al. 2002). In other herds, such as the Nelchina herd and the Western Arctic herd, both pregnancy rates and summer calf survival decreased as the herd size decreased (ADFG 2001).

There have not been enough collars in the Bathurst herd to use them to determine whether cows calved or not as a measure of pregnancy rates. Another method to measure pregnacy rates is during community-based monitoring of harvested caribou (Lyver and Gunn 2004). Experienced hunters rate the condition of the caribou as well as whether the cows are pregnant.

An alternative approach to index pregnancy rates is to determine the proportion of cows during calving that have velvet antler growth. Barren cows shed their antlers in April and their new antler growth highly visible in June. In contrast, pregnant cows retain their antlers until calving and new antler growth is only visible as antler buttons until later in June. In the Western Arctic herd, the June cow:calf ratio negatively correlated with the proportion of cows with velvet antlers (Alaska Department of Fish and Game 2001).

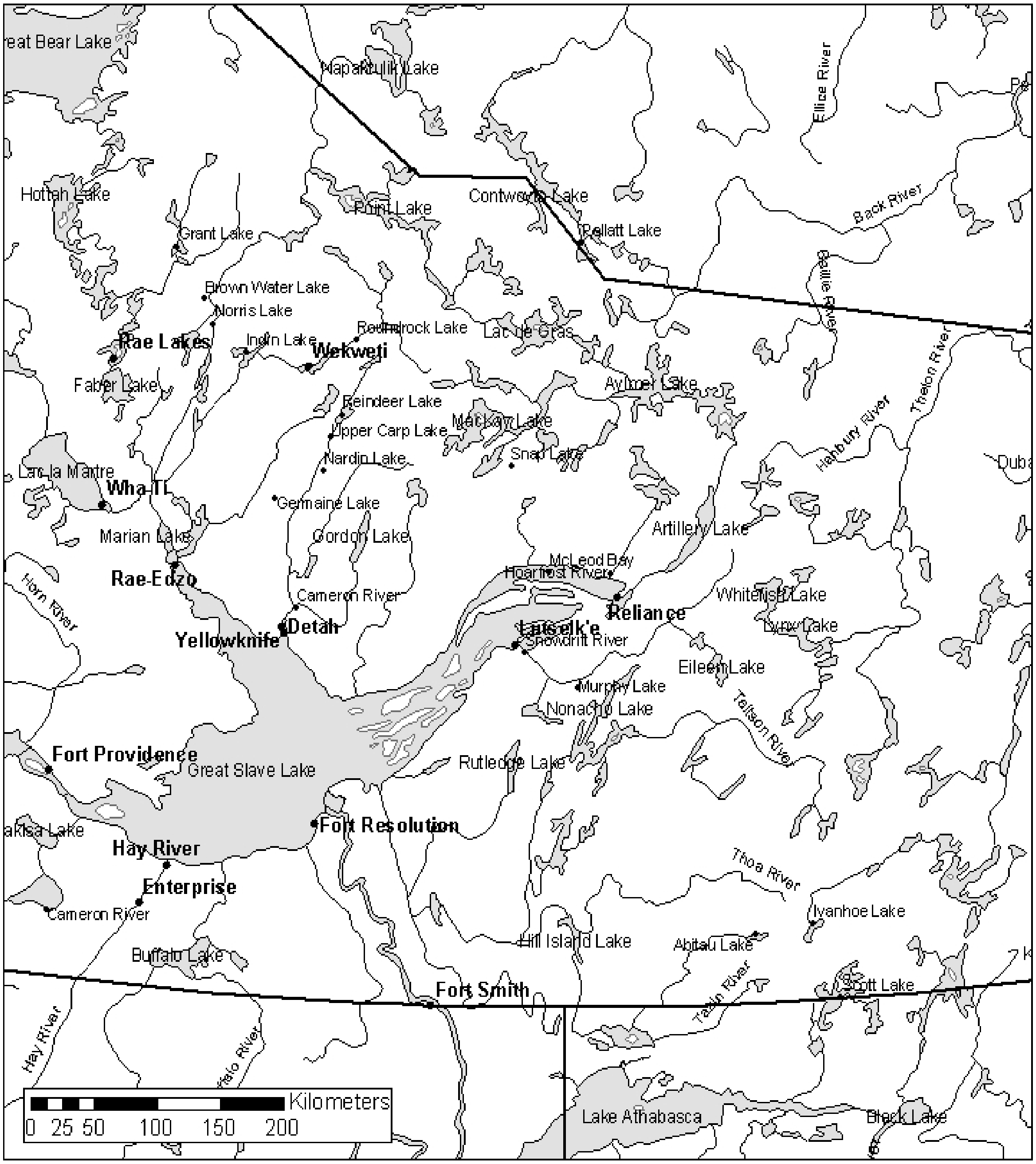

Figure 1: Study area for spring and fall collaring and sex age composition surveys conducted on the Bathurst caribou range, Northwest Territories, 2003-2005.

This report brings together the March 2003, October 2004 and March 2005 collaring effort, and the reconnaissance surveys in October 2004 and March 2005 on the seasonal ranges of the Bathurst and its neighbouring herds. We also discuss overlap in winter ranges and herd identity. The identification of seasonal ranges of the Bluenose-

East herd is partly based on 1998-2001 satellite collar data from a Sahtu Renewable Resources Board funded project. (Appendix A).

This report updates the trend in calf survival using data collected in April 2005. Calf survival has recently been reported to be low during the summer (Gunn et al. 2005a) and as part of the diagnosis for reasons for the low calf survival we examined environmental conditions during the summer.

METHODS

Pregnancy rates June 2004: In June 2004, as cows were leaving the calving grounds, we sampled as many groups as possible to determine the proportion of cows with velvet buttons, no visible growth and conspicuous velvet growth (visually categorized less than ¼, ½, ¾ the length of the ear and greater than the length of the ear). By waiting until cows left the calving ground, the barren cows will have reached the calving ground and mixed into the large groups. We also noted the presence of calves, yearlings, young bulls and prime bulls.

Pregnancy rates winter 2004-05: Hunters recorded whether caribou cows were pregnant and based on their experience, rated caribou condition as excellent, good, poor, or very poor. Warble burden was rated as Low (0-30), Medium (30-60), and High (60+). The hunters measured the depth of back fat and reported the presence of hydatid cysts, Besnoitia and other health conditions.

Collaring: To map caribou distribution, we used a fixed-wing aircraft to fly relatively systematically placed transects covering as large an area as possible. Once caribou distribution was mapped, a capture crew on a Hughes 500D helicopter used a hand held net-gun and a handler to capture and collar caribou cows. Capture and handling followed the Standard Operating Protocol from Environment and Natural Resources' Animal Care Committee. We designated the herd identity for each collared cow based on its location from the mid-June 2005 calving ground location.

Calf survival April 2005: We used a helicopter to search for caribou groups across the distribution mapped from reconnaissance flights flown the preceding week. We classified small groups 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 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 followed standard criteria to classify caribou as cows, calves, young or prime bulls (Williams and Fournier 1996). We recorded wolves and wolf kills expressed as a sighting rate of wolves/1000 hours flown (Williams and Fournier 1996).

Insect harassment index: We worked with John Lee to use Environment Canada’s weather data to apply Russell et al.’s (1993) index for insect harassment to the Bathurst herd’s summer range. Russell et al. (1993) developed an index of insect abundance based on wind speed (m/s) and temperature (°C). The model was derived by sampling mosquitoes (Culicidae) and then also applied to oestrid flies (nasal bot flies, *Cephenemyia trompe* and warble flies, *Hypoderma tarandi)* at different wind speeds and temperatures. The index ranged from 0 to 1, with 1 being the highest. Gunn et al*.* (2001) concluded that the daily minimum wind speed and the mean daily air temperature were highly correlated to the insect index.

We only had weather data for the southern part of the caribou range from 1996. Hourly weather records for Yellowknife from 2004 and 2005, and Ekati, Daring Lake, and Lupin for the years 1996 to 2005 were obtained through Environment Canada and Aurora Wildlife Research (2305 Annable Rd., Nelson, BC V1L 6K4). The files were reformatted and daily mean temperature and minimum wind speeds were determined for each site for the period 1 June to 15 September.

A separate mosquito and osterid index for each tundra site (Ekati: 64^{o} 42' 110^{o} 36'; Lupin: 65^{o} 45' 111^{o} 15', and Daring Lake: 64^{o} 52' 111^{o} 35') was calculated annually for every day between 1 June through 15 September, inclusive. The daily indices for the three sites were then averaged to yield a single daily mosquito and osterid index for that day. The first and last day of each year where the index was above zero determined the length of the season.

Weather records for years prior to 1996 were consistently available only for the northern part of the summer range. Hourly weather records for Contwoyto Lake, NWT

(Lupin: 65^{o} 45'N, 111^{o} 15'W) from the period 1957 to 2005 were obtained from the Meteorological Service of Canada (Environment Canada). The files were reformatted and the daily mean temperature and minimum daily wind speed were determined. Using those data, a mosquito and osterid index for Lupin was calculated for each day between 1 June and 15 September (107 days) inclusive, for each of the 49 years from 1957 to 2005. The first and last day of each year where the index was above zero defined the length of the insect season.

Using the index, the eight indicators of insect intensity listed below were evaluated to estimate the annual severity of insect harassment over the June to September sampling period:

1. Mean index for days where the index was > 0
2. Number of days where the index was > 0
3. Number of days where the index was > 0.75
4. Number of days where the index was > 0 and those days were consecutive
5. Number of days where the index was > 0.75 and those days were consecutive
6. Frequency of groups of consecutive days where osterid index was > 0
7. Number of days in the two longest groups of consecutive days where the index was > 0
8. Length of insect season

Because the sample period of 107 days was constant over years and weather data was available for each day, the actual number of days was used for indicators 2 to 5 rather than a percentage. Indicators 4 to 7 attempted to capture that effect.

Mosquitoes and osterids were considered separately as caribou react differently to them. The mean and 75% confidence intervals of each indicator were calculated for mosquitoes and osterids. Values above the upper limit were given an indicator score of 3, those below the lower limit were scored as 1, and those within the limits were scored as 2. The indicator scores within each year were summed as the annual score. This score could range from a maximum of 24 to a minimum of 8. The mean of the annual scores was determined and the 75% confidence interval calculated. Years with a score above the upper limit were rated as high, those below the lower limit were low and the remaining years were rated as medium.

Statistical Analyses

Following Gunn et al. 2005, calf:cow ratios were estimated as the total number of calves divided by the total number of cows and yearling females, and bootstrap analysis was used to estimate variances. A weighted least squares regression (Kleinbaum and Kupper 1978) was used to detect trends in calf:cow ratios.

RESULTS

Collaring March 2003: A capture crew flew to the vicinity of four existing satellite collars northwest of Colomac and deployed nine collars between 18 and 22 March 2003 (Figure 2, Appendix A). There were three other 2001 and 2002 collared cows (62, 14 and 90), which were beyond the range of the capture crew's helicopter. Also, those three Bathurst collared cows were wintering on ranges overlapping the known winter ranges of the Bluenose-East herd (Nagy et al. 2005).

In March 2003 we deployed a tenth collar (07) near cow 92 (collared in October 1998) south of Délîne; although the area is usually considered Bluenose-East winter range (R. Popko pers. comm.). The subsequent movement of collar 07 to the Bluenose-East calving grounds in June 2003 and 2004 was not unexpected. She migrated with the Bathurst collar 92 until 17 May 2004 when collar 92 continued northeast while 07 changed direction to northwest. Collared cow 92 then either likely died or had a collar failure.

Based on the subsequent locations of the nine March 2003 collars by June 2003, three were Bluenose-East (07, 53 and 14) and six were Bathurst cows. The following June 2004, cows 07, 53 and 14 again returned to the Bluenose-East calving ground and the surviving five of the six Bathurst cows returned to the Bathurst herd's calving ground.

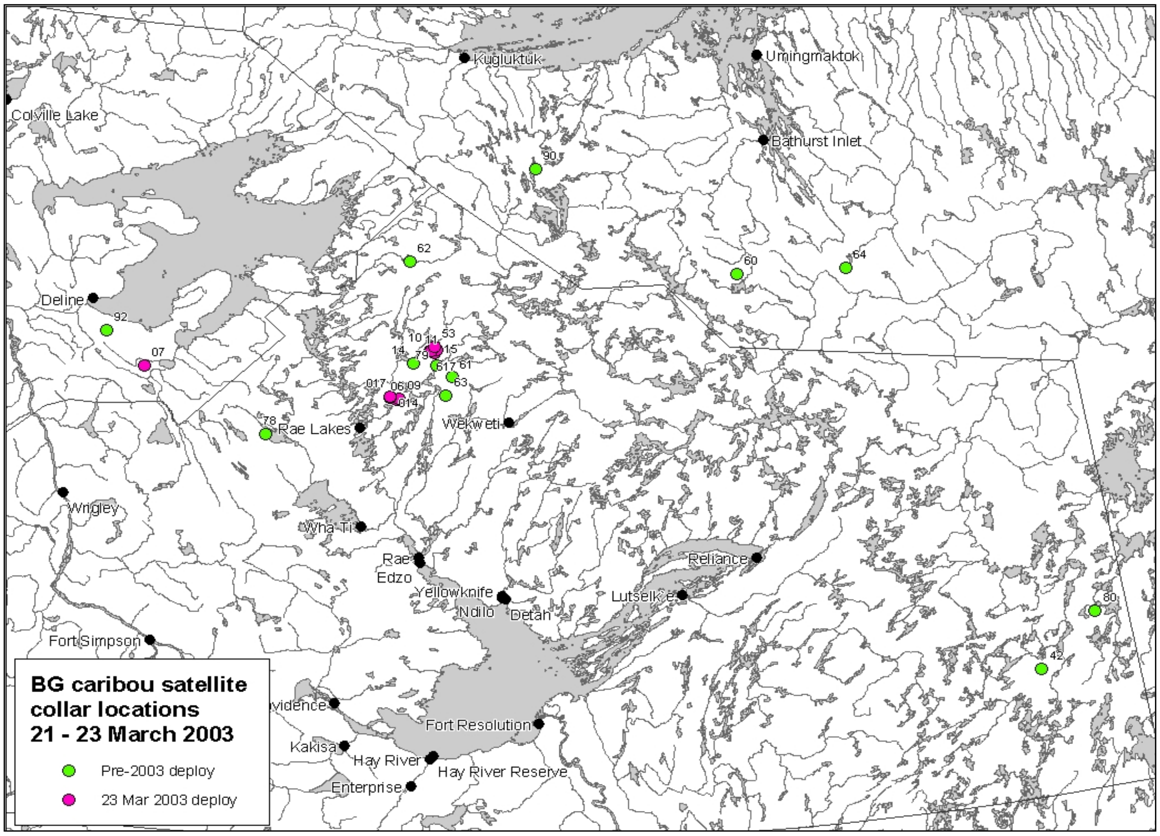

Figure 2: Locations for the pre-2003 collars and the 2003 collar deployments, 23 March, 2003, NWT and Nunavut.

Pregnancy rates June 2004: The antler status and sex-age class of 7,281 caribou in 139 sampling sites were classified between 23 and 26 June, 2004 (Appendix E). The overall ratio of calves to total cows was 0.54 and a total of 4,444 cows were counted. The ratio of calves to breeding cows was 0.57.

Most cows (94%) did not have either hard antlers or much new growth. Cows (n=197) with velvet buds were 5% of total cows seen and together with cows with hard antlers (n=205), cows with no antlers (n=3,729), and cows with no antlers and distended udder (n=60), totalled 4,191 cows. This suggests that the percentage of breeding cows was notably high or there were some non-breeding cows missed. Cows with hard antlers were 5% of all cows which suggests that some calves had only been born a few days before (which is one to two weeks late). We noticed some conspicuously smaller than average calves.

Collaring October 2004: A reconnaissance survey (7,546 km), with a Husky aircraft, was flown between 6 and 17 October 2004 (Figure 3). The first flight on 6 October found the tail end of a large caribou movement southwest of Snap Lake, moving southwest. On 10 October, a large migration of caribou that approached the north end of Gordon Lake from the east was found. Most caribou passed north of Gordon Lake (14 October) to Reindeer Lake area (16 October). In the area of Reindeer Lake, we collared seven caribou (Figure 3, Appendix C). The lead edge of the movement and thousands of caribou filing across Roundrock Lake were observed (20 October). Gunn et al. (2005a) reported on the caribou movements in a report on calf survival in October 2004.

A smaller movement of caribou (low thousands) had turned south at the north end of Gordon Lake and followed the east shore south, feeding heavily in the sedge areas along the shoreline and Cameron River. Two cows southeast of Gordon Lake were collared from this movement.

In October 2004, caribou were collared either in grassy areas along rivers and lake edges or small muskegs. The larger lakes were mostly not frozen and although smaller lakes were ice-covered, the snow cover on the ice was incomplete and only a few centimeters deep. The capture crew only pursued and caught caribou on the grassy areas.

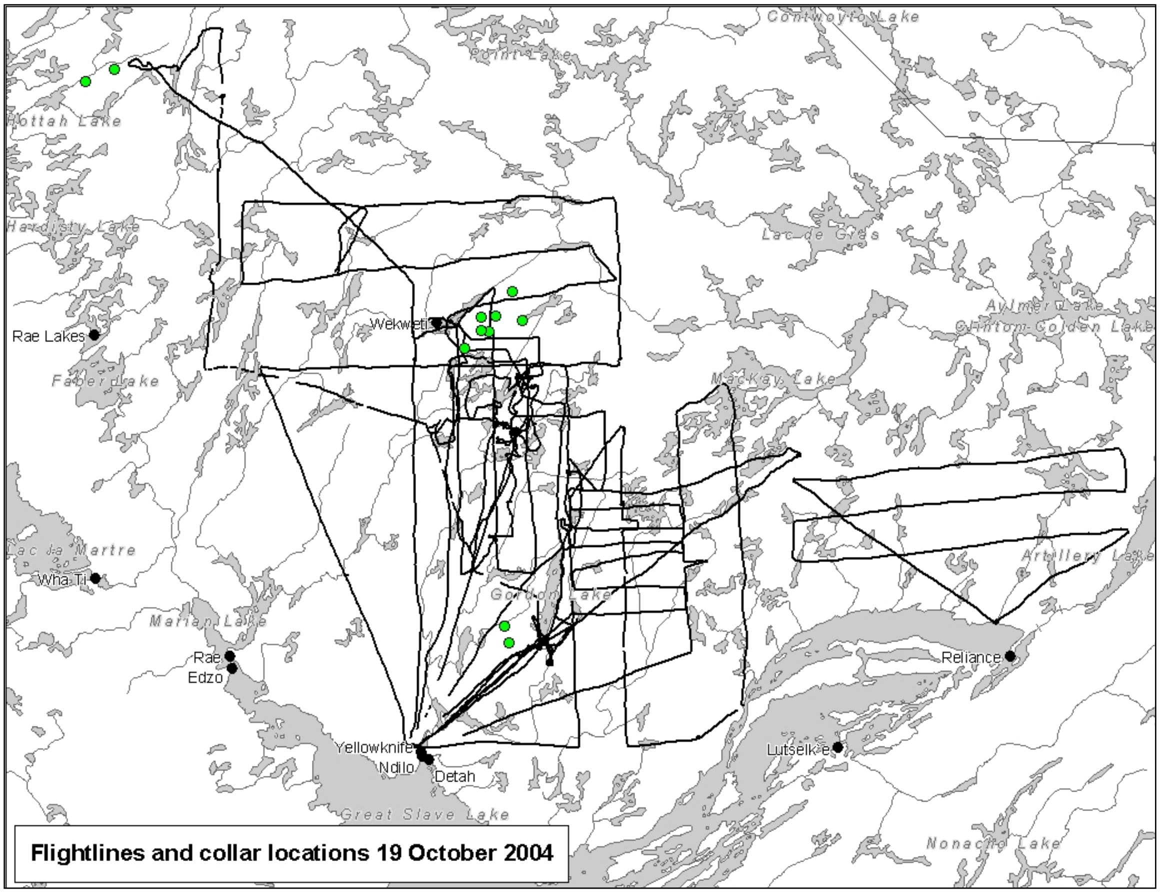

Figure 3: Flight lines for aerial reconnaissance and collaring locations, NWT, October 2004.

By June 2005, of the nine cows collared south of Wekweètì in October 2004, three died during the winter and six migrated to the Bathurst herd's calving grounds.

Collaring March 2005: Transects spaced at approximately 25 km intervals were flown during a reconnaissance survey, 16-25 March, 2005, (10,878 km) in a Helio-Courier aircraft (Figure 4, Appendix B). The Sahtu regional ENR staff covered the area west of Lac La Martre (Richard Popko pers. comm. 2005). They had reported large numbers of caribou near Lac Grandin, which was also the location of a collared Bathurst herd cow 06 (collared October 2004). As a result, we extended the reconnaissance flight to Lac Grandin (Figure 4) to gauge the relative caribou densities.

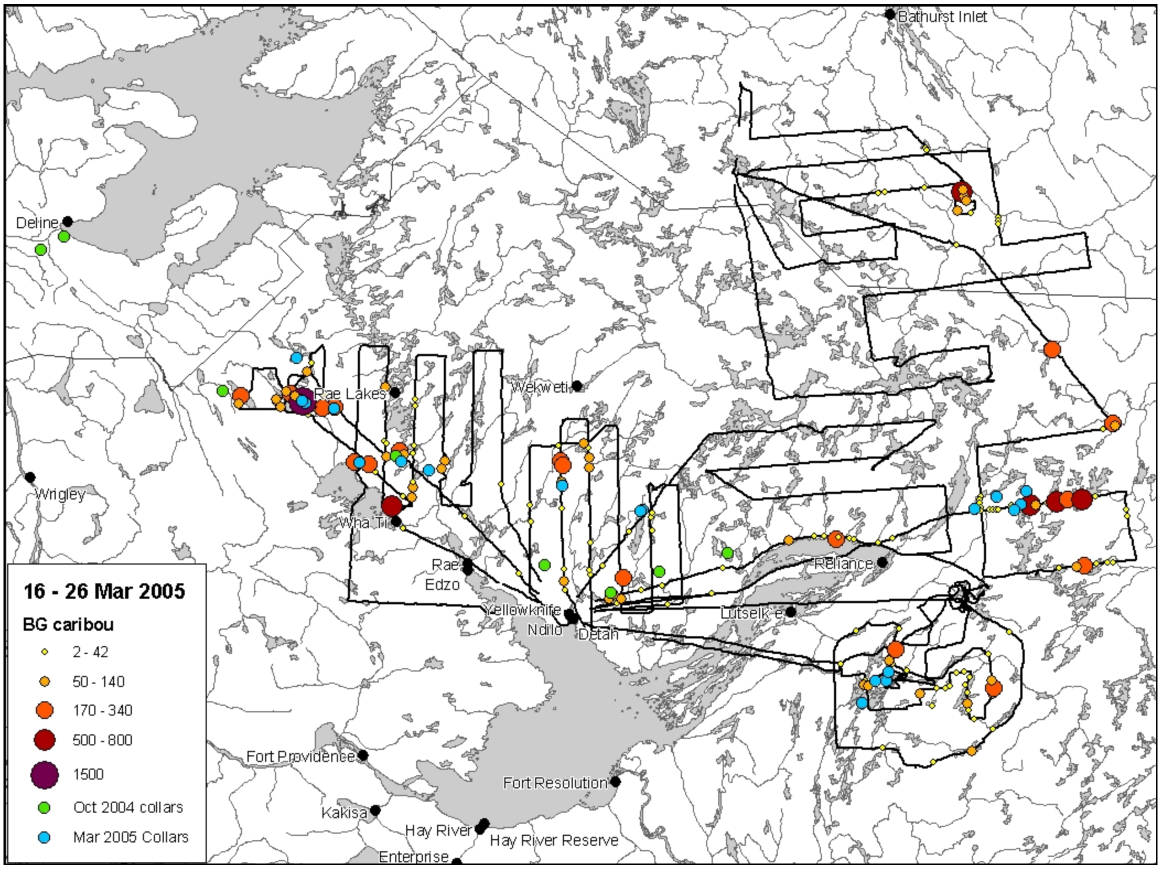

Figure 4: Flight lines, caribou observations, location 2004 satellite collars and collaring locations during March 2005, NWT.

The caribou were distributed from Lac Grandin (the heaviest concentrations of caribou, trails and feeding craters), east to south of Rae Lakes and then in relatively low densities until east of Yellowknife. East of Yellowknife, we found low thousands of caribou extending north and south of Gordon and Duncan Lakes. There were smaller concentrations of caribou at the north end of Gordon Lake and toward Upper Carp Lake. Along the north shore of McLeod Bay, groups of caribou were filing west and trails indicated that they had moved from at least Kluzial Island. The island was heavily tracked and cratered.

Caribou were found in association with all the October 2005 collars (Figure 4). A few thousand caribou between the north end of Gordon Lake and Upper Carp Lake were also found that did not have a satellite collared cow in the area.

Caribou were not found east of Contwoyto Lake, near Pellat Lake or Aylmer Lake, which had been areas where collared caribou from the Ahiak herd had previously wintered. However, a few hundred caribou were found on the Back River and thousands of caribou were found east of Artillery Lake. A second concentration of caribou was found in the Nonacho Lake area and caribou trails and small groups of caribou moving northeast from Nonacho Lake connected the two areas.

A fixed-wing aircraft was also used as a spotter plane and carried extra fuel to support the capture and collaring (22 to 26 March). Capture crews added four satellite collars to the concentration of caribou in the Lac Grandin area and three collars to caribou south of Rae Lakes. Three cows were collared between North Gordon to Upper Carp Lake. Of those 10 collars, three died (191 by 30 April; 198 by 20 May, and 95 by 4 June) and the remaining seven migrated to the Bathurst calving ground. Cow 198 migrated northeast from the Lac Grandin area where she had been collared. We suspect that she had migrated with cows from the Bluenose-East herd when she died.

Five cows in the area of Nonacho Lake and five cows immediately east of Artillery Lake were collared. Based on the June 2005 distribution of these collared cows, we concluded that eight cows were from the Ahiak herd. Two (86 and 88) of the five cows collared at Nonacho Lake migrated to the Bathurst herd’s calving grounds, west of Bathurst Inlet. One cow (88) crossed the East Arm of Great Slave Lake and by 1 June 2005, she was the first collared cow to reach the Hood River (calving ground). The nine other cows, collared at Nonacho Lake and Artillery Lake, migrated northeast and were all east of Bathurst Inlet by 6 June, 2005, scattered between Bathurst Inlet and east to the Back River. However, one cow (86) abruptly turned west and crossed Bathurst Inlet to the Hood River by 11 June.

On 17 October 2005, flying in a Husky fixed wing aircraft, tracks of caribou or caribou were not found until Wopmay Lake north of Wekweètì. The 2005 flight was extended because it appeared most collared caribou had, in early October, moved west along the north shore of Great Slave Lake, swung northwest passing north of Gordon Lake and crossed Roundrock and Snake Lakes. North of Wekweètì, a relatively narrow (<10 km) band of heavy caribou tracks and trails aligned east from Wopmay Lake was found and caribou were seen migrating west in files of 10s to 50s. Capture crews returned to the area 18 October, 2004 and collared two cows (05 and 99). The two collared cows continued to migrate west and by early November 2004 were south of Délîne. Subsequently, those cows collared north of Wekweètì (05 and 99) migrated north to the Bluenose-East herd's calving grounds in June 2005.

Calf survival April 2005: Sex and age classes were recorded at 175 locations between 31 March and 6 April 2005 (Figure 5, Table 1, and Appendix D). The mean calf:cow ratio was 14 calves/100 cows (0.01 Standard Error (SE)). We saw 25 wolves and 47 wolf kills (Appendix C). The sighting rate of wolves was 1 wolf/1 hour flying time (Williams and Fournier 1996).

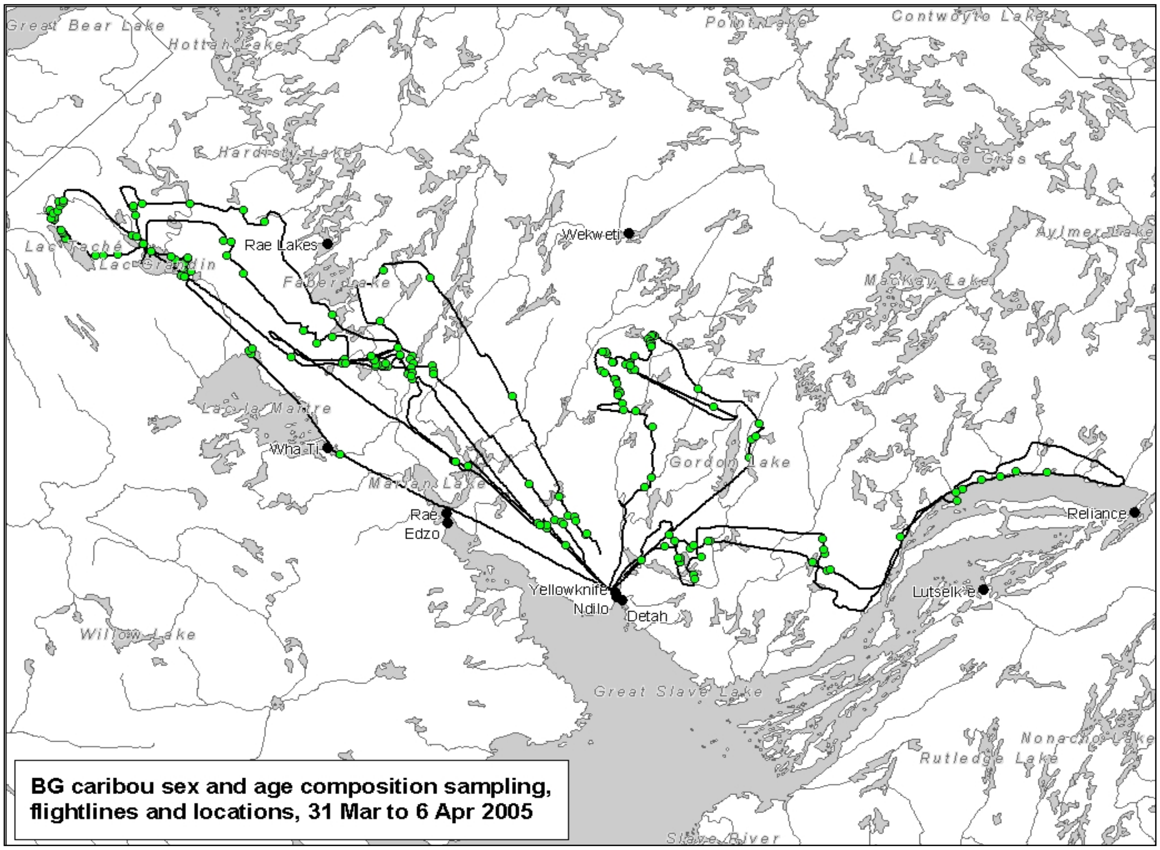

Figure 5: Flight lines and locations for sex and age composition counts in the Bathurst caribou herd, March 2005, NWT.

Based on the reconnaissance survey, our sampling locations were spread across the distribution of caribou from Lac Grandin to the north shore of Great Slave Lake. Caribou east of Artillery Lake or southeast at Nonacho Lake were not included as we assumed those caribou to be from the Ahiak herd. Four areas of concentration were found separated by relatively few caribou or only scattered tracks. Calf:cow ratios differed between those areas (Figure 6). Comparison of the calf:cow ratio estimates with percentile-based Bootstrapped confidence intervals suggests the calf:cow ratio in the Lac Grandin was higher than other areas.

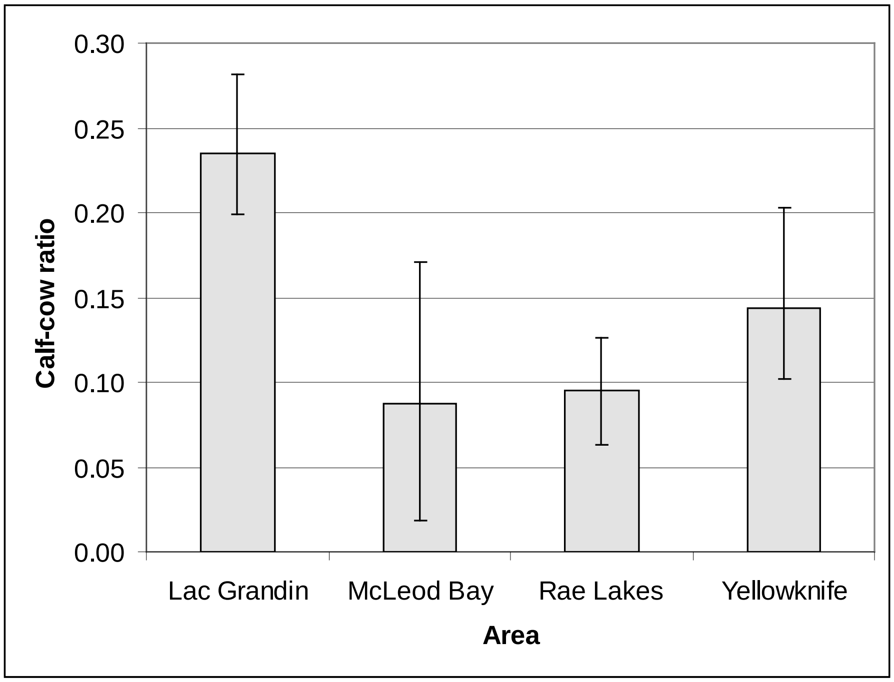

Figure 6: Calf:cow ratios in four areas sampled across the winter range of the Bathurst herd, March 2005, NWT.

Table 1: Dates, sampling effort and wolf sightings for monitoring calf survival in the caribou Bathurst herd, NWT, 2000-2004 (from Gunn et al. 2005a) and 2005.

Year	Date	Search km	Hours flown	Sampling locations	Number caribou	Wolf kills	Wolves
2001	6 – 10 April	3,831	24	240	11,351	17	1, 4
2002	22 – 26 March	2,690	17	115	7,512	1	4
2003	8 – 14 April	3,623	23	123	9,571	15	6,7,1,2,7
2004	25 – 30 March	3,862	24	247	8,488	22	1,1,1,1,2,3, 3,5
2005	31 March – 6 April	3,759	24	175	9,660	47	2, 2, 1, 5, 3, 3, 2, 7

Caribou Condition: Between 29 January, 2005 and 6 April, 2005, Earl and Trevor Evans harvested 179 barren-ground caribou; 160 females and 19 males (Appendix E). The harvest included 16 caribou possibly from the Beverly herd at Abitall Lake, approximately 240 kilometers north east of Fort Smith, NWT. Of the other caribou harvested, 163 caribou were from the Bathurst herd northeast of Yellowknife in the vicinity of Gordon, Hidden, Sparrow and Sarah Lakes (Table 2).

Table 2: Age and sex of caribou collected on range of Beverly and Bathurst herds, March 2005.

	Abitall Lake	West Sarah Lake	Central		
			Hidden Lake	Sparrow Lake	Gordon Lake
Male	6	6	5	0	2
Female	10	87	36	18	9
Adult	15	46	40	15	11
Yearling	0	0	1	0	0
Calf	1	0	0	0	0
Unknown	0	47	0	3	0

The hunters rated the overall condition of the caribou and measured back fat depth (Appendix F). For the caribou cows from the Bathurst herd, hunter ratings were grouped into two classes: high (excellent to good) and low (fair to very poor). Mean back fat differed significantly between the two classes (Mann Whitney Rank Sum T=4871, P=<0.001). Mean (and Standard Error) back fat depth in the high rated condition caribou was 11.0 $\pm$ 0.66 mm compared to 1.9 $\pm$ 0.18 mm in the low rated condition caribou.

The overall pregnancy rate was 63% for 150 cows harvested on the Bathurst range. The overall Bathurst pregnancy sample rate was 52% (87 cows) on the western part of the Bathurst range (Sarah Lake near Rae Lakes), compared to 79% (63 cows) on the central winter range (Gordon, Sparrow, and Hidden Lakes).

The percentage of cows rated as good to excellent condition were similar between the western and central areas (40-43%) and mean back fat were similar between the west (6.4 $\pm$ 0.86 mm) and central (5.3 $\pm$ 0.53 mm) parts of the winter range for cows harvested in late March and April. Thirteen males were in fair to very poor condition from both sampling areas.

Comparisons for back fat and condition had to be for the same sampling period as the thickness of back fat did change during mid- and late winter. Back fat was significantly less for cows harvested on the central ranges in January (2.7 $\pm$ 1.24 mm, n=29; Mann Whitney Rank Sum Test T=774, P=<0.002) compared to late March / early-April (8.0 $\pm$ 1.19 mm). Within the central range, caribou cows harvested at Hidden Lake in late January had significantly less back fat 2.9 $\pm$ 1.27 mm, n=18) than in early April (10.3 $\pm$ 1.76, n=23; Mann Whitney Rank Sum Test T=256, P=0.001). However, cows harvested on Gordon Lake in January were not significantly thinner based on their back fat (2.3 $\pm$ 0.92, n=11) compared to caribou cows harvested in early April on Sparrow Lake (5.0 $\pm$ 1.27, n=18; Mann Whitney Rank Sum Test T=141, P=0.281).

All the caribou were recorded as having warbles. Hunters rated the degree of warble infestation as high (>60 warbles), medium (30-60) and low (<30). Forty-six percent of the males harvested were recorded as being infested with both high and medium categories of warbles. Female caribou had 5% individuals in the high category of warbles, 52% in the medium and 43% in the low category. Females from the central area tended to have fewer warbles (Figure 7).

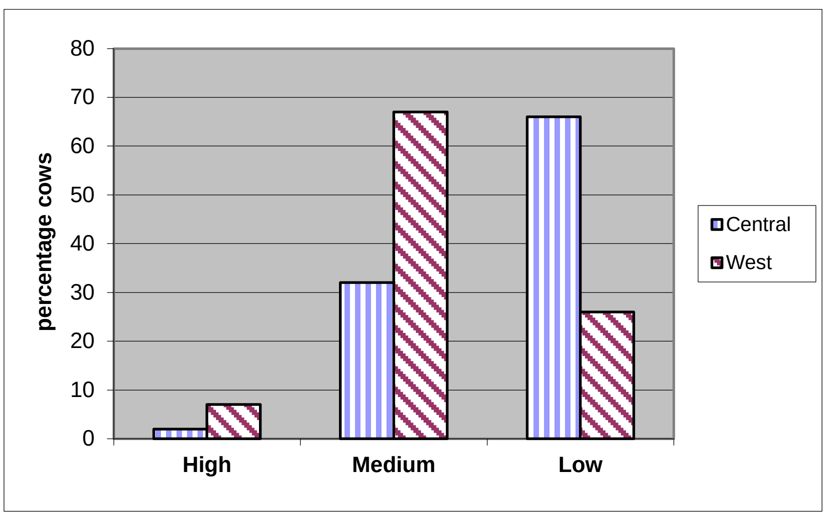

Figure 7: Categories of warble larvae (high, medium, and low) found on caribou harvested on the central western parts of the Bathurst herd's winter range January-April, 2005.

Caribou from the Beverly herd had body weight and kidney fat measurements taken. There were no differences between sexes (t=4.3, P> 0.97). Mean kidney fat weight was

71.1 ± 13.6 SE g.; mean body weight was 82.7kg ± 3.9 SE. There was no difference between the sexes (t=-0.487, P> 0.5). Eight out of ten females were pregnant.

Insect harassment: The annual mosquito season (99.7 days, n=10, SE = 4.2) was significantly longer than the osterid season (66.8 days, n=10, SE = 3.6) (t=-8.46, p< 0.001). Within the June to September sample period 1996-2005, 6 June 1998 was the earliest day where the osterid index was greater than zero and 15 September 1996 was the latest. The earliest mosquito index over zero occurred 1 June 1999 and the latest, 15 September 2001. It is probable that a mosquito index over zero occurred before 1 June or after 15 September. Those indices tended to be comparatively infrequent and low (Figure 8).

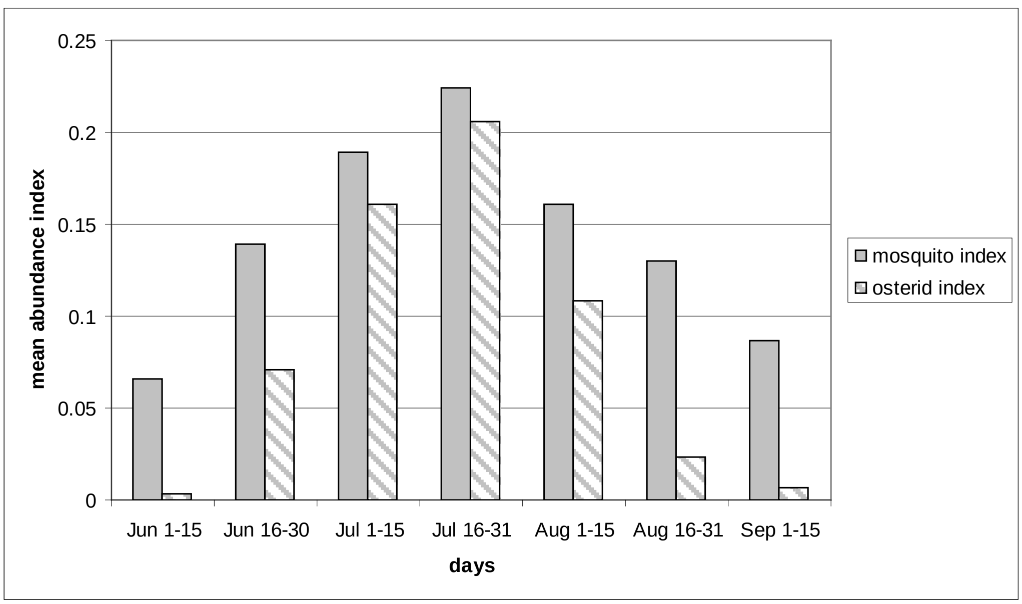

Figure 8: Seasonal distribution of seasonal mosquito and osterid abundance index for the years 1996 to 2005.

Longer-term weather data (1957-2005) available from Contwoyto Lake is more typical of the early post-calving range, assuming the overall weather is relatively representative of the annual conditions over the region. The annual trends for osterids and mosquitos are increasing in the number of days with high indices (Figures 9 and 10).

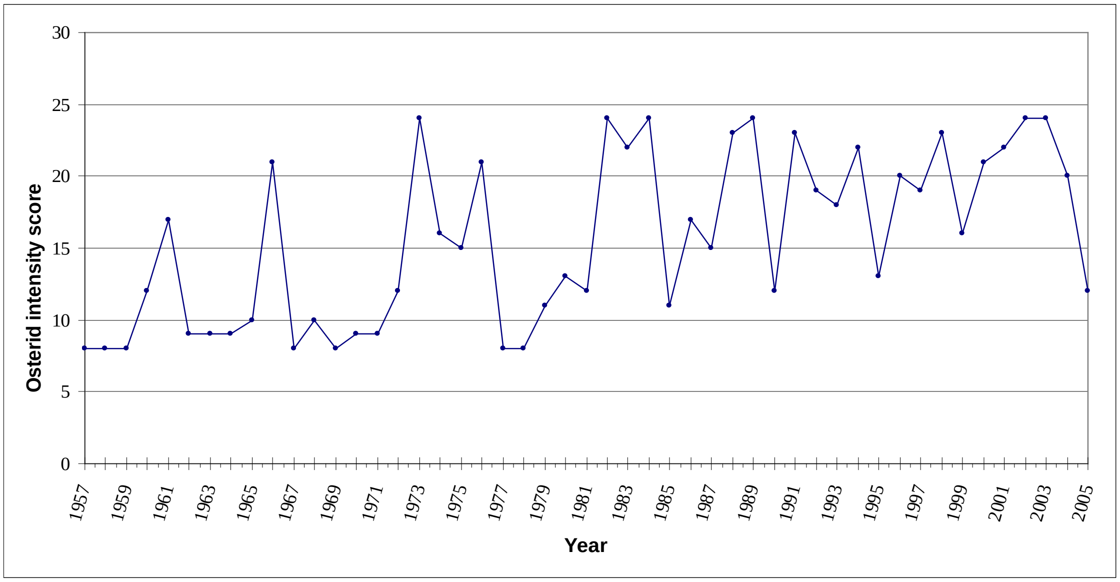

Figure 9: Annual osterid intensity scores for the area around Lupin, NWT based on an index derived from temperature and wind speed records from, 1957 to 2005.

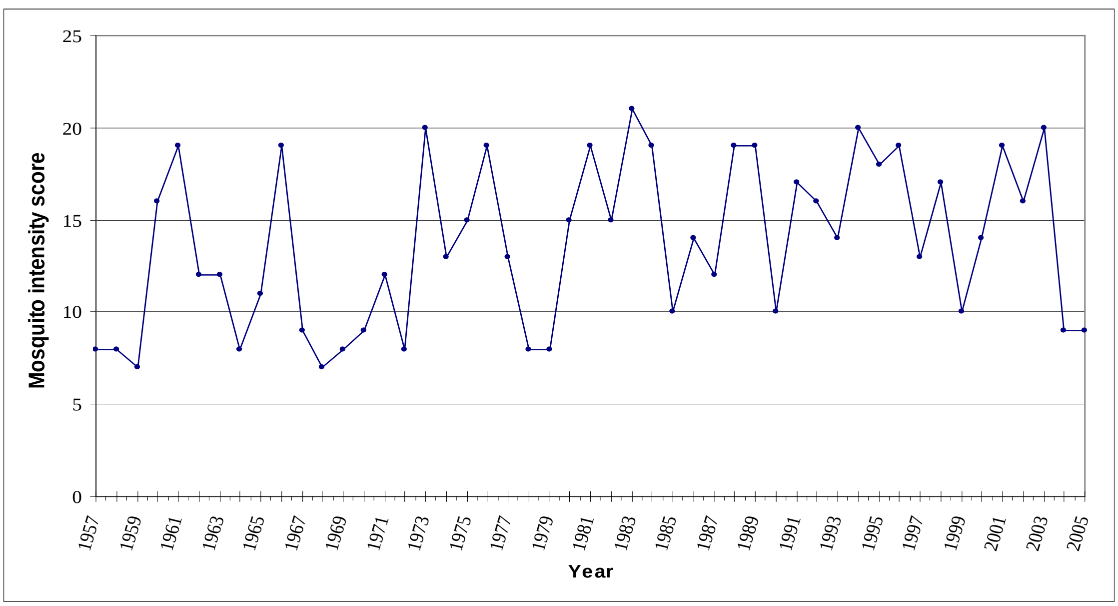

Figure 10: Annual mosquito intensity scores for the area around Lupin, NWT based on an index derived from temperature and wind speed records from, 1957 to 2005.

The late 1970s and early 1980s marked the beginning of the global temperature increase (Jones and Moberg 2003). Based on this, the period from 1957 to 2005 was divided into two groups: 1957-1981, and 1982-2005 (Table 3 and 4). The number of high osterid ratings were significantly greater in the 1982-2005 grouping than during the earlier time period (chi^2=18.679, df=1, p<0.01). Although the number of high mosquito ratings were greater between 1982-2005; the difference was not significant (chi^2=3.57, df=1, p=0.059). The means of the mosquito intensity scores for the two groups (1957-1981: mean=13.9, n=25; 1982-2005: mean=17.8, n=24) were different (t=2.953, df=47, p=0.005).

Table 3: Distribution of Osterid intensity ratings before and after 1982.

Time period	**High**	**Medium**	**Low**	**Total**
1957 to 1981	4	2	19	25
1982 to 2005	18	2	4	24
Total	22	4	23	49

Table 4: Distribution of mosquito intensity ratings before and after 1982.

Time period	**High**	**Medium**	**Low**	**Total**
1957 to 1981	8	1	16	25
1982 to 2005	14	1	9	24
Total	22	2	25	49

DISCUSSION

Satellite collars were replaced on caribou in late winter when conditions were best for capture and handling (cool temperatures and snow-covered lakes). However, overlap in the winter ranges of neighbouring herds meant that some cows were inadvertently collared from neighbouring herds. Overlap in the winter range of neighbouring herds has been known previously at the regional scale, based on hunters returning ear-tags for the Beverly and Qamanirjuaq herds (Heard 1984). Comparisons of satellite collared cows on winter ranges reveals that caribou in the same area, even within kilometers of each other, can be from different herds.

Overlapping central winter ranges has meant that of the 40 cows collared since 2001 during late winter, 12 had migrated to calving grounds other than the Bathurst herd's calving ground (nine to the Ahiak Herd, one to the Beverly Herd and two to the Bluenose-East Herd).

Using satellite collars on cows has aided our understanding of the extent and annual variability of overlapping winter ranges. The advantage of having individually marked cows is the ability to track where they calved and rutted. Despite overlap on the winter range, collared cows were found to return annually to their same calving grounds and have fidelity to post-calving and summer ranges.

Satellite telemetry has helped reinforce an earlier definition of caribou herds based on the return of the cows to their traditional calving grounds (Thomas 1969). Satellite telemetry has also justified the use of either calving ground or post-calving aggregation photography to census herd size based on fidelity to calving and post-calving areas. However, satellite telemetry is also revealing an overlap in winter distribution, which illustrates how a harvest can affect more than one individual herd.

In March 2003, based on the movements of the satellite collared cows, the overlap in winter ranges of the Bluenose-East and Bathurst caribou herds extended east to north of

Wekweètì. An original supposition was that the area north of Wekweètì was most likely the Bathurst herd's winter range and not an overlap area. This was based on the 1996/97, 1998/99 and 2001/02 winters when collared caribou had wintered west and north of Wekweètì and then subsequently migrated to the Bathurst calving grounds. Now it is evident that hunters from Wekweètì could possibly be harvesting Bluenose-East caribou in some years. Overlap between winter ranges of the Bluenose-East and Bathurst caribou also extended west to Délîne in winter 2002-03, based on movements of collared cow 92.

Although overlap in winter ranges is a characteristic of winter distribution of neighbouring herds, the extent of the overlap varies annually as does annual use of the winter ranges. Analyses using telemetry and weather data reveal how annual variation in winter range partly reflects snowfall early in winter (McNeill et al. 2004). Unusual weather such as freezing rains or unusually heavy snowfall can also influence caribou distribution. For example, deeper snow along the western Arctic coast during fall 2003 may have caused caribou of the Bluenose-West and Cape Bathurst herds to winter south of their normal wintering ranges (D'Hont et al. *in prep*.).

Along the coast of Hudson Bay in November 2004, there was freezing rain and heavy snowfall (M. Campbell pers. comm. 2005). Satellite collared caribou from the Qamanirjuaq, Wager Bay and Lorrilard River herds extended their distribution west and overlapped known winter ranges of the Bathurst, Ahiak and Beverly herds (Figure 11).

The use of locations from satellite collared caribou cows of the Bathurst herd for monitoring at the diamond mines is increasing. However, measuring caribou responses to the diamond mines is limited by the number of collared caribou (Boulanger et al. 2004). Collaring cows in March 2003, October 2004 and March 2005 helped maintain a sample size of 10-20 satellite collared cows in the Bathurst herd. An additional objective in 2005 was to satellite collar ten cows in the Ahiak herd. By June 2005, 15 cows had been satellite collared in the Bathurst herd, eight in the Ahiak and nine in the Bluenose-East herd.

The sample size of collars for each herd is influenced by death of the cow, failure of the collar, or the collared cow moving to another herd. Between October 2004 and June 2005, none of the 30 Bathurst collars deployed had prematurely failed. Between October 2004 and March 2005, one cow was shot and two other collared caribou died. Of 20 collars deployed on Bathurst and Ahiak cows in March 2005, three collared cows had died by June 2005 (30 April, 20 May and 4 June). The average annual survival rate of satellite collared cows between 1996 and 2003 was 0.82 (CI= 0.74 to 0.878) for the Bathurst herd (Boulanger and Gunn unpublished data).

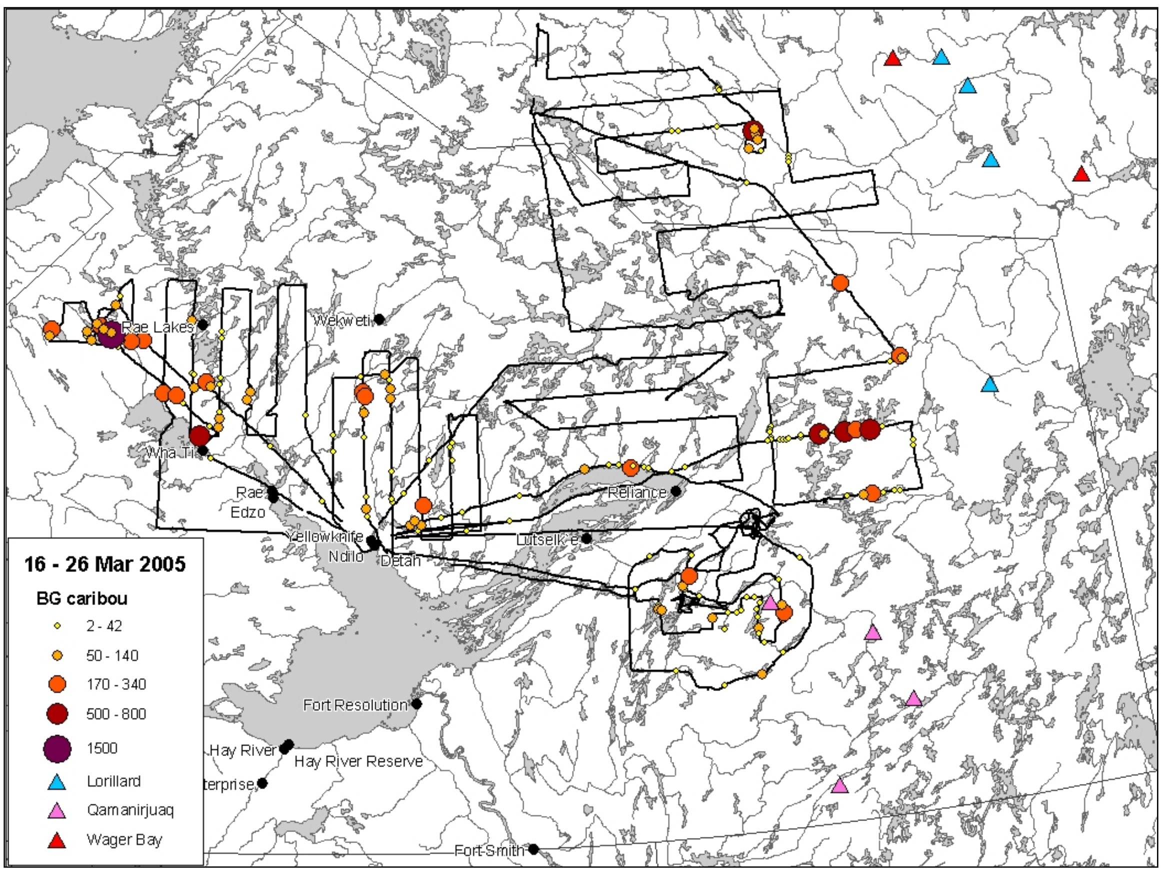

Figure 11: Locations of collared caribou from the Qamanirjuaq, Wager Bay and Lorillard River herds and caribou sightings during reconnaissance flights March, 2005 (data from Mitch Campbell, Government of Nunavut).

In March 2005, five collared cows migrated from other herds to the Bathurst's calving ground in 2005. The calf:cow ratio in March 2005 was low (14 calves:100 cows) which is consistent with the 18 calves:100 cows recorded in October 2004. The trend in mean late winter calf survival is a significant decline (p = 0.0003) since 1985 (Figure 12) and the calf:cow ratios have declined by almost half since 2001-2004 compared with 1985-1996.

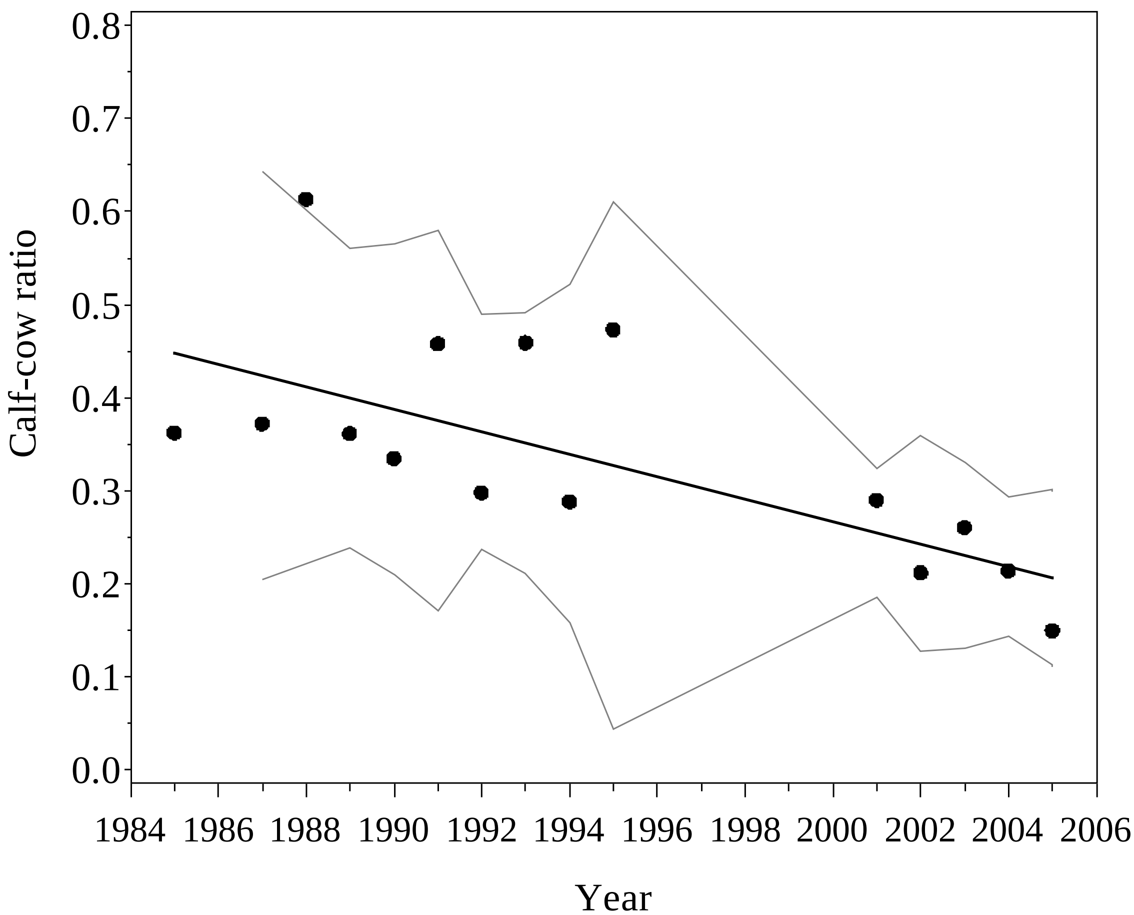

Figure 12: Calf cow ratios and their confidence intervals regressed against year for the Bathurst herd 1985-2005.

On the 2004/2005 winter range, pregnancy rates were relatively low (63%; 150 cows sampled), 52% and 79% on the western (Lac Grandin) and central parts (Gordon Lake) area of the winter range. Caribou cows in the Lac Grandin area with the lower pregnancy rate had relatively more calves (higher calf:cow ratio) and, although in similar condition (based on fat reserves) as the cows in the central area, the warble infection intensities were higher. The differences between the two areas of the winter range indicate the need to consider regional differences in designing caribou health and condition monitoring program.

Relatively low pregnancy rate is consistent with the low calf survival, as seen in October 2004 and April 2005. One could interpret that cows were in poor shape during 2004 post calving and summer, calves were prematurely weaned (and did not survive) and cows may not have made up sufficient condition in late summer to conceive during the rut.

Brotton and Wall (1997) had previously detected an increase in summer temperatures on the ranges of the Bathurst herd using monthly temperature data 1951-1980. They had suggested that insect harassment would increase. More recent annual temperatures from the central barrens were used. Analysis suggests that potential increase intensified after the early 1980s as the index for warble fly severity and mosquito abundance (Figure 13 and Appendix F) is toward greater number of years with greater severity.

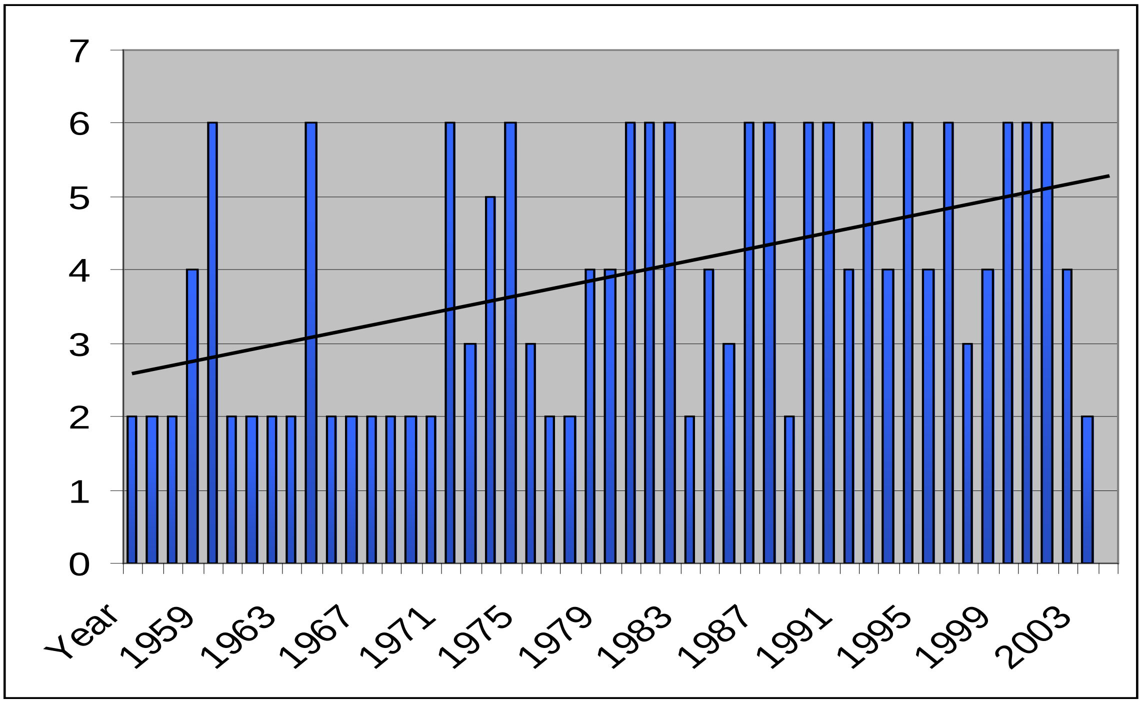

Figure 13: Trend line and annual scores for mosquito and oestrid fly harassment (scored as 1 for low, 2 for moderate and 3 for high) based on 1957-2005 weather records for Contwoyto Lake, NU.

Russell et al.'s (1993) index was used although we were aware that the index does not include cloud cover: cloud reduces the amount of time that the warbles are active. Weladji et al. (2003) did include cloud cover in their index and they recorded that reindeer calf weight declined as the index to insect harassment increased. Hagemoen and Reimers (2002) also included cloud cover in their index to insect harassment. They concluded that reindeer responded strongly to warble fly harassment with reduction in foraging and lying while mosquitoes had relatively little effect on reindeer behaviour. A new index incorporating cloud cover should be applied for the Bathurst herd's summer ranges and correlated with observations of caribou foraging and lying behaviour. Regardless, a season with numerous consecutive days of high insect activity may create more harassment for caribou, as there would seldom be any respite. Similarly, the more periods of consecutive days and the longer those periods were, the more likely the harassment would be an important factor.

Additional empirical data may be needed for the Bathurst herd to help explain the summer condition of caribou. For the George River herd, post-calving and summer ranges were considered to have been affected by the foraging of caribou and the reduced available forage resulted in poor caribou condition. Although amounts of grasses, sedges, forbs and most shrubs were similar between grazed and non-grazed sites, caribou grazing had reduced lichens and dwarf birch (Manseau et al. 1996).

The sex ratio in the Bathurst herd is skewed toward females (Gunn et al. 2005a). With fewer males, the male age structure is skewed toward younger males; younger males could be expected to breed cows in their second oestrus, delaying calving and reducing calf survival (Mysterud et al. 2002). In other deer, the harassment of females by young males has influenced female breeding strategies and mate choice (Clutton Brock et al. 1992). However, in caribou much remains to be determined about their breeding strategies and caution is needed when interpreting sex ratios. Mysterud et al. (2002) concluded, "*We argue that the effects of males on population dynamics of ungulates are likely to be non-trivial, and that their potential effects should not be ignored. The mechanisms we discuss may be important – though much more research is required before we can demonstrate they are.*"

In conclusion, collaring of caribou cows on late winter ranges has added further support to the identification of caribou herds based on fidelity of cows to a particular calving ground. At the same time, collaring is revealing the extent of overlapping wintering distribution. Calf recruitment in 2005 was low mostly because calf survival had been poor during summer 2004, which was the fifth consecutive year with a severe rating for warble fly harassment. During summer and/or fall 2004, cow condition was likely relatively poor as late winter 2005 pregnancy rates were lower than average. If the lower than average pregnancy rate and low calf survival persist, the Bathurst herd is unlikely to reverse its current decline in abundance.

ACKNOWLEDGEMENTS

David Abernethy and Morris Martin helped during the classification surveys. I also thank Dave Oelsen (Air Tindi) and Perry Linton (Northwright Air Services) who were both especially helpful while flying the fixed-wing reconnaissance. The capture crews appreciated Dave and Kristen Olesen for their hospitality at the Hoarfrost River. Earl and Trevor Evans shared their observations and information on the caribou that they harvested for the community of Fort Smith. Adrian D'Hont and Judy Williams helped in many ways with the telemetry and maps. Rob Gau and Patricia Handley (ENR) edited this report and their efforts are appreciated.

PERSONAL COMMUNICATIONS

Richard Popko, Environment and Natural Resources, Norman Wells, NWT.

John Nagy, Environment and Natural Resources, Inuvik, NWT.

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APPENDIX A: Summary of 1998-2000 Satellite Collars on Bluenose-East Caribou Herd.

Introduction: In 1998, a small-scale cooperative study between the Sahtu Renewable Resources Board (SRRB) and the Department of Resources, Wildlife and Economic Development (RWED) was started in order to map the seasonal movements of caribou wintering in the vicinity of Great Bear Lake. The area south of Great Bear Lake is within the known winter distribution for both the Bathurst and the Bluenose-East herds of barren-ground caribou. Hunters from Tulita and Délîne have traditionally hunted caribou south of Great Bear Lake. Distinguishing between which herds are being hunted is necessary to determine the sustainable harvest levels for the herds. The number of caribou harvested varies among years depending on caribou distribution as caribou rotate their use of winter range over the years.

Maps showing the movements of the satellite collared caribou were sent weekly to the communities on the ranges of the Bathurst and Bluenose-East herds. The database was provided to the SRRB but with changes in staff, a report was not completed. Consequently, the project is summarised here and the database was provided to the Inuvik Region for John Nagy's (2005) summary maps of cumulative winter ranges for the three Bluenose herds.

On 26 April, 1998, Joe Blondin (Délîne Renewable Resources Council) and Richard Popko (RWED) flew south along McVicar Arm (Great Bear Lake) where they observed mostly bulls. Their reconnaissance flight continued southeast to Hottah and Rae Lake before turning east to Snare Lake; they did not see caribou east of Hottah Lake. Hunters returning by snowmachine from Kugluktuk reported seeing many cows at Dismal Lakes and Hornby Bay west of Port Radium.

Caribou distribution was discussed with Robert Nowosad (SRRB) and RWED staff. The consensus was to go ahead with collaring caribou that had wintered south of Great Bear Lake. On 6 May, 1998, a helicopter capture crew was contracted to collar five cows in the vicinity of Dismal Lakes. Pursuit times were less than one minute and no cows were injured. The cows were fitted with satellite collars, programmed to transmit every five days for two years.

Five cows collared in April 1998 moved northeast to presumably calve in the vicinity of the Rae River (east of Bluenose Lake). Calving was not verified through observations on the calving ground. By October, four of the cows were on the northeast shore of Great Bear Lake (McTavish Arm). The fifth cow was further west on the north shore of Smith Arm; she remained in that area until December where she died. The four remaining collared cows travelled south and west crossing McVicar Arm in early December 1998, migrating northeast, crossing McTavish Arm during March and April 1999.

In June, the four cows were east of Bluenose Lake, returning to Caribou Point area in August. By mid-October 1999, the four cows were between the east coast of Great Bear Lake and the Coppermine River and had migrated through the Hottah Lake area south of the Bear River and Délîne.

By June 2000, there were only two collared cows alive (or functional collars); they were east of Bluenose Lake in a similar area to June 1999. In mid-October 2000, the two collared caribou migrated through the north end of Hottah Lake and wintered south of Bear River. By May 2001, one collared cow had migrated across Great Bear Lake to Caribou Point where she died. The remaining cow migrated across Great Bear Lake in April; in June 2001, she was north of the Richardson River.

APPENDIX B: Caribou Collaring Capture Details for March 2005 and October 2004.

March 2005

ID	55190	55191	55192	55193	55194	55195	55196	55197	55198	55199
DATE	23/03/05	24/03/05	24/03/05	24/03/05	22/03/05	24/03/05	24/03/05	23/03/05	23/03/05	23/03/05
LATITUDE	63d58,940	63d11,058	63d11,058	64d01,573	63d26,22	64d01,573	63d39	63,5187	64d14,406	63,574
LONGITUDE	118d23,656	113d03,538	113d03,538	118d58,661	114d26,15	118d58,661	117d14	116,66113	118d55,101	118,01
SYSTEM	551601A	551602A	551603A	45902A	551608A	551610A	551611A	551612A	551615A	551616A
FREQUENCY	152.150	152.170	152.190	150.530	152.220	152.230	152.240	152.250	152.270	152.290
CHASE TIME	17h27	15h28	15h51	12h19	16h59	11h49	10h57	12h59	16h58	15h51
CAPTURE TIME	17h29	15h30	15h54	12h21	17h01	11h50	10h58	13h00	17h00	14h52
RELEASE TIME	17h32	15h37	16h01	12h26	17h07	11h56	11h07	13h09	17h06	15h00
HANDLING TIME	3 min	7 min	7 min	5 min	5 min	6 min	9 in	9 min	6 min	8 min
TEMPERATURE (°C)	-8'C	-1'C	-1'C	-9'C	-20'C	-10'C	-11'C	-10'C	-8'C	-10'C
AGE	4	5	3	5	3	6	5	4	6+	4
age A Gunn	**4**	**4**	**3-4**	**4**	**2**	**old**	**4+**	**4+**	**4+**	**4**
AGE (1st database)	5	6+	4	6+	5	6+	5+	4+	6+	6+
HERD SIZE	200	50	50	500	20/20	500	50	150	90	40
CALF	without	without	without	without	without	without	without	without	without	without
BODY SIZE	medium	medium	medium	medium	small	medium	medium	medium	medium	medium
BODY CONDITION	good	good+	good++	good++	good	good+	good+	good	good++	good
ANTLERS	2 medium	2 medium	0*	2 medium	2 small	2 medium	2 medium	2 medium	2 medium	2 medium
RUMP FAT (1-10)	7	7	8	8	6	7	7	6+	8	7
INCISOR WEAR	light	light	light	light	light	moderate	light	light	moderate	light
EXTERNAL INJURIES	none	none	none	none	none	none	none	none	none	none
NOTES	---	---	* broke 1	---	---	---	---	---	---	---

*Incisor tooth

ID	55180	55181	55182	55183	55184	55185	55186	55187	55188
DATE	25/03/05	25/03/05	26/03/05	26/03/05	25/03/05	26/03/05	26/03/05	25/03/05	26/03/05
LATITUDE	63.01	63,08	61d51	61,82782	63,00	62d27,3	61d50,820	62,59697	62d37,794
LONGITUDE	106.43	107,18	109d15	109,47275	106.56	107d54,02	109d36,390	107,3512	111d59,211
SYSTEM	545030A	545038A	545059A	545116A	545116A	545125A	545136A	545137A	545138A
FREQUENCY	150.090	150.210	150.250	150.260	150.270	150.280	150.290	150.320	150.330
CHASE TIME	13h10	15h28	13h14	11h39	12h45	15h19	12h31	12h01	15h45
CAPTURE TIME	13h11	15h30	13h15	11h40	12h46	15h20	12h32	12h02	15h46
RELEASE TIME	13h17	15h34	13h25	11h44	12h54	15h24	12h36	12h08	15h49
HANDLING TIME	6 min	4 min	10 min	4 min	8 min	4 min	4 min	6 min	3
TEMPERATURE (°C)	-21'C	-21'C	-24'C	-21'C	-21'C	-27'C	-21'C	-21'C	-23'C
AGE	5+	6+	3+	-3	5+	6	4	4	5
Age A Gunn	**4+**	**old**	**2-3 year?**	**2-3 year**	**old**	**4+**	**2-3 year?**	**4 +**	**4+**
AGE	5+	6+	6+	3+	5+	5	6+	6+	6+
HERD SIZE	50	120	60	30	150	12	50	15	30
CALF	without	without	without	without	without	without	without	without	without
BODY SIZE	medium	medium	medium	small	medium	medium	medium	medium	medium
BODY CONDITION	good+	good	excellent	good++	excellent-	good-	good+	good+	light+
ANTLERS	1 medium	1 medium	1*	1 small	2 medium	2 medium	2 medium	2 medium	2 medium
RUMP FAT (1-10)	6	7	6	6	6	7	7	7	5
INCISOR WEAR	moderate-	moderate-	light	light	moderate+	light	light	light	light
EXTERNAL INJURIES	none	none	none	none	none	none	none	none	none
NOTES	---	---	* broke 1	---	---	---	---	---	---
RATING (1-10)	6	7	8	7	7	6	8	7	6+

*Incisor tooth

October 2004

ID #	45896	45897	45898	45899	45900	45901	45902	45903	45904	45905	45906
DATE	16-Oct-04	17-Oct-04	16-Oct-04	16-Oct-04	16-Oct-04	17-Oct-04	17-Oct-04	18-Oct-04	16-Oct-04	16-Oct-04	17-Oct-04
LATITUDE	63 45.70	63 57.67	63 55.88	63 45.67	63 47.13	62 49.95	63 55.69	65 14.60	65 12.85	63 55.98	62 48.02
LONGITUDE	113 33.68	113 28.36	113 22.76	113 33.57	113 33.62	113 13.31	113 31.06	116 41.05	116 38.56	113 22.78	113 13.26
SYSTEM #	530525	530532	530533	530534	530537	530538	530542	530515	530545	530554	530556
FREQUENCY	150.620	150.630	150.650	150.690	150.750	150.840	150.530	150.870	150.540	150.240	150.600
CHASE TIME	< 1 min	< 1 min	< 2 min	< 2 min	< 2 min	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min	< 1 min
CAPTURE TIME	10:50	13:11	14:47	11:34	12:40	10:35	12:28	11:52	11:30	13:55	10:05
RELEASE TIME	11:04	13:19	15:00	11:47	12:50	10:52	12:49	12:01	11:37	14:12	10:19
HANDLING TIME	0:14	0:08	0:13	0:13	0:10	0:17	0:21	0:09	0:07	0:17	0:14
TEMPERATURE (°C)	-10	-10	-10	-10	-10	-11	-8	-16	-16	-10	-11
SEX	female	female	female	female	female	female	female	female	female	female	female
AGE CLASS	adult	adult	adult	adult	adult	adult	adult	adult	adult	adult	adult
STATUS	Lrg grp/w. calf	w. calf	w. bull	Lrg grp/w.calf	Lrg grp/w. calf	Lrg grp/w. calf	w. calf	10-15 cb w. calf	15-20 cb w. calf	Lrg grp/w. calf	Lrg grp/w. calf
BODY SIZE	Medium	Medium	Large	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Medium
BODY CONDITION	Good	Good	Excellent	Good	Good	Good	Good	Good	Good	Good	Good
ANTLERS	Medium	Large	Large	Medium	Medium	Medium	Medium	Medium	Medium	Small	Medium
RUMP FAT	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable	Palpable
INCISOR WEAR	Light	Moderate	Light	Moderate	Moderate	Moderate	Heavy	Light	Moderate	Moderate	Moderate
CONDITION OF ANIMAL	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EXTERNAL INJURIES	None	None	None	None	None	None	None	None	None	None	None
NOTES	-	-	-	-	-	-	-	-	-	-	-

APPENDIX C: Sex and Age Composition of Caribou from the Bathurst Herd, March 2005, NWT.

	Lac Grandin area			Cow			Young bull	Prime bull	Total
				Antlered	None	Calf			
4-Apr-05	36	64.20348	-120.275	16		7			7
4-Apr-05	35	64.16329	-120.255	31	6	13	2		15
4-Apr-05	37	64.18714	-120.245	19	1	5			5
4-Apr-05	32	64.15738	-120.24	8		3	2		5
4-Apr-05	34	64.16939	-120.226	7		4	2		6
4-Apr-05	33	64.15553	-120.218	48	1	20	20	1	41
4-Apr-05	38	64.20006	-120.202	150	4	30	48	8	86
4-Apr-05	40	64.24343	-120.19	24	1	11	5	1	17
4-Apr-05	39	64.22508	-120.175						0
4-Apr-05	42	64.25257	-120.148	31		5	4		9
4-Apr-05	41	64.24059	-120.147	38	1	7	7	3	17
4-Apr-05	31	64.10888	-120.145	14		3	3		6
4-Apr-05	30	64.10096	-120.128	91	2	18	26	3	47
4-Apr-05	29	64.09538	-120.12	18		8	7	1	16
4-Apr-05	26	64.07658	-120.091	73	1	14	32	8	54
4-Apr-05	27	64.07134	-120.091	44	1	18	13	3	34
4-Apr-05	25	64.07815	-120.075	21		2	5	5	12
4-Apr-05	24	63.99774	-119.766	35	3	9	4	2	15
4-Apr-05	23	64.00137	-119.685				4		4
4-Apr-05	22	64.01127	-119.535						0
5-Apr-05	26	64.25168	-119.414	42	4	6	3	5	14
5-Apr-05	25	64.24177	-119.404	1				2	2
4-Apr-05	43	64.10917	-119.401	30	1	6			6
5-Apr-05	27	64.20686	-119.38	10	1	2	2	8	12
4-Apr-05	44	64.10502	-119.347	161	10	25	43	4	72
5-Apr-05	24	64.26504	-119.315						0
5-Apr-05	29	64.07031	-119.277						0
4-Apr-05	45	64.03638	-119.189	169	2	39	39	25	103
4-Apr-05	21	64.02009	-118.98						0
4-Apr-05	20	64.00395	-118.933	160	6	33	53	10	96
4-Apr-05	5	63.93118	-118.862	60	1	13	19	3	35
4-Apr-05	10	63.98027	-118.838						0
4-Apr-05	9	63.96842	-118.837	48	3	19	23	3	45
4-Apr-05	11	63.9902	-118.836	206	10	31	71	5	107
4-Apr-05	6	63.9251	-118.82	14		4	2		6
5-Apr-05	23	64.2792	-118.813						0
4-Apr-05	15	64.01483	-118.802	48	1	8	13		21
4-Apr-05	16	64.01897	-118.801	61	1	17	12	15	44

	Lac Grandin area			Cow			Young bull	Prime bull	Total
				Antlered	None	Calf			
4-Apr-05	12	64.01145	-118.799	10	1	7	5	2	14
4-Apr-05	8	63.95268	-118.755	6		2	1		3
5-Apr-05	196	64.10769	-118.444	33	3	4	1		5
5-Apr-05	198	64.0386	-118.397	49	3	6	5	12	23
5-Apr-05	197	64.10273	-118.358	69	2	9	31	35	75
5-Apr-05	21	64.26184	-118.245	24	2	4	2	9	15
5-Apr-05	199	63.95499	-118.214						0
4-Apr-05	3	63.58518	-118.109	35	3	6	7		13
4-Apr-05	2	63.56827	-118.093	26		10	7	14	31
4-Apr-05	4	63.59725	-118.086	75	4	23	42	1	66
5-Apr-05	20	64.20768	-118.023	38	2	4	2		6
						455	**567**	**188**	**1,210**

		Rae Lakes area		Cow			Young Bull	Prime Bull	Total
				Antlered	None	Calf			
4-Apr-05	46	63.56365	-117.675						
5-Apr-05	200	63.69555	-117.568	79	6	13	14	18	45
5-Apr-05	201	63.63561	-117.419	189	16	27	35	7	69
5-Apr-05	202	63.63633	-117.416				1	9	10
5-Apr-05	19	63.77362	-117.273						0
5-Apr-05	203	63.66821	-117.266	73	2	11	7		18
4-Apr-05	47	63.5396	-117.149						0
4-Apr-05	1	63.10179	-117.136	15	2	6	3	31	40
1-Apr-05	7	63.56193	-117.127						0
5-Apr-05	204	63.54153	-117.119	68	4	7	21	2	30
5-Apr-05	205	63.58219	-116.86						0
1-Apr-05	8	63.56712	-116.839						0
5-Apr-05	17	63.55944	-116.818	66	4	15	26	53	94
5-Apr-05	16	63.54059	-116.807						0
4-Apr-05	48	63.53097	-116.802						0
5-Apr-05	15	63.53976	-116.782	126	3	7	25	7	39
5-Apr-05	206	63.7488	-116.772						0
5-Apr-05	207	63.99623	-116.758						0
5-Apr-05	13	63.53551	-116.741	17	1	2		12	14
5-Apr-05	12	63.53347	-116.735						0
4-Apr-05	49	63.53198	-116.729						0
5-Apr-05	11	63.53072	-116.711	15	2	1	3	3	7
5-Apr-05	14	63.54878	-116.71	19	1	1	6	5	12
5-Apr-05	10	63.53535	-116.683	97	5	4	10	26	40
1-Apr-05	9	63.62583	-116.58						0
5-Apr-05	9	63.58943	-116.564	36	2	4	1	8	13
5-Apr-05	8	63.58391	-116.555	15			5	6	11
1-Apr-05	15	63.50194	-116.474	6		1	3		4
1-Apr-05	14	63.50368	-116.464	7	3		1	7	8
1-Apr-05	11	63.56962	-116.452	3					0
5-Apr-05	6	63.49049	-116.445	54	3	6	4		10
1-Apr-05	13	63.53116	-116.443	19	3	3	6	3	12
1-Apr-05	10	63.58553	-116.429	7	1	1	5	24	30
1-Apr-05	16	63.50648	-116.428	343	30	36	75	30	141
5-Apr-05	5	63.47675	-116.425	275	13	6	67	53	126
1-Apr-05	12	63.54968	-116.418	23	1	4	6		10
5-Apr-05	208	63.96439	-116.267	3		1	1	2	4
4-Apr-05	51	63.54221	-116.228	35	2	1		2	3
4-Apr-05	52	63.51778	-116.211	8	4				0
4-Apr-05	53	63.50003	-116.207	11	1	1	2		3
1-Apr-05	17	63.0794	-115.969						0
1-Apr-05	18	63.06053	-115.848	1	1			1	1

		Rae Lakes area		Cow					
				Antlered	None	Calf	Young Bull	Prime Bull	Total
				1,610	110	158	327	309	794

		Yellowknife east and west		Cow			Young Bull	Prime Bull	Total
				Antlered	None	Calf			
5-Apr-05	210	63.39913	-115.397					6	6
4-Apr-05	54	62.97734	-115.226	5	1				0
1-Apr-05	19	62.78736	-115.134				1	14	15
5-Apr-05	3	62.77946	-115.115				4	59	63
1-Apr-05	20	62.76524	-115.053				1	22	23
5-Apr-05	2	62.78042	-115.05				1	22	23
4-Apr-05	55	62.80671	-114.968					11	11
5-Apr-05	211	62.91436	-114.926	18		4	3	6	13
4-Apr-05	56	62.79266	-114.908	9		1	1		2
4-Apr-05	57	62.7816	-114.886					2	2
5-Apr-05	1	62.68115	-114.862					11	11
5-Apr-05	212	62.82602	-114.835	18	3	6	2		8
5-Apr-05	213	62.82179	-114.772				2	5	7
5-Apr-05	214	62.79701	-114.764	7	1		7	6	13
5-Apr-05	215	62.73429	-114.664	10		3	4	1	8
5-Apr-05	216	62.73552	-114.644	36	2	7	6	1	14
31-Mar-05	31	63.51922	-114.49	19	1	1	2		3
31-Mar-05	30	63.61316	-114.476	19	1	2	2		4
31-Mar-05	32	63.51286	-114.452	6	1				0
31-Mar-05	29	63.61316	-114.448						0
31-Mar-05	28	63.60263	-114.428	12	1	1	1		2
31-Mar-05	27	63.55952	-114.372		1	1			1
31-Mar-05	26	63.56341	-114.359	14	1	3	2		5
31-Mar-05	34	63.4809	-114.354						0
31-Mar-05	33	63.48259	-114.345	180	3	6	44	2	52
31-Mar-05	36	63.46175	-114.331	43	3	5	4		9
31-Mar-05	37	63.42561	-114.323	81	3	4	12	1	17
31-Mar-05	40	63.40282	-114.317	28	4		1		1
31-Mar-05	38	63.42417	-114.311	6	2	2			2
31-Mar-05	39	63.41205	-114.305	45		1	8		9
31-Mar-05	41	63.36393	-114.276	22	1		4		4
31-Mar-05	42	63.33094	-114.269						0
31-Mar-05	21	63.55109	-114.243						0
31-Mar-05	20	63.55625	-114.205						0
31-Mar-05	19	63.56099	-114.192	87	6	7	9		16
31-Mar-05	25	63.54577	-114.192	88	6	4	17		21
31-Mar-05	22	63.52364	-114.177						0
31-Mar-05	18	63.58937	-114.149						0
31-Mar-05	24	63.52457	-114.146	96	5	3	33	2	38
31-Mar-05	43	63.32462	-114.139	2	1		1		1
6-Apr-05	1	62.609	-114.113	8		3			3

		Yellowknife east and west		Cow			Young Bull	Prime Bull	Total
				Antlered	None	Calf			
6-Apr-05	32	62.63935	-114.104						0
31-Mar-05	46	62.95751	-114.068	13	2	2			2
31-Mar-05	13	63.67294	-114.005	2			3	2	5
31-Mar-05	45	63.00213	-113.991	14	2	2			2
31-Mar-05	16	63.64411	-113.986	115	10	7	30		37
31-Mar-05	14	63.6617	-113.984	6		1	4	2	7
31-Mar-05	44	63.25135	-113.976	18					0
31-Mar-05	12	63.68519	-113.97						0
31-Mar-05	15	63.64927	-113.969	111		14	37	5	56
31-Mar-05	17	63.6348	-113.969	77	3	4	15		19
31-Mar-05	11	63.69044	-113.962	2					0
31-Mar-05	10	63.68627	-113.933						0
6-Apr-05	2	62.67245	-113.876	25	2	5	3		8
6-Apr-05	31	62.73015	-113.831	46	1	7		14	21
6-Apr-05	3	62.69487	-113.771	74	2	8	14	1	23
6-Apr-05	30	62.61655	-113.742	130	2	23	35	7	65
6-Apr-05	27	62.59311	-113.731	27	1	7	6	6	19
6-Apr-05	29	62.61653	-113.718	121	1	19	20		39
6-Apr-05	28	62.59376	-113.717	99	3	18	40	4	62
6-Apr-05	4	62.66204	-113.623	36	3	34	35		69
6-Apr-05	25	62.52993	-113.594	55	4	7	22	1	30
6-Apr-05	26	62.51249	-113.587	9		4	2		6
6-Apr-05	5	62.67322	-113.582	46	1	15	13	8	36
6-Apr-05	24	62.61852	-113.507	8	2	1	9	2	12
31-Mar-05	9	63.42687	-113.5						0
6-Apr-05	7	62.69355	-113.441	10	1	3	2		5
6-Apr-05	6	62.69552	-113.415	69	1	14	15		29
31-Mar-05	23	63.3388	-113.353						0
31-Mar-05	5	63.09282	-113.006	7	2		3		3
31-Mar-05	6	63.17672	-112.979						0
				1,979	**90**	**259**	**480**	**223**	**962**

		McLeod Bay area		Cow			Young Bull	Prime Bull	Total
				Antlered	None	Calf			
31-Mar-05	7	63.19207	-112.93	4			5	2	7
31-Mar-05	8	63.25319	-112.889						0
6-Apr-05	9	62.57697	-112.411	15			3	5	8
6-Apr-05	22	62.63585	-112.297	5					0
6-Apr-05	23	62.6842	-112.294				1	5	6
6-Apr-05	21	62.61294	-112.284				2	2	4
6-Apr-05	10	62.53424	-112.264	146	5	33	26	13	72
6-Apr-05	11	62.53656	-112.236	47	3	7	11		18
6-Apr-05	12	62.68023	-111.522	15					0
6-Apr-05	18	62.87676	-110.939	36	1	3	11		14
6-Apr-05	19	62.83616	-110.936	12	1	1	3		4
6-Apr-05	13	62.8903	-110.87	117	6	2	40	1	43
6-Apr-05	14	62.9293	-110.675						0
6-Apr-05	15	62.94009	-110.485	62	4	1	4		5
6-Apr-05	16	62.96229	-110.321	15			6	1	7
6-Apr-05	17	62.94343	-110.013	28	1	1	5		6
6-Apr-05	20	62 50	110 55	55	1		8		8
				557	**22**	**48**	**125**	**29**	**202**

APPENDIX D: Sex and Age Classes and Antler Status for Caribou Classified 23-26 June, 2005.

		Breeding Females				Non Breeding females				Calves	Bulls	Total
Way-		No	Hard	No antler or	Antler	New antler classes						
point	June	antler	Antler	udder	buds	1	2	3	4			
2	23								1		1	2
3	23										2	2
4	23										6	6
5	23										8	8
6	23										9	9
7	23										2	2
8	23										6	6
9	23	6	3				1				3	13
10	23										3	3
11	23										2	2
12	23										5	5
13	23										0	0
14	23										0	0
15	23										0	0
16	23	1									4	5
17	23										3	3
18	23	4	1	1	1						9	16
19	23										3	3
20	23										6	6
21	23	5		1							7	13
22	23				1						5	6
23	23										0	0
24	23			1							0	1
25	23	1	1							1	1	4
26	23										3	3
27	23	6									0	6
28	23	4					1				0	5
29	23										1	1
30	23	13	1	2						3	0	19
31	23										0	0
32	23	1									3	4
33	23	10				2				1	7	20
34	23										0	0
35	23	12	1	2	3	3	2			3	2	28
36	23										2	2
37	23	8	1	1		1	1				0	12
38	23	2									0	2
39	23	3			1						0	4
40	23	8				1				1	0	10
41	23	8		1		1					7	17
42	23										2	2
43	23	21	2	1	8			1		1	5	39
44	23	12			2	1	1				0	16
45	23	8	1		3						2	14
46	23	9									5	14
47	23				1	2					2	5
48	23					1	1				2	4

		Breeding Females				Non Breeding females				Calves	Bulls	Total
Way-		No	Hard	No antler or	Antler	New antler classes						
point	June	antler	Antler	udder	buds	1	2	3	4			
49	23	1		2						1	1	5
50	23							1			2	3
51	23										4	4
52	23	3									1	4
53	23										8	8
54	23										4	4
55	23										2	2
56	23	1	1								3	5
57	23	2			3		1				11	17
58	23										5	5
59	23										1	1
72	23	289	22		21	3	7	3	1	231	1	578
75	23	165	13	4	2					152	0	336
77	23	127	6		1	2				118	0	254
78	23	152	7			1				128	0	288
82	23	64	4							64	0	132
88	23	12				2	1	1		2	0	18
89	24	138	3			2				116	0	259
92	24	140	3		2					143	0	288
93	24	12	1	4						10	0	27
94	24	54	2	15						51	0	122
95	24	31	4	2						7	0	44
96	24	169	13					1		97	0	280
97	24	43	4							34	1	82
98	24	15								4	0	19
99	24	7								2	0	9
100	24	55	3							21	0	79
101	24	14	1								0	15
102	24	14					1			3	0	18
103	24	51	1				1			16	0	69
104	24	65	3		1	5	1	1		17	2	95
106	24	8			1	2	2				2	15
107	24	1				2		1			3	7
108	24	1	1	1		3		1			10	17
109	24	4									0	4
110	24					1	1				0	2
111	24										4	4
112	24	2									15	17
114	24					1					7	8
115	24					1					2	3
116	24					1					1	2
117	24					1					21	22
119	25	5		1						1	0	7
120	25	69	2		17	6				19	3	116
122	25	10	1	3	19	4				5	1	43
123	25	149	21	3	3					152	0	328
125	25	184	21		17	1				179	0	402
127	25	239	9	2	2	4				135	0	391
129	25	2									0	2
130	25	96	4	11	3	2				51	0	167
132	25	23								11	0	34
133	25	12		1						1	2	16

		Breeding Females				Non Breeding females				Calves	Bulls	Total
Way-		No	Hard	No antler or	Antler	New antler classes						
point	June	antler	Antler	udder	buds	1	2	3	4			
135	25	208	6		2		1			106	0	323
141	25										5	5
142	25	1				1					1	3
144	25										1	1
145	25										8	8
146	25										16	16
147	25										5	5
148	25										6	6
149	25					2		1			0	3
151	25					1		2	1		30	34
152	25		1			2	1	1			0	5
153	25										4	4
154	25										9	9
155	25				1	1					11	13
156	25					4					5	9
157	25	57			4	13	2	4	1	27	8	116
159	25	261	5		4	6	2	1	2	157	1	439
162	25	7	4			2				9	0	22
163	25	21					1		2	15	0	39
169	26	3				3	1				3	10
170	26				1						10	11
171	26					1					8	9
172	26	1									0	1
173	26							1	1		6	8
174	26				1				1		3	5
175	26	2		1	1	1					0	5
176	26	3			2		1		1		0	7
177	26	2			1	1	1				0	5
178	26	1				2			2		0	5
179	26	32	2		5	5		5	1		1	51
180	26					1		2			0	3
181	26										0	0
182	26	2									0	2
184	26	5				1					0	6
185	26	4				2					3	9
186	26				1	2		1	1		8	13
187	26	5			2	2			1		8	18
188	26	2			1	4					2	9
190	26	541	26		59	39	5	14	6	312	23	1025
		3,729	**205**	**60**	**197**	**152**	**37**	**42**	**22**	**2,407**	**430**	**7,281**

APPENDIX E: Physical Condition and Measurements for Caribou Harvested January-April 2005, Bathurst Herd Winter Ranges, NWT. (Data from Earl and Trevor Evans, Fort Smith, NWT)

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	0.5	Y	N	MEDIUM	-38c Deep snow. Taenia krabbi. 1 hydatid, 1 thread worm
2	28-Jan-05	West Bay Gordon Lake	F	Adult	GOOD	4	Y	N	LOW	besnoitia lower legs
3	28-Jan-05	West Bay Gordon Lake	M	Adult	LOW	0	N	N	MEDIUM	Thread worm left lung, very poor condition
4	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	0.5	N	N	LOW	
5	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	0.5	N	N	MEDIUM	
6	28-Jan-05	West Bay Gordon Lake	F	Adult	GOOD	10	Y	N	LOW	
7	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	2	Y	N	MEDIUM	
8	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	0.5	N	N	LOW	Taenia Krabbi in meat, besnoitia lower legs
9	28-Jan-05	West Bay Gordon Lake	F	Adult	GOOD	5	Y	N	LOW	
10	28-Jan-05	West Bay Gordon Lake	F	Adult	LOW	2	Y	N	MEDIUM	
11	28-Jan-05	West Bay Gordon Lake	M	Adult	LOW	0	N	N	HIGH	Big bull in poor condition. 1 hydatid cyst in lung

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	29-Jan-05	Hidden Lake	F	Adult	GOOD	4	Y	N	LOW	-38c, DEEP SNOW
2	29-Jan-05	Hidden Lake	F	Adult	LOW	0	N	N	MEDIUM	Besnoitia lower legs
3	29-Jan-05	Hidden Lake	M	Yearling	LOW	0	N	N	LOW	Very poor condition
4	29-Jan-05	Hidden Lake	M	Adult	LOW	0.5	N	N	MEDIUM	Big male, poor condition. 2 taenia hydatigeba on liver, 10-12 cm
5	29-Jan-05	Hidden Lake	F	Adult	LOW	2	Y	N	MEDIUM	Besnoitia lower legs
6	29-Jan-05	Hidden Lake	F	Adult	GOOD	7	Y	N	LOW	
7	29-Jan-05	Hidden Lake	M	Adult	LOW	0	N	N	HIGH	
8	29-Jan-05	Hidden Lake	F	Adult	LOW	0.5	N	UNK	MEDIUM	Besnoitia lower legs
9	29-Jan-05	Hidden Lake	F	Adult	LOW	3	Y	N	LOW	2 Hydatid cysts approx 12cm in diameter
10	29-Jan-05	Hidden Lake	F	Adult	GOOD	7	Y	N	MEDIUM	Mucus like fluid in utter
11	29-Jan-05	Hidden Lake	F	Adult	LOW	3	Y	N	LOW	
12	29-Jan-05	Hidden Lake	M	Adult	LOW	0.5	N	N	MEDIUM	
13	29-Jan-05	Hidden Lake	F	Adult	LOW	0.5	N	N	LOW	
14	29-Jan-05	Hidden Lake	F	Adult	LOW	0.5	Y	N	LOW	Besnoitia lower legs, 1 Cyst on liver, 1cm Long
15	29-Jan-05	Hidden Lake	M	Adult	LOW	2	N	N	MEDIUM	1 Hydatid cyst on lungs, 10-14cm
16	29-Jan-05	Hidden Lake	F	Adult	GOOD	8	Y	N	LOW	Taenia krabbi present
17	29-Jan-05	Hidden Lake	F	Adult	LOW	2	Y	N	MEDIUM	lungs stuck to rib wall about 4 inches
18	29-Jan-05	Hidden Lake	F	Adult	VERY GOOD	12	Y	N	LOW	

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	26-Feb-05	Abitall Lake	F	Adult	VERY GOOD	15	Y	N	LOW	150mi NE Fort Smith
2	1-Mar-05	Abitall Lake	M	Adult	GOOD	6	N	N	LOW	
3	1-Mar-05	Abitall Lake	M	Calf	VERY LOW	0	N	N	LOW	
4	1-Mar-05	Abitall River	M	Adult	LOW	0.5	N	N	MEDIUM	Taenia krabbi present in hind quarters
5	1-Mar-05	Abitall Lake	M	Adult	GOOD	5	N	N	LOW	
6	1-Mar-05	Abitall Lake	M	Adult	LOW	0.5	N	N	HIGH	LF hoof has abnormal lump 1.5cm diam between hoof and 1st joint
7	1-Mar-05	Abitall Lake	F	Adult	GOOD	11	Y	N	LOW	
8	28-Feb-05	Abitall River	F	Adult	VERY GOOD	14	Y	N	LOW	Besnoitia on legs, heavy bruising on forelegs
9	28-Feb-05	Abitall River	F	Adult	GOOD	5	Y	N	UNK	Rt side of lungs adheared to rib cage
10	28-Feb-05	Abitall River	F	Adult	VERY LOW	1	N	N	MEDIUM	Incisors worn, older animal,antlers well developed
11	1-Mar-05	Abitall Lake	F	Adult	EXCELLENT	17	Y	UNK	LOW	Loaded with mesentary fat
12	1-Mar-05	Abitall Lake	F	Adult	GOOD	7	Y	UNK	UNK	
13	1-Mar-05	Abitall Lake	M	Adult	LOW	0.5	N	N	MEDIUM	Old injury rear hock hair gone, 1x6 inches
14	1-Mar-05	Abitall Lake	F	Adult	LOW	0.5	N	N	UNK	2 Hydatid cysts in lungs approx 12-15cm. Besnoitia present
15	1-Mar-05	Abitall Lake	F	Adult	GOOD	12	Y	UNK	LOW	Good mesentary fat
16	1-Mar-05	Abitall Lake	F	Adult	VERY GOOD	18	Y	N	LOW	Heavy inside fat

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	19-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	MEDIUM	Warble scale: Low=0-30, medium=30-60, high=60+
2	19-Mar-05	Sarah Lake	F	UNK	FAIR	2	Y	UNK	MEDIUM	
3	19-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	HIGH	5 hydatid cysts in lungs, photos
4	19-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	besnoitia in lower legs
5	19-Mar-05	Sarah Lake	F	UNK	GOOD	7	Y	UNK	LOW	
6	19-Mar-05	Sarah Lake	F	UNK	FAIR	2	Y	UNK	MEDIUM	
7	19-Mar-05	Sarah Lake	F	UNK	FAIR	0.5	N	UNK	MEDIUM	mesentery fat good. Mucus like fluid in udder
8	19-Mar-05	Sarah Lake	F	UNK	GOOD	6	Y	UNK	MEDIUM	
9	19-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	MEDIUM	taenia krabbi present
10	19-Mar-05	Sarah Lake	M	UNK	POOR	0.5	N	UNK	HIGH	older male
11	19-Mar-05	Sarah Lake	M	UNK	POOR	0.5	N	UNK	HIGH	older male
12	19-Mar-05	Sarah Lake	F	UNK	GOOD	12	Y	UNK	LOW	besnoitia in lower legs
13	20-Mar-05	Sarah Lake	F	UNK	FAIR	3	Y	UNK	MEDIUM	
14	20-Mar-05	Sarah Lake	F	UNK	FAIR	2	Y	UNK	MEDIUM	
15	20-Mar-05	Sarah Lake	F	UNK	FAIR	4	N	UNK	LOW	1 Hydatid liver cyst, 1cm
16	20-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	
17	20-Mar-05	Sarah Lake	F	UNK	GOOD	11	Y	UNK	MEDIUM	
18	20-Mar-05	Sarah Lake	F	UNK	GOOD	7	Y	UNK	LOW	
19	20-Mar-05	Sarah Lake	F	UNK	GOOD	5	N	UNK	MEDIUM	Thread worm in lungs
20	20-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	
21	20-Mar-05	Sarah Lake	M	UNK	POOR	0.5	N	UNK	VERY HIGH	280 warbles. Highest count yet
22	20-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	LOW	
23	20-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	heavy bruising in front legs
24	20-Mar-05	Sarah Lake	F	UNK	GOOD	5	Y	UNK	MEDIUM	
25	20-Mar-05	Sarah Lake	F	UNK	GOOD	11	Y	UNK	LOW	
26	20-Mar-05	Sarah Lake	F	UNK	FAIR	2	Y	UNK	MEDIUM	
27	20-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	
28	20-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	HIGH	
29	20-Mar-05	Sarah Lake	F	UNK	GOOD	9	Y	UNK	MEDIUM	no antlers
30	20-Mar-05	Sarah Lake	M	UNK	FAIR	3	N	UNK	MEDIUM	
31	20-Mar-05	Sarah Lake	M	UNK	POOR	0	N	UNK	HIGH	taenia krabbi present
32	20-Mar-05	Sarah Lake	F	UNK	GOOD	6	Y	UNK	MEDIUM	

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
33	20-Mar-05	Sarah Lake	F	UNK	FAIR	4	Y	UNK	MEDIUM	Left antler broken off
34	20-Mar-05	Sarah Lake	F	UNK	GOOD	8	Y	UNK	MEDIUM	
35	20-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	2 large hydatid cysts in lungs, photos
36	20-Mar-05	Sarah Lake	F	UNK	FAIR	2	N	UNK	LOW	
37	20-Mar-05	Sarah Lake	F	UNK	FAIR	3	Y	UNK	MEDIUM	
38	20-Mar-05	Sarah Lake	F	UNK	GOOD	7	N	UNK	MEDIUM	taenia krabbi present
39	21-Mar-05	Sarah Lake	F	UNK	GOOD	10	Y	UNK	MEDIUM	besnoitia in lower legs
40	21-Mar-05	Sarah Lake	F	UNK	EXCELLENT	17	Y	UNK	MEDIUM	Heavy mesentery fat
41	21-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	LOW	only 9 warbles on entire hide
42	21-Mar-05	Sarah Lake	F	UNK	FAIR	2	Y	UNK	LOW	
43	21-Mar-05	Sarah Lake	F	UNK	FAIR	4	Y	UNK	MEDIUM	
44	21-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	
45	21-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	HIGH	older cow, teeth badly warn
46	21-Mar-05	Sarah Lake	F	UNK	FAIR	2	N	UNK	MEDIUM	
47	21-Mar-05	Sarah Lake	F	UNK	GOOD	7	Y	UNK	MEDIUM	
48	21-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	LOW	besnoitia in lower legs
49	21-Mar-05	Sarah Lake	F	UNK	GOOD	12	Y	UNK	MEDIUM	
50	21-Mar-05	Sarah Lake	F	UNK	GOOD	8	Y	UNK	MEDIUM	
51	21-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	LOW	Lung stuck to ribs
52	21-Mar-05	Sarah Lake	F	UNK	POOR	0.5	Y	UNK	MEDIUM	
53	21-Mar-05	Sarah Lake	F	UNK	FAIR	2	N	UNK	MEDIUM	
54	21-Mar-05	Sarah Lake	F	UNK	FAIR	4	N	UNK	MEDIUM	
55	21-Mar-05	Sarah Lake	F	UNK	GOOD	9	N	UNK	MEDIUM	
56	21-Mar-05	Sarah Lake	F	UNK	GOOD	11	Y	UNK	LOW	
57	21-Mar-05	Sarah Lake	M	UNK	FAIR	3	N	UNK	MEDIUM	
58	21-Mar-05	Sarah Lake	F	UNK	POOR	2	N	UNK	LOW	
59	21-Mar-05	Sarah Lake	F	UNK	POOR	0.5	Y	UNK	LOW	
60	21-Mar-05	Sarah Lake	F	UNK	GOOD	9	Y	UNK	MEDIUM	
61	22-Mar-05	Sarah Lake	F	UNK	GOOD	11	Y	UNK	MEDIUM	besnoitia in lower legs
62	22-Mar-05	Sarah Lake	F	UNK	VERY GOOD	16	Y	UNK	MEDIUM	
63	22-Mar-05	Sarah Lake	F	UNK	GOOD	7	N	UNK	LOW	taenia krabbi present
64	22-Mar-05	Sarah Lake	F	UNK	POOR	0	N	UNK	MEDIUM	

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
65	22-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	HIGH	
66	22-Mar-05	Sarah Lake	F	UNK	FAIR	3	Y	UNK	MEDIUM	
67	22-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	
68	22-Mar-05	Sarah Lake	F	UNK	EXCELLENT	20	Y	UNK	MEDIUM	Fattest caribou harvested
69	22-Mar-05	Sarah Lake	F	UNK	GOOD	9	Y	UNK	LOW	
70	22-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	huge swollen lower leg, pictures
71	22-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	MEDIUM	
72	22-Mar-05	Sarah Lake	F	UNK	GOOD	10	Y	UNK	LOW	Thread worm in left lung
73	22-Mar-05	Sarah Lake	F	UNK	GOOD	7	N	UNK	LOW	
74	22-Mar-05	Sarah Lake	F	UNK	GOOD	9	Y	UNK	MEDIUM	
75	22-Mar-05	Sarah Lake	F	UNK	POOR	1	N	UNK	MEDIUM	
76	22-Mar-05	Sarah Lake	F	UNK	FAIR	3	N	UNK	VERY HIGH	taenia krabbi present
77	22-Mar-05	Sarah Lake	F	UNK	GOOD	14	Y	UNK	MEDIUM	
78	23-Mar-05	Sarah Lake	F	UNK	GOOD	11	Y	UNK	MEDIUM	Mucus in udder
79	23-Mar-05	Sarah Lake	F	UNK	GOOD	8	Y	UNK	LOW	
80	23-Mar-05	Sarah Lake	F	UNK	GOOD	0.5	N	UNK	MEDIUM	
81	23-Mar-05	Sarah Lake	F	UNK	FAIR	4	Y	UNK	MEDIUM	1 Hydatid liver cyst, 1 small hydatid cyst on lungs
82	23-Mar-05	Sarah Lake	F	UNK	VERY GOOD	16	Y	UNK	LOW	
83	23-Mar-05	Sarah Lake	F	UNK	POOR	2	N	UNK	MEDIUM	
84	23-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	HIGH	besnoitia in lower legs
85	23-Mar-05	Sarah Lake	F	UNK	FAIR	4	N	UNK	MEDIUM	liver stuck to back of stomach
86	23-Mar-05	Sarah Lake	F	UNK	GOOD	10	Y	UNK	MEDIUM	
87	23-Mar-05	Sarah Lake	F	UNK	VERY GOOD	15	Y	UNK	LOW	no antlers
88	23-Mar-05	Sarah Lake	F	UNK	FAIR	6	N	UNK	MEDIUM	
89	23-Mar-05	Sarah Lake	F	UNK	VERY GOOD	17	Y	UNK	MEDIUM	
90	23-Mar-05	Sarah Lake	F	UNK	POOR	0.5	N	UNK	LOW	
91	23-Mar-05	Sarah Lake	F	UNK	GOOD	12	Y	UNK	MEDIUM	
92	23-Mar-05	Sarah Lake	F	UNK	FAIR	3	Y	UNK	MEDIUM	
93	23-Mar-05	Sarah Lake	F	UNK	VERY POOR	0	N	UNK	LOW	cluster of white rice like balls found on spleen, collected sample. Photos

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	5-Apr-05	Hidden Lake	F	UNK	POOR	0.5	Y	UNK	LOW	besnoitia on lower legs
2	5-Apr-05	Hidden Lake	F	UNK	GOOD	6	Y	UNK	MED	Tania krabbei present in legs
3	5-Apr-05	Hidden Lake	F	UNK	VERY GOOD	13	Y	UNK	LOW	Warble scale: Low=0-30, medium=30-60, high=60+
4	5-Apr-05	Hidden Lake	F	UNK	VERY GOOD	12	Y	UNK	LOW	older cow, 1 tooth broken
5	5-Apr-05	Hidden Lake	F	UNK	VERY GOOD	13	Y	UNK	MED	some besnoitia in legs
6	5-Apr-05	Hidden Lake	F	UNK	EXCELLENT	16	Y	UNK	LOW	
7	5-Apr-05	Hidden Lake	F	UNK	FAIR	4	Y	UNK	LOW	#1 photo taken of hydatid lung cyst
8	5-Apr-05	Hidden Lake	F	UNK	EXCELLENT	24	Y	UNK	LOW	
9	5-Apr-05	Hidden Lake	F	UNK	EXCELLENT	29	Y	UNK	LOW	foto of backfat. This is the fattest caribou harvested this year
10	5-Apr-05	Hidden Lake	F	UNK	GOOD	6	Y	UNK	LOW	
1	6-Apr-05	Hidden Lake	F	UNK	GOOD	9	Y	UNK	LOW	
2	6-Apr-05	Hidden Lake	F	UNK	FAIR	3	Y	UNK	MED	
3	6-Apr-05	Hidden Lake	F	UNK	GOOD	7	Y	UNK	LOW	
4	6-Apr-05	Hidden Lake	F	UNK	VERY GOOD	19	Y	UNK	LOW	
5	6-Apr-05	Hidden Lake	F	UNK	POOR	0.5	Y	UNK	LOW	1 small cyst on liver
6	6-Apr-05	Hidden Lake	F	UNK	FAIR	3	N	UNK	MED	
7	6-Apr-05	Hidden Lake	F	UNK	VERY POOR	0	Y	UNK	LOW	pic 2, very poor but pregnant. Photo of hydatid
8	6-Apr-05	Hidden Lake	F	UNK	FAIR	3	Y	UNK	VERY LOW	only 12 warbles
9	6-Apr-05	Hidden Lake	F	UNK	EXCELLENT	24	Y	UNK	VERY LOW	
10	6-Apr-05	Hidden Lake	F	UNK	VERY GOOD	17	Y	UNK	VERY LOW	
11	6-Apr-05	Hidden Lake	F	UNK	VERY GOOD	18	Y	UNK	VERY LOW	
12	6-Apr-05	Hidden Lake	F	UNK	FAIR	7	Y	UNK	MED	besnoitia on legs
13	6-Apr-05	Hidden Lake	F	UNK	FAIR	3	Y	UNK	MED	

Sample	Date	Location	Sex	Age	Condition	Back fat mm	Preg	Lactating	Warble	Notes
1	7-Apr-05	Sparrow Lake	F	UNK	FAIR	4	Y	UNK	LOW	no antler on this cow
2	7-Apr-05	Sparrow Lake	F	UNK	FAIR	2	Y	UNK	LOW	older cow
3	7-Apr-05	Sparrow Lake	F	UNK	FAIR	5	Y	UNK	LOW	1 liver cyst
4	7-Apr-05	Sparrow Lake	F	UNK	POOR	0	N	UNK	HIGH	mucus on lungs, sample and photo. Very old cow, 2 middle teeth broken/worn
5	7-Apr-05	Sparrow Lake	F	UNK	FAIR	5	Y	UNK	LOW	
6	7-Apr-05	Sparrow Lake	F	UNK	FAIR	3	N	UNK	LOW	
7	7-Apr-05	Sparrow Lake	F	UNK	GOOD	7	Y	UNK	LOW	
8	7-Apr-05	Sparrow Lake	F	UNK	GOOD	12	Y	UNK	LOW	
9	7-Apr-05	Sparrow Lake	F	UNK	VERY GOOD	14	Y	UNK	LOW	
10	7-Apr-05	Sparrow Lake	F	UNK	VERY POOR	0	N	UNK	LOW	2 lung cysts, 1 liver cyst. Photo
11	7-Apr-05	Sparrow Lake	F	UNK	POOR	0	N	UNK	LOW	lung stuck to rib wall
1	6-Apr-05	Sparrow Lake	F	UNK	FAIR	6	Y	UNK	MEDIUM	
2	6-Apr-05	Sparrow Lake	F	UNK	FAIR	3	Y	UNK	MEDIUM	Besnoitia on legs
3	6-Apr-05	Sparrow Lake	F	UNK	GOOD	12	Y	UNK	LOW	
4	6-Apr-05	Sparrow Lake	F	UNK	VERY GOOD	17	Y	UNK	LOW	
5	6-Apr-05	Sparrow Lake	F	UNK	POOR	0	Y	UNK	MEDIUM	
6	6-Apr-05	Sparrow Lake	F	UNK	VERY POOR	0	N	UNK	VERY HIGH	one of the highest warble counts
7	6-Apr-05	Sparrow Lake	F	UNK	POOR	0.5	N	UNK	MEDIUM	huge 35-40cm cyst in lungs, collected to A Gunn, photo. Small heart

APPENDIX F: A Weather-Related Index to Mosquito and Warble Fly Abundance for the Post Calving and Summer Range of the Bathurst Herd, NWT, 1957-2005 (Service Contract 781079 to John Lee).

Mosquito index:
If temperature>=18 then tim=1
If temperature<=6 then tim=0
If 18>temperature>6 then tim=(1-(18-temperature)/18)
If wind speed >6 then twin=0;
If wind speed <6 then twin=(6-minwind)/6;
Index =tim*twin;

Osterid flies
If temperature>=18 then tio=1;
If temperature<=13 then tio=0;
If 18>temperature>13 then tio=(1-(18-temperature)/10);
If meanwind>9 then owin=0;
If meanwind<9 then owin=(9-meanwind)/9;
ostindex=tio*owin;

Table 1. Relative annual ratings of osterid harassment intensity for the area centered around Lupin, Ekati, and Daring Lake based on an index derived from temperature and wind speed, 1996 to 2005. Numbers in parenthesis are the annual indicator scores.

Indicators of insect harassment level	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Mean yearly osterid index for days index > 0	0.692 (3)	0.593 (1)	0.607(2)	0.594 (1)	0.659 (3)	0.599 (1)	0.633 (2)	0.655 (3)	0.591 (1)	0.562 (1)
Percent days where Osterid index > 0.0	41.7 (1)	45.0 (2)	53.9 (3)	34.9 (1)	70.2 (3)	45.2 (2)	54.2 (3)	46.2 (2)	65.3 (3)	25.3 (1)
Percent days where Osterid index > 0.75	21.4 (2)	15.0 (1)	21.1 (2)	7.9 (1)	33.3 (3)	16.1 (2)	20.3 (2)	23.8 (3)	22.4 (3)	8.0 (1)
Percent days where Osterid index > 0.0 and days were consecutive	39.3 (1)	36.3 (1)	54.9 (3)	30.2 (1)	66.7 (3)	40.3 (2)	50.8 (2)	57.4 (3)	63.3 (3)	21.3(1)
Percent days where Osterid index > 0.75 and days were consecutive	16.7 (2)	12.5 (1)	19.7 (2)	7.9 (1)	31.6 (3)	16.1 (2)	18.6 (2)	27.7 (3)	14.3 (2)	6.7 (1)
Number of groups of consecutive days where Osterid index was > 0	3 (1)	6 (2)	9 (3)	6 (2)	4 (1)	5 (2)	5 (2)	6 (2)	6 (2)	6 (2)
Number of days in the highest 2 groups of consecutive days	26 (3)	19 (2)	17 (2)	11 (1)	32 (3)	19 (2)	19 (2)	16 (2)	18 (2)	8 (1)
Osterid Score	13	10	17	8	19	13	15	18	16	8
Osterid rating	**Medium**	**Low**	**High**	**Low**	**High**	**Medium**	**Medium**	**High**	**High**	**Low**

Table 2. Relative annual ratings of mosquito harassment intensity for the area centered around Lupin, Ekati, and Daring Lake based on an index derived from temperature and wind speed, 1996 to 2005. Numbers in parenthesis are the annual indicator scores.

Indicators of potential insect level	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**
Mean yearly mosquito index for days index > 0	0.544 (3)	0.465 (2)	0.475 (2)	0.436 (1)	0.483 (3)	0.435 (1)	0.448 (2)	0.466 (2)	0.454 (2)	0.414 (1)
Percent days where Mosquito index > 0.0	45.7 (1)	64.6 (3)	63.4 (3)	58.8 (3)	50.5 (2)	55.3 (2)	51.0 (2)	57.7 (3)	51.1 (2)	37.1 (1)
Percent days where Mosquito index > 0.75	28.6 (3)	29.2 (3)	33.7 (3)	23.5 (2)	17.6 (1)	16.5 (1)	26.0 (2)	24.0 (2)	20.2 (1)	18.6 (1)
Percent days where Mosquito index > 0.0 and days were consecutive	80.0 (1)	89.6 (3)	90.1 (3)	77.5 (1)	89.0 (3)	81.6 (2)	78.8 (1)	85.5 (3)	71.3 (1)	80.4 (2)
Percent days where Mosquito index > 0.75 and days were consecutive	18.1 (3)	11.5 (2)	17.8 (3)	6.9 (1)	14.3 (3)	8.7 (1)	13.5 (3)	10.6 (2)	8.5 (1)	5.2 (1)
Number of groups of consecutive days where Mosquito index was > 0	6 (2)	2 (1)	2 (1)	8 (3)	3 (1)	5 (2)	7 (3)	5 (2)	8 (3)	6 (2)
Number of days in the highest 2 groups of consecutive days	71 (3)	76 (3)	82 (3)	43 (1)	75 (3)	66(2)	48 (1)	62 (2)	42 (1)	43 (1)
Mosquito Score	16	17	18	12	16	11	14	16	11	9
Mosquito rating	**High**	**High**	**High**	**Medium**	**High**	**Low**	**Medium**	**High**	**Low**	**Low**

Indicators of oestrid intensity based on an index derived from temperature and wind speed at Lupin, NWT between June 1 and September 15, 1957-2005.

Year	Mean osterid index for days index > 0	Days osterid index > 0	Days osterid index >.75	Days osterid index > 0 and days consecutive	Days osterid index > 0.75 and days consecutive	Number groups consecutive days osterid index > 0	Number days in highest 2 groups consecutive day	Season length in days	Osterid Intensity Score	**Osterid Intensity Rating**
1957	0.50	4	0	2	0	1	2	13	8	**L**
1958	0.52	1	0	0	0	0	0	1	8	**L**
1959	0.44	2	0	4	0	2	2	2	8	**L**
1960	0.61	12	1	10	0	4	5	50	12	**L**
1961	0.58	19	0	14	3	5	5	66	17	**H**
1962	0.58	8	0	8	0	2	8	9	9	**L**
1963	0.49	9	0	4	0	2	2	48	9	**L**
1964	0.48	14	1	8	0	4	2	42	9	**L**
1965	0.62	5	1	5	0	2	5	11	10	**L**
1966	0.58	23	5	21	5	8	8	60	21	**H**
1967	0.55	3	0	0	0	0	0	11	8	**L**
1968	0.54	5	0	4	0	2	2	63	10	**L**
1969	0.47	8	0	5	0	2	2	43	8	**L**
1970	0.51	10	1	8	0	3	6	47	9	**L**
1971	0.52	8	1	7	0	3	5	53	9	**L**
1972	0.62	4	0	0	0	0	0	62	12	**L**
1973	0.62	31	11	28	11	6	15	68	24	**H**
1974	0.60	17	4	15	2	4	9	50	16	**M**
1975	0.58	16	0	15	0	4	10	54	15	**M**
1976	0.59	23	5	19	4	4	15	49	21	**H**
1977	0.53	9	0	4	0	2	2	45	8	**L**
1978	0.00	0	0	0	0	0	0	0	8	**L**
1979	0.74	8	4	6	2	2	3	45	11	**L**
1980	0.51	16	1	15	0	3	13	48	13	**L**
1981	0.54	17	3	14	2	6	5	33	12	**L**

Year	Mean osterid index for days index > 0	Days osterid index > 0	Days osterid index >.75	Days osterid index > 0 and days consecutive	Days osterid index > 0.75 and days consecutive	Number groups consecutive days osterid index > 0	Number days in highest 2 groups consecutive day	Season length in days	Osterid Intensity Score	**Osterid Intensity Rating**
1982	0.60	24	6	23	6	7	12	66	24	**H**
1983	0.69	19	7	17	3	5	11	52	22	**H**
1984	0.69	28	8	26	7	6	14	69	24	**H**
1985	0.62	8	2	7	2	2	6	46	11	**L**
1986	0.68	17	6	11	0	2	11	55	17	**H**
1987	0.62	16	3	15	2	5	3	49	15	**M**
1988	0.66	26	8	23	5	4	16	76	23	**H**
1989	0.68	39	14	37	11	7	19	83	24	**H**
1990	0.62	13	3	11	2	2	11	37	12	**L**
1991	0.63	33	8	29	4	4	21	56	23	**H**
1992	0.73	17	9	16	5	5	9	44	19	**H**
1993	0.57	20	0	20	0	4	14	56	18	**H**
1994	0.55	41	8	37	5	11	15	89	22	**H**
1995	0.58	12	1	11	0	2	11	70	13	**L**
1996	0.67	30	10	30	7	3	24	39	20	**H**
1997	0.57	29	3	23	0	5	16	81	19	**H**
1998	0.56	38	7	36	4	9	16	77	23	**H**
1999	0.52	19	2	15	2	5	9	64	16	**M**
2000	0.62	37	8	36	2	4	32	58	21	**H**
2001	0.64	19	7	14	5	4	11	63	22	**H**
2002	0.61	26	8	23	7	5	16	62	24	**H**
2003	0.65	25	12	20	10	5	13	64	24	**H**
2004	0.60	19	6	14	5	4	9	48	20	**H**
2005	0.59	15	3	11	2	4	7	76	12	**L**

Year	Mean mosquito index for days index > 0	Days mosquito index > 0	Days mosquito index >.75	Days mosquito index > 0 and days consecutive	Days mosquito index > 0.75 and days consecutive	Number groups consecutive days mosquito index > 0	Number days in highest 2 groups consecutive day	Season length in days	Mosquito Intensity Score	**Mosquito Intensity Rating**
1957	0.44	58	2	57	2	8	27	76	9	**L**
1958	0.41	66	0	32	0	5	21	96	11	**L**
1959	0.34	21	0	15	0	5	9	70	8	**L**
1960	0.49	70	7	70	3	7	32	86	17	**H**
1961	0.52	67	9	67	5	6	40	80	20	**H**
1962	0.41	67	5	62	2	6	45	101	15	**L**
1963	0.41	64	3	63	0	7	42	83	13	**L**
1964	0.44	62	3	52	0	7	31	73	9	**L**
1965	0.48	62	3	61	2	7	33	76	12	**L**
1966	0.51	77	8	66	6	10	29	102	22	**H**
1967	0.39	54	2	48	0	9	16	91	11	**L**
1968	0.37	54	2	49	2	7	23	89	8	**L**
1969	0.41	54	2	53	0	6	32	67	9	**L**
1970	0.43	62	1	57	0	10	31	90	10	**L**
1971	0.45	64	1	61	0	11	24	92	14	**L**
1972	0.42	59	2	55	0	6	36	85	9	**L**
1973	0.50	82	15	80	12	11	34	105	23	**H**
1974	0.47	60	6	60	4	12	9	86	14	**L**
1975	0.45	77	10	75	4	7	13	97	18	**H**
1976	0.46	69	11	63	9	9	34	100	22	**H**
1977	0.44	69	3	65	2	11	23	101	16	**M**
1978	0.40	33	0	24	0	8	9	96	11	**L**
1979	0.44	60	5	56	3	8	31	86	9	**L**
1980	0.44	67	5	65	4	8	39	91	17	**H**
1981	0.47	68	8	67	4	7	34	101	22	**H**
1982	0.55	52	12	48	7	7	26	97	18	**H**
1983	0.51	75	12	72	6	7	44	96	24	**H**
1984	0.58	75	16	75	13	2	72	82	20	**H**

Year	Mean mosquito index for days index > 0	Days mosquito index > 0	Days mosquito index >.75	Days mosquito index > 0 and days consecutive	Days mosquito index > 0.75 and days consecutive	Number groups consecutive days mosquito index > 0	Number days in highest 2 groups consecutive day	Season length in days	Mosquito Intensity Score	**Mosquito Intensity Rating**
1985	0.45	56	3	49	3	9	24	105	13	**L**
1986	0.51	59	10	55	9	8	25	83	15	**L**
1987	0.45	53	8	49	4	9	25	98	15	**L**
1988	0.50	79	14	74	10	3	61	99	22	**H**
1989	0.50	85	18	80	12	4	63	102	22	**H**
1990	0.39	57	5	57	4	9	31	94	13	**L**
1991	0.49	66	9	63	4	5	38	93	19	**H**
1992	0.51	61	10	59	7	5	40	84	17	**H**
1993	0.51	56	8	54	6	6	32	82	15	**L**
1994	0.45	78	11	75	6	9	47	108	23	**H**
1995	0.47	68	6	67	6	8	38	83	19	**H**
1996	0.51	81	12	82	8	5	71	106	22	**H**
1997	0.43	79	6	79	0	4	58	91	15	**L**
1998	0.43	80	11	68	9	11	23	101	20	**H**
1999	0.39	64	3	51	2	9	30	101	13	**L**
2000	0.45	75	6	73	2	5	50	92	16	**M**
2001	0.42	72	9	66	5	9	38	103	22	**H**
2002	0.45	64	9	58	7	7	32	100	19	**H**
2003	0.47	76	10	72	7	12	34	104	23	**H**
2004	0.46	48	4	42	2	8	23	98	12	**L**
2005	0.42	59	6	55	2	10	29	90	10	**L**