BLUENOSE CARIBOU SURVEYS,

1978-1979

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ABSTRACT

Aerial calving ground surveys of the Bluenose herd of barren-ground caribou (Rangifer tarandus groenlandicus) were conducted during 30 May - 10 June 1978, and 1-9 June 1979. The number of caribou over 1 year of age was estimated at (in round numbers) 10,800 ± 1,000 and 13,800 ± 2,000, respectively. A classification survey was conducted during 5-14 October 1978, during which 3842 caribou were segregated; of these 58% were females (excluding calves). The total population of the Bluenose herd (excluding calves) in 1978 and 1979 was estimated at (in round numbers) 27,000 and 34,500, respectively.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

INTRODUCTION

The objective of the surveys described in this report were to confirm the location of calving grounds used by the Bluenose herd of barren-ground caribou (Rangifer tarandus groenlandicus), and to obtain a total population estimate. The calving ground surveys conducted in 1978 and 1979 accomplished the first objective. Data from these surveys, together with data from a fall classification survey conducted in 1978, provided enough information to derive a population estimate.

The Bluenose herd has previously been reported on by Banfield (1951, 1954), Decker (1976), Hawley (1967, 1970), Hawley and Pearson (1966), Hawley et al. (1976, 1979), Kelsall (1968), Thomas (1969), and Wooley and Mair (1977).

Kelsall (1968) reported "major calving" between the Horton and Hornaday Rivers, and also in the Melville Hills and Bluenose Lake areas. Hawley et al. (1976, 1979), as a result of extensive work conducted during 1974-1976, found calving areas in two main locations: on Bathurst Peninsula, and between Hornaday River and Bluenose Lake.

Although some caribou are reported to remain above treeline during winter (Hawley et al. 1979), the majority winter below treeline south to the Great Bear Lake/Fort Good Hope area. Interactions, if any, with the Bathurst herd in the area northeast of Great Bear Lake are unknown.

The Bluenose herd is hunted by people from the communities of Arctic Red River, Colville Lake, Fort Franklin, Fort Good Hope, Fort MacPherson, Inuvik, Paulatuk, and Tuktoyaktuk. It is unknown

what proportion, if any, of the Coppermine harvest comes from this herd.

METHODS

Calving Ground Surveys

Stratified strip sampling was employed on both aerial surveys in 1978 and 1979, following the method outlined by Heard (1981). Reconnaissance flights were flown over suspected calving grounds and an initial estimate of density in the various calving areas was calculated. Subsequent intensive coverage of the major calving areas was in proportion to the densities indicated by the reconnaissance flights.

Both reconnaissance and intensive coverage were flown at 120 m agl at a speed of 190 km/h in a Cessna 185. Two observers were used, one in each back seat, with a navigator in the front passenger seat. Flight lines and the location of sightings were plotted on 1:250,000 mapsheets by the navigator, while the relevant details of each sighting were recorded on magnetic tape by the observers. During the actual survey portion, caribou were counted within a 400 m strip on each side of the aircraft. Black tape placed on each wingstrut assisted observers in determining strip boundaries.

D. Brackett and W. Spencer acted as observers on both surveys. In 1978 the navigator was A. Kipsigak, in 1979 it was Ed Hall. In both years the survey crew was based in Paulatuk. In 1979 a fuel cache prior to the beginning of the survey was made at Bluenose Lake, thus reducing ferry time.

The calving ground population estimates and their variance were determined using Jolly's Method 2 (Norton-Griffiths 1978).

No ground observations were made, nor did we attempt to determine peak or duration of calving.

Fall Classification Survey

The fall classification survey in 1978 began with reconnaissance flights made in a Cessna 337, based out of Inuvik, to locate the caribou. Once major groups were found, a Bell 206 helicopter was used to land observers nearby. For this part of the survey, the crew (D. Brackett and D. Vincent) was based at a former Petro-Can drillsite at Ewekka Lake. Twelve-power spotting scopes were used to classify caribou according to age and sex.

Total Population Estimate

The total population estimate for the Bluenose herd was obtained using the method outlined by Heard (1981), incorporating the calving ground population estimate and the sex ratio from the fall classification survey.

RESULTS

Calving Ground Surveys

1978

Reconnaissance flights were flown 30-31 May, and on 1, 3-5, and 10 June; four calving ground strata were delineated (Fig. 1). Strata II and III were surveyed on 7 June, Stratum I on 8 June, and Stratum IV on 12 June. No flights were made on 2, 6 or 9 June due to bad weather. Persistent ground fog prevented coverage east and southeast of Bluenose Lake.

Our estimate for the number of caribou over 1 year of age on the caving grounds was 10,791 ± 998. Observations, parameters of the the four strata, and calculations of caribou density and numbers are given in Table 1.

One wolf (Canis lupus) was sighted (off calving grounds), and 27 grizzlies (Ursus arctos) were seen (8 on calving grounds, 19 off). In addition, 248 muskoxen (Ovibos moschatus) were sighted; locations are given in Appendix A. A list of birds observed at Paulatuk, 1-10 June, is given in Appendix B.

1979

Reconnaissance flights were flown 1-4 June, and three calving ground strata were delineated (Fig. 2). Stratum I was surveyed on 8 June, and Strata II and III on 9 June. Poor weather prevented flying on 5-7 June; unlike 1978, however, all areas were covered.

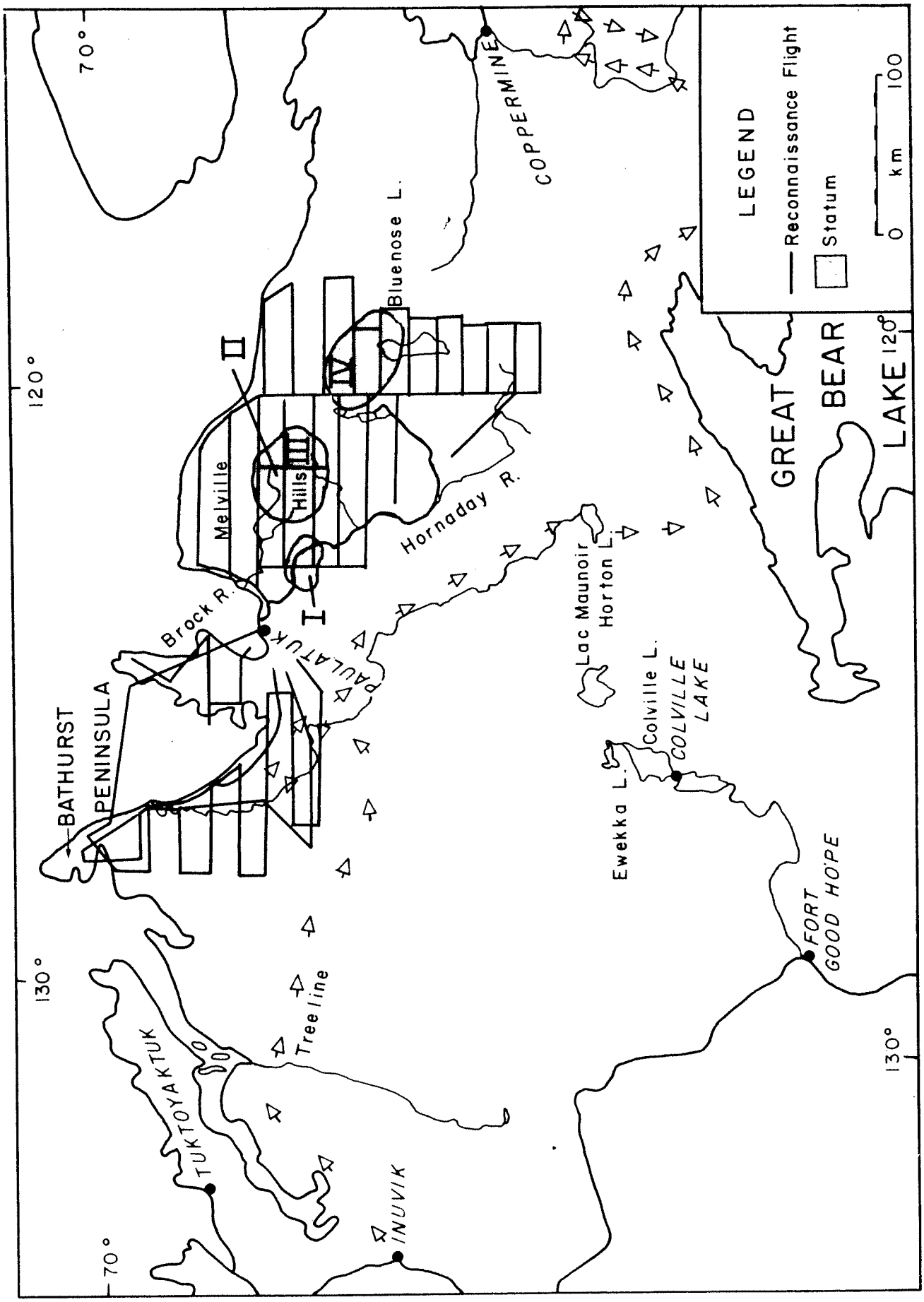

Figure 1. Reconnaissance flight lines and four strata surveyed on the Bluenose calving grounds, 30 May - 12 June, 1978.

Table 1. Observations and calculations, Bluenose calving ground survey, 1978.

Stratum	I	II	III	IV	Total
Calves observed	5	535	20	251	811
(a) Caribou (1+ years) observed	60	1,269	57	427	1,813
Transect length (km)	69.3	302.4	110.1	577.3	1,059.1
(b) Transect area (km^2)	55.4	241.8	88.0	461.8	847.0
(c) Stratum area (km^2)	543.9	1,364.0	817.7	2,718.6	5,444.2
Coverage (%)	10	17	10	15	-
Caribou (1+ years) density (no./km^2)	1.1	5.2	0.7	0.9	-
(d) Caribou (1+years) estimate	589	7,158	530	2,514	10,791
Variance	155,910	762,719	204	76,929	995,762
Standard error	394	873	14	277	998
Coefficient of variation	0.67	0.12	0.03	0.11	0.09

$\frac{(a)}{(b)} \times (c) = (d)$

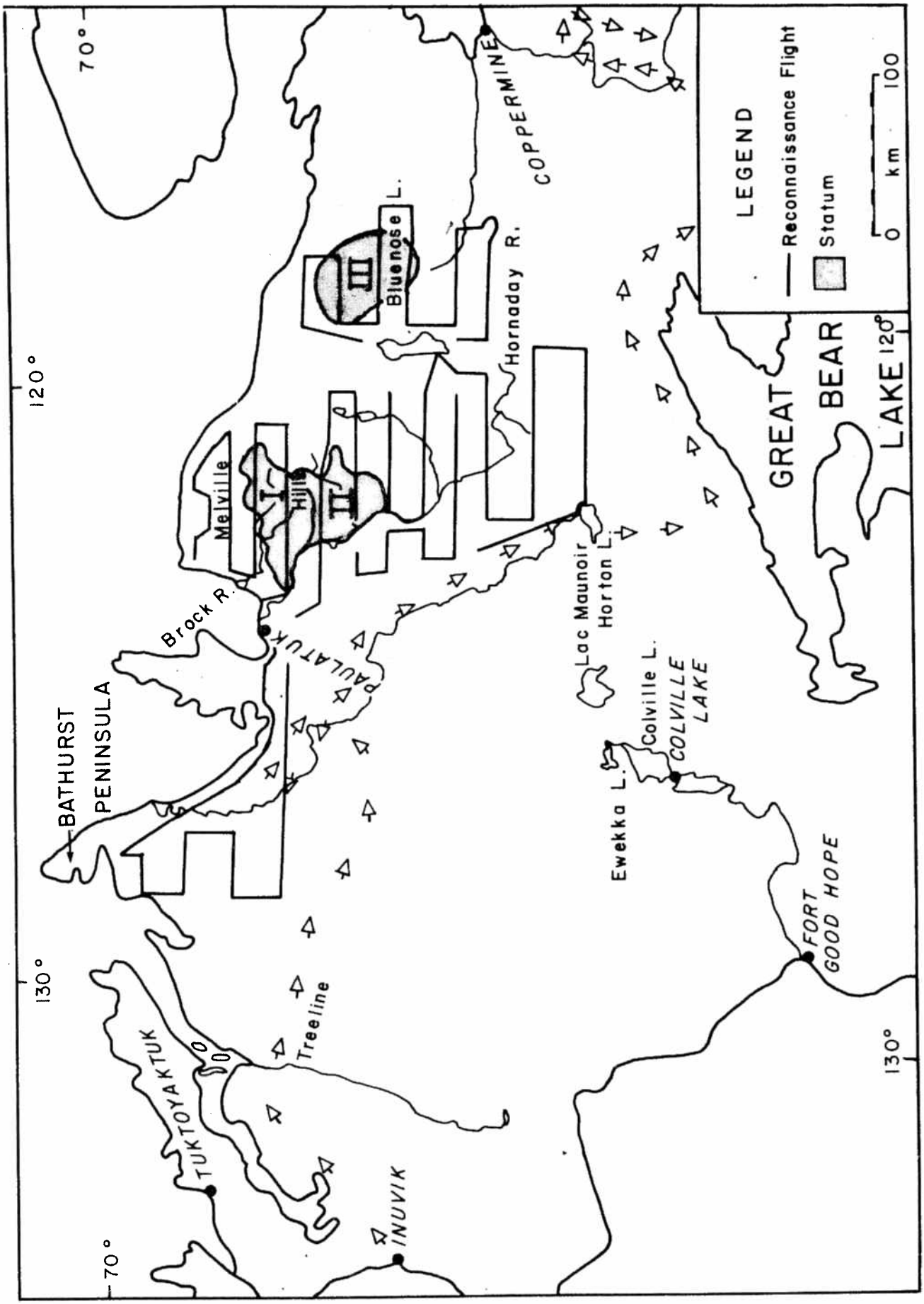

Figure 2. Reconnaissance flight lines and three strata surveyed on the Bluenose calving grounds, 1 - 9 June, 1979.

Our estimate for the number of caribou over 1 year of age on the calving grounds was 13,786 ± 1,979. Observations, parameters of the three strata, and calculations of caribou density and numbers are given in Table 2.

No wolves were sighted, and only three grizzlies were seen (off calving grounds). In addition, 436 muskoxen were sighted; locations are given in Appendix A.

Fall Classification Survey

Reconnaissance flights began on 5 October 1978, while classification took place during 11-14 October (Fig. 3). Observations were made on the ground in the general area between Colville Lake and Lac Maunoir. A total of 3842 caribou was classified, of which 58% were females (excluding calves) (Table 3). We observed 51 calves per 100 females of 1+ years (Table 3).

Total Population Estimate

An estimate of the total caribou population over 1 year of age was derived using the following formula:

$$\frac{\text{calving ground population (excluding calves)}}{\text{proportion of breeding females in the total population (excluding calves)}} \times \frac{\text{proportion of animals on the calving ground that were breeding females (excluding calves)}}{\text{proportion of females in the total population (excluding calves)}}$$

The calving ground population (excluding calves) was estimated as 10,791 ± 998 in 1978, and 13,786 ± 1,979 in 1979 (Tables 1 and 2).

Table 2. Observations and calculations, Bluenose calving ground survey, 1979.

Stratum	I	II	III	Total
Calves observed	1,467	382	85	1,934
(a) Caribou (1+ years) observed	2,532	694	153	3,379
Transect length (km)	677.9	454.5	288.4	1,420.8
(b) Transect area (km^2)	542.2	363.4	230.8	1,136.4
(c) Stratum area (km^2)	1,951.3	1,672.8	2,230.5	5,854.6
Coverage (%)	25	20	10	-
Caribou (1+ years) density (no./km^2)	4.7	1.9	0.7	-
(d) Caribou (1+ years) estimate	9,112	3,195	1,479	13,786
Variance	3,662,091	190,867	62,639	3,915,597
Standard error	1,913	436	250	1,979
Coefficient of variation	0.21	0.14	0.17	0.14

$$\frac{(a)}{(b)} \times (c) = (d)$$

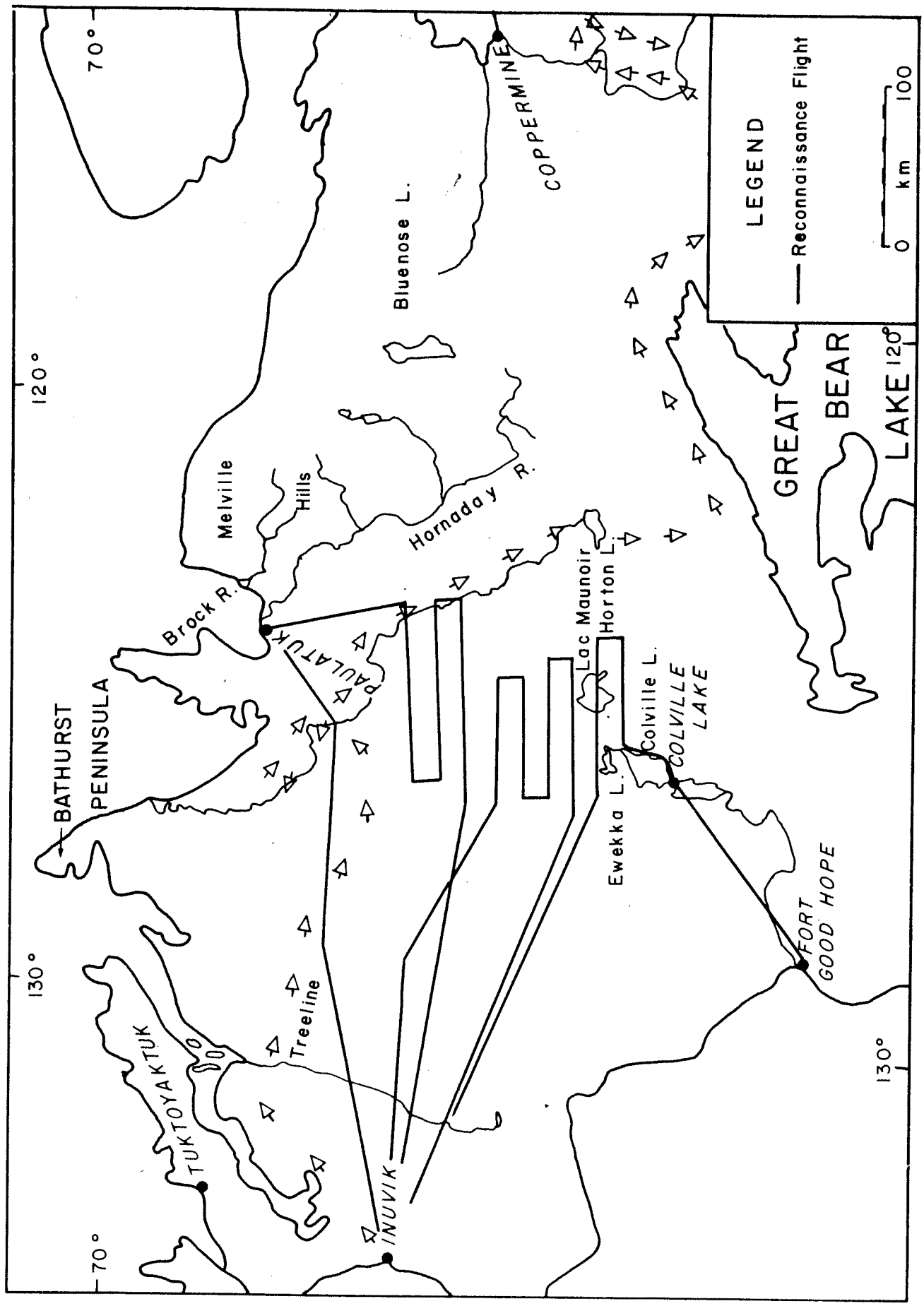

Figure 3. Reconnaissance flights flown during fall classification survey of the Bluenose herd, October 1978.

Table 3. Bluenose fall classification survey, 1978.

	Bulls				Yearlings		
	Mature	Immature	Cows	Calves	Males	Females	Total
11 Oct.	11	5	17	13	10	12	68
12 Oct.	238	71	434	243	130	88	1,204
13 Oct.	277	105	516	341	88	79	1,406
14 Oct.	161	64	509	277	88	65	1,164
Total	687	245	1,476	874	316	244	3,842
% Total	17.9	6.4	38.4	22.7	8.2	6.4	100

$$\% \text{ females (excluding calves)} = \frac{1{,}476 + 244}{3{,}842 - 874} \times 100 = 58\%$$

$$\frac{874 \text{ calves}}{1{,}476 \text{ cows} + 244 \text{ female yearlings}} = .51 \text{ or } 51 \text{ calves:100 females of 1+ years}$$

The proportion of animals on the calving grounds that were breeding females was not determined since no calving ground classification counts were made. A figure of 0.80 was used, taken from calving ground counts of the Kaminuriak herd (Parker 1972).

The proportion of breeding females in the total population was not determined. This involves the collection of female specimens in mid to late winter to determine pregnancy, and was beyond the scope of this study. A figure of 0.69 was used, again taken from the Kaminuriak herd (Parker 1972).

The proportion of females in the total population (excluding calves) was determined as 0.58 from the fall classification survey conducted in 1978 (Table 3).

Our population estimate from the Bluenose herd in 1978 was therefore:

$$\frac{10{,}791}{0.69} \times \frac{0.80}{0.58} = 21{,}582 \text{ caribou over 1 year of age}$$

Our population estimate for the Bluenose herd in 1979 was:

$$\frac{13{,}786}{0.69} \times \frac{0.80}{0.58} = 27{,}572 \text{ caribou over 1 year of age}$$

To account for animals overlooked during the calving ground surveys, a correction factor of 25% was used to adjust the final population estimate (Thomas 1969), giving a figure of 26,977 in 1978, and 34,465 in 1979. We did not attempt to calculate standard error for these population estimates, since two of the parameters used in the calculations came from another herd.

DISCUSSION

The precise location of calving grounds varied between 1978 and 1979, but remained roughly centred in the area east of Hornaday River, bounded in the north by the Melville Hills, and extending east beyond the northeast end of Bluenose Lake.

Hawley et al. (1976, 1979) believed that calving might have occurred on Bathurst Peninsula in 1974-1976. However, in 1978 and 1979 we sighted only one and three cow/calf pairs in this area, respectively.

Following the 1978 survey, the number of caribou east and southeast of Bluenose Lake was unknown. In 1979, this area was searched and no calving caribou were sighted.

In 1978 some cows with newborn calves were observed to have moved a distance of 40 km within 24 hours, from the south side of the Hornaday River to the Melville Hills area. In 1979, no such rapid "en masse" movements were noted. The major proportion of breeding females remained relatively stationary between the Brock and Hornaday Rivers.

In one instance (Stratum I, 1979), calving ground reconnaissance indicated that coverage in excess of 25% was required. This was not feasible, however, due to the difficulty of navigating over snow-covered featureless terrain at a transect spacing of closer than 3.2 km. Therefore, the stratum was given a maximum coverage of 25%.

The main shortcoming in our total population estimates is the use of composition data from the Kaminuriak herd. However, our estimate of the size of the calving ground population is probably

good because (a) the same two observers did the counting during both calving ground surveys, with no significant difference found in the number of caribou recorded by each observer (using a Wilcoxon matched pairs test [Siegel 1956] 1978: $Z=0.64$, $p=0.52$; 1979: $Z=0.75$, $p=0.43$; and (b) the coefficients of variation in both years was low when compared to other calving ground counts (Heard 1981).

It is our subjective belief that the 1979 survey was the more accurate of the two calving ground surveys.

RECOMMENDATIONS

The most obvious requirement for obtaining an accurate population estimate of the Bluenose herd is the completion of a calving ground classification survey. Helicopter time is needed for this.

The most desireable scenario would be the completion of a full cycle of surveys -- calving ground census and classification, and fall classification -- during a one-year period.

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Appendix A. Muskox sightings during Bluenose calving ground surveys, 1978 and 1979.

1978

Adults	Calves	Total	Location
3	0	3	69°18'N, 125°30'W
6	0	6	69°01'N, 121°45'W
4	0	4	68°50'N, 122°35'W
11	1	12	69°01'N, 120°50'W
4	1	5	69°01'N, 120°51'W
1	0	1	69°17'N, 120°31'W
12	2	14	68°30'N, 120°07'W
2	0	2	68°30'N, 119°30'W
1	0	1	68°05'N, 120°00'W
3	0	3	68°45'N, 123°00'W
8	0	8	68°42'N, 121°46'W
5	0	5	68°37'N, 119°28'W
16	3	19	68°35'N, 120°35'W
16	2	18	68°27'N, 119°37'W
13	0	13	68°10'N, 120°30'W
1	0	1	68°05'N, 120°00'W
1	0	1	68°00'N, 119°33'W
1	0	1	68°00'N, 120°20'W
9	3	12	68°08'N, 120°30'W
7	0	7	68°19'N, 120°30'W
4	0	4	69°12'N, 125°00'W
8	0	8	69°15'N, 125°00'W
11	2	13	68°45'N, 118°30'W
5	0	5	68°35'N, 119°35'W
2	0	2	68°35'N, 119°00'W
9	0	9	-- --
1	0	1	69°08'N, 122°23'W
4	1	5	68°55'N, 121°40'W
15	3	18	69°03'N, 123°35'W
6	0	6	68°37'N, 120°30'W
1	0	1	68°41'N, 120°30'W
11	1	12	68°05'N, 119°37'W
2	0	2	68°05'N, 119°07'W
1	0	1	68°55'N, 120°15'W
25	0	25	69°40'N, 125°15'W
229	19	248	

1979

Adults	Calves	Total	Location
2	0	2	69°14'N, 123°09'W
3	0	3	69°25'N, 123°10'W
6	1	7	69°25'N, 122°55'W
11	1	12	69°14'N, 121°50'W
6	0	6	69°14'N, 122°30'W
3	0	3	69°15'N, 123°45'W
15	4	19	69°01'N, 121°05'W
4	0	4	68°59'N, 120°52'W
25	0	25	68°51'N, 120°17'W
8	0	8	68°47'N, 118°45'W
33	6	39	68°36'N, 118°37'W
25	7	32	68°26'N, 118°20'W
17	0	17	68°14'N, 119°00'W
12	3	15	68°30'N, 120°35'W
4	1	5	68°50'N, 122°30'W
1	0	1	68°51'N, 122°36'W
2	0	2	69°22'N, 124°31'W
3	0	3	69°19'N, 124°17'W
1	1	2	68°42'N, 122°30'W
4	0	4	68°37'N, 122°28'W
17	0	17	67°54'N, 122°50'W
3	0	3	67°45'N, 122°40'W
6	0	6	69°15'N, 122°45'W
10	0	10	68°08'N, 122°17'W
10	2	12	68°12'N, 122°05'W
3	3	6	68°15'N, 122°12'W
1	0	1	68°14'N, 122°06'W
2	0	2	68°22'N, 121°43'W
4	1	5	68°27'N, 121°40'W
13	0	13	68°28'N, 121°38'W
2	0	2	68°20'N, 121°14'W
2	0	2	67°52'N, 122°32'W
4	0	4	67°51'N, 122°25'W
1	0	1	67°48'N, 122°28'W
10	2	12	67°47'N, 122°28'W
3	0	3	68°38'N, 119°05'W
65	10	75	68°44'N, 118°54'W
4	1	5	68°50'N, 118°45'W
9	1	10	68°46'N, 118°40'W
11	3	14	68°40'N, 118°47'W
2	0	2	68°34'N, 118°54'W
1	0	1	68°31'N, 118°57'W
8	3	11	68°28'N, 118°50'W
383	53	436	

Appendix B. List of birds sighted at Paulatuk, N.W.T., 1-10 June 1978.

Common name	Scientific name
Common loon	Gavia immer
Red-throated loon	Gavia stellata
Whistling swan	Olor columbianus
Canada goose	Branta canadensis
White-fronted goose	Anser albifrons
Black brant	Branta nigricans
Snow goose	Chen hyperborea
Pintail	Anas acuta
American widgeon	Mareca americana
Common eider	Somateria mollissima
Oldsquaw	Clangula hyemalis
Rough-legged hawk	Buteo lagopus
Gyrfalcon	Falco rusticolus
Rock ptarmigan	Lagopus mutus
Sandhill crane	Crus canadensis
American golden plover	Pluvialis dominica
Black-bellied plover	Squatarola squatarola
Semipalmated plover	Charadruis semipalmatus
Stilt sandpiper	Micropalama himantopus
Ruddy turnstone	Arenaria interpres
Pectoral sandpiper	Erolia melanotos
Knot	Caladris canutus
White-rumped sandpiper	Erolia fucicollis
Baird's sandpiper	Erolia bairdii
Least sandpiper	Erolia minutilla
Semipalmated sandpiper	Ereunetes pusillus
Northern phalarope	Lobipes lobatus
Pomarine jaeger	Stercorarius pomarinus (including one rare dark phase bird)
Long-tailed jaeger	Stercorarius longicaudus
Glaucous gull	Larus hyperboreuos
Herring gull	Larus argentatus
Arctic tern	Sterna paradisaea
Short-eared owl	Asio flammeus
Snowy owl	Nyctea scandiaca
Horned lark	Eremophila alpestris
Common raven	Corvus corax
Redpoll, sp.	Acanthis sp. (probably a hoary redpoll, only one bird)
Lapland longspur	Calcarius lapponicus
Snow bunting	Pletrophenax hyperboreus