PEARY CARIBOU AND MUSKOXEN ON PRINCE PATRICK ISLAND, EGLINTON ISLAND, AND EMERALD ISLE, NORTHWEST TERRITORIES, JULY 1986

Frank L. Miller

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Copies may be obtained from:

Canadian Wildlife Service
Western & Northern Region
2nd Floor, 4999 - 98 Avenue
Edmonton, Alberta
T6B 2X3

ABSTRACT. An aerial survey to determine numbers and distributions of Peary caribou (Rangifer tarandus pearyi) and muskoxen (Ovibos moschatus) was flown between 4 and 13 July 1986. The survey area included Prince Patrick Island, Eglinton Island, and Emerald Isle, Northwest Territories, in the Canadian Archipelago. A systematic unbounded line transect survey was flown at about 90 m above ground level along transects at 6.4-km intervals, for an overall coverage of about 27%. The survey aircraft was a Bell-206B turbo-helicopter on floats, equipped with an Omega/VLF Navigation System. A four-person survey crew was used. Only 62 caribou and 51 muskoxen (1+ yr-old), 21 caribou calves, and two muskox calves were seen during the survey. Numbers of caribou and muskoxen within the entire survey area were estimated at 247 and 165, respectively. Overall estimated density for all caribou was 1.38 caribou/ 100 km^{-2} and for all muskoxen was 0.92 muskoxen/100 km^{-2}. The estimated number of caribou was greatest on Prince Patrick Island but the highest density was estimated for caribou on Eglinton Island. Both the estimated number and the estimated density of muskoxen were greatest on Eglinton Island. Caribou calves represented 26.7% of all caribou and muskox calves only 2.5% of all muskoxen seen on and off survey. Large portions of Prince Patrick Island were resurveyed by air once and the whole of Eglinton Island twice at higher coverages between 17 and 29 July 1986. Overall resurvey results supported the overall findings from the aerial survey but some within island differences occurred, particularly for muskoxen. A better estimation of muskoxen on Eglinton Island is 136 at 8.76 muskoxen/100 km^{-2}. Also, a better measure of proportional representation of muskox calves in July 1986 is 7%. Muskoxen appear to have increased within the 1986 survey area by about 27% from 1974. Peary caribou appear to have continued to decline in number within the 1986 survey area by about a further 63% from 1974 and an overall 90% from 1961. The number of Peary caribou summering within the 1986 survey area would not safely support essentially any level of sustained annual harvest; especially, if it involved the removal of breeding age females.

RÉSUMÉ. Un relevé aérien visant au dénombrement des populations de Caribous de Peary (Rangifer tarandus pearyi) et de Boeufs musqués (Ovibos moschatus), ainsi qu'au calcul de leur distribution, a été fait entre le 4 et le 13 juillet 1986. Le territoire couvert comprend trois îles de l'archipel Arctique, soient les îles Prince Patrick, Eglinton et Emerald, dans les Territoires du Nord-Ouest. Le relevé systématique empruntait la forme de virées transversales non limitées et séparées l'une de l'autre de 6,4-km. L'appareil survolait le territoire à environ 90 m du sol. Cela assurait une couverture globale d'environ 27 %. L'appareil était un hélicoptère à turbine Bell-206B équipé de flotteurs et dirigé grâce à un système de navigation Omega/VLF. L'équipe du relevé était formée de quatre personnes. Seulement 62 Caribous et 51 Boeufs musqués (un an et plus), 21 faons et 2 bouvillons furent aperçus durant le relevé. Les populations respectives ont été évaluées à 247 Caribous et 165 Boeufs musqués sur l'ensemble du territoire couvert. La densité pour l'ensemble des populations est évaluée à 1,38 Caribou au 100 km^2 et 0,92 Boeuf musqué au 100 km^2. C'est sur l'île Prince Patrick que la population évaluée de Caribous était la plus élevée, mais c'est sur l'île Eglinton que la densité évaluée était la plus forte. C'est également sur cette dernière île que la population et la densité évaluées de Boeufs musqués étaient les plus fortes. Les faons représentaient 26,7 % de toute la population de Caribous et les bouvillons représentaient seulement 2,5 % de la population de Boeufs musqués observés en cours de relevé ou non. De grandes parties de l'île Prince-Patrick ont fait l'objet d'un nouveau relevé aérien et l'ensemble de l'île Eglinton a fait l'objet de deux relevés aériens à des couvertures supérieures entre le 17 et la 29 juillet 1986. Dans l'ensemble, les résultats des nouveaux relevés ont confirmé les résultats des premiers; cependant, il y a eu certaines différences observées à l'intérieur même des îles, notamment avec les Boeufs musqués. De meilleures évaluations de la population et de la densité, respectivement, des Boeufs musqués sur l'île Eglinton seraient 136 et 8,76 Boeufs musqués au 100 km^2. Aussi, il serait plus juste d'évaluer la représentation proportionnelle de bouvillons en juillet 1986 à 7 %. Il semble que la population de Boeufs musqués dans le territoire couvert se soit accrue d'environ 27 % par rapport à ce qu'elle était en 1974. La population de Caribous de Peary semble avoir poursuivi son déclin numérique dans le territoire couvert en 1986, d'environ 63 % depuis 1974 et 90 % au total depuis 1961. La population de Caribous de Peary qui est venue estiver dans le territoire couvert par le relevé de 1986 n'est pas suffisante pour soutenir essentiellement tout niveau de récolte annuel soutenu, surtout si des femelles en âge de se reproduire sont supprimées.

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INTRODUCTION

Peary caribou (Rangifer tarandus pearyi) once ranged over the Canadian Arctic Archipelago and sections of Greenland (Banfield 1961). Currently, however, Peary caribou are restricted to Canada, having died out in Greenland (H. Thing, personal communication). Thus, the Peary caribou is now a unique form of wildlife in the natural heritage of arctic Canada.

Numbers of Peary caribou on the islands of the Canadian Arctic Archipelago declined drastically from, at least, 1961 (Tener 1961, 1963) to 1974 (Miller et al. 1977a). In 1979 the Canadian Committee on the Status of Endangered Wildlife in Canada (COSEWIC) recognized the Peary caribou as a "Threatened" form of wildlife in Canada. The designation as "Threatened" was based on a Canadian Wildlife Service report to the committee (Gunn, Miller, and Thomas, COSEWIC, 1979; or see Gunn et al. 1981). Recognition of Peary caribou as a "Threatened" form of wildlife makes their conservation and preservation a concern of Environment Canada and more specifically the Canadian Wildlife Service under the Canada Wildlife Act.

The muskox (Ovibos moschatus) was designated as an "Endangered" form of wildlife in Canada by Government of the Northwest Territories Order-in-Council in 1962. Although numbers of muskoxen recently have increased markedly on the southern tier of islands in the Canadian Arctic Archipelago (essentially south of 74°N) and on mainland ranges, the order has not been rescinded. Also, numbers of muskoxen on the islands north of 74°N in the High Arctic declined drastically from 1961 (Tener 1963) to at least 1974 (Miller et al. 1977a) and most likely on into the early 1980s. Therefore, as muskoxen occur in association with Peary caribou in the High Arctic they are also monitored with Peary caribou, when possible, by the Canadian Wildlife Service.

Peary caribou and muskoxen essentially are the sole source of fresh red meat from terrestrial animals for Inuit in the Canadian High Arctic; and most Inuit prefer the meat of caribou to muskoxen. The annual replacement value of that fresh meat would represent an appreciable yearly cost to the federal government. Thus, both significant economic and non-tangible values are associated with conserving Peary caribou and muskoxen at usable population levels.

The Canadian Wildlife Service, especially because of its concern for Peary caribou, initiated a 3-yr aerial survey program to evaluate the current statuses of Peary caribou and muskoxen in the Canadian High Arctic. Due to limited resources, the planned aerial surveys are restricted to Melville, Bathurst, Prince Patrick, Eglinton, and Lougheed islands (and some of their small satellite islands). These Queen Elizabeth Islands are the ones which previously supported the greatest numbers of Peary caribou, when first surveyed by air in 1961 (Tener 1963). The following is a progress report of the second year's results obtained from aerial

surveys of Prince Patrick Island, Eglinton Island, and Emerald Isle, Northwest Territories, July 1986.

SURVEY AREA

1. Islands

The Queen Elizabeth Islands surveyed in July 1986 lie between latitudes 74° and 77°N and longitudes 113° and 123°W (Fig. 1). Total landmass of the islands surveyed is about 17 930 km^2. The survey area is mostly low-lying and mainly below 150 m above mean sea level (amsl) in elevation.

1.1. Prince Patrick Island

Prince Patrick lies on the western edge of the Queen Elizabeth Group, 25 km west of Eglinton, 132 km north of Banks and 47 km south of Brock. The island is large (15 830 km^2) and elongated along a northeast-southwest axis. West and central Prince Patrick (Strata I, 7740 km^2 and II, 5980 km^2) are within the Arctic Coastal Plain region which is underlain by the Beaufort Formation (Tozer and Thorsteinsson, 1964). The plain slopes gently from the centre of the island to the low-lying west coast; on the southeast the relief is more pronounced where the plain ends in an escarpment. Eastern Prince Patrick (Stratum III, 2110 km^2) is a dissected plateau with sandstone bluffs and sea cliffs. The south of the island (Stratum I) also has pronounced relief with escarpments and cliffs reaching the maximum elevation of 279 m amsl on the island, about 3% (535 km^2) of the land is between 151-300 m amsl. The sandstones vary in vegetative cover that they support, but the Beaufort Formation (63% of the island, Tener, 1963) underlying the Arctic Coastal Plain is uniform in its sparse vegetative cover (Tozer and Thorsteinsson, 1964).

1.2. Eglinton Island

The almost parallel east and west coasts of Eglinton face Melville and Prince Patrick respectively, both islands are about 25 km from Eglinton. The island (1550 km^2) is an eroded peneplain with flat-topped hills especially well developed in the central and south portions of the island. About 66% of the total area is below 60 m amsl and only about 4% is above 150 m amsl with a maximum elevation of 240 m amsl. The northern end is low-lying except for some cliffs reaching 114 m amsl on the northeast corner. The "badlands" of the northern part are underlain by the Isachsen Formation which supports little vegetation. The Cretaceous shales of the south and central portion are more favourable to vegetation cover (Tozer and Thorsteinsson, 1964).

1.3. Emerald Isle

Emerald is a small (550 km^2) island lying 28 km north of Melville and 27 km east of Prince Patrick. The island is dome-shaped, with a gently undulating plain rising to a maximum elevation of 90 m amsl. Occasional cliffs of 60-70 m amsl interrupt the otherwise flat coast.

1.4. Eight Bears Island

The island is small (18 km^2) and low, with the gently rolling land reaching a maximum of 48 m amsl. Eight Bears lies about 6 km east of Fitzwilliam Owen and about 25 km north of Emerald.

1.5. Fitzwilliam Owen Island

Fitzwilliam Owen is a small island about 25 km north of Emerald, 40 km east of Prince Patrick and 40 km south of Mackenzie King. Fitzwilliam Owen has an area of 34 km^2 and reaches 45 m amsl. It is a disc-shaped island with a rolling landscape that is mostly bare ground. The vegetation is moss with vascular plants dominating few communities such as on south-facing slopes and coastal saline tundra (Kuc, 1970).

2. Weather

The climate of the survey area is characterized by long cold winters, short cool summers and low precipitation. Air temperatures average below -17.7°C from December to March. Mean daily temperatures do not rise above 0°C until after 1 June on the extreme south of the survey area, and 15 June on the rest of the survey area (Meteorological Branch 1970). The snow cover usually starts to melt in early June, and rapidly dissipates to bare ground by mid June, except for snowbanks in sheltered sites (Potter 1965). However, extensive snow covered areas do persist into the first week of July in some years. Summer is the period when the ground is generally snow free, and lasts from the beginning of July to the end of August. Winter starts when the mean daily temperature falls below 0°C usually about 15 September. September and October are the stormiest months and much of the annual snowfall may occur in those months. From December to March anticyclones dominate the weather causing frequent calms, clear skies and light snowfall.

An east-west gradient of weather across the western Queen Elizabeth Islands appeared evident for the 1970s from weather records collected at Mould Bay, Prince Patrick Island, and Resolute Bay, Cornwallis Island, and empirical observations (Miller et al. 1977a). Unfortunately the absence of long-term weather records from

Melville allows only an extrapolation of weather from Mould Bay and Resolute Bay to describe weather on Melville. Subjective observations suggest the weather of eastern Melville is most similar to that recorded at Resolute Bay. Thompson (1971) compared 1 year's weather data from the National Museum of Science research station in Polar Bear Pass on central Bathurst Island to data from Resolute Bay. Her results suggested that the differences in the weather between the two locations were the result of the research station's inland site and local topographical effects. Mould Bay tends to have cooler, drier and less stormy weather than Resolute Bay.

The amount and duration of snow cover, especially in spring, are critical to arctic ungulates, but also critical are the types of snow cover and incidences of freezing rain. Wind removes the snow from exposed slopes and redeposits it as shallow but hard compacted cover and drifts in more sheltered and relatively well-vegetated sites. Freezing rain in autumn which results in ground-fast ice before snow cover accumulates; ice layering in the snow, crusting of the snow; and especially the formation of ground-fast ice in spring (e.g., Miller et al. 1982) compounds the stress of forage unavailability on arctic ungulates. Unfortunately neither the type of snow cover nor the incidence of ground-fast ice or ice layering is available for the western Queen Elizabeth Islands.

METHODS

1. Aircraft

A Bell-206B (Jet Ranger) turbo-helicopter was used as the survey aircraft. The helicopter was equipped with an Omega/VLF Navigation System.

2. Observers

I used a 4-person survey crew: pilot-navigator-spotter (right front seat); navigator-spotter (left front seat); and a left and a right rear seat observer. The survey crew communicated by use of a voice activated intercommunication system. The helicopter pilot navigated the line transects with the aid of the Omega/VLF Navigation System, making occasional visual reference checks with the 1:250 000 topographical maps. The navigator-spotter navigated visually with the 1:250 000 map sheets; recorded the location of each observation by consecutive numbering (within each stratum) directly onto the map sheet; and called out the number for each observation to the rear seat observers. Both the pilot and the navigator also served as spotters and alerted the rear seat observers to the sighting of animals. If one of the rear seat observers was first to see animals, he called out his sighting to alert the other crew members. The rear seat observer on the side of the helicopter where the animals were located recorded the details of the observation in a field notebook: (1) date; (2) stratum

number; (3) transect number; (4) observation number; (5) degrees of angle of depression obtained with hand held clinometer; (6) species and composition of animals sighted, as bulls, calves, and/or others (cows, juveniles, yearlings); and (7) remarks, if any. The animal(s) sighted were circled, if necessary, to determine their number and/or sex and age composition (all 4 crew members participated in the determinations).

3. Omega/VLF Navigation System

The Omega/VLF Navigation System (ONS) is an automatic, computerized, earth-orientated navigational system (Canadian Marconi Company). The ONS uses signals from the network of Omega navigation transmitters and from selected United States Navy very low frequency (VLF) communications stations, when applicable, to provide continuous position and navigation information. I used the ONS to fly standard line transects (north-south) by the "cross track" method; and "deadheading" courses between predetermined points by the "waypoint coordinates" method (details available in Canadian Marconi Company. 1983. Operators guide (Part I System description). Publication No. 734/740/771-GEN-0319. 26 pp. and Canadian Marconi Company. 1983. Operators guide (Omega Navigation System CMA-734/740/771 Part II Operational program). Publication No. 734/740/ 771-GEN-0101. 56 pp. Canadian Marconi Company, Avionics Division, 2442 Trenton Avenue, Montreal, Quebec, Canada H3P 1Y9).

4. Altitude

Altitude above ground level was maintained, as best possible, at about 90 m above ground level (agl) during the survey and resurveys. Altitude was measured with a standard aviation altimeter (pressure type) in units of 6.1 m (20 ft).

5. Helicopter Speed

The air speed of the helicopter was held at about 160 $km \cdot h^{-1}$. Air speed was read from the aircraft air speed indicator.

6. Angle Of Animal(s) Sighting

Each angle from the animal(s) to the helicopter was indirectly measured in whole degrees with a hand held clinometer (Suunto Co., Helsinki, Finland). The actual angle obtained was the angle of depression from the horizontal plane of the inflight helicopter to the animal(s) (Fig. 2). Thus, when the height of the helicopter is supposedly known; distance along a horizontal plane (supposedly at ground level) to the animal(s) from the point where the vertical projection of the centre of the helicopter theoretically touches the ground can be obtained from the simple trigonometric function involving the tangent of an acute angle.

Given

(1) A right-angled triangle (ACB) is formed by joining (A) the helicopter, (B) the location of the animal(s) on the ground, and (C) the intercept of a horizontal plane from (A) with a vertical leg from (B) (Fig. 2).

(2) Side (CB) (Fig. 2) = (a) = vertical distance from animal(s).

(3) Side (AC) (Fig. 2) = (b) = horizontal distance from helicopter.

(4) Hypotenuse (AB) (Fig. 2) = (c) = diagonal leg from helicopter.

(5) Alpha (α) angle (BAC) is the acute angle of depression measured with a hand held clinometer by an observer (Fig. 2).

Assumptions

(1) Length (a) (Fig. 2) is equal to the height of the helicopter above ground level.

(2) Length (b) (Fig. 2) is equal to the horizontal distance from the helicopter to the animal(s).

Since $\text{Tangent } \alpha = \frac{a}{b}$

Therefore $b = \frac{a}{\text{Tan } \alpha}$

7. Survey Design

I used a systematic, unbounded line transect type, aerial survey to obtain numbers and distributions of Peary caribou and muskoxen. Evenly spaced north-south line transects were drawn directly onto 1:250 000 topographical map sheets at about 6.4-km or 3.2-km intervals over each of the five strata, originating from baselines at 115°00'W, 118°00'W, or 119°00'W (Appendices 1 and 2). Selection of a baseline was done mainly as a technical consideration to allow connection of each cross (+) indicator at each 15 minutes of one degree of latitudinal change along that meridian to maximize the subsequent accuracy of ruling off transect lines. These indicators appear as crosses (+) for each 15 minutes of latitude and each full degree of longitude in a grid pattern over each entire 1:250 000 Geological Survey of Canada topographical map sheet.

Prince Patrick Island was divided into three survey land strata after Miller et al. (1977a) on Geological Survey of Canada

1:250 000 topographical map sheets (Fig. 1). The three strata were separated on land by an arbitrary line drawn from east to west along the 75°50'N parallel. The area of each stratum was determined with a planimeter. The whole of Eglinton Island was treated as survey Stratum IV and Emerald Isle as Stratum V. Eight Bears and Fitzwilliam Owen islands were not given stratum designations, as they were not systematically surveyed.

8. Measurements And Units

An array of measurement units was employed and had to be converted to the metric system. (1) The Omega/VLF Navigation System gives distance readouts in "international nautical miles": one international nautical mile (hereafter referred to simply as a 'nautical mile') equals 1851.999 m (6,076.115 ft) or 1852 m. (2) The air speed indicator in the Bell 206B helicopter gives readings in "U.S. statute miles: one U.S. statute mile (hereafter referred to simply as a 'mile') equals 1609.344 m (5,280 ft) or 1609 m. (3) The Geological Survey of Canada topographical maps used in this work are scaled in imperial inches (hereafter referred to simply as 'inches'). The maps are at a scale of 1:98 425.197 cm (1:250 000 inches) or 1:98 425 cm. Therefore, each 2.54 cm (1 inch) equals 6349.999 m (20,833.333 ft) or 6350 m.

The smallest increment of transect length was measured from 1:250,000 topographical map sheets in units of 0.0625 inches (0.159 cm). Then the total length of each transect in inches was multiplied times 6350 m (value of 1-inch in metres at 1:250 000 scale) and divided by 1000 to obtain distance in kilometres. Each resultant value of transect length (distance in km) was then rounded off to three places beyond the decimal point and multiplied by the appropriate transect width in kilometres (all values taken to three places beyond the decimal point) to obtain transect area (km^2).

Intervals between transects were first measured on 1:250 000 topographical maps in inches (smallest unit, 0.0625 inches); then resultant values were converted to kilometres by multiplying by 6350 m, dividing by 1000, and rounding to three places beyond the decimal point.

9. Statistical Methods

Density and population estimates as well as their variance estimates and 95% confidence intervals were made for both caribou and muskox populations in all survey strata. The probability P (0.05 was the level of acceptance for significant relationships reported in this study.

The following symbols are used in the estimation procedure that follows:

n = the number of these N transects that are sampled.

f = n/N, the sampling fraction.

y_i = the number of animals counted on the ith sampled transect.

x_i = the area of the i'th sampled transect.

Y = the true population of animals in the survey area.

$\overline{Y}$ = the mean number of animals per transect on all N transects.

$\overline{X}$ = the mean area of all transects.

A = total area.

R = the true mean density of animals in the survey area, $R = \overline{Y}/\overline{X}$.

d_i = $y_i - \hat{R}x_i$ where $\hat{R}$ is an estimator of R.

The standard estimator for the true mean density R is the ratio estimate:

$$\hat{R} = \frac{\sum_{i=1}^{n} y_i/n}{\sum_{i=1}^{n} x_i/n} = \frac{\sum_{i=1}^{n} y_i}{\sum_{i=1}^{n} x_i} = \frac{\bar{y}}{\bar{x}}$$

where $\bar{y}$ = the mean count of animals on the sampled transects, $\bar{x}$ = the mean area of the sampled transects.

Following the methods described by Kingsley and Smith (1981) an estimate of the variance of R is found by:

$$\hat{V}(R) = (1 - f) \frac{\sum_{i=1}^{n-1} (d_i - d_{i+1})^2}{2n\,(n-1)\bar{x}^2}$$

The estimate of the true population Y is found by multiplying the density estimate by the total area under consideration, that is: $\hat{Y} = \hat{R} \cdot A$ and the estimate of the variance of Y is obtained by multiplying the variance estimator of R by the quare sof the survey area.

$\hat{V}(Y) = [A^2 \cdot \hat{V}(R)]$.

Confidence intervals (95%) for the true density and the true population total are given by:

$$R: \quad \hat{R} \pm t_{\frac{\alpha}{2},\, n-1} \sqrt{\hat{V}(R)}$$

$$Y: \quad \hat{Y} \pm t_{\frac{\alpha}{2},\, n-1} \sqrt{\hat{V}(Y)}$$

Observations of caribou or muskoxen with measured angles (to the nearest whole degree) below the horizon of 6° or more were considered to be "on" transect and were used to calculate the estimates. Observations with measured angles of 5° or less were considered "off" transect and were not included in the above analysis.

10. Definitions Of Terms Or Style

10.1. On transect

In this report all animals seen "on transect" are those animals that were seen within a strip width of 857 m on either side of the helicopter. The location of animals within that strip width was determined by the observer by reading an angle of depression of 6° or more with the hand held clinometer. The 857-m-wide strip from each side of the helicopter was combined for a maximum feasible strip width of 1.714 km.

10.2. On survey

In this report animals seen "on survey" are all of the animals seen by the observers while the helicopter was flying along the line transects. This condition excludes all animals seen while the helicopter was flying to or from the line transects (that is, flying to or from fuel caches or the base camp).

10.3. Off survey

In this report all animals seen "off survey" are those animals seen while the helicopter was flying to or from fuel caches or the base camp (excludes all animals seen on survey).

10.4. Sex/age classification

Recognition of muskoxen was restricted to bulls, calves, and others. No special effort was made to separate cows from juveniles and no attempt was made to identify yearlings.

Peary caribou were recognized and classified by sex/age class as follows.

10.4.1. "Bulls" (mature males, assumed 4+ yr-old) are recognized by the relatively large size and advanced development of their new antler growth, which is exaggerated by the presence of velvet on the antlers. Diagnostic characteristics of the antler growth include the large diameter of the main beams; the long, posteriorly curved main beams; and the presence of well-developed, anteriorly directed brow or bez tines. Secondary characteristics include large body size, relatively large head size; and presence of new pelage, especially on the lateral parts of the body and on the face. When the caribou under consideration exhibits male-like antler growth, the following exercise is used to distinguish bulls from juvenile males. The observer makes a mental evaluation of the length of the new antler growth present in relation to the length of the animal's head (from crown of skull to tip of nose). If the impression received is that the antler growth is longer than the head - the animal is classified as a bull; and if shorter than the head - a juvenile male.

10.4.2. "Cows" (mature females, assumed 3+ yr-old) are recognized by the retention of hard antlers from the previous year or the absence of antlers and any new growth of antlers. In some few cases, minor new growth on the simple main beams has begun (such new growth most likely occurs among individuals just coming of age or possibly some few older cows that maintained better physical condition because they did not have the added burden of carrying a fetus and nursing a calf in the current year). Cows, especially those that produced a calf in the current year, still retain much of their previous winter's pelage and have a faded, lifeless, often patchy appearance about them (relative to other sex/age classes in July). The general drab appearance of a successful maternal cow often remains clearly recognizable into August of the year.

10.4.3. "Juvenile males" (males, assumed 1-3 yr-old) are recognized by their new pelage and their advance, well-developed, but relatively small (when compared to bulls) new antler growth. Also, their relatively small body size (especially that of yearlings), when compared to adults, aids in their separation from bulls and cows.

10.4.4. "Juvenile females" (females, assumed 1-3 yr-old) are recognized by their new pelage, new antler growth, and relatively small body size (particularly yearlings). They are separated from juvenile males by the new antler growth appearing shorter than the ears and being restricted to small spike-like main beams or at the most, small main beams with minute branching. Antler growth characteristics together with the relatively small body size and new pelage separates them from cows or bulls.

10.5. Caribou group or muskox herd

A "caribou group" or "muskox herd" is composed of two or more individuals of the same species that were seen in close

association (no fixed minimum or maximum distance of separation but usually much closer than 100 m) and apparently spatially isolated from other individuals of the same species at the time of observation. Two or more individuals (of the same species) are considered as one group even if they were more than 100 m apart but moved together when disturbed by the survey aircraft.

10.6. Bull-only caribou group or bull-only muskox herd

A "bull-only caribou group" is composed of mature males only (bulls, assumed 4+ yr old, relatively large antler size). In July of the year both bulls and immature males (at least 2 yr old and possibly 1-yr olds) are readily recognizable by their relatively advanced antler development from other sex/age classes of Peary caribou. A "bull-only muskox herd" is composed of only bulls (assumed 4+ yr old) that can be readily recognized by their large body size, and their relatively large horn size and well developed boss area of the horns.

10.7. Mixed sex/age caribou group or mixed sex/age muskox herd

A "mixed sex/age caribou group" or a "mixed sex/age muskox herd" may be mixed by sex or age or both and contains any possible combination of bulls, cows, juveniles, yearlings, or calves (when bulls could not be recognized, the presence of both sexes was not determined).

10.8. Values in parentheses

When values are given in parentheses (x+y) they always equal 1+ yr-old animals plus calves in this report: e.g., caribou (36+11) equals 36, 1+ yr-old caribou plus 11 caribou calves.

10.9. Estimates

The reader may note that slight inconsistencies sometimes occur between the summations of estimates by each survey stratum when compared with their counterparts that are obtained from a single estimate of several or all survey strata. The magnitude of these discrepancies is insignificant and they are pointed out only to assure the reader that the errors are the results of the method of machine calculation and not errors or transcription.

10.10. Sites

In this report a solitary animal is not considered as a group. Therefore, the term "site" is used to designate any observation regardless of whether it involved a solitary animal or a group of two or more animals. Site is essentially synonymous with observation.

RESULTS

I carried out an aerial survey of Peary caribou and muskoxen on Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, between 4 and 13 July 1986. From those results I estimated that there were about 247 Peary caribou at 1.379 caribou/100 km^{-2} and about 165 muskoxen at 0.919 muskoxen/100 km^{-2} on the three-island survey area. Results from the aerial survey are presented by island in the following section - 1. Aerial Survey. Subsequently, I resurveyed portions of Prince Patrick Island once and the whole of Eglinton Island twice between 17 and 29 July 1986. Those findings from the aerial resurveys support the overall estimates obtained from the aerial survey, and those resurvey results are presented by island in section - 2. Aerial resurveys.

Eight Bears and Fitzwilliam Owen islands were unsystematically searched by air in their entireties on 5 July 1986. No caribou or muskoxen were seen on either island, except one dead muskox bull on Fitzwilliam Owen.

1. Aerial Survey

1.1. Prince Patrick Island

All three survey strata on the island received about 27% coverage between 5 and 13 July 1986 (Fig. 2; App. 1, 3-6). The helicopter developed a mechanical problem on 8 July and remained grounded until 11 July, otherwise the survey was carried out uninterrupted.

1.1.1. Peary caribou

I observed only 52 caribou (38+14) on 19 sites on survey and 43 of those caribou (30+13) on 14 sites were on transect (Tables 1, 2; App. 5). The distribution of the caribou was mainly coastal, with 84.6% seen on survey being within 5.0 km of the seacoast and 56.8% of them <2.5 km from the seacoast. Caribou on all three survey strata followed the same distributional pattern (Table 3).

I also saw 29 caribou (21+8) on nine sites off survey on Stratum I and I judged by their discrete locations that they were different individuals from those seen on survey in Stratum I. All of the caribou seen off survey in Stratum III were judged to have also been seen on survey in that stratum. No caribou were seen off survey in Stratum II. I saw 67.3% of the caribou (24+11) in Stratum I; followed by 19.2% (8+2) in Stratum III; and only 13.5% (6+1) in Stratum II (App. 5). No caribou were seen on the Beaufort Formation which covers about 63% of the land area of Prince Patrick, essentially the western two-thirds of the island along a northeast-southwest axis. Distribution of caribou within each stratum was uneven: on Stratum I, the caribou were on the eastern half, mostly

on south coastal sites; on Stratum II, all of them were on the eastern third; and on Stratum III, most of them (80%) were on the western half. The observed numbers and distributions of caribou on Prince Patrick Island indicated a preference on a relative landmass basis for Strata III and I and a lack of caribou within Stratum II ($P < 0.005$).

I estimated that there were about 154 Peary caribou at 0.973 caribou/100 km^{-2} on Prince Patrick in early July 1986 (ca. 107, 1+ yr olds at 0.678/100 km^{-2}). The density of caribou was greatest on Strattum III, followed closely by that on Stratum I, and lowest on Stratum II (Table 2). Although the density of caribou was greater on Stratum III than on Stratum I, the contribution to the number of caribou estimated on Prince Patrick was 3.6 times greater from Stratum I than from Stratum III (Tables 1, 2).

All 81 caribou seen on Prince Patrick during the aerial survey (App. 5) were segregated. Proportional representation of caribou calves among all caribou seen was high (Table 4). Nine of the 12 mixed sex/age groups of two or more caribou seen on survey with cows present contained calves: Stratum I, 2(1+1), 2(2+1), 1(2+2), 1(3+2), 1(5+3); Stratum II, 1(2+1); and Stratum III, 1(3+2). Calves in those nine groups averaged 1.6 $\pm$ 0.73 (S.D.) per group. The 13th mixed sex/age group was composed of a bull and a juvenile male. All five of the mixed sex/age groups seen off survey contained calves: Stratum I, 2(2+1), 2(2+2), and 1(3+2). Calves in those five groups averaged 1.6 $\pm$ 0.55 (S.D.) per group. Proportions of caribou calves to total caribou seen varied markedly among strata, representation being greatest on Stratum I and least on Stratum II (Table 4).

The caribou seen on survey occurred as four singles (3 bulls, 1 juv. male), two pairs of bulls, and 13 mixed sex/age groups (Tables 5, 6). Group size ($n = 15$), excluding singles, averaged 3.2 $\pm$ 1.70 (S.D.) and ranged from 2-8 individuals. No bulls were associated with the 12 mixed sex/age groups with cows present.

1.1.2. Muskoxen

I observed only 18 muskoxen on five sites on survey and all were on transect (Tables 7, 8; App. 6). Most (61.1%) of the muskoxen seen on survey were <2.5 km from the seacoast (Table 9). No muskox calves were seen on Prince Patrick in July 1986 (Table 10). An additional 14 muskoxen on two sites were seen off survey in Stratum I; none was seen off survey in Stratum II or III. Six dead muskoxen that appeared to have died during spring 1986 were found on Prince Patrick: five (2 bulls; 2, 2-3 yr-old males; and 1 yearling male) on Stratum I; and one bull on Stratum III.

The 12 muskoxen (66.7%) in Stratum I occurred as a solitary bull on a site between 5.1-10.0 km from the seacoast and a herd of three bulls and a mixed sex/age herd of eight on two sites

<2.5 km from the seacoast. The 14 muskoxen seen off survey occurred as one mixed sex/age herd of eight and six each; both herds were 5.1-10.0 km from the seacoast.

The six muskoxen (33.3%) in Stratum III were all bulls and grouped as a pair and a bull only herd of four on two sites between 5.1- 10.0 km from the seacoast.

I estimated that there were about 64 muskoxen at 0.407 muskoxen/100 km^{-2} on Prince Patrick in early July 1986. The density of muskoxen was greatest on Stratum III (Table 8). Although the density of muskoxen was greater on Stratum III than on Stratum I, the contribution to the number of muskoxen estimated on Prince Patrick was twice as great from Stratum I as from Stratum III (Tables 7, 8).

Muskoxen observed on survey occurred as one solitary bull, three bull-only herds, and one mixed sex/age herd (Tables 11, 12). Herd size (n = 4), excluding singles, averaged 4.3 + 2.63 (S.D.) and ranged from 2-8 individuals. At least one bull was associated with the mixed sex/age herd of eight.

1.2. Eglinton Island

The island received about 27% aerial coverage on 4 July 1986 (Fig. 2; App. 2-6).

1.2.1. Peary caribou

I saw 27 caribou (21+6) on seven sites on survey and 22 of them (18+4) on six sites were on transect (Tables 1, 2; App. 5). I also saw one group of eight caribou (5+3) off survey. The caribou were all within 5.0 km of the seacoast (Table 3) on the southwest part of the island: south of 75°50'N and west of 118°45'W.

I estimated that there were about 79 Peary caribou at 5.110 caribou/100 km^{-2} on Eglinton Island in early July 1986 (ca. 65, 1+ yr olds at 4.181/100 km^{-2}). The density of caribou on Eglinton was the greatest within the three-island survey area (Table 2). However, the contribution to the estimated number of caribou in the survey area was only 51.3% as great as that for caribou from Prince Patrick (Tables 1, 2). The 35 caribou were all segregated (Table 4). Proportional representation of caribou calves among all caribou seen was high but slightly lower than on Prince Patrick Island (Table 4). Two of the three mixed sex/age groups of two or more caribou seen on survey with cows present contained calves, (8+4, 3+2). Calves in those two groups averaged 3.0 $\pm$ 1.41 (S.D.) per group. The third mixed sex/age group was composed of two juvenile males.

The caribou seen on survey occurred as two singles (1 bull, 1 juv. male), one bull-only group, and four mixed sex/age

groups (Tables 5, 6). Group size (n = 5), excluding singles, averaged 5.0 ± 4.12 (S.D.) and ranged from 2-12 individuals. No bull was associated with the mixed sex/age groups.

1.2.2. Muskoxen

I saw 35 muskoxen (33+2) on nine sites on survey and 28 of them (26+2) on seven sites were on transect (Tables 7, 8; App. 6). I also saw an additional herd of 12 muskoxen (no calves) off survey. All muskoxen were within 10 km of the seacoast; most (65.7%) were within 5 km; and 30.4% of them <2.5 km of the seacoast (Table 9). The observed muskoxen were more widely distributed on an east-west basis than the caribou, occurring on sites scattered over most of the island south of 75°50'N (essentially south of the northern "badlands"). Nine dead muskoxen that appeared to have died during spring 1986 were found on Eglinton: 4 bulls, 4 juveniles (only 2 were inspected closely, and they were males, apparently 2-3 yr olds), and 1 yearling male.

I estimated that there were about 101 muskoxen at 6.503 muskoxen/100 km^{-2} on Eglinton in early July 1986 (ca. 94, 1+ yr-olds at 6.039). The density of muskoxen was nearly 15 times greater and the estimated number 57.8% greater than those values for muskoxen on Prince Patrick (Tables 7, 8).

All 47 muskoxen were segregated (App. 6). Proportional representation of calves among all muskoxen seen was extremely low (Table 10). Only two of the five mixed sex/age herds seen with cows present (on or off survey) contained calves, both (6+1).

Observed muskoxen occurred as one solitary bull, four bull-only herds, and four mixed sex/age herds (Tables 11, 12). Herd size (n = 8), excluding singles, averaged 4.3 ± 2.25 (S.D.) and ranged from 2-7 individuals. At least one or two bulls were associated with each mixed sex/age herd.

1.3. Emerald Isle

The island received about 27% aerial coverage on 5 July 1986 (Fig. 2; App. 2-5).

1.3.1. Peary caribou

I saw only four caribou (3+1) in one group between 2.5-5.0 km from the seacoast on a north-central site during the survey (Tables 1, 2, 4, 5; App. 5). All four of the caribou were on transect. The group was composed of two cows, a juvenile (most likely female), and a calf. The one calf could represent 25% calves among all caribou seen but the sample size is really too small to seriously consider proportional representation of calves on Emerald Isle.

I estimated that there were only about 14 Peary caribou at 2.625 caribou/100 km^{-2} on Emerald Isle in July 1986 (ca. 11, 1+ yr olds at 1.969/100 km^{-2}). Although the contribution to the estimated number of caribou within the three-island survey area was only 5.7% of the total, the density estimate was 2.7 times greater than that from Prince Patrick and half as great as that from Eglinton (Tables 1, 2).

1.3.2. Muskoxen

No muskoxen were seen.

2. Aerial Resurveys

2.1. Prince Patrick Island

All of Stratum III was resurveyed at 58.3% coverage on 17-18 July 1986 (App. 1, 3-6). I then began an aerial resurvey of Stratum I on 18 July 1986 but prevailing weather on the 19th prevented resurvey flights. Most of the coastal segments of the transects on the eastern side of Stratum I (ca. 2610 km^2) were completed at 54.0% coverage on 18, 20-21 July (App. 1, 3-6). However, further attempts at a complete resurvey of Stratum I were unsuccessful due to a prolonged period of low cloud cover, persistent fog banks, and frequent snow squalls over the western and central portions of Stratum I throughout the remainder of July 1986. The eastern portion of Stratum II (ca. 1562 km^2), where caribou were seen during the aerial survey, was resurveyed at 27% coverage on 28 July (App. 1, 3-6).

2.1.1. Peary caribou

I observed 43 caribou (37+6) on 11 sites on resurvey on the subsample area of Stratum I and 40 of those caribou (34+6) on nine sites were on transect (Tables 13-18; App. 5). Even though the distribution of caribou on Stratum I could not be fully evaluated during the resurvey, results suggested that most caribou within the subsample area had shifted to more inland sites from their earlier coastal locations (Table 15). I observed 12 caribou (9+3) on three sites on resurvey on the subsample area of Stratum II and only three of them (no calves) were on transect (Tables 13-18; App. 5). The limited observations suggested that those few caribou had also shifted inland from previously occupied more coastal locations (Table 15). I observed 50 caribou (42+8) on 15 sites on resurvey on Stratum III and 42 of them (36+6) on 11 sites were on transect (Tables 13-18; App. 5). The later distribution of caribou within Stratum III was much stronger on interior sites during the resurvey than it had been during the aerial survey (Table 15).

The area of Prince Patrick Island that was resurveyed encompassed where 95.1% of all caribou on the island had been seen during the aerial survey. Thus, the 157 Peary caribou estimated on

the resurvey area agrees closely with the 154 caribou estimated during the aerial survey, assuming that at least about the same proportion of caribou had remained within the resurvey area. Comparison of the estimated densities and numbers of caribou obtained from the aerial survey versus those from the aerial resurvey suggests considerable influx of caribou from Stratum I onto Stratum III during mid July 1986. Estimates obtained from aerial resurvey of caribou on Stratum III had increased about 2.7 times while those from Stratum I had decreased 23.7%. However, increases in proportions of caribou seen on transect to all caribou seen on survey for both strata I and III during the aerial resurvey compared to during the aerial survey masks the true magnitude of the apparent changes between the two periods. Probably the caribou actually decreased at least 35% in number on Stratum I while increasing about 2.5 times on Stratum III by ingress from Stratum I, based on calculated values obtained from fixed proportions (0.8 on transect) of on transect to off transect animals during both periods.

The higher density of caribou on Stratum III during the aerial resurvey then during the aerial survey results from the marked increase of caribou on Stratum III during the later period. However, the increased densities obtained from the aerial resurvey within the subsample areas of strata I and II simply reflect the effect of substratification on areas of concentration within those two survey strata, even with the overall reduction in the number of caribou present on the subsample area of Stratum I.

Proportional representation of caribou calves among all caribou seen on Prince Patrick was appreciably lower during the aerial resurvey period than during the aerial survey period (Table 16). Cows were present in 13 of the 15 mixed sex/age groups; one of the remaining groups was made up of one bull and one juvenile male and the other group of two juveniles (likely, both yearling males). Although calves were present in 13 of the 15 mixed sex/age groups, the groups were on the average non-significantly larger during aerial resurveys than during the aerial survey (10+1, 9+2, 5+2, 5+2, 5+1, 4+1, 4+1, 3+2, 2+1, 2+1, 1+1, 1+1, 1+1, 2+0, 2+0). Calves in those 13 groups averaged 1.3 $\pm$ 0.48 (S.D.) per group.

The caribou seen during the partial aerial resurvey occurred as seven solitary bulls, seven bull-only groups, and 15 mixed sex/age groups (Tables 17, 18). Group size (n = 22), excluding singles, averaged 4.5 $\pm$ 2.96 (S.D.) and ranged from 2-11 individuals. Only two bulls were associated with mixed sex/age groups with cows present: one bull with a group of 11 and one bull with a group of seven.

2.1.2. Muskoxen

I observed only 13 muskoxen (no calves) on two sites on resurvey on the subsample area of Stratum I and six of them on one

site were on transect (Tables 19, 20; App. 6). Most (81.8%) muskoxen were on sites <2.5 km from the seacoast (Table 21). No muskox calves were present (Table 22; App. 6). The two herds were both on sites <2.5 km from the seacoast. I saw one group of three muskoxen <2.5 km from the seacoast on the subsample area of Stratum II, none was on transect. I observed only six muskox bulls on two sites on resurvey on Stratum III and four of them on one site were on transect (Tables 19, 20; App. 6). The herd of four was on a site 2.5-5.0 km from the seacoast and the pair was on a site <2.5 km from the seacoast.

The restricted distribution and clumped low numbers of muskoxen seen on Prince Patrick Island during both the aerial survey and the aerial resurvey seem to account for differences in estimates of densities and numbers between the two periods, rather than as a result of actual changes (Tables 7, 8, 19, 20). All muskoxen seen on survey during aerial survey and aerial resurvey are comparable (18 vs. 22). There were at least 32 muskoxen on Prince Patrick, based on the 18 plus 14 muskoxen seen on and off survey, respectively. Doubling the coverage during the resurvey, still gave a low count (22). Thus, it is most likely that the estimated number of muskoxen obtained from the aerial survey is high, and that obtained from the aerial resurvey is definitely low. This condition is caused by the variation resulting from the apparently chance occurrence of muskoxen seen on transect within the same restricted areas during both periods.

Muskoxen observed on resurvey occurred as two bull-only herds and two mixed sex/age herds (Tables 23, 24). Herd size (n = 5), excluding singles, averaged 4.4 $\pm$ 2.07 (S.D.) and ranged from 2-7 individuals. Four bulls were associated with the mixed sex/age herd of seven and at least one bull was associated with the herd of six.

2.2. Eglinton Island

I twice resurveyed the whole of Eglinton by air at 55.2% coverage, once on the 27th then again on the 29th of July 1986 (App. 2-6). On both dates some isolated patches of fog reduced lateral visibility but viewing was generally favourable.

2.2.1. Peary caribou

On 27 July I observed 61 caribou (51+10) on 10 sites on resurvey and 50 of those caribou (43+7) on nine sites were on transect (Tables 13, 14; App. 5). On 29 July I observed 53 caribou (41+12) on 10 sites on resurvey and 49 of them (39+10) on nine sites were on transect (Tables 13, 14; App. 5). Most (70.5%) of those caribou were seen on interior sites (5.1-15.0 km) and more than half (52.5%) of them were within the most interior zone on the island (10.1-15.0 km) on 27 July (Table 15). All of the caribou seen were off coastal sites by 29 July; 100% were on sites within 5.1-15.0 km

and almost two-thirds (66.0%) of them were on the most interior zone (Table 15).

The estimates of Peary caribou obtained during the two aerial resurveys of Eglinton Island were slightly higher (14.3% and 12.1%, respectively) but similar to the estimates obtained from the aerial survey (Tables 1, 2, 13, 14). The highest estimates for caribou on Eglinton in July 1986 were 91 caribou at 5.843 caribou/ 100 km^{-2}, based on results from the 1st resurvey (Tables 13, 14).

Proportional representation of calves to all caribou seen was markedly lower during the aerial resurvey periods than during the aerial survey period (Table 16). However, the overall value obtained during the second resurvey (Table 16) suggests that the mid July mortality of caribou calves was not as great on Eglinton as on Prince Patrick. Calves were present in all six of the mixed sex/age groups of caribou seen with cows present on 27 July (8+3, 5+3, 5+2, 5+2, 4+1, 2+2). Calves in those six groups averaged 2.0 $\pm$ 0.89 (S.D.) per group. Four bulls were associated with five juvenile males in the 7th mixed sex/age group and five juveniles and yearlings composed the 8th mixed sex/age group. On 29 July five of the seven mixed sex/age groups of caribou observed with cows present had calves in them (5+3, 5+3, 4+2, 2+2, 2+2). Calves in those five groups averaged 2.4 $\pm$ 0.55 (S.D.) per group.

The caribou seen during the first aerial resurvey occurred as two bull-only groups and eight mixed sex/age groups (Tables 17, 18). Group size (n = 10), excluding singles, averaged 6.1 $\pm$ 2.81 (S.D.) and ranged from 2-11 individuals. Two bulls were associated with a mixed sex/age group of seven and two other bulls with a group of five. During the second resurvey caribou occurred as a solitary bull, two bull-only groups, and seven mixed sex/age groups (Tables 17, 18). Group size (n = 9), excluding singles, averaged 5.8 $\pm$ 1.92 (S.D.) and ranged from 3-8 individuals. One bull was associated with a mixed sex/age group of five.

2.2.2. Muskoxen

On 27 July I observed 116 muskoxen (109+7) on 25 sites on resurvey and 75 of them (70+5) on 17 sites were on transect (Tables 19, 20; App. 6). On 29 July I observed 128 muskoxen (117+11) on 27 sites on resurvey and 64 of them (59+5) on 14 sites were on transect (Tables 19, 20; App. 6). There were 4.9% and 14.3% proportionally fewer muskoxen on coastal sites (<5 km) on 27 and 29 July, respectively, than on 4 July 1986 (Table 21). At the same time muskoxen detected on the most interior zone of the island (Table 21) increased from none on 4 July to 4.3% on 27 July to 11.7% on 29 July 1986. However, the relationship of muskoxen on Eglinton relative to the seacoast during aerial survey versus the two aerial resurveys is masked by the finding of 2.5 and 2.7 times more muskoxen during the two respective aerial resurveys. Therefore, it cannot be clearly discerned whether or not the apparent slight distributional shift

towards the interior of the island in late July 1986 was real or simply a reflection of the subsequent locating of muskoxen missed during the aerial survey.

Estimates of muskoxen obtained from the aerial resurvey of Eglinton Island were 34.7% and 15.0%, respectively, higher than those obtained from the aerial survey (Tables 7, 8, 19, 20). However, as a maximum of 128 muskoxen were actually seen on Eglinton (during 2nd resurvey) the estimates obtained from the aerial survey and the 2nd aerial resurvey are obviously low. Thus, the 136 muskoxen at 8.764 muskoxen/100 km^{-2} estimated during the 1st aerial resurvey are the best measures on muskoxen on Eglinton in July 1986.

Only 41.4% of the 116 muskoxen seen on Eglinton Island on 27 July and 37.5% of the 128 seen on 29 July 1986 occurred in groupings of equal size and sex and age composition on both occasions. The remaining 58.6% and 62.5% of the muskoxen seen on those occasions, respectively, occurred in groupings of various size and composition that only were seen on one of the two resurveys. This condition suggests that there were either actually more muskoxen than estimated on Eglinton or that considerable movement and regrouping of those muskoxen took place within the 2-day time lapse between those two resurveys.

No valid comparisons of proportional representation of calves among all muskoxen seen on Eglinton during aerial survey with those seen during the two aerial resurveys can be made (Table 22 and text). The data suggest that the overall representation of muskox calves was about 2 to 3 times greater on 27 and 29 July, respectively, than on 4 July 1986. These misleading increases are most likely merely a reflection of the larger and more representative samples of muskoxen obtained on Eglinton during the aerial resurveys than that obtained during the aerial survey. However, all of the data (Table 22 and text) support the belief that early survial (or initial production) of muskox calves was low within the three-island survey area in 1986, with the best but still poor performance occurring among muskoxen on Eglinton Island. Only five (31.2%) of the 16 mixed sex/age herds seen on 27 July had calves present (9+2, 7+1, 6+1, 5+1, 4+2). Calves in those five herds averaged 1.4 $\pm$ 0.55 (S.D.) per herd. On 29 July seven (43.8%) of the 16 mixed sex/age herds seen had calves in them (11+2, 7+2, 7+1, 6+2, 6+1, 4+1, 3+2). Calves in those seven herds averaged 1.6 $\pm$ 0.54 (S.D.) per herd.

Muskoxen observed on 27 July occurred as three solitary bulls, six bull-only herds, and 16 mixed sex/age herds (Tables 23, 24). Herd size (n = 22), excluding singles, averaged 5.1 $\pm$ 2.23 (S.D.) and ranged from 2-11 individuals. All but one of the mixed sex/age herds had at least one or two bulls associated with each herd. One mixed sex/age herd of four had three bulls in it. On 29 July the observed muskoxen occurred as two solitary bulls, nine bull-only herds, and 16 mixed sex/age herds (Tables 23, 24). Herd

size (n = 25), excluding singles, averaged 5.0 ± 2.69 (S.D.) and ranged from 2-13 individuals. All but one of the 16 mixed sex/age herds had at least one or two bulls associated with each herd. One mixed sex/age herd of eight had six bulls in it.

DISCUSSION

1. Prince Patrick Island

As noted by Tener (1961, 1963) only relatively small areas of good vegetation for herbivores exist on Prince Patrick Island. This condition of restricted suitable habitat on Prince Patrick seems particularly true for muskoxen, especially on a year round basis. Miller et al. (1977a) suggested that from empirical impressions they thought that the areas occupied by muskoxen in 1973-74 represented most of the habitat suitable for muskoxen on Prince Patrick. It still appears that only several major drainage systems located on the southeastern and eastern coasts of Prince Patrick provide satisfactory year round range for muskoxen. Those combined areas probably account for less than 10% and surely less than 20% of Prince Patrick's total landmass. Although Prince Patrick provides only limited support for muskoxen it has, however, the potential of being a relatively important island for considerable numbers of Peary caribou, such as those numbers that occurred there up until at least 1961.

1.1. Peary caribou

In July 1986 most of the Peary caribou seen on Prince Patrick Island were on the southeastern portion of the island (east of 121°W and south of 76°25'N). This observed distribution is in agreement with all prior summertime observations for Prince Patrick (Tener 1963, Miller et al. 1977a).

The 1986 estimate of 154 Peary caribou on Prince Patrick is only 6.8% as great as the number estimated there in 1961 (Table 25). The 1986 estimate also suggests a further 24.8% decrease in the number of caribou summering on Prince Patrick from the number estimated there in 1974 (Table 25). Whether or not these reductions were caused totally or in part by mortality exceeding reproduction or survival, or by emigration will remain unknown. This condition pertains because of the 12-yr time lapse between aerial surveys of Prince Patrick Island and is further complicated by our inability to recently survey the entire western Queen Elizabeth Islands on an annual basis, due to insufficient resources.

Unfortunately, we do not know whether or not the number of caribou currently wintering on Prince Patrick has declined in proportion to the number summering there. Thus, it is possible that Prince Patrick still serves as a relatively important island for winter range for caribou. Also, it is still likely that range on Prince Patrick will serve in the future as an integral part of the

winter requirements for maintenance of caribou from Melville Island, at least when caribou are at high densities (Miller et al. 1977a, 1977b).

1.2. Muskoxen

Tener (1961, 1963) saw no muskoxen on Prince Patrick Island in July 1961. At that time, the last sighting of muskoxen on Prince Patrick had been by R. Thorsteinsson in 1958 (Tener 1961). The island was then surveyed four times between 1973-74 at 25% coverage (Miller et al. 1977a) and 95 muskoxen were seen on Prince Patrick in April 1973, 94 in July-August 1973, 105 in April 1974, and 81 in July 1974. The estimated number of muskoxen on Prince Patrick in July 1974 was 114 (Miller et al. 1977a). Thus, the 1986 estimate of 64 muskoxen suggests a 43.9% overall decrease in muskoxen summering on Prince Patrick. This change in number of muskoxen summering on Prince Patrick is most likely an underestimate as the 1986 estimate is likely high, due to the small, clumped sample of muskoxen being, by chance, mostly on transect during the aerial survey.

The total absence of muskox calves and the small number of muskoxen seen on Prince Patrick in July 1986 seemingly suggest that muskoxen there were environmentally stressed during the winter of 1985-86. As a result, the marked reduction in muskoxen summering on Prince Patrick in 1986 could be largely, if not solely, attributed to environmentally forced mass emigration from Prince Patrick, sometime prior to the aerial survey. Whether or not the number of muskoxen on Prince Patrick in July 1986 reflects a marked loss resulting from long- or short-term inbalance in mortality over reproduction or survival or is due, in part or solely, to emigration will remain unknown.

2. Eglinton Island

Most all of Eglinton Island, except the northern quarter ("the badlands") is seasonal or year round range for both Peary caribou and muskoxen. The numbers of Peary caribou or muskoxen, their specific site selection, or relative use of range on the island has varied within and between seasons and among years (Miller et al. 1977a, 1977b, and this study). Although Eglinton is limited by its size (1550 km^2), it should be considered an important supplemental seasonal range for both Peary caribou and muskoxen, most likely from Prince Patrick or Melville islands.

2.1. Peary caribou

The number of caribou summering on Eglinton remains well below (ca. 39%) the number estimated there in 1961 (Table 26). Numbers of caribou on Eglinton fluctuate both seasonally and among years but those numbers were always relatively low compared to those estimated for caribou on Prince Patrick in the same period,

especially summer (Tables 25, 26). The 1986 estimate of Peary caribou on Eglinton compared to the estimated number on Prince Patrick suggests that Eglinton was relatively important as a summering area in 1986, more so than when measured in past years (Tener 1963, Miller et al. 1977a). The known annual seasonal movements of Peary caribou among the islands of Melville, Prince Patrick, and Eglinton (Miller et al. 1977a, 1977b) prohibits any detailed evaluation of the apparent changes. However, it seems probable that proportionately more caribou moved off Prince Patrick prior to the aerial survey in 1986 and, at least some of them, summered on Eglinton. How many of those caribou from Prince Patrick may have travelled to and summered on Melville Island in 1986 will remain unknown. However, it has been documented that caribou summering on Melville Island in the 1970s included unknown proportions of caribou that had wintered on Prince Patrick (Miller et al. 1977a, 1977b). Currently, I think that the best measure of the actual overall change that has occurred in numbers of caribou on Prince Patrick and Eglinton islands from 1961 or 1974 can be obtained by combining the 1986 estimate from Eglinton with that from Prince Patrick and comparing them to those respective combined estimates from 1961.

2.2. Muskoxen

Tener (1963) saw no muskoxen on Eglinton in July 1961. From April 1972 to July 1974 six aerial surveys of Eglinton indicated that muskoxen were present in low numbers. In all six surveys the numbers of muskoxen actually seen (on and off transect) exceeded the numbers estimated on 1.6-km strip transects (Table 27). Even though the estimates from the 1970s for the numbers of muskoxen on Eglinton are all in error, the comparison of the number seen in July 1974 (50) to the maximum seen in July 1986 (128) suggests a major increase in the number of muskoxen summering on Eglinton. Whether or not this apparent increase is a result of annual high levels of reproduction and survival from 1975 to 1986 will never be clarified. However, I suggest that much or all of the apparent increase could most likely have resulted from movements onto the island in 1986 (or possibly earlier) rather than through continued, unlikely high levels of reproduction and survival from 1975 to 1986. The low numbers of muskoxen seen and estimated on Prince Patrick; the total absence of muskox calves on Prince Patrick; and the low survival of muskox calves on Eglinton all, seemingly, argue for a mass influx of environmentally stressed muskoxen from Prince Patrick to Eglinton, sometime prior to the aerial survey in July 1986. A possible, but I think unlikely, alternative explanation for the high number of muskoxen on Eglinton in 1986 could be as a result of continued recolonization from western Melville Island. However, any such successful long-term recolonization should also have been reflected in the number of muskoxen on Prince Patrick, and it was not. As for Peary caribou, I currently assume that the combined estimated numbers of muskoxen on Eglinton and Prince Patrick islands

in 1986 compared with those respective combined estimates from 1961 give the best measure of overall change over the past 25 years.

3. Emerald Isle

The value of Emerald Isle to Peary caribou or muskoxen seems quite limited on a sustained basis because of the island's small size (550 km^2). However, Emerald has provided supplemental summer range for caribou (Tener 1963, Miller et al. 1977a) and most likely could, at least sporadically, provide some winter relief range in years when forage unavailability forced animals off larger adjacent islands. The low numbers of caribou seen on Emerald since 1973 prohibits any evaluation of specific site selection or relative use of range on the island. The finding of a single muskox skull on Emerald in the late 1950s (Macpherson 1961) supports only the past presence of a muskox on Emerald, not that muskoxen necessarily successfully ranged there either seasonally or over a period of years.

3.1. Peary caribou

The number of caribou summering on Emerald has declined drastically from that of 25 years ago (Table 28). The 1986 estimate of caribou is only 8.7% as great as the caribou estimated on Emerald in summer 1961 (Table 28). Also, an estimate of caribou on Emerald in summer 1958 derived from an aerial survey (ca. 6% coverage), made by geologists, suggests that there possibly were almost three times as many caribou (450 vs. 161) on Emerald in 1958 as in 1961 (Macpherson 1961). This would suggest that the magnitude of the decline in the number of caribou summering on Emerald has been in excess of 96% over the past 28 years (1958 vs. 1986).

It is likely that Emerald Isle is mainly a summering island for caribou, most likely from Melville Island, based on 1973-74 aerial survey results (Miller et al. 1977a). Therefore, numbers of caribou summering on Emerald may reflect the status of caribou on Melville, exhibiting a direct relationship as numbers change on Melville. However, environmentally forced movements due to forage unavailability during the wintery period could also influence numbers of caribou summering on Emerald in any given year. Thus, this matter cannot be further evaluated until Melville Island is surveyed in 1987.

3.2. Muskoxen

The absence of or failure to find any muskoxen on Emerald Isle during the July 1986 aerial survey is in agreement with findings from earlier aerial surveys, as none were found there in 1958 (Macpherson 1961), 1961 (Tener 1963), 1973 and 1974 (Miller et al. 1977a). As with caribou, the occurrence of muskoxen on Emerald is probably seasonal and related to highs in their population on Melville Island, especially western Melville.

4. Species Summary Discussion

4.1. Peary caribou

The 1986 results indicate that the overall number of Peary caribou summering on Prince Patrick Island, Eglinton Island, and Emerald Isle has declined about 90% from 1961. The decline from 1961 is greatest on Prince Patrick (93.2%) and least on Eglinton (61.3%). Also, the 1986 estimate of caribou on Prince Patrick represents a major loss from the number estimated there in 1974; while the number estimated on Eglinton in 1986 represents a marked increase over the number estimated there in 1974. Thus, it now appears that the relatively better rate of survival of Peary caribou on Prince Patrick after the severe winter of 1973-74 (Miller et al. 1977a) was only a short-term favourable situation.

The density estimate of Peary caribou on Eglinton Island was 5.2 times greater than that for Prince Patrick Island and 1.9 times greater than that for Emerald Isle. However, the contribution to the overall number of caribou within the three-island survey area was 1.9 times greater for caribou from Prince Patrick than for caribou from Eglinton. Thus, southern Prince Patrick, especially the coastal areas of Stratum I (east of 121°W) and Stratum III must be considered the most important summer range for Peary caribou within the 1986 survey area. However, range on Eglinton could on occasion serve as an important alternative summering area for caribou.

Overall survival of Peary caribou calves was high (26.7% calves among all caribou seen) on the three-island survey area to early July 1986. Proportional representation of caribou calves was similar on all three islands, although proportions of calves varied among survey strata. Subsequent counts of calves to all caribou seen later in July 1986, during the aerial resurveys, suggest that considerable mortality of calves occurred over the few days between the aerial survey and the aerial resurveys. Reasons for the mortality of calves remains undiscerned.

It appears probable that there was an initial high overall caribou calf survival of about 89% to early July, then a marked mortality of calves of 31-39% during mid July 1986 (based on the data in Tables 4 and 16 and the assumption that maximal representation of calves to all caribou seen was 30%). No objective explanation can be offered for the apparent subsequent high loss of calves in mid July 1986. However, the loss does seem real as the proportional representations of calves declined markedly on both Prince Patrick (41% decline from about 91% to 54%) and Eglinton (27-36% decline from about 86% to 55-63%). Possibly, if whatever caused the lack of muskox calves within the survey area in 1986 was some form of environmental stress, it could have also influenced the physical condition of pregnant or parturient caribou and subsequently led to many deteriorated maternal cows not being able

to successfully rear their young. However, if the factor(s) involved was linked to initial reproductive failure or disease in muskoxen, it likely would not have contributed in any way to the mid July 1986 loss of caribou calves.

Seventy-seven (92.8%) of the 83 Peary caribou seen on survey during the aerial survey occurred in 21 groups of 2-12 individuals each (mean 3.7 $\pm$ 2.46 S.D.). Only the remaining six (7.2%) caribou occurred as solitary individuals. Twenty of the 21 groups contained eight or less caribou each, including calves. Calves occurred in 66.7% of all mixed sex/age groups and when present averaged 1.8 $\pm$ 0.96 S.D. calves in each group and ranged from 1-4. The largest group seen, 12 individuals, contained four calves; so, the greatest number of 1+ yr-olds in any one group was eight. Groups of five or less, including calves, constituted 90.5% of all groups seen. The most frequent group size was two (42.9%), but cow-calf pairs made up only 22.2% of those nine pairs. The most frequent group sizes with calves present were five (3+2) and three (2+1), three (14.3%) groups each. The same overall pattern of grouping pertained for the 49 observations of caribou obtained during aerial resurveys, with slight shifts toward larger groups; 52.6% of the caribou were in groups of 6-11.

4.2. Muskoxen

Although there were no muskoxen seen within the 1986 three-island survey area in summer 1961, there were 131 seen and 178 estimated in summer 1973 and 131 seen and only 130 estimated in summer 1974 (Miller *et al.* 1977a). The 1986 results from the aerial survey suggest an apparent 26.9% increase in the number of muskoxen summering within the survey area since 1974.

On an island basis it appears from the 1986 aerial survey results that muskoxen summering on Prince Patrick have declined by at least 44% since 1974; while on Eglinton they have increased by at least 6.3 times. It is likely, based on associated evidence, that the decline of muskoxen on Prince Patrick in 1986 is actually closer to 70% from 1974. But at the same time aerial resurvey results from Eglinton (maximum of 128 seen and 136 estimated) indicate that muskoxen have actually increased 8.5 times on that island over the 1974 estimate. This condition most likely reflects environmentally forced movements by muskoxen between Prince Patrick and Eglinton islands rather than within-island changes over time.

None of the three islands within the 1986 survey area likely ever have or will support high numbers of muskoxen on a sustained basis. I suggest that 200-300 muskoxen probably represents maximum feasible numbers within the Prince Patrick-Eglinton complex. However, temporary influxes of greater numbers could occur, when numbers of muskoxen on nearby Melville Island are peaking, especially when extremely high densities are reached on western Melville.

The few muskoxen seen in July 1986 on Prince Patrick Island all occurred on lowlands of major valleys that drain to the eastern and southern coasts. Those muskoxen were within the areas previously documented as muskox range on Prince Patrick (Tener 1963, Miller et al. 1977a). Seemingly, only those major valleys produce enough vegetation to sustain muskoxen year round on Prince Patrick. It is not likely that Prince Patrick Island would ever sustain a large population of muskoxen, because of the limited suitable range on the island. All documentation to date indicates that the occurrence of muskoxen in excess of 100 animals has been for only a relatively brief part of the past 33 years (MacDonald 1954, Macpherson 1961, Tener 1963, Miller et al. 1977a).

The relatively high number of muskoxen on Eglinton Island in summer 1986 probably is a temporary situation. If those muskoxen occurred there as a result of influx, they likely will move back to Prince Patrick or Melville islands in the near future. The value to muskoxen of year round range on Eglinton apparently is not great because of the island's relatively small landmass.

Overall early survival of muskox calves appeared extremely low (2.5% calves among all muskoxen seen) on the three-island survey area in early July 1986. Not a single muskox calf (live or dead) was seen on Prince Patrick or on Emerald and few were seen on Eglinton during the aerial survey. However it became apparent that the value derived from measures obtained during the aerial survey of Eglinton was excessively low, as a result of proportional under-representation of calves among the muskox herds then sampled. Larger samples of muskox herds obtained during aerial resurveys yielded better measures of the low proportion of muskox calves actually present on Eglinton in July 1986. Thus, 7% calves among all muskoxen seen is a better measure of early survival than the earlier lower value obtained for proportional representation of calves. Either few muskox calves were born within the survey area in 1986 or a major mortality of muskox calves took place before the aerial survey in July 1986. No objective explanation can be provided for the observed general lack or island-wide absence of muskox calves in July 1986. Environmental stress, reproductive failure, or disease are all possible factors that, singlarly or in combination, could have caused the observed condition.

That the survival of muskox calves was low in July 1986 is not in itself necessarily unexpected, although the cause(s) remains unknown. The complicating factor in this matter is, however, that production of caribou calves and their early survival were high on the same ranges where either production or early survival of muskox calves was low to nil or totally lacking in 1986.

Muskox herds averaged 4.3 $\pm$ 2.26 (S.D.) and ranged from 2-8 on Prince Patrick and Eglinton islands during the aerial survey. The average herd size then increased to a maximum of 5.0 $\pm$ 2.18 (S.D.) and ranged from 2-13 later in July during the aerial

resurveys. Both mean and maximum number of muskoxen per herd were considerably lower in summer 1986 than in summers 1973-74 on Prince Patrick and summers 1972-74 on Eglinton (Miller et al. 1977a). This condition seemingly adds further evidence for muskoxen on those islands being environmentally stressed, likely some time during the winter of 1985-86.

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Table 1

Estimates of numbers of Peary caribou on Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986, based on systematic aerial survey at about 27% overall coverage (1.714-km wide strip transects at 6.4-km intervals)

Survey area		Number of animals seen	Population estimates		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All caribou, including calves					
Prince Patrick	I	28	97.1	1742.3	11.8-182.3
	II	7	26.8	164.0	0.4- 53.2
	III	8	26.9	335.8	0.0- 69.2
Eglinton	IV	22	79.2	4006.3	0.0-228.9
Emerald	V	4	14.4	182.0	0.0- 49.1
1+ yr olds only, calves excluded					
Prince Patrick	I	18	62.4	639.0	10.8-114.0
	II	6	23.0	111.1	1.3- 44.7
	III	6	20.2	171.0	0.0- 50.3
Eglinton	IV	18	64.8	2512.8	0.0-183.4
Emerald	V	3	10.8	102.4	0.0- 36.8

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 2

Estimates of densities of Peary caribou on Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986, based on systematic aerial survey at about 27% overall coverage (1.714-km wide strip transects at 6.4-km intervals)

Survey area		Number of animals seen	Density/100 km^{-2}		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All caribou, including calves					
Prince Patrick	I	28	1.254	0.291	0.153- 2.355
	II	7	0.448	0.046	0.007- 0.889
	III	8	1.276	0.754	0.000- 3.278
Eglinton	IV	22	5.110	16.676	0.000-14.767
Emerald	V	4	2.625	6.017	0.000- 8.932
1+ yr olds only, calves excluded					
Prince Patrick	I	18	0.806	0.107	0.139- 1.473
	II	6	0.384	0.031	0.021- 0.747
	III	6	0.957	0.384	0.000- 2.386
Eglinton	IV	18	4.181	10.459	0.000-11.829
Emerald	V	3	1.969	3.385	0.000- 6.699

[a]When the low confidence limit is a negative value, it is reported as 0.000.

Table 3

A comparison of percentage distributions from the seacoast of all Peary caribou observed on survey during an aerial survey of Prince Patrick and Eglinton islands, NWT, July 1986

Survey area	Distances from the seacost (km)					Total caribou observed
	<2.5	2.5-5.0	5.1-10.0	10.1-15.0	>15.0	
Prince Patrick - % land area						
	18.8	15.2	24.3	18.4	23.3	
Prince Patrick - % caribou						
St. I	65.7	25.7		2.9	5.7	35
St. II	28.6	42.8	28.6			7
St. III		70.0	30.0			10
St. I-III	48.1	36.5	9.6	1.9	3.9	52
Eglinton - % land area						
	32.1	25.7	33.2	9.0		
Eglinton - % caribou						
St. IV	44.4	55.6				27

Table 4

Measures of early survival of Peary caribou calves on Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986, obtained from aerial survey

Survey area		On transect		On survey		On or off survey	
Island	Stratum	Number caribou seen	% calves	Number caribou seen	% calves	Number caribou seen	% calves
Aerial survey							
Prince Patrick	I	28	35.7	35	31.4	64	29.7
	II	7	14.3	7	14.3	7	14.3
	III	8	25.0	10	20.0	10	20.0
	I-III	43	30.2	52	26.9	81	27.2
Eglinton	IV	22	18.2	27	22.2	35	25.7
Emerald	V	4	25.0	4	25.0	4	25.0
All islands	I-V	69	26.1	83	25.3	120	26.7

Table 5

Observations of Peary caribou by type and size of grouping, Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986, obtained from aerial survey

Survey area		Type of	
Island	Stratum	grouping	Number of groups (by size of group)
Prince Patrick	I	singles	3
		bull-only	1(2)
		mixed sex/age	1(8), 1(5), 1(4), 3(3), 2(2)
	II	mixed sex/age	1(3), 2(2)
	III	singles	1
		bull-only	1(2)
		mixed sex/age	1(5), 1(2)
	I-III	singles	4
		bull-only	2(2)
		mixed sex/age	1(8), 2(5), 1(4), 4(3), 5(2)
Eglinton	IV	singles	2
		bull-only	1(4)
		mixed sex/age	1(12), 1(5), 2(2)
Emerald	V	mixed sex/age	1(4)

Table 6

Group statistics for Peary caribou on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial survey

Group types by island	Group statistics				
	N	Mean	± S.D.	Range	95% C.I.
Prince Patrick					
Bull-only groups	2	2.0	0.00	2-2	2.0 - 2.0
Mixed sex/age groups with calves	13	3.4	1.76	2-8	2.3 - 4.4
calves included	9	3.9	1.90	2-8	2.4 - 5.3
calves excluded	9	2.3	1.23	1-5	1.4 - 3.3
Mixed sex/age groups without calves	4	2.3	0.50	2-3	1.5 - 3.0
Eglinton					
Bull-only groups	1	4.0	0.00	4-4	4.0 - 4.0
Mixed sex/age groups with calves	4	5.3	4.72	2-12	0.0[a]-12.8
calves included	2	8.5	4.95	5-12	0.0 -53.0
calves excluded	2	5.5	3.54	3-8	0.0 -37.3
Mixed sex/age groups without calves	2	2.0	0.00	2-2	2.0 - 2.0

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 7

Estimates of numbers of muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, based on systematic aerial survey at about 27% overall coverage (1.714-km wide strip transects at 6.4-km intervals)

Survey area		Number of animals seen	Population estimates		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All muskoxen, including calves					
Prince Patrick	I	12	41.6	652.3	0.0- 93.8
	II	0			
	III	6	20.2	298.0	0.0- 60.0
Eglinton	IV	28	100.8	1587.6	6.6-195.0
1+ yr olds only, calves excluded[b]					
Eglinton	IV	26	93.6	1360.4	6.4-180.8

[a]When the low confidence limit is a negative value, it is reported as 0.0.

[b]Muskox calves were seen on Eglinton Island only.

Table 8

Estimates of densities of muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, based on systematic aerial survey at about 27% overall coverage (1.714-km wide strip transects at 6.4-km intervals)

Survey area		Number of animals seen	Density/100 km^{-2}		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All muskoxen, including calves					
Prince Patrick	I	12	0.538	0.109	0.000- 1.211
	II	0			
	III	6	0.957	0.669	0.000- 2.843
Eglinton	IV	28	6.503	6.608	0.424-12.583
1+ yr olds only, calves excluded[b]					
Eglinton	IV	26	6.039	5.662	0.411-11.666

[a]When the low confidence limit is a negative value, it is reported as 0.000.

[b]Muskox calves were seen on Eglinton Island only.

Table 9

A comparison of percentage distributions from the seacoast of all muskoxen observed on survey during an aerial survey of Prince Patrick and Eglinton islands, NWT, July 1986

Survey area	Distances from the seacoast (km)					Total muskoxen observed
	<2.5	2.5-5.0	5.1-10.0	10.1-15.0	>15.0	
Prince Patrick - % land area						
	18.8	15.2	24.3	18.4	23.3	
Prince Patrick - % muskoxen						
St. I	91.7		8.3			12
St. II						0
St. III			100.0			6
St. I-III	61.1		38.9			18
Eglinton - % land area						
	32.1	25.7	33.2	9.0		
Eglinton - % muskoxen						
St. IV	20.0	45.7	34.3			35

Table 10

Measures of early survival of muskox calves on Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986, obtained from aerial surveys

Survey area		On transect		On survey		On or off survey	
Island	Stratum	Number muskoxen seen	% calves	Number muskoxen seen	% calves	Number muskoxen seen	% calves
Prince Patrick	I-III	18	0.0	18	0.0	18	0.0
Eglinton	IV	28	7.1	35	5.7	47	4.3
Emerald	V	0					
All islands	I-V	46	4.3	53	3.8	79	2.5

Table 11

Observations of muskoxen by type and size of grouping, Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial survey

Survey area		Type of	
Island	Stratum	grouping	Number of herds (by size of herd)
Prince Patrick	I	singles	1
		bull-only	1(3)
		mixed sex/age	1(8)
	II	none	
	III	bull-only	1(4), 1(2)
	I-III	singles	1
		bull-only	1(4), 1(3), 1(2)
		mixed sex/age	1(8)
Eglinton	IV	singles	1
		bull-only	1(3), 3(2)
		mixed sex/age	2(7), 1(6), 1(5)

Table 12

Herd statistics for muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial survey

Herd types by island	Herd statistics				
	N	Mean	± S.D.	Range	95% C.I.
Prince Patrick					
Bull-only herds	3	3.0	1.00	2-4	0.5 - 5.5
Mixed sex/age herds without calves	1	8.0			
Eglinton					
Bull-only herds	4	2.3	0.50	2-3	1.5 - 3.0
Mixed sex/age herds with calves	4	6.3	0.96	5-7	4.7 - 7.8
calves included	2	7.0	0.00	7-7	7.0 - 7.0
calves excluded	2	6.0	0.00	6-6	6.0 - 6.0
Mixed sex/age herds without calves	2	5.5	0.71	5-6	0.0[a]-11.9

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 13

Estimates of numbers of Peary caribou on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys at various coverages (see App. 4)

Survey area		Number of animals seen	Population estimates		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All caribou, including calves					
Prince Patrick	I	40	74.1	376.6	33.9-114.2
	II	3	11.1	66.7	0.0- 29.6
	III	42	72.1	248.3	38.8-105.3
Eglinton (1st)	IV	50	90.6	702.1	34.4-146.7
(2nd)	IV	49	88.8	755.9	30.5-147.0
1+ yr olds only, calves excluded					
Prince Patrick	I	34	63.0	278.2	28.5- 97.5
	II	3	11.1	66.7	0.0- 29.6
	III	36	61.8	199.4	32.0- 91.6
Eglinton (1st)	IV	41	74.3	530.9	25.4-123.1
(2nd)	IV	39	70.6	671.4	15.7-125.6

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 14

Estimates of densities of Peary caribou on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys at various coverages (see App. 4)

Survey area		Number of animals seen	Density/100 km^{-2}		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All caribou, including calves					
Prince Patrick	I	40	2.838	0.553	1.300-4.376
	II	3	0.711	0.273	0.000-1.894
	III	42	3.417	0.558	1.841-4.993
Eglinton (1st)	IV	50	5.843	2.922	2.219-9.467
(2nd)	IV	49	5.726	3.146	1.966-9.486
1+ yr olds only, calves excluded					
Prince Patrick	I	34	2.412	0.408	1.090-3.734
	II	3	0.711	0.273	0.000-1.894
	III	36	2.929	0.448	1.517-4.341
Eglinton (1st)	IV	41	4.791	2.210	1.640-7.943
(2nd)	IV	39	4.557	2.795	1.013-8.101

[a]When the low confidence limit is a negative value, it is reported as 0.000.

Table 15

A comparison of percentage distributions from the seacoast of all Peary caribou observed on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Survey area	Distances from the seacoast (km)					Total caribou observed
	<2.5	2.5-5.0	5.1-10.0	10.1-15.0	>15.0	
Prince Patrick - % land area						
	18.8	15.2	24.3	18.4	23.3	
Prince Patrick - % caribou						
St. I	14.0	27.9	58.1			43
St. II		83.3		16.7		12
St. III			72.0	22.0	6.0	50
St. I-III	5.6	23.1	56.5	12.0	2.8	105
Eglinton - % land area						
	32.1	25.7	33.2	9.0		
Eglinton - % caribou						
St. IV (1st)	6.5	23.0	18.0	52.5		61
St. IV (2nd)			34.0	66.0		53

Table 16

Measures of early survival of Peary caribou calves on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Survey area		On transect		On survey		On or off survey	
Island	Stratum	Number caribou seen	% calves	Number caribou seen	% calves	Number caribou seen	% calves
Prince Patrick	I	40	15.0	43	14.0	43	14.0
	II	3	0.0	12	25.0	12	25.0
	III	42	14.3	50	16.0	50	16.0
	I-III	85	14.1	105	16.2	105	16.2
Eglinton (1st)	IV	50	14.0	61	16.4	61	16.4
Eglinton (2nd)	IV	49	20.4	53	18.9	53	18.9
1-(1st)	IV	135	14.1	166	16.3	166	16.3
1-(2nd)	IV	134	16.4	158	18.4	158	18.4

Table 17

Observations of Peary caribou by type and size of grouping, Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Survey area		Type of	
Island	Stratum	grouping	Number of groups (by size of group)
Prince Patrick	I	singles	3
		bull-only	3(2)
		mixed sex/age	2(11), 2(5), 1(2)
	II	bull-only	1(3)
		mixed sex/age	1(7), 1(2)
	III	singles	4
		bull-only	1(9), 1(5), 1(2)
		mixed sex/age	1(7), 1(6), 1(5), 2(3), 3(2)
	I-III	singles	7
		bull-only	1(9), 1(5), 1(3), 4(2)
		mixed sex/age	2(11), 2(7), 1(6), 3(5), 2(3), 5(2)
Eglinton (1st)	IV	bull-only	1(4), 1(2)
		mixed sex/age	1(11), 1(9), 1(8), 2(7), 2(5), 1(3)
Eglinton (2nd)	IV	singles	1
		bull-only	1(6), 1(3)
		mixed sex/age	3(8), 1(6), 1(5), 2(4)

Table 18

Group statistics for Peary caribou on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Group types by island	Group statistics N	Mean	± S.D.	Range	95% C.I.
Prince Patrick (partial resurvey)					
Bull-only groups	7	3.6	2.64	2-9	1.1 - 6.0
Mixed sex/age groups with calves	15	4.9	3.09	2-11	3.2 - 6.6
calves included	13	5.3	3.09	2-11	3.4 - 7.2
calves excluded	13	4.0	2.89	1-10	2.3 - 5.7
Mixed sex/age groups without calves	2	2.0	0.00	2-2	2.0 - 2.0
Eglinton (1st complete resurvey)					
Bull-only groups	2	3.0	1.41	2-4	0.0[a]-15.7
Mixed sex/age groups with calves	8	6.9	2.53	3-11	4.8 - 9.0
calves included	6	6.8	2.71	3-11	4.0 - 9.7
calves excluded	6	4.8	1.94	2-8	2.8 - 6.9
Mixed sex/age groups without calves	2	7.0	2.83	5-9	0.0 -32.4
Eglinton (2nd complete resurvey)					
Bull-only groups	2	4.5	2.12	3-6	0.0 -23.6
Mixed sex/age groups with calves	7	6.1	1.86	3-6	4.4 - 7.9
calves included	5	6.0	2.00	4-8	3.5 - 8.5
calves excluded	5	3.6	1.52	2-5	1.7 - 5.5
Mixed sex/age groups without calves	2	6.5	2.12	5-8	0.0 -25.6

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 19

Estimates of numbers of muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys at various coverages (see App. 4)

Survey area		Number of animals seen	Population estimates		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All muskoxen, including calves					
Prince Patrick	I	6	11.1	64.9	0.0- 27.8
	II	0			
	III	4	6.9	21.4	0.0- 16.6
Eglinton (1st)	IV	75	135.9	995.0	69.0-202.7
(2nd)	IV	64	115.9	1205.8	42.3-189.5
1+ yr olds only, calves excluded[b]					
Eglinton (1st)	IV	70	126.8	880.3	63.9-189.7
(2nd)	IV	59	106.9	952.6	41.4-172.3

[a]When the low confidence limit is a negative value, it is reported as 0.0.
[b]Muskox calves were seen on Eglinton Island only.

Table 20

Estimates of densities of muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys at various coverages (see App. 4)

Survey area		Number of animals seen	Density/100 km^{-2}		
Island	Stratum	on transects	Estimate	Variance	95% C.I.[a]
All muskoxen, including calves					
Prince Patrick	I	6	0.426	0.095	0.000-1.064
	II	0			
	III	4	0.325	0.048	0.000-0.789
Eglinton (1st)	IV	75	8.764	4.142	4.450-13.079
(2nd)	IV	64	7.479	5.019	2.729-12.228
1+ yr olds only, calves excluded[b]					
Eglinton (1st)	IV	70	8.180	3.664	4.122-12.238
(2nd)	IV	59	6.895	3.965	2.673-11.116

[a]When the low confidence limit is a negative value, it is reported as 0.000.
[b]Muskox calves were seen on Eglinton Island only.

Table 21

A comparison of percentage distributions from the seacoast of all muskoxen observed on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Survey area	Distances from the seacoast (km)					Total caribou observed
	<2.5	2.5-5.0	5.1-10.0	10.1-15.0	>15.0	
Prince Patrick - % land area						
	18.8	15.2	24.3	18.4	23.3	
Prince Patrick - % muskoxen						
St. I	100.0					13
St. II	100.0					3
St. III	33.3	66.7				6
St. I-III	81.8	18.2				22
Eglinton - % land area						
	32.1	25.7	33.2	9.0		
Eglinton - % muskoxen						
St. IV (1st)	22.4	40.5	32.8	4.3		116
St. IV (2nd)	11.0	45.3	32.0	11.7		128

Table 22

Measures of early survival of muskox calves on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Survey area		On transect		On survey		On or off survey	
Island	Stratum	Number muskoxen seen	% calves	Number muskoxen seen	% calves	Number muskoxen seen	% calves
Prince Patrick	I-III	19	0.0	19	0.0	19	0.0
Eglinton (1st)	IV	75	6.7	116	6.0	116	6.0
Eglinton (2nd)	IV	64	7.8	128	8.6	128	8.6
1-(1st)	IV	85	5.9	135	5.2	135	5.2
1-(2nd)	IV	74	6.8	147	7.5	147	7.5

Table 23

Observations of muskoxen by type and size of grouping, Prince Patrick and Eglinton islands, NWT, July 1986, obtained from partial aerial resurveys

Survey area		Type of grouping	Number of herds (by size of herd)
Island	Stratum		
Prince Patrick	I	mixed sex/age	1(7), 1(6)
	II	none	
	III	bull-only	1(4), 1(2)
	I-III	bull-only	1(4), 1(2)
		mixed sex/age	1(7), 1(6)
Eglinton (1st)	IV	singles	3
		bull-only	1(5), 1(4), 1(3), 3(2)
		mixed sex/age	1(11), 2(8), 2(7), 4(6), 3(5), 3(4), 1(3)
Eglinton (2nd)	IV	singles	2
		bull-only	1(6), 1(5), 3(3), 4(2)
		mixed sex/age	1(13), 1(9), 3(8), 2(7), 3(5), 5(4), 1(3)

Table 24

Herd statistics for muskoxen on Prince Patrick and Eglinton islands, NWT, July 1986, obtained from aerial resurveys

Herd types by island	Herd statistics N	Mean	± S.D.	Range	95% C.I.
Prince Patrick (partial resurvey)					
Bull-only herds	2	3.0	1.41	2-4	0.0[a]-15.7
Mixed sex/age herds without calves	3	5.3	2.08	3-7	0.2 -10.5
Eglinton (1st complete resurvey)					
Bull-only herds	6	3.0	1.27	2-5	1.7 - 4.3
Mixed sex/age herds with calves	16	5.9	1.98	3-11	4.9 - 7.0
calves included	5	7.6	2.07	6-11	5.0 -10.2
calves excluded	5	6.2	1.92	4-9	3.8 - 8.6
Mixed sex/age herds without calves	11	5.2	1.47	3-8	4.2 - 6.2
Eglinton (2nd complete resurvey)					
Bull-only herds	9	3.1	1.45	2-6	2.0 - 4.2
Mixed sex/age herds with calves	16	6.1	2.63	3-13	4.7 - 7.5
calves included	7	7.9	2.73	5-13	5.3 -10.4
calves excluded	7	6.3	2.56	3-11	3.9 - 8.7
Mixed sex/age herds without calves	9	4.8	1.64	3-8	3.5 - 6.0

[a]When the low confidence limit is a negative value, it is reported as 0.0.

Table 25

Estimated numbers, densities, and percentage change from 1961 of Peary caribou on Prince Patrick Island, NWT, 1961-1986

Survey date	% survey coverage	Caribou		
		Estimated number	Estimated density[a] (100 km^{-2})	% change from 1961
Jul. 1961[b]	4.2	2254	14.2	
Apr. 1973[c]	25.0	1381	8.7	-38.7
Jul. 1973[d]	25.0	807	5.1	-64.2
Apr. 1974	25.0	1049	6.6	-53.5
Jul. 1974	25.0	621	3.9	-72.5
Jul. 1986[e]	27.9	154	1.0	-93.2

[a]Based on estimated caribou divided by 15 830 km^2 and multiplied by 100.
[b]From Tener (1963).
[c]1973-74 from Miller et al. (1977a).
[d]Survey began in July and ended in August 1973.
[e]This study.

Table 26

Estimated numbers, densities, and percentage change from 1961 of Peary caribou on Eglinton Island, NWT, 1961-1986

Survey date	% survey coverage	Caribou		
		Estimated number	Estimated density[a] (100 km^{-2})	% change from 1961
Jul. 1961[b]	6.4	204	14.3	
Apr. 1972[c]	25.0	574	37.0	+181.4
Aug. 1972	25.0	83	5.3	-59.3
Apr. 1973	44.0	90	5.8	-55.9
Aug. 1973	50.0	12	0.8	-94.1
Apr. 1974	50.0	301	19.4	+47.5
Jul. 1974	50.0	18	1.2	-91.2
Jul. 1986[d]	27.8	79	5.1	-61.3
Jul. 1986[d]	55.2	91	5.8	-55.4
Jul. 1986[d]	55.2	89	5.7	-56.4

[a]Based on estimated caribou divided by 1550 km^2 and multiplied by 100.
[b]From Tener (1963).
[c]1972-74 from Miller *et al.* (1977a).
[d]This study: aerial survey, 1st aerial resurvey, and 2nd aerial resurvey.

Table 27

Numbers of muskoxen seen and estimated along with the associated minimal error of those estimates obtained from aerial surveys, Eglinton Island, NWT, 1972-1986

Survey date	% survey coverage	Total muskoxen seen	Estimated number muskoxen	% minimal error associated with estimate[b]
Apr. 1972[a]	25.0	24	12	-52.0
Aug. 1972	44.0	20	4	-80.0
Apr. 1973	50.0	45	22	-51.1
Aug. 1973	50.0	37	26	-29.7
Apr. 1974	50.0	51	44	-13.7
Jul. 1974	50.0	50	16	-68.0
Jul. 1986[c]	27.8	47	101	
Jul. 1986[c]	55.2	116	136	
Jul. 1986[c]	55.2	128	116	-9.4

[a]1972-74 from Miller et al. (1977a).
[b]This evaluation ignores any measure of variation associated with the estimate and simply compares the estimted number to the actual number seen.
[c]This study: aerial survey, plus two aerial resurveys.

Table 28

Estimated numbers, densities, and percentage change from 1961 of Peary caribou on Emerald Isle, NWT, 1961-1986

Survey date	% survey coverage	Caribou		
		Estimated number	Estimated density[a] (100 km^{-2})	% change from 1961
Jul. 1961[b]	7.8	161	29.3	
Apr. 1973[c]	25.0	0	0.0	-100.0
Jul. 1973	25.0	39	7.0	-75.8
Apr. 1974	25.0	12	2.2	-92.5
Jul. 1974[d]	-	20	3.6	-87.6
Jul. 1986[e]	27.7	14	2.6	-91.3

[a]Based on estimated caribou divided by 550 km^2 and multiplied by 100.
[b]From Tener (1963).
[c]1973-74 from Miller et al. (1977a).
[d]Extrapolated from winter 1974 observations and calculated overall decrease (1973-74) on islands surveyed in summer 1974 (Miller et al. 1977a).
[e]This study.

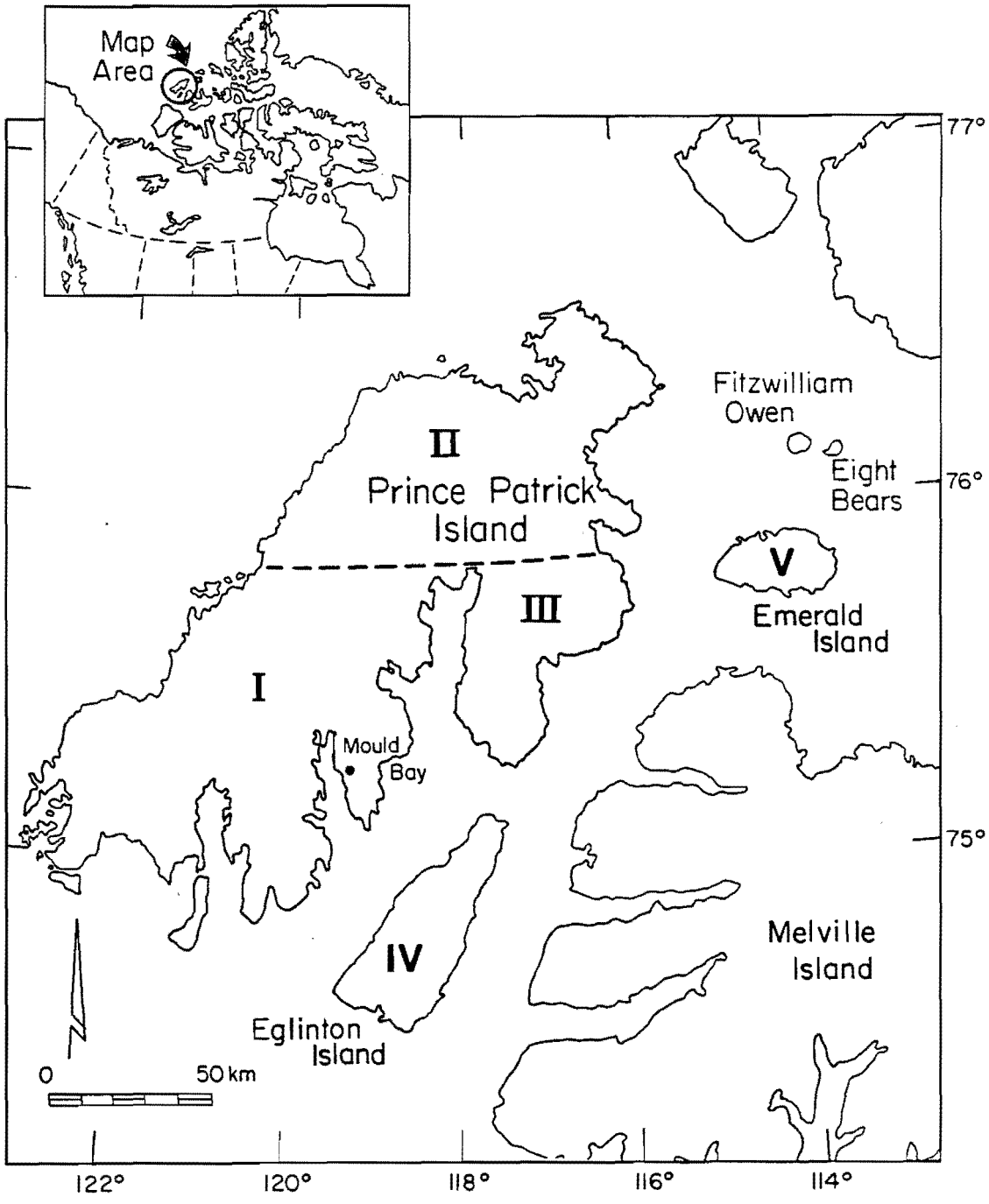

Figure 1. Locations of the five survey strata used in July 1986 aerial survey of three High Arctic Islands, NWT.

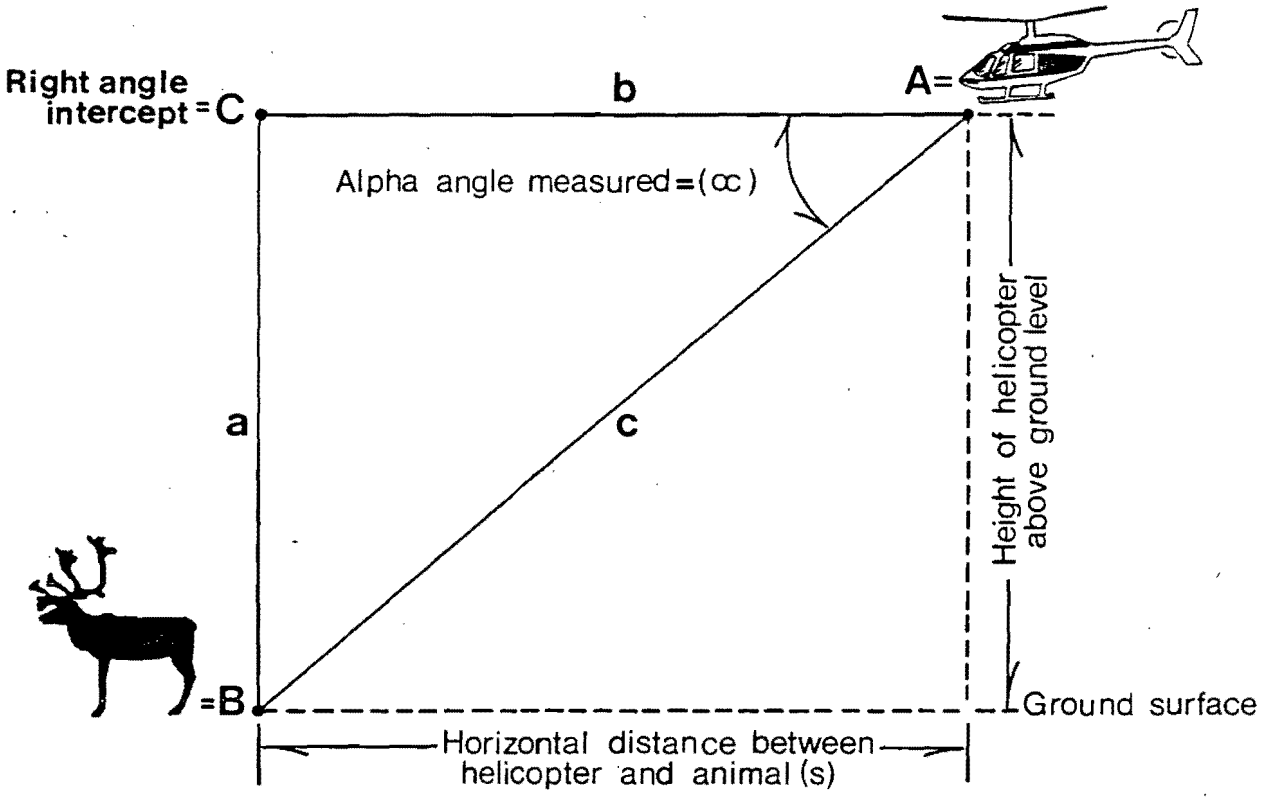

Figure 2. Schema of angle measured with hand held clinometer for calculation of horizontal right angle distance to animal(s) sighted along line transects.

Appendix 1

Locations of survey line transects used during aerial survey and aerial resurveys of Prince Patrick Island, NWT, July 1986, distances given as west (left) or east (right) of the baseline at 118°00'W

Transect number[a]	Distance of transect from baseline by stratum (km)		
	I	II	III
1	(baseline) 0.0	east 57.2	(baseline) 0.0
2	west 6.4	50.8	east 6.4
3	12.7	44.4	12.7
4	19.0	63.5	19.0
5	19.0	57.2	25.4
6	25.4	50.8	31.8
7	31.8	44.4	38.1
8	38.1	44.4	44.4
9	44.4	38.1	50.8
10	44.4	31.8	east 3.2
11	50.8	31.8	9.5
12	57.2	25.4	15.9
13	63.5	25.4	22.2
14	69.8	19.0	28.6
15	76.2	12.7	34.9
16	76.2	6.4	41.3
17	82.6	(baseline) 0.0	47.3
18	west 82.6	west 6.4	east 54.0
19	88.9	12.7	
20	88.9	19.0	
21	95.2	25.4	
22	101.6	31.8	
23	108.0	38.1	
24	114.3	44.4	
25	114.3	50.8	
26	120.6	57.2	
27	127.0		
28	127.0		
29	133.4		
30	133.4		
31	133.4		
32	133.4		
33	east 3.2		
34	west 3.2		
35	9.5		
36	9.5		
37	15.9		
38	west 22.2		
39	22.2		
40	28.6		
41	34.9		
42	41.3		
43	47.6		
44	54.0		

[a]On Stratum I survey transects no. 1-32 were flown during the 11-13 July aerial survey and transects no. 1-12 and 33-44 during the subsequent aerial resurvey, 18, 20-21 July; on Stratum II survey transects no. 1-26 were flown during the 5-7 July aerial survey and transects no. 1-9 and 11 during the subsequent aerial resurvey, 28 July; and on Stratum III transects no. 1-9 were flown during the 8 July aerial survey and transects no. 1-18 during the subsequent aerial resurvey, 17-18 July 1986.

Appendix 2

Location of survey line transects used during aerial survey and aerial resurveys of Eglinton Island and Emerald Isle, NWT, July 1986, distances given as west (left) or east (right) of the baseline at 119°00'W and 115°00'W, respectively

Transect number[a]	Distance of transect from baseline by stratum (km)	
	Eglinton Island Stratum IV	Emerald Isle Stratum V
1	west 6.4	east 6.4
2	(baseline) 0.0	12.7
3	east 6.4	19.0
4	12.7	25.4
5	19.0	31.8
6	25.4	38.1
7	31.8	
8	38.1	
9	west 9.5	
10	3.2	
11	east 3.2	
12	9.5	
13	15.9	
14	22.2	
15	28.6	
16	east 34.9	
17	41.3	

[a]On Eglinton Island (Stratum IV) transects no. 1-8 were flown during the 4 July aerial survey and transects no. 1-17 during the subsequent resurveys on 27 and 29 July 1986; and on Emerald Isle (Stratum V) transects no. 1-6 were flown during the 5 July 1986 aerial survey (Emerald Isle was not resurveyed in 1986).

Appendix 3

Basic statistics for aerial survey and aerial resurveys of Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986

Survey area Island	Stratum	Dates surveyed July 1986	Total length of transects (km)
Aerial survey			
Prince Patrick	I	11-13	1302.546
	II	5-7	911.245
	III	8	365.920
Eglinton	IV	4	251.206
Emerald	V	5	88.899
Aerial resurveys			
Prince Patrick	subsample - I	18, 20-21	822.323
	part A - I		431.006
	part B - I		391.317
	subsample - II	28	246.062
	total - III	17-18	717.170
	part A - III		365.920
	part B - III		351.250
Eglinton	(1st) IV	27	499.269
	part A - IV		251.206
	part B - IV		248.063
Eglinton	(2nd) IV	29	499.269
	part A - IV		251.206
	part B - IV		248.063

Appendix 4

Basic statistics for obtaining estimates of Peary caribou and muskoxen from a systematic aerial survey and aerial resurveys of Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986

Survey area by island and stratum	% coverage	Total transects possible	Number of transects surveyed	Area surveyed (km^2)
Aerial survey				
Prince Patrick				
I	28.8	118	32	2232.564
II	26.1	96	26	1561.874
III	29.7	33	9	627.187
Eglinton				
IV	27.8	29	8	430.567
Emerald				
V	27.7	22	6	152.373
Aerial resurveys				
Prince Patrick				
I - subsample	54.0	44	24	1409.462
I - part A	28.3	44	12	738.745
I - part B	25.7	44	12	670.717
II - subsample	27.0	37	10	421.750
III - total	58.3	33	18	1229.229
III - part A	29.7	33	9	627.187
III - part B	28.6	33	9	602.042
Eglinton (1st)				
IV	55.2	31	17	855.747
IV - part A	27.8	31	8	430.567
IV - part B	27.4	31	9	425.180
Eglinton (2nd)				
IV	55.2	31	17	855.747
IV - part A	27.8	31	8	430.567
IV - part B	27.4	31	9	425.180

Appendix 5

Peary caribou seen on or off survey during an aerial survey and aerial resurveys of Prince Patrick Island, Eglinton Island, and Emerald Isle, NWT, July 1986

On or off survey by island and stratum	Caribou seen			Total 1+ yr-old caribou	Total all caribou
	Bulls	Calves	Others[a]		
On survey					
Prince Patrick - survey					
I	4	11	20	24	35
II		1	6	6	7
III	4	2	4	8	10
I-III	8	14	30	38	52
Eglinton - survey					
IV	5	6	16	21	27
Emerald - survey					
V		1	3	3	4
On resurveys					
Prince Patrick - resurvey					
I - subsample	11	6	26	37	43
II - subsample	4	3	5	9	12
III - total	21	8	21	42	50
I-III (partial)	36	17	52	88	105
Eglinton - resurvey					
IV - 1st	16	10	35	51	61
IV - 2nd	11	12	30	41	53
Off survey					
Prince Patrick					
I	8	8	13	21	29
Eglinton					
IV		3	5	5	8

[a]Includes all females 1+ years old and young males (antler growth not great enough to distinguish them as bulls).

Appendix 6

Muskoxen seen on or off survey during an aerial survey and aerial resurveys of Prince Patrick and Eglinton islands, NWT, July 1986

On or off survey by island and stratum	Muskoxen seen			Total 1+ yr-old muskoxen	Total all muskoxen
	Bulls	Calves	Others[a]		
On survey					
Prince Patrick - survey					
I	5		7	12	12
II					
III	6			6	6
I-III	11		7	18	18
Eglinton - survey					
IV	16	2	17	33	35
On resurveys					
Prince Patrick - resurvey					
I - subsample	5		8	13	13
II - subsample	1		2	3	3
III - total	6		6	6	6
I-III (partial)	12		16	22	22
Eglinton - resurvey					
IV - 1st	45	7	64	109	116
IV - 2nd	56	11	61	117	128
Off survey					
Prince Patrick					
I	9		5	14	14
Eglinton					
IV	3		9	12	12

[a]No muskoxen were seen on Emerald Isle (Stratum V) in July 1986.