



ESTIMATING PEARY CARIBOU (*Rangifer tarandus pearyi*) AND MUSKOX
(*Ovibos moschatus*) NUMBERS, COMPOSITION AND DISTRIBUTION ON
ELLESMERE ISLAND, NUNAVUT

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As part of a multi-year research program, Ellesmere Island, Nunavut, was surveyed using both aerial and ground survey methods. Aerial data, collected using standard distance sampling methods, was analyzed using program Distance 5.0 to provide density estimates for both Peary caribou and muskox. Ground survey data was assembled in a Geographical Information System (GIS) and mapped. All results are being finalized and will be detailed in a comprehensive report (Government of Nunavut File Report) that will be updated after the 2007 research program.

1.0 Introduction

The committee on the Status of Endangered Wildlife in Canada (COSEWIC) in their Assessment Summary of May 2004, assessed the entire *pearyi* subspecies of caribou as Endangered: that is, it is facing imminent extinction. This caribou is a Canadian endemic subspecies and numbers have declined by about 72% over the last three generations, mostly because of catastrophic die off related to severe icing episodes (COSEWIC 2004). Voluntary restrictions on hunting by local people have occurred and efforts to conserve Peary caribou by local Hunting and Trapping Organizations (HTO) are well documented. Nonetheless, the overall decline of Peary caribou across its entire range is profound and further management and conservation efforts are necessary to ensure the recovery of Peary caribou and the re-establishment of populations capable of sustaining the harvest needs of local people.

The Government of Nunavut has undertaken a long-term research project to survey and estimate Peary caribou and also muskoxen across their range. Since 2001 the Department of Environment (DoE) and HTO's from Resolute Bay and Grise Fiord have completed joint ground/aerial surveys on the Bathurst Island Group, Cornwallis Island, western Devon, Prince of Wales, Somerset, and in 2005-06 the entire non-glaciated area of Ellesmere and Graham Islands. In 2007, aerial survey techniques will be used to record wildlife numbers and their locations on Axel Heiberg Island, the Ringnes islands and their smaller satellite islands: these island have not been surveyed since 1961.

Concurrently, collaborative research projects have been undertaken to understand the spatial patterns of these ungulates and their relationship with habitat features (see Maher 2005). Inuit Traditional Knowledge has been documented to capture information at a large temporal and spatial scale that will help direct research needs and assist in the interpretation of research results (Taylor 2005).

2.0 Project Objectives

This multi-year project has both short and long-term objective that will facilitate ecological recovery and biological sustainability but also economic, social, and cultural sustainability, given the profound relationship between Inuit and wildlife.

- A. Complete a ground-aerial survey to estimate population sizes, recruitment and distributions of Peary caribou and muskoxen on Ellesmere Island April-May 2005 and 2006.
- B. Continue preparation of a file report about Peary caribou and muskox population data from the QEI, based on studies conducted during 2001-06.
- C. Assess seasonal habitat use, habitat fidelity and inter-island movements, and delineate populations of Peary caribou and muskoxen, using satellite telemetry data collected on Bathurst, Devon and Cornwallis Islands (2003-2006).
- D. Build on a resource selection model which will involve the identification, classification and mapping of foraging habitats used by Peary caribou on the high arctic islands, and estimate the proportion of these islands with snow cover suitable for foraging and its inter-annual variability (using historical imagery) during 2003-06.
- E. Continue the collection, compilation and analysis of historical and recent IQ about Peary caribou and muskoxen on the High Arctic islands, particularly during 2003-06.
- G. Develop a model of the population dynamics of high arctic Islands Peary caribou populations for use in population risk assessment, harvesting regimes, and potential impact of winter habitat loss or deterioration due to climate change or human development.
- H. Continue Management Plan development for both Peary Caribou and muskox with the HTOs of Grise Fiord and Resolute Bay; submit Management Plans to the NWMB for approval, and utilize the Plans as part of a Recovery Strategy to ensure the long-term survival of Peary caribou in the Canadian High Arctic.

3.0 Materials and Methods

This study used line transects (distance) methodology to estimate the population density of Peary caribou and muskoxen on Ellesmere Island. Data collection required a stratified transect design with a random starting located. Lines were positioned approximately 5 km apart and ran east west across the study area (Figure 1). Transects cover the entire land base with the exception of extensive ice fields or glaciers. Transects were flown using a Bell 206L helicopter at

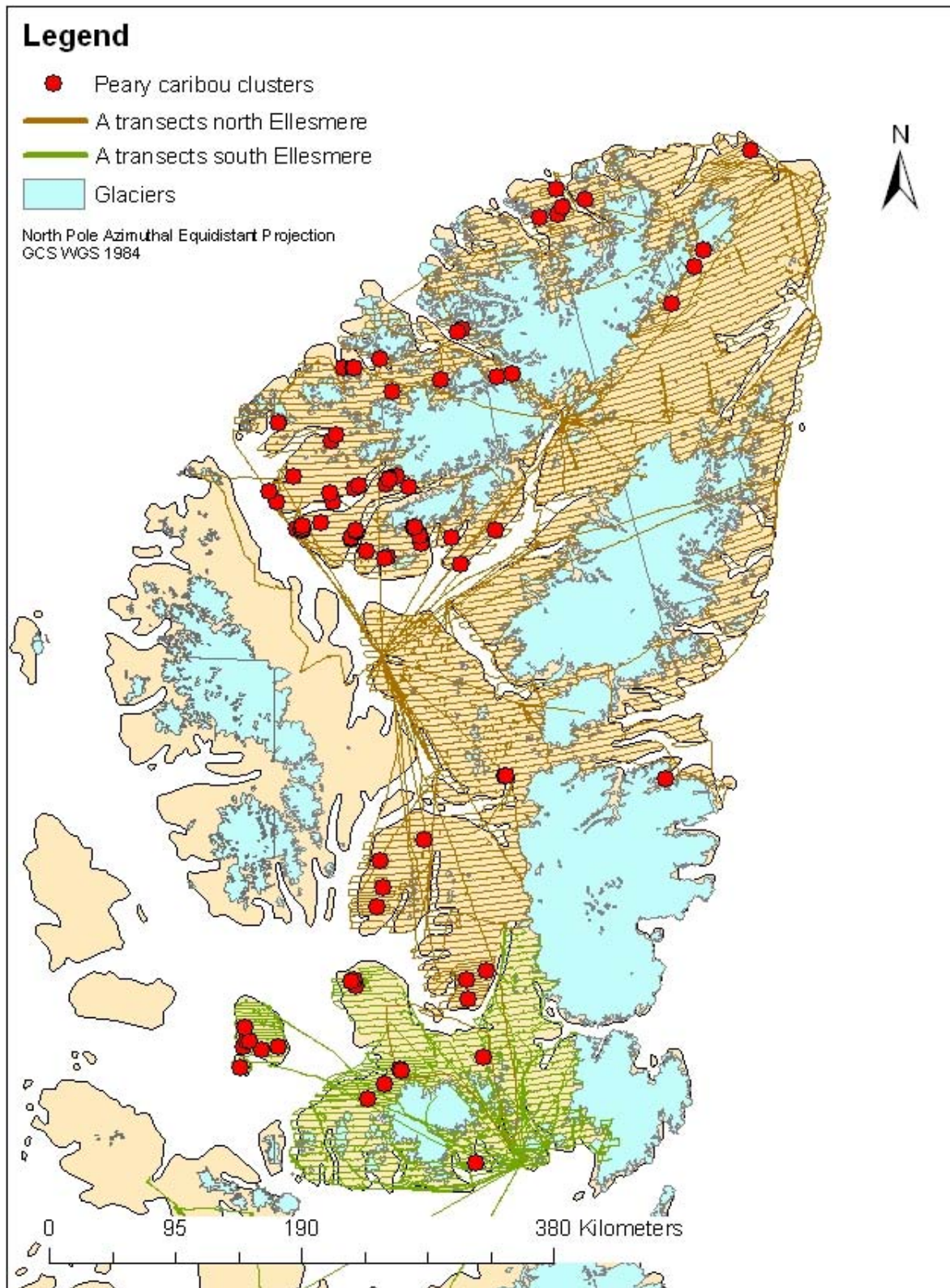


Figure 1: Aerial transects with observed clusters of Peary caribou.

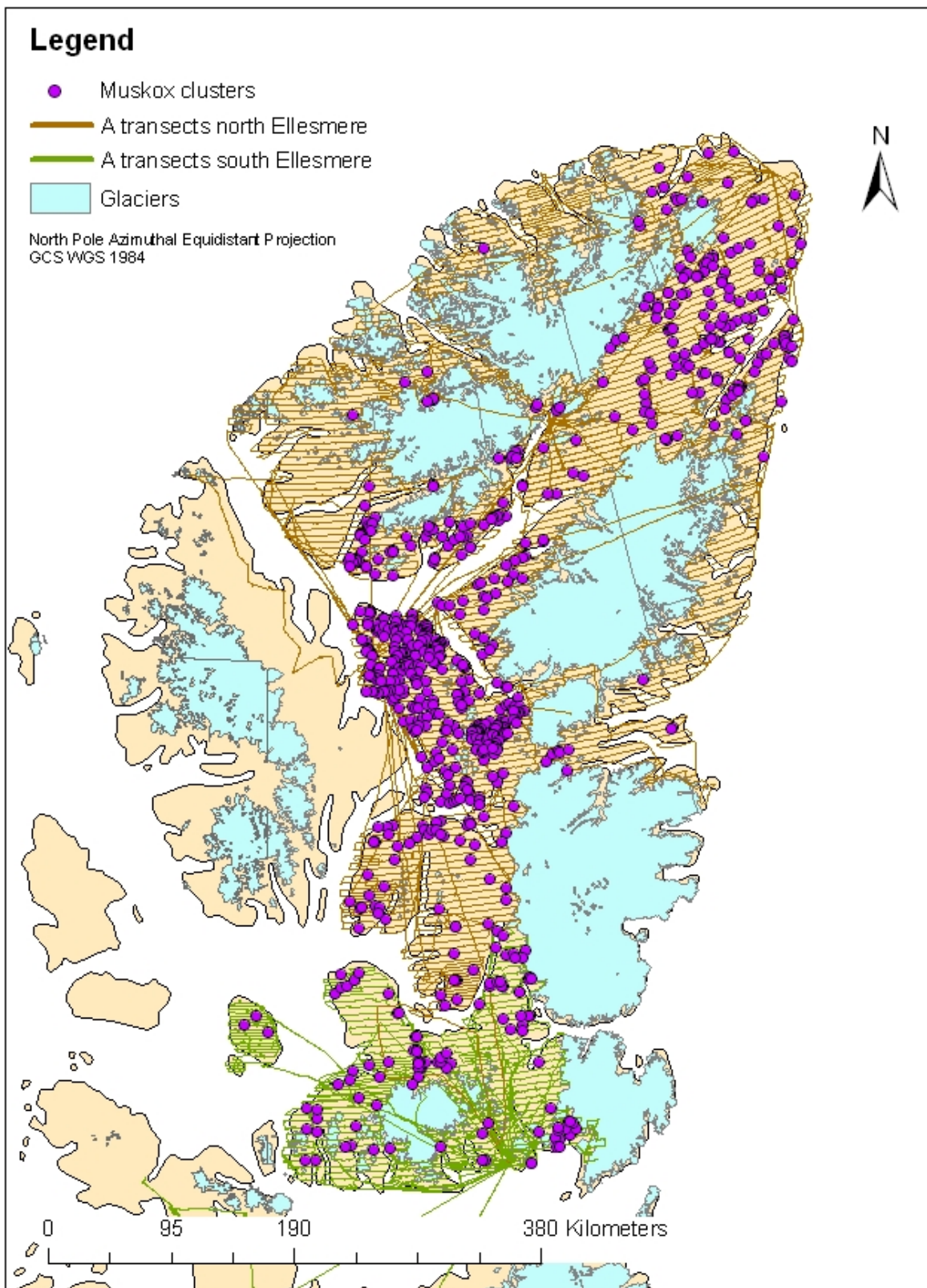


Figure 2: Muskox clusters observed on Ellesmere Island (2005-06).

approximately 50 -100 meters above ground level to detect animals. To maximize accurate detection, air speed ranged from 50-140 km/h depending on patchiness of snow cover, topography and evidence of wildlife. Upon detection all individuals and groups (clusters) were approach to record location, and identify sex, age, and group size. The perpendicular distance from the animal cluster to the transect was determined using GPS and then a Geographical Information System (GIS). Program Distance 5.0 (Thomas et al. 2005) was used to model the detection function and estimate the density of Peary caribou and muskoxen. The detection function models (key function/series expansion) recommended by Buckland et al. (2001) were used to analyze the data and the most parsimonious model was selected using Akaike's Information Criterion (AIC).

Concurrently, ground surveys using snowmobiles, were carried out by the Grise Fiord HTO. Using hand-held GPS units, travel routes and locations of caribou, muskox, and sign (i.e. feeding craters, tracks) were recorded. The data were mapped and analyzed in a Geographical Information System.

4.0 Results

The survey of Ellesmere Peary caribou and muskox was successfully completed June 1, 2006. Approximately 25,000 km was flown along pre-determined Type A transect lines (Figure 1). Observations of Peary caribou yielded approximately 97 adult males, 229 adult females, 31 young males, 31 yearlings, and 23 unclassified adults for a total of 410 animals. Over the same period, 5080 adult muskox with approximately 168 young bulls and yearlings, and 921 calves were observed across Ellesmere. Animal clusters are illustrated on Figures 1 and 2.

In general, caribou were not observed in areas of high muskox density nor were muskox generally found in areas of high caribou density. Of note was the extremely poor condition of all age classes of muskox in May 2005. Animals in too poor a condition to stand or run were observed frequently and over 40 emaciated recently dead carcasses were observed throughout the survey area. Reports of poor muskox conditions were also described by the hunters of Grise Fiord over that same period.

The distance of animal clusters from the transect and group size were used in Program Distance 5.0 (Thomas et al. 2005) to model the detection function and estimate the density of Peary caribou and muskox for Ellesmere in 2005 and 2006. The results are currently being finalized and documented in a report that summarizes the entire multi-year project.

In general, findings from the ground survey supported observations from the aerial survey program. Ground survey efforts although constrained by

topography and relief enhance local participation and allow sample collection for genetic research.

5.0 Discussions

Population estimates of Peary caribou and muskoxen for all non-glaciated portions of Ellesmere Island will be provided. Previous estimates are limited temporally and are constrained in their spatial coverage (Case and Ellsworth 1989, Gauthier 1996). The distribution of caribou and muskoxen raise questions regarding their spatial and temporal interactions. Observed patterns may be a reflection of different habitat preferences (Krebs 1972) although predator and faecal avoidance may also influence the distribution of these ungulates. For example, Rettie and Messier (2000) suggested that woodland caribou spaced away from areas with a high abundance of other ungulates, notably, moose, as a predator avoidance strategy. Similarly, caribou may avoid areas where muskox occur at high densities as a strategy to avoid wolves. Research will be necessary to understand habitat relationships and determine if muskox directly or indirectly represent a limiting factor for Peary caribou.

6.0 Management Implications

The distribution of Peary caribou and muskox during the survey period (April/May) provides fundamental information on areas critical for calving and post calving. The survey data is essential for the estimation of population parameters and this information will be used to assess requirements for TAHs, making recommendations that will 1) ensure the conservation of caribou and muskox, and 2) the long-term sustainable use of these resources by local people. As well, these population estimates will provide benchmarks against which future estimates can be compared and the recovery of Peary caribou measured.

7.0 Reporting to Communities/Resource Users

Reporting on the 2006 survey program was initiated immediately after the field program was completed. A summary report entitled *Estimating Peary Caribou (*Rangifer tarandus pearyi*) and Muskox (*Ovibos moschatus*) Numbers, Composition and Distributions on Ellesmere Island, Nunavut.* (Campbell 2006) was distributed to the Resolute Bay and Grise Fiord HTO's and Wildlife officers, NWMB, NTI, the Director of Wildlife, the Baffin Regional Manager, the Manager of Wildlife Research and the Qikirttaaluk Wildlife Board (QWB), in June 2006. In November 2006, a research summary was presented to the QWB at their annual meeting in Iqaluit. As well, research results from the 2001-2006 field programs and the proposed 2007 aerial survey were detailed to both the Grise Fiord and Resolute Bay HTOs, the community Wildlife Officers, NTI representatives, and their invited elders at a workshop held in Resolute Bay on December 5 and 6, 2006.

8.0 References

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