# SPRING CLASSIFICATION COUNTS ON THE BLUENOSE CARIBOU HERD MARCH, 1983

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## ABSTRACT

From 4 to 21 March 1983 the spring distribution of the Bluenose caribou herd was mapped and ground classification counts were conducted to estimate calf survival to one year of age. Most caribou were concentrated north and northwest of Colville Lake south of 68°30'N latitude. The herd did not begin a concerted migration towards the calving ground until 15 March. Of 3,723 caribou over one year old, 26% were male and 74% were female. From the ratio of 44 ± 2.0 ($\bar{x}$ ± SE) calves per 100 females over one year old, and assuming an initial calf production of 69 calves per 100 females (Parker 1972) and female survival from June 1982 of 93% (Heard and Calef 1979), 59% of calves born in June 1982 were alive in March 1983. This indicates that calf survival over the winter was excellent. The ratio of 44 ± 2.0 calves per 100 females is similar to recent estimates for the Beverly caribou herd. We found 18 ± 2.8 yearlings per 100 cows over two years of age. After we incorporated the unrepresented male segment of the Bluenose herd, we estimated that calves and yearlings composed 20% and 8% of the population, respectively. We observed 0.54 wolves per hour flown. Caribou reacted more stongly to the aircraft and presence of observers in the morning than in the afternoon. The use by caribou of lake ice as a mineral lick is reported.

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# INTRODUCTION

In March 1982 the federal government created the Environmental Studies Revolving Fund (ESRF) under the Canada Oil and Gas Act to fund studies related to physical and social environments that are relevant to oil and gas activities. The northern ESRF is administered by the Northern Affairs Program on behalf of the Minister of DIAND. The Northern Oil and Gas Action Program (NOGAP) was created by DIAND to administer ESRF funds to studies that increase the understanding of northern ecology. In response to submissions by the Government of the Northwest Territories in 1982, NOGAP funds were provided to conduct baseline studies into the status of the Bluenose caribou (Rangifer tarandus groenlandicus) herd. The Bluenose herd occupies that portion of the NWT mainland between the Mackenzie and Coppermine rivers north of Great Bear Lake (Fig. 1) and has the potential to be affected by oil and gas development in the Beaufort Sea.

Previous studies have provided population estimates (Carruthers and Jakimchuk 1981, Hawley and Pearson 1966, Hawley et al. 1979, Kelsall and Hawley 1967, Thomas 1969, Wooley and Mair 1977), observations of seasonal distributions and movements (Carruthers 1981, Carruthers and Jakimchuk 1981, Decker 1976, Hawley and Pearson 1966, Hawley et al. 1979, Wooley and Mair 1977) and calving ground censuses (Hawley et al. 1979, Brackett et al. 1982, Latour and Heard in prep.). No previous work has documented late winter sex-age composition, nor estimated calf survival to one year of age. This survey was designed to fill that data gap.

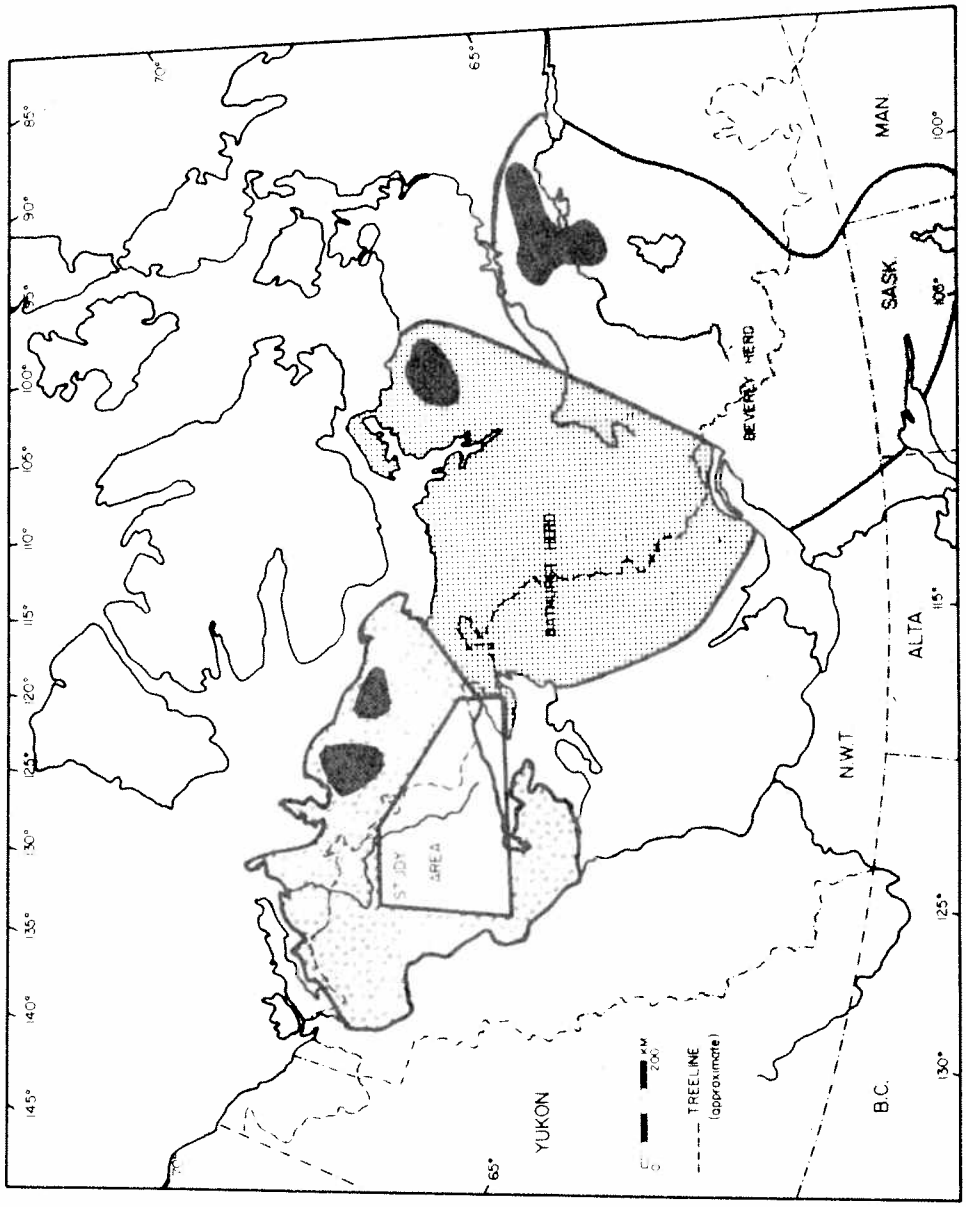


Figure 1. The study area, Bluenose spring classification counts, March 1983. Dark shaded areas represent calving grounds.

From 4 to 21 March 1983 we flew fixed wing and helicopter reconnaissance flights from Colville Lake, NWT. We described the late spring distribution of Bluenose caribou and conducted ground classification counts.

# METHODS

From 4 to 7 March from Colville Lake, NWT we flew fixed wing aircraft (Helio Courier) reconnaissance flights within the forested winter range of the Bluenose herd north and west of Great Bear Lake (Fig. 2). Renewable Resources Consulting Services Ltd. (D. Carruthers pers. comm.) provided preliminary caribou distribution information for the period 24 to 28 February 1983. We flew arbitrary routes 350 m above ground level (agl) to confirm the preliminary distribution and search historically occupied areas of winter range. Two observers noted the location of caribou and caribou signs.

From 8 to 21 March we determined the percentage of calves in the population. Two observers were positioned with a Bell 206B helicopter. From the ground we viewed caribou through a 20x spotting scope. Unless the penis was visible, sex identification was based on the presence or absence of a vulva. Caribou were classified as cows, calves (9 month old animals), male or female yearlings (21 month old animals) and antlered or antlerless bulls. Calves were distinguished by their small body size and rounded skull profile. Yearlings were intermediate sized animals with a straight skull profile. Young bulls were small bodied males with at least one hard antler, while adult bulls were large and antlerless. Observations were recorded on magnetic tape in the field to be transposed later into fieldbooks. Observers worked together periodically to ensure consistency of classifications. To avoid duplicate classifications of groups, sampling areas were changed daily and selected arbitrarily. All caribou in a group

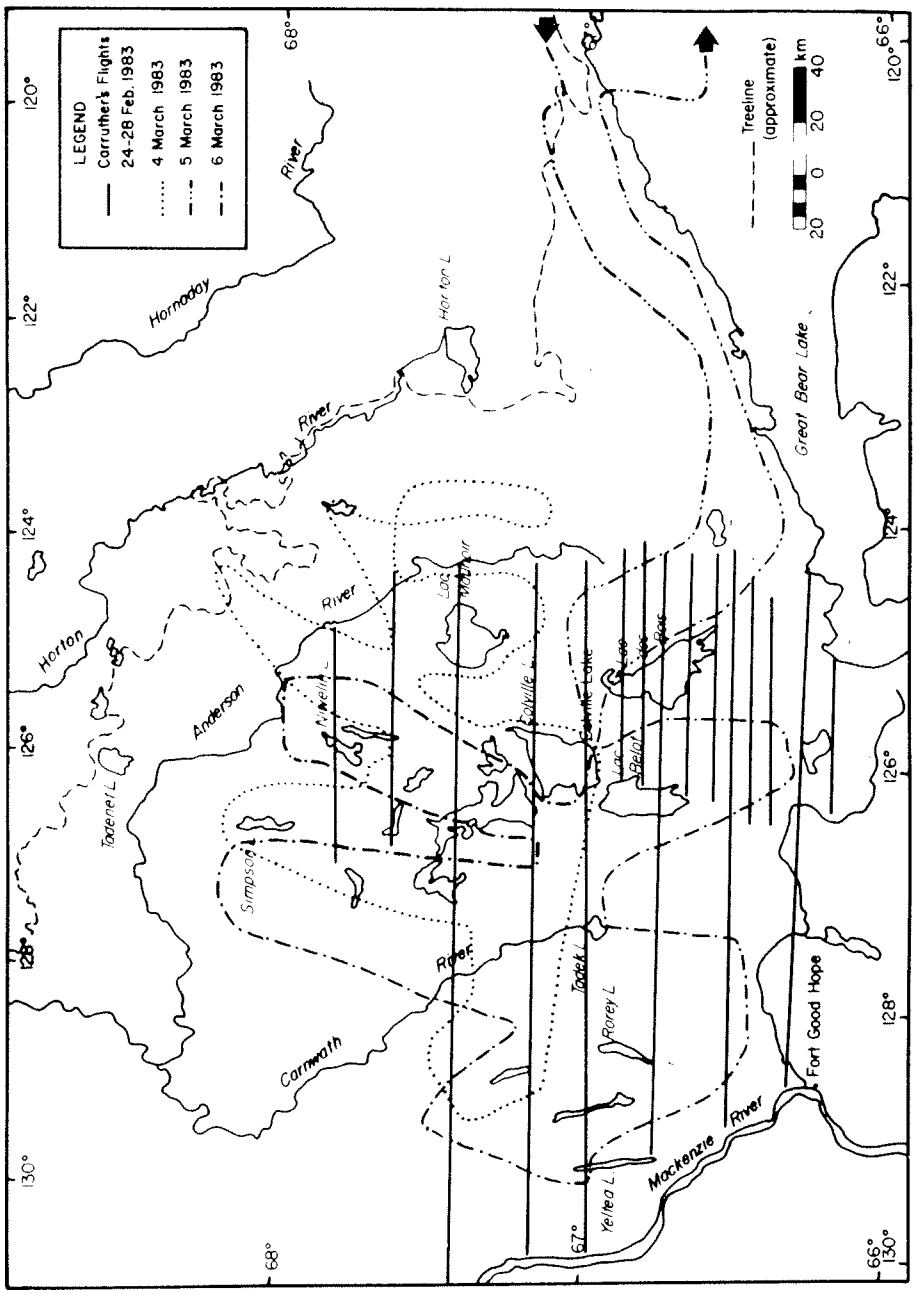


Figure 2. Fixed wing reconnaissance flights, 4 to 7 March 1983.

had to be classified for that data to be incorporated in the analysis. We used cluster sampling procedures (Cochran 1977: 64-68 and 150-156) to estimate the proportion and associated variance of the calf to 1+ female, yearling to 2+ cow and 1+ bull to 1+ female ratios.

# RESULTS

## Distribution

Bluenose caribou did not greatly change their distribution between the 28 February preliminary survey conducted by Renewable Resources Consulting Services Ltd. and 4 March. Most caribou were concentrated in an area north and northwest of Colville Lake south of 68°30'N latitude (Fig. 3). A few small, scattered groups were encountered beyond the limits of the main distribution area.

Based on caribou signs (tracks, trails, bedding and foraging areas), the herd did not start migrating towards the calving ground until 15 March. After 15 March north and northeast oriented trails and larger group sizes were noted. By 20 March several thousand caribou had moved northeast to the Simpson Lake area (Fig. 3).

## Classification Counts

We classified 4,923 caribou in 41 groups during 9 days between 7 and 20 March 1983 (Fig. 4, Table 1). The mean group size was 120 caribou and ranged from 12 to 612. Overall group composition was 52.2% cows, 24.4% calves, 3.6% female yearlings, 4.8% male yearlings, 1.0% unknown sex yearlings, 11.6% young (antlered) bulls and 2.4% mature (antlerless) bulls (Table 1). We assumed that the sex ratio of 50 unclassified yearlings was the same as the 411 whose sex was established. Therefore, 264 (57%) of the 461 yearlings were males and 197 (43%) were females, giving a ratio of 133 yearling males to 100 yearling females. Of 3,723

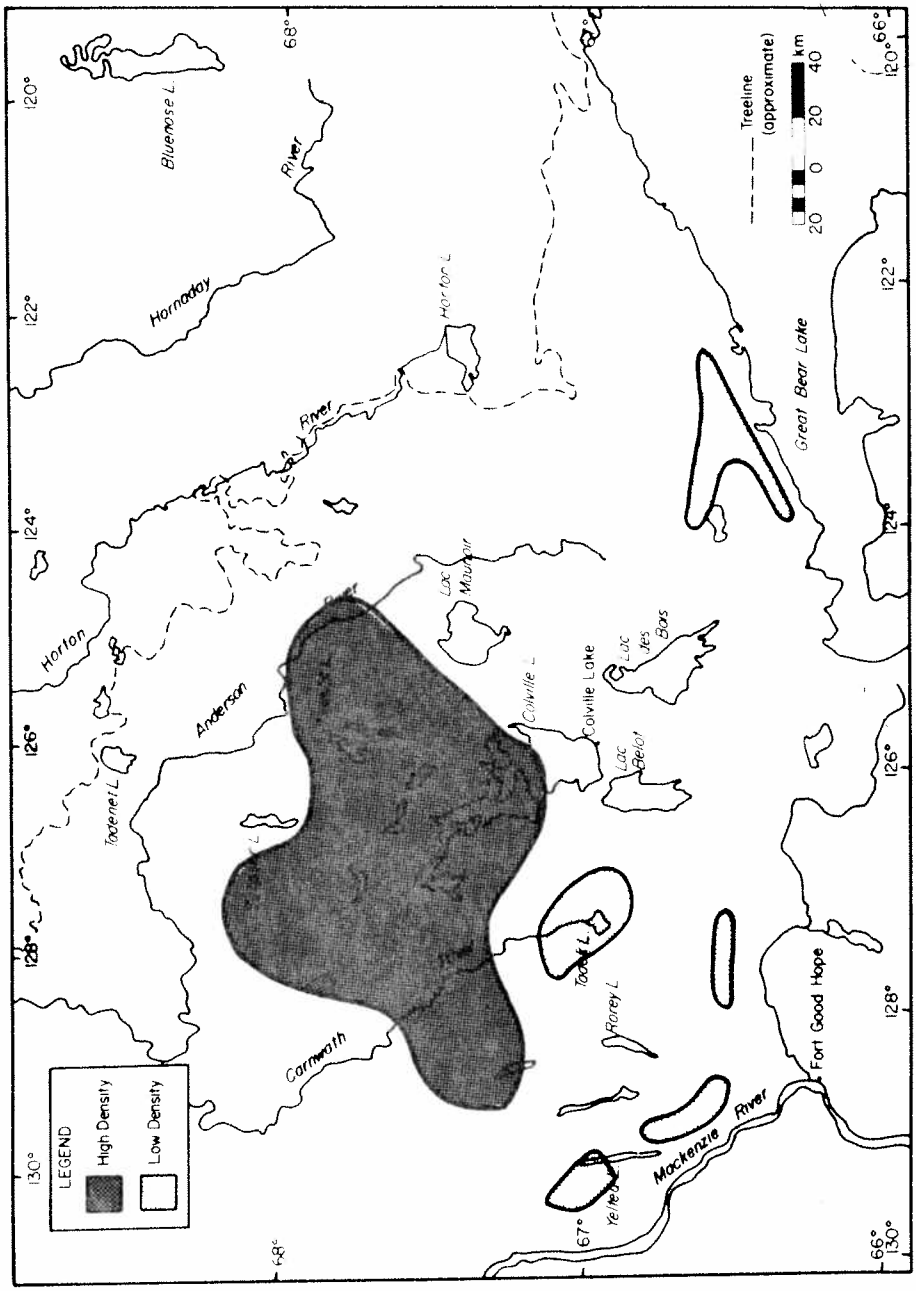


Figure 3. Spring distribution of the Bluenose caribou herd, March 1983.

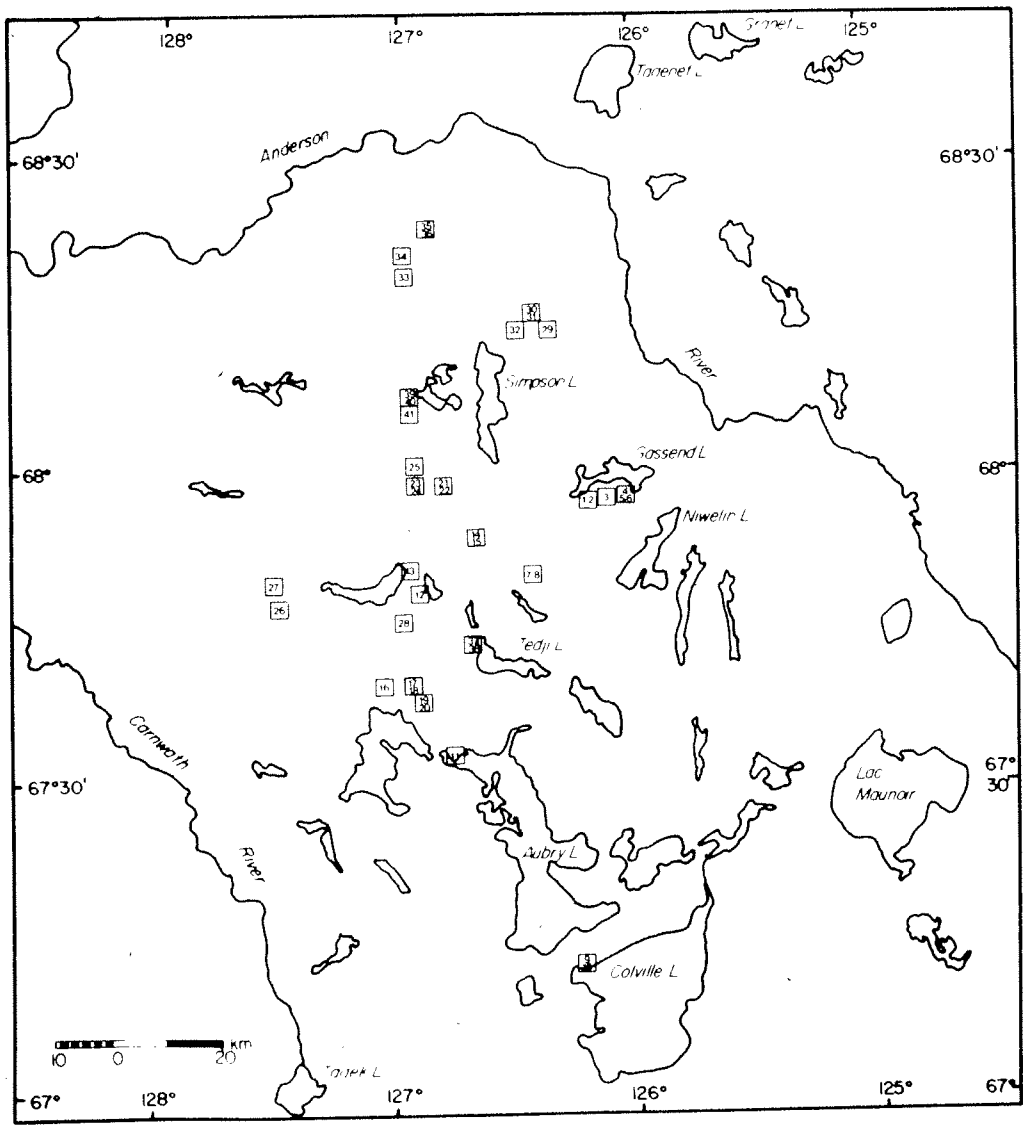


Figure 4. Ground classification sampling sites, 7 to 20 March 1983.

Table 1. Bluenose spring classification summary, March 1983.

| Date | Location point | Cows | Calves | Female yearling | Male yearling | Unknown yearling | Young bulls | Mature bulls | Total | Observer |
|---|---|---|---|---|---|---|---|---|---|---|
| 7 March | 1 | 142 | 49 | 11 | 11 | 1 | 16 | 5 | 235 | MW |
| | 2 | 50 | 17 | - | 3 | 3 | 5 | - | 78 | CE |
| | 3 | 30 | 11 | 1 | - | - | 6 | 8 | 56 | CE |
| 8 March | 4 | 49 | 18 | 5 | 4 | - | 5 | 1 | 82 | MW |
| | 5 | 72 | 25 | 1 | 3 | - | 7 | 1 | 109 | MW |
| | 6 | 173 | 73 | 1 | 22 | 10 | 29 | - | 308 | CE |
| | 7 | 25 | 8 | 1 | 3 | - | 12 | - | 49 | MW |
| | 8 | 5 | - | - | 1 | - | 5 | 1 | 12 | CE |
| | 9 | 27 | 20 | 3 | 5 | - | 5 | - | 60 | CE |
| | 10 | 8 | 3 | - | 1 | - | - | - | 12 | MW |
| 9 March | 11 | 4 | 6 | 1 | 3 | - | 2 | 5 | 21 | MW |
| | 12 | 34 | 20 | 6 | 4 | - | 5 | 1 | 70 | MW |
| | 13 | 107 | 72 | 6 | 10 | 1 | 35 | 9 | 240 | MW |
| 15 March | 14 | 23 | 18 | 4 | 4 | - | 6 | 7 | 62 | MW |
| | 15 | 2 | 2 | - | 6 | - | 12 | 11 | 33 | CE |
| | 16 | 39 | 11 | 2 | 7 | - | 18 | - | 77 | MW |
| 16 March | 17 | 25 | 14 | 4 | 3 | - | 19 | 7 | 72 | MW |
| | 18 | 17 | 8 | 1 | 5 | 1 | 3 | 5 | 40 | CE |
| | 19 | 21 | 16 | - | 8 | - | 22 | 10 | 77 | MW |
| | 20 | 26 | 17 | 1 | 7 | 2 | 23 | 3 | 79 | CE |
| | 21 | 76 | 21 | 8 | 6 | - | 24 | 1 | 136 | MW |
| | 22 | 33 | 33 | 2 | 11 | 2 | 26 | - | 107 | CE |
| | 23 | 45 | 21 | 1 | 2 | - | 9 | 1 | 79 | MW |
| | 24 | 25 | 8 | 2 | 1 | - | 18 | 2 | 56 | CE |
| | 25 | 76 | 36 | 7 | 6 | - | 11 | 1 | 137 | MW |
| 17 March | 26 | 43 | 17 | - | 6 | 2 | 25 | 6 | 99 | CE |
| | 27 | 65 | 27 | 4 | 6 | - | 16 | - | 118 | MW |
| | 28 | 10 | 10 | - | 1 | - | 15 | 18 | 54 | CE |

continued...

Table 1. continued

| Date | Location point | Cows | Calves | Female yearling | Male yearling | Unknown yearling | Young bulls | Mature bulls | Total | Observer |
|---|---|---|---|---|---|---|---|---|---|---|
| 18 March | 29 | 25 | 12 | 3 | - | - | 2 | - | 42 | MW |
| | 30 | 145 | 54 | 17 | 7 | 1 | 12 | - | 236 | MW |
| | 31 | 54 | 20 | - | 3 | 2 | 2 | - | 81 | CE |
| | 32 | 212 | 73 | 21 | 7 | - | 33 | 1 | 347 | MW |
| 19 March | 33 | 30 | 9 | 3 | 3 | - | 2 | - | 47 | MW |
| | 34 | 69 | 33 | 6 | 4 | 5 | 17 | - | 134 | CE |
| | 35 | 197 | 63 | 13 | 11 | 2 | 10 | 1 | 297 | MW |
| | 36 | 127 | 51 | 7 | 7 | 9 | 26 | 1 | 228 | CE |
| 20 March | 37 | 30 | 29 | 1 | 4 | 6 | 12 | 1 | 83 | CE |
| | 38 | 18 | 16 | 5 | 3 | - | 3 | - | 45 | MW |
| | 39 | 50 | 33 | 2 | 6 | - | 3 | 2 | 96 | MW |
| | 40 | 49 | 35 | 1 | - | 3 | 28 | 1 | 117 | CE |
| | 41 | 311 | 191 | 24 | 32 | - | 44 | 10 | 612 | MW |
| Total | | 2569 | 1200 | 175 | 236 | 50 | 573 | 120 | 4923 | |
| % | | 52.2 | 24.4 | 3.6 | 4.8 | 1.0 | 11.6 | 2.4 | | |

caribou over one year old, 957 (26%) were male and 2,766 (74%) were female resulting in a 34 ± 2.8 ($\bar{x}$ ± SE) 1+ bull to 100 1+ cow ratio (Appendix A). Of 693 bulls over 2 years of age, 573 (83%) were immature (retained hard antlers) and 120 (17%) were mature (had no antlers).

The sample contained 24% calves or 44 ± 2.0 ($\bar{X}$±S.E.) calves per 100 females over one year old and 9% yearlings or 18 ± 0.6 ($\bar{X}$±S.E.) yearlings per 100 females over two years old (Appendix A). Survival of calves from birth until the beginning of April was 69%, assuming an initial calf production of 69 calves per 100 females (Parker 1972) and female survival from June 1982 of 93% (Heard and Calef 1979, Appendix A).

We assumed that the sex ratio of 34 ± 2.8 1+ males:100 1+ females (74% females) was not representative of the herds' composition and that Brackett et al.'s (1982) fall 1981 estimate of 73 1+ males:100 1+ females (58% females) is accurate, and revised our calculations to incorporate the unrepresented male segment of the Bluenose population (Appendix A). Our revised estimate is 20% calves (1200/5985) and 8% yearlings (461/5985).

## Other Wildlife

We observed 25 wolves in seven groups (mean = 4, range 1-9) in 46.5 hours of flying time or 0.54 wolves per hour (Table 2). We also counted seven locations where wolves had killed caribou. We observed 81 muskoxen in five groups (mean = 16.2, range 4-31) between the tree line and Great Bear Lake (Table 3). We saw 15 moose in 11 groups (mean = 1.4, range 1-3) scattered throughout

Table 2. Wolf observations, Bluenose classification counts, March 1983.

| Date | No. of wolves | Location | Comments |
|---|---|---|---|
| 4 March | 1 | 67°07'N,127°27'W | Black; west of Colville Lake. |
| 6 March | 3 | 66°58'30"N,125°40'W | all cream-grey; west of Lac des Bois. |
| 6 March | 4 | 67°14'N,126°47'W | 3 cream, 1 brown; west of southern tip of Aubry Lake. |
| 6 March | 9 | 67°46'N, 126°15'W | 2 black, rest whites and greys; between Tedji and Niwelin lakes. |
| 9 March | 3 | 67°10'N,126°22'W | 1 black, 2 cream; just west of Colville Lake. |
| 9 March | 4 | 67°94'N,126°52'W | all cream; northwest of Tedji Lake. |
| 15 March | 1 | 67°25'30"N,126°40'W | cream-grey; west of Aubry Lake. |

Total = 25

Observed 7 wolf kills

Total hours flown on survey = 46.5

Table 3. Muskoxen and moose sightings, March 1983.

| Date | Species and number | Location |
|---|---|---|
| 4 March | 2 moose | 67°21'N,125°41'W |
| 4 March | 1 moose | 67°18'N,124°34'W |
| 4 March | 1 moose | 67°10'N,123°55'W |
| 4 March | 1 moose | 67°28'30"N,123°53'W |
| 4 March | 6 muskoxen | 67°52'N,123°50'W |
| 4 March | 30 muskoxen | 67°02'30"N,124°05'W |
| 4 March | 31 muskoxen | 67°48'30"N,124°17'W |
| 4 March | 1 moose | 68°11'N,124°26'30"W |
| 4 March | 10 muskoxen | 68°12'N,124°36'W |
| 4 March | 1 moose | 67°35'N,128°30'W |
| 5 March | 1 moose | 67°00'30"N,120°22'W |
| 5 March | 2 moose | 66°57'N,118°37'W |
| 5 March | 3 moose | 66°59'N,118°30'W |
| 5 March | 4 muskoxen | 66°57'N,122°06'W |
| 6 March | 1 moose | 66°40'30"N,126°23'30"W |
| 20 March | 1 moose | 67°16'N,126°37'W |

Total moose = 15 number of groups = 11
mean group size = 1.4 range 1-3

Total muskoxen = 81 number of groups = 5
mean group size = 16.2 range 4-31

the treed regions of the Bluenose winter range (Table 3), but noticed the greatest density along the Dease River east of Great Bear Lake.

## General Observations

### Caribou Behaviour Relative to Aircraft and Observers

We observed variation in caribou behaviour relative to the aircraft (Bell 206B). Caribou were skittish in the morning, frequently leaving lakes if the aircraft landed within approximately 0.5 km. They also tended to bolt at first sight of the observers, particularly when we were partly obscured as we approached caribou through woods rather than across lakes or open meadows. Caribou were less skittish in the afternoon, allowing us to place observers closer to the aggregations and reducing the caution required on approach. At those times it was frequently necessary for one observer on foot to "drive" caribou past the other observer to prevent the caribou from bedding in the middle of the lake.

### Use of Lake Ice as a Salt Lick

On 19 March we observed approximately 250 caribou cratering over a large area of lake ice at 68°23'N, 127°03'W. The craters covered 3 (50 m x 50 m) areas about 100 m from the shore of a small lake. Much aggression was associated with the cratering activity with cows and antlered bulls displacing yearlings and calves. The caribou allowed the senior author to approach within

30 m before moving away from the craters. After being displaced, the smaller animals returned immediately to the craters, followed by the larger animals. Many craters were pawed down to bare ice, which looked and tasted normal. Upon analysis the ice was found to contain sodium concentrations approximately 10 times that of seawater. The concentration of magnesium chloride was similar to sodium. We do not know why the ice of this lake would contain such high levels of salt. The caribou apparently were using the lake ice as a mineral lick.

Similar observations of caribou using ice as a mineral lick were reported by Williams and Heard (in prep.) in March 1982 on the winter range of the Beverly caribou herd. A sample of ice taken at that time contained sodium and potassium levels that were greater than seawater.

# DISCUSSION

## Distribution

The distribution of Bluenose caribou in March 1983 was consistent with literature reports of late winter and spring range use (Carruthers and Jakimchuk 1981, Carruthers and Sopuck 1982, Hawley and Pearson 1966, Hawley et al. 1979, Wooley and Mair 1977), although traditionally used areas immediately north and east of the Dease Arm of Great Bear Lake were not occupied. Small groups of caribou in the Dismal Lakes and Rae River areas were hunted by Coppermine residents throughout the spring (R. Binne pers. comm.). We did not survey those areas as we wished to concentrate our effort on the main caribou concentrations north and west of Colville Lake.

Based on caribou signs and increasing size of caribou groups a concerted migration to the calving grounds began on about 15 March. This migration started later in 1983 than in some previous years when signs of migration were noted by mid February (Hawley et al. 1979) and on 6 March (Wooley and Mair 1977), but is consistent with other March, April and May observations of distribution and movements (Carruthers and Jakimchuk 1981, Carruthers and Sopuck 1982, Decker 1976, Hawley et al. 1979).

## Classification Counts

Few comparable spring classification data exist for the Bluenose herd. The sex ratio observed in March 1983 (34 1+ males per 100 1+ females) was lower than the fall 1981 estimate of 73 1+

males per 100 females reported by Brackett et al. (1982). We feel that the lower male:female ratio determined from this study reflects under-sampling of the mature bull component, which appeared to be scattered throughout the southern and western portions of the occupied range, rather than a skewed sex ratio.

The March 1983 calf:1+ female ratio (44 ± 2.0 calves per 100 1+ females) is greater than the mean of four values (31:100) reported for the Beverly herd from 1978 to 1982 (Williams and Heard in prep.) for that population. We found a greater percentage of calves (24%) than that found in February 1981 (18%) (Carruthers and Jakimchuk 1981). Our estimates of calf survival from June 1982 to April 1983 (59%) and the revised estimate of the proportion of calves in the population (20%) after we incorporated the unrepresented male segment indicate that survival of the 1982 calf cohort was excellent.

## Wolf Abundance

The number of wolves observed per hour flown is a crude estimate of relative wolf abundance. Prior to January 1981 wolf abundance was low (Table 4, Hawley and Pearson 1966, Thomas 1969, Carruthers and Jakimchuk 1981). Carruthers (1981) reported a relatively high abundance (3.02 wolves/hour) in January 1981. Subsequent estimates in February 1981 (0.70, Carruthers and Jakimchuk 1981), January and February 1982 (0.70, 1.25, Carruthers and Sopuck 1982) and March 1983 (0.54, this study), while not sufficiently precise to deduce population trends between years, indicate that wolves associated with the Bluenose herd's winter range may be more abundant now than prior to 1981.

Table 4. Literature reports of wolf observations per hour flown over the Bluenose winter range.

| Date | No. wolves | Hours flown | Wolves per hour | Reference |
|---|---|---|---|---|
| March 1966 | 14 | 45* | 0.31 | Hawley and Pearson 1966 |
| March, April 1967 | 7 | 43 | 0.16 | Thomas 1969 |
| March 1980 | 4 | 78.7 | 0.05 | Carruthers and Jakimchuk 1981 |
| January 1981 | 32 | 10.6 | 3.02 | Carruthers 1981 |
| February 1981 | 29 | 41.6 | 0.70 | Carruthers and Jakimchuk 1981 |
| January 1982 | 14 | 20* | 0.70 | Carruthers and Sopuk 1982 |
| February 1982 | 20 | 16* | 1.25 | Carruthers and Sopuk 1982 |
| March 1983 | 25 | 46.5 | 0.54 | This study |

* Estimated by dividing transect distances by airspeed of Cessna 185 (approximately 190 km/hr).

ACKNOWLEDGEMENTS

We wish to thank our hosts, Bernard and Margaret Brown of Colville Lake for their considerable effort in providing meals and lodgings for our crew. Warren Wright of Nahanni Air Service and Frank and Bob O'Connor of Aero Arctic provided skillful and safe flying. Dan Carruthers generously provided us with a copy of his caribou distribution map thereby saving us hours of reconnaissance flying.

## PERSONAL COMMUNICATIONS

Binne, Roger. Assistant Regional Superintendent, Department of Renewable Resources, Cambridge Bay, NWT.

Carruthers, Dan. Biologist, Renewable Resources Consulting Services Ltd., Sidney, B.C.

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Appendix A. Calculations.

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1. Sex ratio of unclassified yearlings

Classified yearlings 175 female:236 male = 175/(175+236)
= 43% females

50 unclassified yearlings x 0.43 = 22 females
and therefore, 28 males (50-22)

Yearling sex ratio = 236+28 males/175+22 females
= 133 males:100 females

2. Sex ratio of animals over one year old

573 young bulls + 120 mature bulls + 264 male yearlings = 957 1+ males

2569 cows + 197 yearling females = 2766 1+ females

% 1+ males = 957/(957+2766) = 26%

% 1+ females = 2766/(2766+957) = 74%

sex ratio = 26/74 x 100 = 34 $\pm$ 2.8 ($\bar{x} \pm$ SE)
1+ males:100 1+ females (Cochran 1977)

3. Percentage calves and ratio of calves to 1+ cows

1200 calves/4923 = 24% calves in the classified sample

$\Sigma$ (calves/(cows + female yearlings) = 0.44 $\pm$ 0.02 ($\bar{x} \pm$ SE)
x 100 = 44 $\pm$ 2.0 calves: 100 1+ females (Cochran 1977)

4. Percentage yearlings and ratio of yearlings to 2+ cows

175 female + 236 male + 50 unknown yearlings = 461/4923 = 9% in the classified sample

$\Sigma$ (yearlings/cows) = 0.18 $\pm$ 0.006 ($\bar{x} \pm$ SE) x 100 =
18 $\pm$ 0.6 yearlings:100 2+ cows (Cochran 1977)

5. Survival of calves from birth to April

assume a) initial calf production of 69 calves/100 females (Parker 1972)
and b) female survival from June 1982 of 93% (Heard and Calef 1979).

Y cows in June x 0.93 = 100 cows in March

Y = 100/0.93 = 108 .˙. 108 June cows = 100 March cows

69 calves/100 cows x 108 = 75 calves

75 calves/100 March cows ——> 44 calves/100 March cows

44/75 = 59% calf survival

6. Correction for unrepresented male segment

Brackett et al. (1982) found 73 1+ males:100 females (58% females) in fall 1978

73/100 x 2766 total 1+ females = 2019 1+ males

but we found 957 1+ males, therefore, add 2019 - 957 = 1062 males

total caribou = 4923 + (1062 1+ males) = 5985

a) corrected % calves = 1200/5985 = 20%

b) corrected % yearlings = 175+236+50/5985 = 8%

Appendix B. Cost of March 1983 Bluenose class counts, NOGAP.

| Item | (x $1,000) |
|---|---|
| 21 hours Helio Courier | 5.2 |
| 15 days (x 2 hr mins) Aero Arctic (28 Hours) | 13.3 |
| Fuel purchase | 3.1 |
| Fuel caching | 4.6 |
| Accomodation - Colville Lake | 6.5 |
| Casual wages | 4.8 |
| Travel | 1.2 |
| Maps | 0.3 |
| Film | 0.2 |
| Total | 39.2 |