# STATUS OF CARIBOU ON NORTHERN MELVILLE PENINSULA IN JUNE 1982

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## ABSTRACT

We conducted an aerial survey to determine the number and distribution of caribou on northern Melville Peninsula (north of 68°N), NWT during 6-15 June 1982. In two survey strata, 561 caribou (excluding calves) were counted within 1.2-km-wide strip-transects, with 154 counted outside the transects. The aerial survey sampled 19.5% of the strata where caribou were observed; and 8.5% of a stratum where no caribou were found. The population was estimated at 2871 caribou (excluding calves) with a 95% confidence interval of 1993 to 3749.

Caribou were distributed principally along the western coast of the peninsula, and in the southeastern quarter of the study area. Calves were observed south of Sarcpa Lake in the south central portion of the survey area; and south of Garry Bay, north along the west coast of Melville Peninsula.

Calving apparently started during or just before the survey period. Only 25 calves were counted with the 561 older caribou observed within the transect strips.

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# INTRODUCTION

Systematic surveys of caribou (Rangifer tarandus groenlandicus) had not been conducted on northern Melville Peninsula before 1982. Attempts have been made at reconnaissance surveys in this area; the most successful being that in June 1981 by Elliott and Elliott (1981) who observed calves along the northwestern coast of the peninsula.

Unfortunately, population estimates for caribou on northern Melville Peninsula have not been made from previous surveys. Calef and Heard (1981) gave an estimate of about 52,000 on Melville Peninsula in 1976; however, their survey did not extend north of 68°N.

It was known from previous reconnaissance flights and local hunters that caribou inhabit northern Melville year-round, although distribution, movement patterns, calving areas and numbers have not been documented. The objective of this survey was to estimate caribou numbers, and to determine the distribution, calving areas, and productivity of caribou on Melville Peninsula north of 68°N.

The study area (Figure 1) consists of: coastal plains and raised beaches to the east; rugged hills and islands to the north; the Prince Albert Hills in the west rising to 550 m above sea level; and rolling hills in the central area. All areas are boulder strewn. Fog and low clouds are frequent and these have disrupted previous survey attempts.

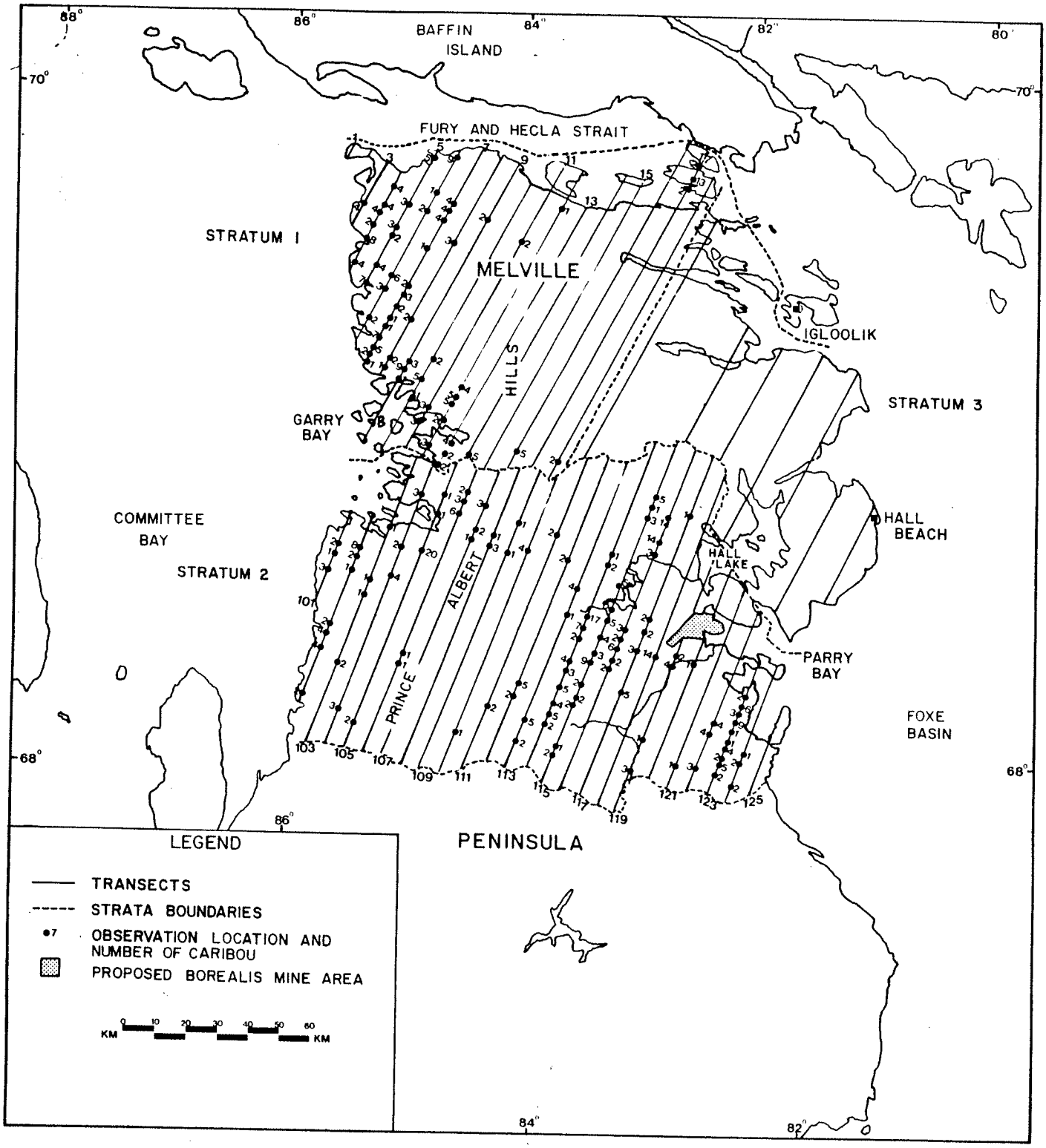


Figure 1. Distribution of caribou on northern Melville Peninsula, Northwest Territories, during an aerial survey, 6-15 June 1982.

# METHODS

A Helio-courier fixed-wing aircraft was flown between 120-190 km/h at about 152 m above ground level. Two rear-seat observers recorded observation data on tape recorders; while the pilot navigated and plotted locations of observed caribou on maps. Data recorded for each group of caribou included: the number of animals in each age-sex category; and the transect strip in which it was observed (i.e., 0-0.4 km, 0-0.8 km, or outside the transect strip).

Neonatal "calves" were distinguished by their small size and dark fur. Since almost all males (and some females) drop their antlers before June (Miller 1982), "bulls" were distinguished by their relatively large velvet antlers, while caribou with bare antlers were classified as "cows". All other caribou were "unclassified". Udders could not be seen on adult females due to the type of aircraft and the altitude at which it was flown.

The aircraft did not have wing struts. Therefore, a wire was strung between the wing and the fuselage on each side of the aircraft and marked with tape to indicate transect widths of 0.4 and 0.8 km on the ground during the survey. The right observer searched the full 0.8-km strip; while the left observer confidently searched only out to 0.4 km. As a result, the total transect width was 1.2 km.

The study area was divided into three strata. Transect lines were oriented northeasterly/southwesterly in all strata so as to cross most river drainages at right angles. In strata 1 and 2, transects were 6.4 km apart giving approximately 19% coverage. Based on personal knowledge and that of local residents, few animals were expected in Stratum 3. Therefore, transects in Stratum 3 were largely 12.9 km apart giving about 9% coverage.

The population estimate was calculated using Jolly's Method 2 for unequal-sized sampling units (Norton-Griffiths 1978).

# RESULTS

We completed the survey in 44 hours of flying over 10 days. Two days were unsuitable for surveying due to fog and low-lying cloud. Whenever we encountered a fog patch which made surveying impossible, we left the area and surveyed the transects later. Snow cover changed from complete at the start of the survey to patchy in the coastal areas by the end of the survey. The central portion of the study area remained snow-covered throughout the survey.

The observers apparently did not search their survey strips with equal effectiveness. The left observer counted a total of 212 caribou (excluding calves) within 0.4 km; while the right observer counted 349 within 0.8 km. These numbers of observed caribou differed ($Chi^2$, $P<0.05$) from the expected ratio of 1:2, based on the strip widths. The narrower strip width was probably more effective, given the patchy background caused by incomplete snow melt.

Caribou were not observed in Stratum 3 where we surveyed 8.5% of 5,241 $km^2$ (Figure 1.).

Excluding calves, a total of 561 caribou was counted within the 1.2-km-wide strip-transects in Strata 1 and 2; while 154 were seen outside the transects (Table 1). We sampled 18.8% of 8,283 $km^2$ in Stratum 1, and 19.9% of 12,869 $km^2$ in Stratum 2. These observations yielded a total estimate of 2,871 caribou

Table 1. Numbers and densities of observed caribou on northern Melville Peninsula[1], Northwest Territories, from an aerial survey during 6-15 June 1982.

| Sampling stratum (Sampling intensity) | Number of caribou[2] | | Number of caribou[2] per sq km | Estimated number of caribou[2] | | | Number of calves | |
|---|---|---|---|---|---|---|---|---|
| | Within 1.2-km transects | Outside transects | | Total estimate | Standard error | 95% confidence interval | Within 1.2-km transects | Outside transects |
| 1 (18.8%) | 189 | 73 | 0.121 | 1003.1 | 213.4 | 553 - 1453 | 11 | 2 |
| 2 (19.9%) | 372 | 81 | 0.145 | 1868.0 | 378.6 | 1087 - 2649 | 14 | 3 |
| 3 (8.5%) | 0 | 0 | ----- | ------ | ----- | ---- - ---- | 0 | 0 |
| Total[3] (19.5%) | 561 | 154 | 0.136 | 2871.1 | 434.6 | 1993 - 3749 | 25 | 5 |

[1] See Figure 1.

[2] Excluding calves.

[3] Stratum 3 was excluded from the calculation of total density, estimated total number, standard error and confidence interval.

(excluding calves), with a mean density of 0.14 per $km^2$ in Strata 1 and 2. The 95% confidence interval ranged from 1,993 to 3,749 (Table 1). The coefficient of variation (CV) was 0.15.

Groups (excluding calves) that were within the strip-transects averaged 2.88 individuals (N = 195, SE = 2.20). Group sizes ranged from 1 to 18.

The highest densities of caribou were found in the western coastal area and in the southeast quarter of the study area (Figure 1). Calves were observed from south of Garry Bay north along the west coast, and south of Sarcpa Lake which is southwest of Hall Lake. Only 4.3% of the caribou were calves. Bulls were most common south of Parry Bay along the east coast.

Six polar bears were sighted in the Garry Bay area, including a female with three cubs of the year. One bear was sighted just off the northwestern coast of Fury and Hecla Strait. Several hawks and/or falcons were also sighted, but not identified.

# DISCUSSION

Sex-age classification was essentially impossible except where the caribou were close to the aircraft. Only 21% of all caribou within the strip-transects (n = 586) were classified.

From the proportion of cows with bare antlers (62% among classified caribou) and the low proportion of calves (20%), it was judged that calving may have just begun. Some calves may have been missed due to their close affinity to their cows. Therefore, we did not attempt to estimate calf production.

Caribou were not observed in the proposed Borealis mine area (Figure 1). However, caribou tracks covered this area extensively, especially along the escarpment running north-south along the coast. Snow melted earlier there than in most other parts of northeastern Melville Peninsula. The escarpment may be important for caribou in late winter and early spring.

Three dead caribou which had been scavenged were sighted along the western coastal area. These were possibly the result of wolf or wolverine predation. Although no wolves or wolverines were observed, they are known by Igloolik and Hall Beach residents to occur wherever caribou are found on northern Melville Peninsula. Wolverines prey heavily on caribou in Alaska, Norway and Russia (Wilson 1982).

The patchy snow cover made detection of caribou extremely difficult for the observers, and we were not able to determine

the proportion of undetected animals within the strip-transects. Therefore, the estimated number of 2,871 caribou should be regarded as low.

Heard et al. (1986) estimated a similar number of caribou (i.e., 2500) in May 1983. The density of caribou on northern Melville Peninsula in June 1982 (0.14 $km^{-2}$) was somewhat higher than in May 1983 (0.10 $km^{-2}$, Heard et al. 1986). Heard et al. (1986) indicated that sight-ability of caribou was good in May 1983. However, the coefficients of variation suggest that the precision of our 1982 survey (CV = 0.15) was greater than that in May 1983 (CV = 0.38, Heard et al. 1986). This difference may be due to the higher survey coverage of occupied areas in June 1982 (19.5%) versus May 1983 (5.0%, Heard et al. 1986). Heard et al. (1986) also flew higher above the ground (224 m) and used a wider strip width (1.6 km).

Little information about caribou movements on northern Melville Peninsula is available. Local hunters indicate that caribou leave the eastern portion of the study area in late winter. This information and the distribution of calves and cows along the western coast in June 1982 suggest an east-to-west movement in late winter. Hunters from Igloolik report irregular movements of caribou between northern Melville Peninsula and northern Baffin Island; however, the direction, timing and frequency of these movements vary from year to year.

The May 1983 density was only a tenth of that on southern Melville Peninsula (Heard et al. 1989). The similarity of the June 1982 and May 1983 estimates suggests no major influx or exodus of caribou during May and early June. During ground observations in a 30-$km^2$ study area north of Sarcpa Lake, D. Waters (pers. comm.) observed no obvious directional movements during June 14-August 21, 1985 and May 22-July 2, 1986. Only one calf in 1986 and very few calves in 1985 were observed (D. Waters, pers. comm.). The small number of calves near Sarcpa Lake may come from immediately south of Sarcpa Lake where cows and calves were observed in June 1982; as opposed to the high density calving area farther to the south (i.e., south of 68°N) as implied by Heard et al. (1986).

Hunters from Igloolik and Hall Beach usually harvest caribou on northern Melville Peninsula and northern Baffin Island, and are the only ones known to harvest caribou on northern Melville Peninsula. Donaldson (1988) estimated that from 1981 to 1983 residents of Igloolik and Hall Beach annually harvested a total of 1800-2100 and 1100-1200 caribou, respectively. Based on the 1981 Canadian census, this estimated harvest suggests a consumption of about 2.83 caribou per capita; well within the average range of 2-4 caribou per capita per year for most Inuit communities (Jingfors 1986).

With about 20% of the Igloolik harvest and 80% of the Hall Beach harvest probably taken on northern Melville Peninsula (J. Stevenson, pers. comm.), the total domestic harvest of northern

Melville caribou would probably have been about 1300 annually during 1981-83. As well, about 140 caribou are harvested commercially.

Obviously, a population of 2900 caribou could not sustain this harvest level. Therefore, one or more of the following is probably true:

1. The June 1982 and May 1983 population sizes were grossly underestimated.
2. Immigration of caribou from northern Baffin Island and/or southern Melville Peninsula is sustaining the harvest.
3. The above harvest level is grossly overestimated.

Although the survey results suggest cautious management, we are not aware of any evidence indicating a declining caribou population on northern Melville Peninsula. Therefore, we do not recommend modification of the harvest at the present time. Nevertheless, further studies are required.

# RECOMMENDATIONS

1. The cooperation of the Hunters and Trappers Associations (HTAs) of Igloolik and Hall Beach should be sought to map local knowledge of seasonal caribou movements within and adjacent to northern Melville Peninsula.
2. Recent data on the amount and location of caribou harvesting by Igloolik and Hall Beach has been collected by the Baffin Regional Hunters and Trappers Committee. This data should be analyzed and evaluated. If the accuracy and precision of the data are inadequate for management purposes, a caribou harvest study should be specifically designed for this area in consultation with the local HTAs.
3. A radio-telemetry and/or other marking study of caribou on northern Melville Peninsula, as well as adjacent areas south of 68°N and on northern Baffin Island, should be conducted. The objectives of this study would be to identify population boundaries (or an effective management area), seasonal migration routes and concentration areas, and the magnitude, frequency and timing of immigration and/or emigration.
4. After these studies, an aerial survey should be designed to obtain an accurate population estimate. A survey in late June or early July should allow time for the majority of the area to become free of snow. However, unsuitable weather (e.g., fog) may also plague surveys at these times. Knowledge

of the seasonal movement patterns of the caribou and seasonal weather and terrain conditions should allow for a compromise on which to base an effective aerial survey schedule.

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APPENDIX. Numbers of caribou observed within 1.2-km-wide strip-transects on northern Melville Peninsula during 6-15 June 1982.

| Stratum 1 Transect | Area ($km^2$) | Number of observed caribou by sex-age class | | | | | Caribou density[1] |
|---|---|---|---|---|---|---|---|
| | | Bulls | Cows | Calves | Unclassified | Total | |
| 1 | 4.80 | - | - | - | - | 0 | 0.00 |
| 2 | 3.36 | - | - | - | - | 0 | 0.00 |
| 3 | 26.64 | - | 2 | 2 | - | 4 | 0.08 |
| 4 | 39.60 | - | 3 | 1 | 22 | 26 | 0.63 |
| 5 | 60.48 | - | 9 | - | 15 | 24 | 0.40 |
| 6 | 83.16 | - | 2 | 1 | 20 | 23 | 0.26 |
| 7 | 94.80 | - | 7 | 4 | 26 | 37 | 0.35 |
| 8 | 98.52 | - | 4 | 2 | 2 | 8 | 0.06 |
| 9 | 105.24 | - | 3 | 1 | 11 | 15 | 0.13 |
| 10 | 101.40 | - | 2 | - | 6 | 8 | 0.08 |
| 11 | 114.96 | - | 1 | - | 7 | 8 | 0.07 |
| 12 | 114.72 | - | 3 | - | 17 | 20 | 0.17 |
| 13 | 113.76 | - | 3 | - | 5 | 8 | 0.07 |
| 14 | 109.92 | - | - | - | 5 | 5 | 0.05 |
| 15 | 116.76 | 3 | - | - | - | 3 | 0.03 |
| 16 | 116.16 | - | - | - | 5 | 5 | 0.04 |
| 17 | 125.40 | - | - | - | 4 | 4 | 0.03 |
| 18 | 130.92 | - | 2 | - | - | 2 | 0.02 |
| Total | 1560.00 | 3 | 41 | 11 | 145 | 200 | 0.12 |

[1] Number of caribou observed within the 1,2-km-wide strip-transects, excluding calves.

APPENDIX. (continued)

| Stratum 2 Transect | Area ($km^2$) | Number of observed caribou by sex-age class | | | | | Caribou density[1] |
|---|---|---|---|---|---|---|---|
| | | Bulls | Cows | Calves | Unclassified | Total | |
| 1 | 31.44 | – | – | – | 6 | 6 | 0.19 |
| 2 | 73.44 | – | 4 | 2 | 17 | 23 | 0.29 |
| 3 | 107.04 | – | 1 | – | 4 | 5 | 0.05 |
| 4 | 109.56 | – | 1 | – | 11 | 12 | 0.11 |
| 5 | 108.96 | – | 1 | 1 | 29 | 31 | 0.28 |
| 6 | 122.04 | – | – | – | 13 | 13 | 0.11 |
| 7 | 120.12 | – | – | – | 6 | 6 | 0.05 |
| 8 | 123.12 | – | 1 | – | 3 | 4 | 0.03 |
| 9 | 123.36 | – | – | – | 2 | 2 | 0.02 |
| 10 | 118.68 | – | – | – | 5 | 5 | 0.04 |
| 11 | 126.84 | – | – | – | 4 | 4 | 0.03 |
| 12 | 127.80 | – | 4 | 2 | 3 | 9 | 0.05 |
| 13 | 134.16 | – | – | – | 12 | 12 | 0.09 |
| 14 | 132.12 | – | 12 | 3 | 37 | 52 | 0.37 |
| 15 | 140.40 | 1 | 4 | 2 | 40 | 47 | 0.32 |
| 16 | 144.36 | 2 | 4 | 3 | 19 | 28 | 0.17 |
| 17 | 142.44 | – | 1 | 1 | 12 | 14 | 0.09 |
| 18 | 142.44 | – | – | – | 17 | 17 | 0.12 |
| 19 | 112.68 | 3 | – | – | 10 | 13 | 0.12 |
| 20 | 80.64 | – | – | – | 1 | 1 | 0.01 |
| 21 | 78.84 | – | – | – | 1 | 1 | 0.01 |
| 22 | 62.28 | 1 | – | – | 10 | 11 | 0.18 |
| 23 | 45.60 | 9 | – | – | 47 | 56 | 1.23 |
| 24 | 29.76 | 2 | 2 | – | 7 | 11 | 0.37 |
| 25 | 24.72 | – | – | – | 3 | 3 | 0.12 |
| Total | 2562.84 | 18 | 35 | 14 | 319 | 386 | 0.15 |

[1] Number of caribou observed within the 1.2-km-wide strip-transects, excluding calves.