

**Inuit Qaujimajatuqangit about Population Changes and Ecology of
Peary Caribou and Muskoxen on the High Arctic Islands of Nunavut**

by

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Abstract

Over the past 40 years, severe population fluctuations in Peary caribou (*Rangifer tarandus pearyi*) and muskoxen (*Ovibos moschatus*) living in the High Arctic of Nunavut has caused widespread concern. In order to better understand these fluctuations, patterns of population characteristics need to be examined. The best source for long-range information is from Inuit, who have interacted with these species on a regular basis over the long-term.

This thesis presents the collection and documentation of observations by Inuit to describe the population distribution of caribou and muskoxen. Interviewees also shared their understanding of factors contributing to changes in abundance, and information concerning the ecology of these species.

Interviewees from Resolute Bay have observed severe fluctuations in the abundance of caribou on Somerset, Prince of Wales, Russell, Cornwallis and Bathurst Islands and northern Boothia Peninsula. Interviewees from Grise Fiord indicated that changes in caribou populations on Devon and southern Ellesmere Islands have occurred but have not been substantial. Interviewees also indicated that the populations of muskoxen on Somerset, Prince of Wales, Devon and Southern Ellesmere Islands have increased, whereas muskoxen populations on Cornwallis and Bathurst Islands have been consistently low.

Overall, interviewees expressed that changes in caribou and muskoxen populations are normal. However, interviewees continue to be concerned with the possibility of negative impacts caused by significant human disturbance (e.g., petroleum exploration). They also suggest that factors such as weather, presence of forage and the

handling of animals influence the distribution, abundance and health of caribou and muskoxen.

Interviewees also described the variability in the physical traits of Peary caribou throughout the High Arctic islands. Generally, from Boothia Peninsula to Bathurst Island the bones of caribou become smaller and their fur has a finer texture. On the islands north of Bathurst Island the features that are unique to Peary caribou become more pronounced. Interviewees also explained that overall, caribou are not negatively impacted by wolves and that a large abundance of muskoxen is often followed by the decline in the population of caribou in a specific area. The documentation of this information contributes to our understanding of two unique northern species, and has the potential to aid in shaping the management of human activities that may affect them.

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List of Abbreviations

COSEWIC	Committee on the Status of Endangered Wildlife in Canada
DIANA	Department of Indian and Northern Affairs
ESRI	Environmental Systems Research Institute
GNWT	Government of the Northwest Territories
HTA	Hunters and Trappers Association
NAD	North American Datum
NLCA	Nunavut Land Claims Agreement (<i>Officially titled 'Agreement Between the Inuit of the Nunavut Settlement Area and Her Majesty the Queen in Right of Canada'</i>)
NRCan	Natural Resources Canada
NWMB	Nunavut Wildlife Management Board
QEI	Queen Elizabeth Islands
RCMP	Royal Canadian Mounted Police
SARA	Species at Risk Act
UTM	Universal Transverse Mercator

Chapter 1

Introduction

1.1 Introduction

The islands of the Canadian High Arctic are inhabited by two species of ungulate, Peary caribou (*Rangifer tarandus pearyi*) and muskoxen (*Ovibos moschatus*). These species have occupied these islands for thousands of years and have withstood numerous periods of environmental stress (Dick 2001; Miller et al. 1977; NWT Resources, Wildlife, and Economic Development 1999). However, within the last 40 years fluctuations in the populations of these species have been a source of concern for biologists and local Inuit hunters. Due to severe declines in caribou populations, members of the Resolute Bay Hunters and Trappers Association (HTA) decided to suspend their hunting on Bathurst Island in 1975 and on Cornwallis Island in 1982 (Ferguson 1991).

Nationally, in 1979, Peary caribou was designated as 'threatened' by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). In 1991, the same committee assigned High Arctic Peary caribou the status of 'endangered' (COSEWIC 2005). In 2004, COSWEIC (2005) recommended listing Peary caribou as 'endangered' under the Species at Risk Act (SARA). However, the status of Peary caribou is still undecided because Environment Canada requires further consultation with the Nunavut Wildlife Management Board (NWMB)(COSEWIC 2005; SARA 2005). The NWMB is responsible for approving the listing of endangered species in Nunavut, and has not as yet approved the listing by COSEWIC.

The cause of the changes in the muskoxen and caribou populations has not been positively identified and is subject to debate amongst biologists, HTA members and environmentalists (cf. Ferguson 1991; Miller 1997; GreenPeace 1998). At this time,

regional biologist Michael Ferguson believes Peary caribou and High Arctic muskoxen to be the most sensitive populations of these species within the territory of Nunavut (Ferguson, pers. comm., 2003).

Concern for the viability of caribou has been expressed nationally and internationally (cf. GreenPeace 1998; COSEWIC 2005). However, it is the Inuit¹ residents of the High Arctic communities of Resolute Bay (*Qausuittuq*) and Grise Fiord (*Aujuittuq*) who have been directly impacted by the dramatic changes in these populations. Many people within these communities view caribou and muskoxen as an intrinsic parts of the surrounding ecosystem and Inuit life. These animals are sources of highly nutritious food and valuable materials for producing distinctly Inuit clothing and artwork (Gombay 2003; Freeman 1976).² Activities surrounding the hunting, preparation and use of these animals is seen as culturally valuable and means of reinforcing community relationships.

The first Inuit families came to Resolute Bay and Grise Fiord to permanently settle in 1953 when they were moved from Pond Inlet (*Mittimatalik*) and Port Harrison (*Inukjuak*) by the federal government (Audlaluk and Audlaluk 1998). Since that time, members of these communities have regularly observed and interacted with muskoxen and caribou living on the Queen Elizabeth Islands (QEI), Boothia Peninsula, Prince of Wales Island and Somerset Island. A few individuals from Resolute Bay and Grise Fiord are aware of the distribution and population trends of caribou and muskoxen on Prince of Wales and Somerset Island and Boothia Peninsula prior to 1953 due to their own use of

¹ The term “Inuit” is the plural of “Inuk” meaning “person”, and is used to refer to Indigenous people originating in the Canadian Arctic.

² Caribou skin is used to make blankets, jackets, pants and ‘kamiks’ (traditional Inuit boots) and antlers are carved into jewelry and statues. Muskoxen skins are used for padding, blankets and clothing, and horns are used for carvings.

the more southerly islands (e.g., Somerset Island) and/or information passed on from older Inuit who utilized these areas in the past.

These observations, experiences and knowledge are shaped by the distinct philosophy of Inuit Qaujimajatuqangit. Inuit Qaujimajatuqangit is directly translated as “*what has always been known*” (Thorpe et al., 2001: 4). However, the ability for this body of knowledge to change and evolve over time is more clearly portrayed within Arnakak’s (2001: 2) definition, that states that Inuit Qaujimajatuqangit is “...*a living technology [of the Inuit]. It is a means of rationalizing thought and action, a means of organizing tasks and resources, a means of organizing family and society into coherent wholes*”. This knowledge and wisdom is a source of valuable insight into many aspects of life. However, this study focuses on what is known about the population changes, movements and general ecology of Peary caribou and muskoxen. As well, it is hoped that the documentation of this information will assist in supporting the mandate of Article 5 of the Nunavut Land Claims Agreement (NLCA), which states that Inuit observations and values need to be acknowledged and reflected within the management of wildlife within Nunavut (Government of Nunavut, Department of Sustainable Development 2005).

1.2 Objectives

Tener (1963) conducted a survey of Peary caribou and muskoxen in 1961 across the QEI. This study and ensuing research were constrained due to the large extent of this geographic region (Miller 1990). Today, High Arctic Peary caribou and muskoxen are known to range on most of the QEI, Banks Island, Prince of Wales Island, Somerset Island and Boothia Peninsula (Environment Canada 2005) (Fig. 1.1). This geographic region is also known to contain two of Canada’s largest, undeveloped petroleum deposits

(Morrell 1995). If industrial activity is to increase within the High Arctic, the management of these activities should minimize potential negative impacts on the region's wildlife.

Currently, in comparison to more southerly groups of caribou, little is known about the behavior and movement of Peary caribou. The formal documentation of consistent and long-term observations of Peary caribou and muskoxen through Inuit Qaujimajatuqangit, pertaining to the behavior and ecology of these species, will assist in broadening our understanding of these Arctic ungulates.

The objectives of this research are to:

1. Document and map observations of Peary caribou and muskoxen distribution and changes in abundance over approximately the last fifty years as recalled by Inuit from the communities of Grise Fiord and Resolute Bay.
2. Document Inuit Qaujimajatuqangit in regards to the ecology of Peary caribou and muskoxen, as well as values and principles that interviewees indicated as important to guiding human interaction with these species.

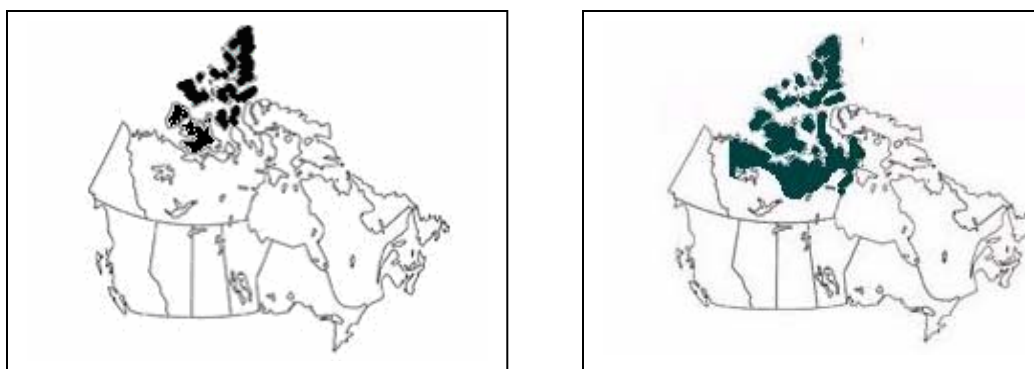


Figure 1.1-Known distribution of Peary caribou (left) and muskoxen (right) in Nunavut (maps adapted from Anand- Wheeler 2002).

1.3 Study Region

Inuit hunters and elders were interviewed in the communities of Resolute Bay and Grise Fiord, Nunavut. These participants provided information regarding Peary caribou and muskoxen for Bathurst Island, Cornwallis Island, Little Cornwallis Island, Ellesmere Island, west Devon Island, Prince of Wales Island, Somerset Island, northern Boothia Peninsula and smaller islands surrounding the larger mentioned islands (Fig. 1.2).

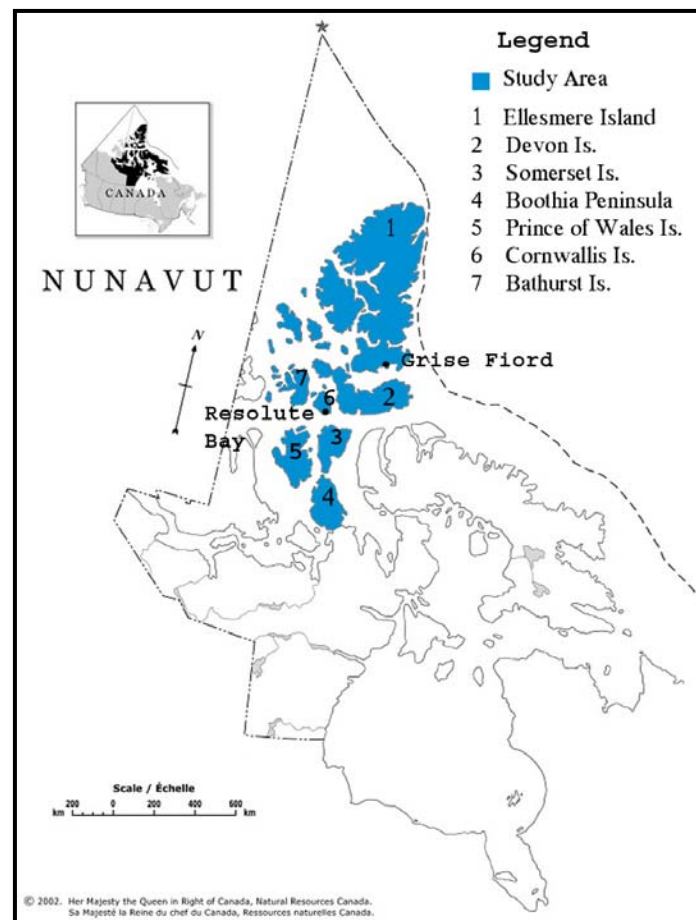


Figure 1.2-Map of study area. Areas highlighted indicate regions for which interviewees provided information.

1.4 Thesis Outline

This research consists of three components: 1) a comprehensive literature review to describe: a) available documentation regarding the population fluctuations and factors influencing Peary caribou and muskoxen living within the High Arctic, and b) the scope of Inuit Qaujimajatuqangit and its use in scientific research; 2) methods and results for interviews with Inuit hunters and elders to: a) map their observations of Peary caribou and muskoxen population movements and fluctuations over extended periods, and b) document the interviewees' understandings and knowledge, as understood through Inuit Qaujimajatuqangit, in regards to Peary caribou and muskoxen population changes and factors influencing the species behaviour and health; and 3) compilation of maps and a digital database to visually represent the interviewees' observations of Peary caribou and muskoxen as recorded during the interview.

The key information derived from the literature review is presented in Chapter 2. The approach and structure of the interviews, as well as the methods used to construct the digital database and maps are presented in Chapter 3. Chapter 4 presents a compilation of observed population and distribution trends of caribou and muskoxen over approximately fifty-years. Chapter 5 describes interviewees' understanding of factors influencing normal or irregular species behaviour, as well as a discussion of Peary caribou and muskoxen ecology based upon Inuit knowledge. Finally, major conclusions drawn from this work and recommendations for future research are outlined in Chapter 6.

Chapter 2

Background Information

This chapter provides a review of what has been documented regarding the status of Peary caribou and muskoxen on the QEI, Prince of Wales Island and Somerset Island. To date, scientific research has provided us with limited insight into the ecology of these species. As a consequence, this review purports a need for a paradigm that will provide a better understanding of these species in order to confidently guide the management of people and wildlife within this region.

2.1 An Historical Qalunaat³ Overview

Over time, Peary caribou and muskoxen have proven to be resilient animals. This includes a particular resilience to variations in climate over the millennia. Peary caribou and muskoxen are thought to have been present in the Arctic prior to the Wisconsinan-Weichselian glaciation, approximately 90,000 years ago (Miller 1990; NWT Resources, Wildlife and Economic Development 1999). Written records of these animals have only occurred within the last 200 years. Prior to written history, as indicated by Taylor (1955) and Dick (2001), Inughuit⁴ from northwestern Greenland were thought to occasionally hunt on the northern islands while Inuit from the southern mainland periodically hunted on the more southerly islands within this region.

The journals of European explorers, beginning in 1819 with writings by William E. Parry and into the early 1900s, document the presence of caribou and muskoxen living on the QEI. Based on their accounts of hunting it is concluded that during this time

³ *Qallunaat* is the Inuktitut word generally used to refer to ‘Whites’ or ‘Euro-Canadians’.

⁴ Inughuit are the aboriginal people from northwestern Greenland and are thought to be descendents of the Thule. The name *Inughuit* means ‘great and beautiful human beings’ (Dick 2001:61).

muskoxen were extremely plentiful, and caribou only slightly less so, on Melville Island during the summer and fall (in Miller et al. 1977). As well, signs of caribou, tracks and antlers, were observed on Bathurst Island and a small number of animals were hunted on Prince Patrick Island. Calculations by Dick (2001) indicate that substantially larger populations must have existed on Ellesmere Island and northwestern Greenland in the late 1800's, to accommodate the mass killings of these species by expedition parties organized by A. Greely, O.Sverdrup, F. Cook and R.E. Peary. This large-scale hunting is thought to have had a deleterious effect and, in a region with characteristically low productivity, a long-term impact on caribou and muskoxen (Dick 2001; Riewe 1973; Freeman 1971).

In the early 1900s caribou and muskoxen were specifically noted on Pim, Byam Martin and Axel Heiberg Islands. Around the same time explorers noted declines in the number of animals on Prince Patrick Island, Melville Island and northern Ellesmere Island (Dick 2001; Miller et al. 1977). In 1917, concern regarding the loss of muskoxen on the mainland tundra of the Northwest Territories (NWT) prompted the Canadian government to enact game legislation to prevent the hunting and harassment of the species (Barr 1991). The only exception was the hunting of muskoxen by people indigenous to the Northwest Territories, and only then when faced with starvation (Dick 2001; Barr 1991).

Again, in the 1950s, concerns regarding the muskoxen population on the southern QEI continued when geological surveyors, MacDonald, MacPherson and Tozer, failed to observe any live muskoxen on southeastern Prince Patrick Island (Miller et al. 1977). Instead, they found muskoxen carcasses that led them to believe that the death and disappearance may have been caused by deep crusted snow conditions during the winters

of 1953 and 1954 that hindered the muskoxen's ability to access vegetation. In contrast, annual 'Game Condition' reports from the Royal Canadian Mounted Police (RCMP) detachment at Craig Harbour, and later Grise Fiord⁵, for 1951- 1952 and 1955, claimed that there was an increase in the number of muskoxen, and reports from the Eureka Weather Station on northern Ellesmere indicate that muskoxen were plentiful (DIANA 1954- 1963; DIANA 1951- 1953).

2.2 A Summary of Biological Research

In 1961, biologists began to conduct aerial surveys to estimate the populations of Peary caribou and muskoxen living on the QEI. However, performing surveys that are representative of such a large geographic area (approximately 419, 000 km²) and in harsh and rugged conditions (e.g., mountainous, glaciated and extreme cold) has been a challenge (Miller et al. 1977). As a consequence, surveys have been irregular and, according to Miller (1990), have produced insufficient data to describe typical population sizes and trends. Additionally, Tener (1963), Miller (1990) and Ferguson (1991) have stated that the ability to obtain representative numbers is often hindered by difficulties spotting caribou against a background of random snow and snow free areas, and a lack of accounting for the possibility of inter-island migrations. As a result of these complications, population estimates and hypotheses regarding the reasons for changes in numbers have been a source of debate (Ferguson 1991).

The first systematic aerial survey of wildlife on the QEI was conducted in 1961 (Tener 1963). The reason for this survey was to determine whether the stocks of wildlife would be able to support an increasing population of relocated Inuit families and to help

⁵ The community that is now Grise Fiord was initially settled at the original RCMP detachment at Craig Harbour in 1953. Both the community and RCMP detachment moved to Grise Fiord in 1955.

inform federal government as to the potential impacts of larger scale human activities on wildlife populations. During this survey, Peary caribou were observed on sixteen islands and Tener estimated that there were approximately 26,000 caribou living on the QEI at this time. Muskoxen were observed on seven of the surveyed islands. Tener estimated that there were approximately 7,400 muskoxen on the QEI. (1963). Population numbers for individual islands were often based upon the total number of animals observed or Tener's 'best guess' because he did not have enough data to calculate a formal estimate (Tener 1963).

In the 1960s and 1970s numerous petroleum deposits were found within the QEI⁶ region (Morrell 1995). Following these findings, the Canadian government and petroleum subsidiaries began studies to establish the feasibility of constructing a natural gas pipeline within the QEI (Morrell 1995). As part of this investigation, the Canadian Government sponsored aerial surveys of most of the major islands during 1973 and 1974 to determine the possible impacts of construction on muskoxen and caribou (Riewe 1973; Miller and Russell 1974).⁷ In 1973, Miller et al. (1977) estimated that, based on the islands surveyed⁸, the population of caribou living on the western QEI was 5,244 and the number of muskoxen was 4,138 animals. The following year the same islands were surveyed, using similar survey techniques, and almost half the number of caribou were observed (i.e., 2,676), and the number of muskoxen observed had decreased approximately 35%, to 2,704, from the previous year. These estimates indicate that the caribou population had

⁶ Nunavut and the Northwest Territories were once thought to have a quarter of Canada's recoverable oil, i.e., 8.7 billion barrels of 34.3 billion barrels. Bent Horn, on Cameron Island, one of the QEI, was thought to be one of the largest deposits in Canada (Northern Oils and Gas Directorate, 1993).

⁷ Major islands are islands exceeding 129 km² (Natural Resources Canada 2004).

⁸ 20 of the 34 major islands that compose the QEI were surveyed (Miller et al. 1974).

decreased by 89% and the population of muskoxen had increased by 25% since the estimates made by Tener in 1961 (Miller et al. 1975). Based upon these estimates, Peary caribou were listed as ‘threatened’ by COSEWIC in 1979.

By the mid-1980s Miller concluded that the population of Peary caribou had continued to steadily decline and estimated that the number of animals left within the High Arctic was approximately 3,300-3,600 (1990).⁹ However, as with the earlier surveys, the study did not cover all of the islands known to have had Peary caribou and the overall estimates are based upon limited observations. Nevertheless, in 1991 Peary caribou within Canada were placed upon the endangered species list based upon the recommendations made by Miller (1990) in a status report produced for COSEWIC. This designation was split to distinguish between the three different populations of Peary caribou on Banks Island, the High Arctic and the Low Arctic (COSEWIC 2004).

During the early 1990s it appeared that the number of caribou and muskoxen were increasing on islands surveyed within the Bathurst Island complex. A survey by Miller (1997) in July of 1994 estimated that approximately 3000 caribou and 1400 muskoxen were present within this area. However, during the following three winters the populations experienced a drastic decline and an unusually high number of carcasses of both caribou and muskoxen were observed within this area. To Miller (1997), it appeared that they had died of malnutrition. While muskoxen populations appeared to remain stable within the region, the estimated numbers of Peary caribou ensured that this species remained upon the endangered species list. However, in May 2004 all three designations

⁹ This decrease was not consistent on all islands as populations appeared to increase on the south-central islands (i.e., Bathurst, Cornwallis, Vanier, Cameron, Alexander, Massey and Little Cornwallis) and the number of caribou harvested on Prince of Wales Island, Somerset Island and Boothia Peninsula suggested that there was a large population of caribou living within this complex (Miller 1990).

of Peary caribou were deactivated in order to reassess them separately. As of this latest deactivation, Peary caribou within the High Arctic has a pending designation within the SARA registry (SARA 2005).

2.3 Suggested Reasons for Observed Decreases

The reason for the observed fluctuations in these populations is a source of on-going discussion within the scientific community, and between Inuit and biologists. Some hypotheses have been offered but few if any have been tested scientifically (Ferguson pers. comm. 2005).

2.3.1 Potential Research Error

In the surveys done in 1961, 1973 and 1974, both Tener (1963) and Miller et al. (1975) state that although weather was stable, there was a possibility that animals were missed due to the difficulty in seeing the light coloured caribou against the snow. This problem could be compounded with what Ferguson (1991) suggests is poor aerial survey methodology and the inclusion of questionable assumptions within population calculations for estimates on Bathurst Island. If this is valid, then it is likely that the same mistakes have been made on other islands.

2.3.2 Climate

Vibe (1967) argued that, historically, climatic variations in the west Greenland-Ellesmere Island region have had the ability to cause rapid increases or declines in wildlife populations. This belief has continued through to today. One of the main suggestions, by biologists, for the cause of the major declines in caribou and muskoxen

populations in the 1970s, 1980s and 1990s is that a series of years with early snowfall, uncharacteristically deep snow depths and ice layering on the snow created conditions that hindered the animal's ability to access forage (Riewe 1973, Miller et al. 1975, Miller 1990, Ferguson 1991, Miller et al. 2003).

2.3.3 Competition

Concern regarding the possibility of competition for forage has been expressed for muskoxen and Peary caribou living on Banks Island (cf. Parker 1978; Vincent and Gunn 1981). Being the largest herbivores in the Canadian Arctic, concern is also warranted for the current study area (i.e., the QEI). However, Vincent and Gunn (1981) found no distributional evidence to show range overlap between these two species. Instead, they concluded that co-existence between the two species is normal and that there is no need for competition because there is little overlap in preferred diets and habitat. However, Parker (1978) and Nagy et al. (1996) suggest that competition may occur when preferred forage is limited or not easily available, such as in winter or when muskoxen densities are high.

2.3.4 Human Disturbances

As previously mentioned, human disturbances have continued to increase within the High Arctic. It has been suggested that aircraft, ground vehicles and seismic activities cause caribou to change their patterns of movement, and may cause both caribou and muskoxen internal stress that could intensify periods of natural stress; such as extreme winters and calving, rutting and migration times (Miller and Gunn 1979; Miller 1990).

However, others argue that there is no evidence of disturbance based on these activities (Riewe 1973)

In the past, hunting was implicated in the decrease of animals (Riewe 1973). However, there has been no correlation between areas used for hunting and declines in populations. As well, local hunters have been careful to self-monitor the number of animals they are harvesting (Miller 1997).

2.4 Caribou, Muskoxen and Inuit Knowledge

Inuit have been at the fore throughout forty years of research on Peary caribou and muskoxen. They have worked as field assistants and guides. References to ‘Inuit’ concerns and observations demonstrate that their ideas influenced the work of the biologists within this region (Riewe 1973; Ferguson 1991; Miller 1997).

In the 1970s political and legal circumstances involving land claims, and the need for the documentation of local human and environmental history encouraged the ‘formal’ recording of the observations and harvesting activities of Canadian Inuit, including those of people living within Resolute Bay and Grise Fiord (Freeman 1976). These studies were undertaken by Dr. Milton Freeman and Dr. Roderick Riewe in, an attempt to collect data on the current and past populations and distributions of muskoxen and caribou. Additionally, their studies also investigated the possible impacts of seismic activities on these animals; a serious concern of Inuit hunters at the time (Riewe 1973; Freeman 1974). Freeman (1974) encouraged the further examination of Inuit knowledge of the ecology and behaviour of both these species. However, according to Freeman (1974) and Freeman and Hackman (1975), the environmental concerns of Inuit from Resolute Bay were unfairly dismissed by the federal government, who claimed that Inuit concerns were

unsubstantiated with little evidence to support otherwise. Hackman and Freeman (1975) suggest that the social rights and environmental knowledge (in reference to caribou ecology) of Inuit were ignored in favour of industrial priorities that could create financial benefit.

In recent years, the Canadian public has shown an escalating interest in Inuit environmental perspectives. Generally, this interest stems from the constant assertion, by Inuit, that their knowledge and resulting interests have merit and deserve attention. As a result, the government of Nunavut attempts to consider and incorporate principles of Inuit Qaujimajatuqangit in the Nunavut Wildlife Act which guides the management and protection of Nunavut's wildlife. As well, the validity of Indigenous knowledge is slowly being recognized within federal government organizations. For example, COSEWIC's Species at Risk Act section 15.2 states:

COSEWIC must carry out its functions on the basis of the best available information on the biological status of a species, including scientific knowledge, community knowledge and aboriginal traditional knowledge (Government of Canada, Species at Risk Act: Public Registry 2005).

This statement indicates that within this policy it is perceived that Indigenous Knowledge could hold as much value as scientific knowledge. This is definitely a step forward for a government that once believed that Inuit and Indigenous people knew so little about wildlife that they had to be educated in the idea and practices of conservation (DIANA 1956).

Within mainstream society the insight of Inuit Qaujimajatuqangit, and Indigenous knowledge in general, has the potential to broaden society's worldview. However, attention should be given as to how it has been appropriated into non-Indigenous communities. There is a distinct difference between Indigenous knowledge presented and understood within a 'traditional' manner (i.e., usually in oral form within indigenous

society) and what can be presented and understood from Indigenous knowledge in any other forms in non-Indigenous society (i.e., an academic thesis). They are different because one body of knowledge is retained and evolving within Indigenous communities, while the other represents a form of hybrid knowledge, born from the interaction of two very different cultures, with the aim to use Indigenous knowledge in mainstream society. Indigenous knowledge that is generated and used within Indigenous communities is defined by the government of the Northwest Territories as “knowledge and values which have been acquired through experience, observation, from the land or from spiritual teachings, and handed down from one generation to another” (GNWT 1997: 52.06). On the other hand, what is produced from the collection and analysis of Indigenous Knowledge within an academic framework is generally seen as a hybridization of information obtained from Indigenous Knowledge digested and presented within an academic framework. The importance of this distinction is that through the process of hybridization the original knowledge may lose its intended meaning.¹⁰ This may compromise the control that an Indigenous community has over the content and use of their knowledge. The primary debates have revolved around the methodology of acquisition and documentation, the philosophy (generally, in comparison to scientific or westernized thinking) and the application of Indigenous Knowledge (Wenzel 1999; Cruikshank 2005).

Within Canada, the use of Indigenous environmental knowledge is generally applied within four areas: improving scientific research; providing environmental baseline data; environmental impact assessment; and monitoring development impacts (Grenier 1998). The content of the research reported here intends to apply to the first two

¹⁰ J. Cruikshank (2005) suggests that both science and Indigenous knowledge can change or evolve through interaction with the other.

areas. Similar studies have used Inuit knowledge for research ranging from sea mammals to large land mammals to birds (Nakashima 1986; Kilabuk 1998; Ferguson et al. 1998; Thorpe et al. 2001; Mallory et al. 2003). These studies have provided new perspectives and insight into the lives and natural histories of specific species. Although the values associated with Inuit knowledge are not often included, many of the ideas and information obtained through Inuit have been used in management plans (Kendrick 1994; Usher 2000).

While many Inuit continue to fight for their values and knowledge to be recognized in governmental policy, their knowledge continues to be used at an extremely important local level. High Arctic communities have many of the same modern amenities to which southern Canadian communities have access. However, as with most communities within Nunavut, distinctly Inuit values remain. In the communities of Grise Fiord and Resolute Bay many Inuit choose to supplement their diet with country foods generally obtained through hunting. For many Inuit, the act of hunting, the preparation and eating of meat and the use of animal byproducts are of importance to their social and cultural lives as well as to their physical health (Gombay 2003). As stated by a senior Grise Fiord hunter in the 1970s “Caribou are needed without end by the Inuit” (Riewe 1973:25).

Inuit have combined their knowledge and skills to hunt both caribou and muskoxen within the Arctic (Freeman 1976; Dick 2001). While Inuit in the communities of Grise Fiord and Resolute Bay have only lived on the QEI for the last fifty years, there are a number of considerations that would support the argument that some of these individuals are indeed experts in the subject of Peary caribou and muskoxen ecology. These include: (i) a strong cultural paradigm that shapes their observations; (ii) sustained and continuous experience on the land; and (iii) frequent observations of these species.

The philosophy of their knowledge, Inuit Qaujimajatuqangit, has been tested and has evolved over generations. In addition, their local and tangible knowledge is refined through each experience they have had with these species. Members of the Iviq (Grise Fiord) HTO and Resolute Bay HTA have expressed concerns about population fluctuations in both species (Miller 1990; Case and Ellsworth 1991; Ferguson 1991). They believe that their knowledge and beliefs should be used in research and management of these animals and in the preservation of a natural environment in which they can continue the hunting of these species.

The following chapters describe what Inuit interviewees from Resolute Bay and Grise Fiord know regarding the historic and recent distribution, and what they know about Peary caribou and muskoxen ecology, as shaped through an Inuit worldview. This documentation will hopefully assist in contributing to what is known about these species, and contribute to the development of future research and management of these animals.

Chapter 3

Methods

This chapter outlines the structure, process of collection and documentation, and analysis of information compiled to describe the distribution, abundance and general ecology of Peary caribou and muskoxen living within Canada's High Arctic.

3.1 Interviews

Sixteen interviews ranging in length from two to eight hours were held with Inuit in the communities of Resolute Bay and Grise Fiord in March, July and August 2003. For training in interview methodology (cf. Ferguson and Messier 1997), the four initial interviews were conducted by Dr. Michael Ferguson while I observed. I then conducted three interviews under Dr. Ferguson's supervision. Subsequently, I conducted each of the other interviews (Table 3.1). In addition, a local interview assistant/interpreter, Susan Salluviniq participated in six of the interviews in Resolute Bay and Jeffery Qaunaq participated in seven of the interviews in Grise Fiord.

People who were knowledgeable about caribou and muskoxen in the study region were selected as potential interviewees through the advice of members of the Resolute Bay HTA and the Iviq (Grise Fiord) HTA. As well, two Inuit who were not hunters were also selected based on the advice of assistants Salluviniq and Qaunaq. They believed that these persons could contribute to the research through their: (i) knowledge of vegetation; (ii) experiences gained through extensive traveling; and (iii) knowledge of caribou and muskoxen obtained through the preparation of these animals for food and clothing. This inclusion is important. Predominantly, information is gathered from male hunters in such studies. However, some Inuit interact with caribou in different ways, and their

observations are useful and insightful. Non-hunting activities are generally performed by women. However, as seen within the current study, there are also women who hunt and their knowledge may not have been adequately utilized in previous Indigenous knowledge studies (Bodenhorn 1990).

Table 3.1- Interviewees that provided information about Peary caribou and muskoxen distribution, abundance and ecology on the Queen Elizabeth, Somerset and Prince of Wales Islands.

Interviewees Initials	Name	Date	Interview Location	Interview Team ¹
AI	Anonymous Interviewee	July 2003	Grise Fiord	AT, JQ
AN	Aksajuk Ningiuk	July 2003	Grise Fiord	AT, JQ
DK	David Kalluk	March 2003	Resolute Bay	MF, SS (AT)
GE	George Eckalook	March 2003	Resolute Bay	AT, SS (MF)
HK	Herodier Kalluk	March 2003	Resolute Bay	MF, SS (AT)
IN	Imooshie Nutarajuk	July 2003	Grise Fiord	MF, JQ (AT)
JAK	Jaypatee Akeeagok	July 2003	Grise Fiord	AT
KK	Kavavow Kiguktak	July 2003	Grise Fiord	AT, JQ
LA	Larry Audlaluk	July 2003	Grise Fiord	AT
LN	Liza Ningiuk	July 2003	Grise Fiord	AT, JQ
MK	Martha Kiguktak	July 2003	Grise Fiord	AT, JQ
NI	Nangat Idlout	July 2003	Resolute Bay	AT, SS
SAK	Seeglook Akeeagok	July 2003	Grise Fiord	AT, JQ (MF)
SAM	Simeonie Amagoalik	July 2003	Resolute Bay	AT, SS
SI	Simon Idlout	March 2003	Resolute Bay	MF, SS (AT)
TM	Tony Manik	July 2003	Resolute Bay	AT

¹ Individuals who conducted the interviews were: Michael Ferguson (MF), Alexandra Taylor (AT), Susan Salluviniq (SS) and Jeffery Quanaq (JQ). Initials in parenthesis within column denote observers present during interview.

Interviews were predominately conducted in quiet offices in public buildings. In Resolute Bay the majority of interviews were held in the Social Services building and in

Grise Fiord interviews were conducted in the public school and the local hotel. Interviews were also conducted in the homes of people who requested this location due to personal preference or physical health. When the interview assistants and I first met with potential interviewees, the research purpose and methodology were explained to them in either English or Inuktitut. If the person was interested in participating, they were provided with a 'Letter of Information' written in the language of the individual's choice - English or Inuktitut syllabics (Appendix A). Potential interviewees then either decided to be interviewed at that time or chose to take the letter with them and return at a later date. This letter informed them of: (i) the research purpose; (ii) what we wished them to contribute; (iii) how their information would be incorporated into the study; (iv) the interview structure; (v) the estimated interview duration; (vi) how they would be compensated for their time; (vii) that the interview was to be videotaped; and (viii) their rights as interviewees. Any questions or concerns were addressed at this time.

If the interviewee agreed to participate in the research, s/he was given an 'Interview Consent Form' (Appendix B). This form was signed by the participant, indicating they understood all that was explained in the 'Letter of Information', and that the interviewee granted the researcher permission to use any information pertaining to Peary caribou and muskoxen obtained during the interview. The interviewee was also asked to state where they would like copies of their taped interviews forwarded when the research was complete. Generally, interviewees indicated that they would like the interview tapes forwarded to the local school, the local HTA or a family member.¹¹ Interviewees were also given the choice of being acknowledged by name within the study

¹¹ It is hoped that the documentation of Inuktitut, information about caribou and muskoxen, and general community/ family history on video tape will be useful or of interest to other members of the community.

or remaining anonymous. Only one interviewee requested to remain anonymous while all other interviewees chose to be referenced by name within the study.

3.1.1 Interview Structure

The interviews followed a semi- structured format described by Ferguson and Messier (1997) for collection of Inuit knowledge of caribou (*Rangifer tarandus groelandicus*) on southern Baffin Island. Hay (2000:52) defines semi- structured interviews as a “...*form of interviewing that has some degree of predetermined order but still ensures some degree of flexibility in the way issues are addressed by the informant*”. Using this structure allowed us to maintain the research focus, yet encourage the interviewee to speak about their personal experiences and what they felt was important regarding caribou and muskoxen.

Interviews consisted of three phases. In the first phase, a biographical timeline was created in order to later link people’s observations of wildlife to a calendar year. To do this, interviewees were asked to describe where they had lived throughout their life. For times when the interviewee had lived within the same area over an extended time period, they were encouraged to identify events that would allow us to chronologically sub-divide the time-frame into five to six year intervals with a minimum precision of ± 3 years. Where possible, records of events were obtained or referenced by incorporating and examining community records, published materials and archives. Such events included the birth or death of family members, major political events (e.g. the establishment of Nunavut, removal of the muskox hunting prohibition), major community events (e.g. moving of a town site) and important personal events (e.g. beginning of a new job). Since many people within Resolute Bay and Grise Fiord are sensitive to

researchers obtaining information about their personal lives, we facilitated the establishment of a chronological series of events by providing a list of fairly neutral community events that could be used for reference if the interviewee could not identify a personal event that they wished to share.

In the second phase of the interview, interviewees were asked to describe their own observations and experiences of Peary caribou and muskoxen. As well, interviewees were encouraged to discuss what observations or information their parents or a close elder, i.e. a hunting teacher or grandparent, had shared with them.

To begin, the interviewee was asked to recall the first time that he or she had seen a caribou or muskox within the study area. If the interviewee could remember the location of this observation, they were asked to mark where they had seen the animal on a clear plastic sheet placed over a 1:500,000 map of the study area (Figure 3.1). Generally, interviewees appeared comfortable and familiar with using this map. However, one elderly woman was not familiar with the use of a map, but was able to use the Inuktitut names for places which could then be found by Qaunaq, the interviewee assistant/translator. If the interviewee could not reliably remember the date of this observation, we referred to the timeline and generally a date could be closely estimated. From the date of their first recollection of caribou or muskoxen and by following the interviewee's timeline of dateable events, they were then asked to describe, in sequence, where they had traveled within the study area. For each location they were asked where they had or had not observed caribou and muskoxen. For each location the interviewee was asked:

- The season in which they had made their observation(s).

- The number or abundance of caribou and/or muskoxen observed or ‘signs’ of either animal (i.e. tracks, feces and/or horns or antlers).
- The age and sex of the caribou and/or muskoxen.
- To describe anything else they thought might be important or of interest.

If an interviewee returned to the same location multiple times, they were asked whether or not they thought the number of muskoxen or caribou within the area had significantly changed, and if so, why they thought a change had occurred. Each area was marked on clear plastic overlying a map and was given a corresponding number and information about each location was written down and recorded on video-tape. A new piece of plastic overlay was used for each interviewee so there could be no confusion as to whom the information belonged to and to eliminate any concerns regarding interviewee bias.



Figure 3.1- Example of an interviewee marking the location of caribou and muskoxen on a map.

In phase three, when interviewees were finished describing their observations, they were asked a series of questions that were to be answered based upon what they knew through their own personal experience, what they had been told by their elders and/or what they understood based on Inuit Qaujimagatuqangit. The main topics for discussion included:

- Reasons for observed changes in numbers or distribution of muskoxen or caribou.

- If caribou and muskoxen had any influence on one another.
- The impact of wolves on caribou and/or muskoxen.
- How vegetation influences caribou and/or muskoxen numbers or distribution.
- The effects of human caused disturbance on caribou or muskoxen (e.g. mining and exploration).
- The effects of weather on caribou and/or muskoxen.

Other questions were often added depending on the interviewee's personal experiences and observations (e.g. knowledge of parasites or disease). At this part of the interview, interviewees often chose to talk about many other issues involving caribou and/or muskoxen and these topics varied depending on the individual. This information was also recorded.

3.2 Analysis

All sixteen interviewees agreed to have their interviews recorded on video tape. Twelve of the video tapes were transcribed four of which were translated by individuals familiar with the local dialects. Due to circumstances beyond our control (i.e., funding and availability of translators) not all interviews were translated. The available transcripts were first scrutinized for answers to questions that may have been leading, and answers that may have been unclear or which simply expressed generalizations. Information obtained by such questions and answers was not considered further. The transcripts were also subjected to minor editing to correct spelling errors, grammatical errors and punctuation. However, care was taken not to change or misconstrue the original meaning of the interviewee's response.

Individually, each transcript was then carefully read and observations regarding distribution and abundance were summarized and organized into the following categories: (i) time period (e.g. early 1990s, mid 1990s, late 1990s); (ii) location (e.g. Cornwallis Island); and (iii) season (English and Inuktitut). For Ellesmere Island, a large geographical area, the locations were mapped based on three regions: Southern Ellesmere (78° and south), Central Ellesmere (78° to 80°) and Northern Ellesmere (80° and north).

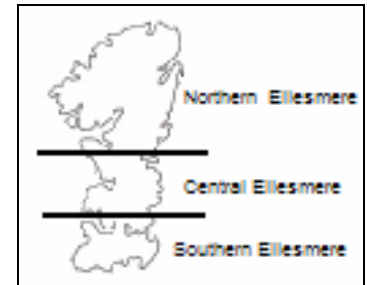


Figure 3.2- Approximate assigned division of regions for Ellesmere

Seasons were classified in terms of the six Inuit seasons based on definitions provided by H. Kalluk (2002, pers. comm.), D. Kalluk (2002, pers. comm.) and Salluviniq (2002, pers. comm.) (Figure 3.3). The observations from all interviewees were compiled and summarized to describe what the participants had observed from the early 1950s to 2003.

Table 3.2- Description of six Inuktitut seasons and seasonal caribou behavior (DK; HK; Salluviniq; Allaby 1992)

INUKTITUT SEASON	DESCRIPTION	APPROX. ENGLISH MONTH	CARIBOU SEASONAL BEHAVIOR
Upingaksaq	Early spring	April/ May ¹²	Roaming
Upingaaq	Late spring	June	Calving
Aujaq	Early summer	July/ August	Calves alone with cows and bulls in coastal areas
Ukiajsaaq	Late summer	September	Bulls and cows together
Ukiaq	Autumn	October	Mating season
Ukiuq	Winter	November to April	Caribou roaming

Information shared within phase three of the interview pertaining to caribou and muskoxen behavior and characteristics, and Inuit philosophies guiding their interaction with these species, was placed within two categories: (i) ecology; and (ii) human disturbances. These were then summarized using sub-categories that were either common between interviewees or themes of research interest (Table 3.2).

¹² Unlike English seasons, Inuktitut seasons are based upon weather (e.g. sun up, dark periods, ice breaking up, etc.) not set times.

Table 3.3- Themes and sub-categories based upon Inuit Qaujimajatuqangit and/or individual interviewee knowledge identified in phase three of the interview.

Ecology	Human Disturbances
Caribou Calving	Petroleum Exploration
Differences between caribou throughout the QEI	Motorized Disturbances: planes, helicopters and snowmobiles.
Population cycles of caribou and muskoxen	Research Involving Caribou and Muskoxen
Parasites	
Weather	
Wolves	

3.3 Mapping

During each interview, the interviewee recorded where s/he had traveled and seen caribou and muskoxen and, just as importantly, where s/he had not seen these animals (Figure 3.1). The locations of areas traveled and the associated observations (or lack of observations), were drawn as polygons or lines on a clear plastic overlay of a 1: 500,000 map of the study area. Since no single map of the entire study area (i.e., at 1:500,000) exists, a map mosaic was constructed to create two maps that covered the entire study area. Information identified on each map overlay included: (i) the interviewee's name; (ii) the date of the interview; (iii) a random map identification number; and (iv) reference coordinates. As well, each polygon and line that was drawn was assigned a numerical identifier.

When all interviews were complete, each map overlay was scanned with a drum scanner and saved as a digital image (i.e., jpeg) file. All lines and polygons on each scanned overlay were then digitized (i.e., heads-up digitizing in ArcView 8.3) and saved as Arc View shape files (ESRI 2002). From the digitized maps, the latitude and longitude

reference coordinates surrounding each line and polygon were recorded in Microsoft Excel (Microsoft Corporation 2002) as a text file.

In order to create a single usable base map of the study area, digital map tiles in North American Datum (NAD) 1983 and NAD 1927 were obtained from Natural Resources Canada (NRCan). Each tile was re-projected, from their original Universal Transverse Mercator (UTM) coordinate system to the Lambert Conformal Conic projection. The tiles were then able to be joined together to create a single base map. The ArcView shape files were then transformed into ArcView coverages and imported into ArcMap 8.3 (ESRI 2002).¹³

The reference coordinates obtained from the scanned maps were transformed from their original UTM projection into (i.e., latitude and longitude) a Lambert Conformal Conic projection. These new coordinates were used to re-project the polygons and lines onto the digital base map. Each line and polygon was assigned a unique identification code that had a corresponding attribute code linked to a database of attributes. The database of attributes contains information pertaining to each interviewee; i.e., a discrete interviewee code, the interviewee's name, date of when the interview was conducted and the location of the interview. In this manner, the map and database were linked using this unique identification code (i.e., a relational database was constructed to link spatial information and attribute information). As well, a database was created to describe the importance of each polygon and line. This information was derived from notes taken during the interviews and additional information obtained from the transcribed interviews.

¹³ Due to the distortions created by working with such a large geographic area at high latitudes, technical assistance was provided by Dave Atkinson for this processing.

The database contained the following fields of information: (i) locations of caribou observations; (ii) locations of muskoxen observations; (iii) locations where caribou were not observed; (iv) locations where muskoxen were not observed; (v) locations with indicators of caribou presence; and (vi) locations with indicators of muskoxen presence. Within each of these categories information was grouped into time periods beginning in the early-1950s to 2003. The attributes linked to polygons and lines representing locations where caribou and muskoxen were observed include: who observed the animals; what year and season the animals were observed, and the number and sex of the animals observed. For places where caribou and/or muskoxen were not observed, attributes include: who was present, and in what year and season the individual visited the location. For locations in which interviewees saw signs of muskoxen or caribou, attributes include: who observed the sign; in what year and season; and the nature of the sign (e.g., hoof prints, feces, antlers, etc.). The database containing information on wolf observations lists the observer's name, and the year and season of the observation.

In order to create layers that display the features and the information as listed in the database, lines and polygons were linked to attributes in the database with corresponding codes. Once linked, features listed under the relevant date for the desired layer were selected. The selected attributes were exported to form a separate layer. This process was repeated for all interviewees that reported during the desired time period. All exported layers were then merged to create a final layer representative of the observations for that time period.

The result of organizing and compiling the information in this manner allows for a visual and descriptive synthesis of what has been observed of Peary caribou and

muskoxen over approximately the last fifty years. Moreover, the addition of personal and cultural information provides a richer understanding of these species within the High Arctic.

Chapter 4

Results and Discussion:

Observed Population and Distribution Trends of Caribou and Muskoxen

A long time ago, long before there were Qallunaat¹⁴ teaching here, Inuit were like this: they traveled anywhere they wanted, lived on any land. Their first concern, after each move, was to examine the abundance of game in the area they had decided to live in. Sometimes they hit the right area naturally, and in that way they tried. Sometimes they did not move to the right area. In this way, sometimes finding and sometimes not finding animals, we came by our knowledge, we as Inuit. (Akeegok, Grise Fiord, in Freeman 1976)

In this chapter, the population and distribution trends of caribou and muskoxen, as described by the interviewees over approximately the last fifty years are presented and discussed. As described in the quote above, these observations were obtained through exploration of the different islands in the areas surrounding the communities.

Interviewees' observations result from their experiences on the land. These are accumulated from a variety of activities including hunting (i.e., caribou, muskoxen, polar bear), fishing, camping, and working for petroleum companies, surveyors, biologists and others.

The content of these observations and knowledge exists within a space that is hard for many scientists to define and place within a familiar category because it is generally holistic and not easily quantified. However, the information gained from this study could be applicable to the biological and social sciences as well as wildlife management and conservation, but it does not readily fit within the boundaries of either philosophical structure. For this reason it is important to outline what the scope and context of the study results are, and just as important, what they are not.

The Inuit observations were not the result of a systematic aerial study that attempted to cover the given percentage of ground using a repeatable methodology.

¹⁴ *Qallunaat* is the Inuktitut word generally used to refer to 'Whites' or 'Euro-Canadians'.

Instead, they are observations made in areas where people could travel by foot, dogsled, snowmobile and/or boat. Sightings were made as a result of: (i) informed decisions as to where to hunt; (ii) exploration of unknown areas i.e., areas where animals had been known to occur sometime in the past; or (iii) by chance (.e.g., not attempting to find caribou or muskoxen but by camping or working in an area where animals happened to be present). As a consequence, their observations are not necessarily repeatable in a scientific sense, but could be the basis for further academic inquiry (e.g., Ferguson and Messier 2000; Ferguson et al. 2001).

The majority of interviewees had a preference for caribou, over muskoxen in all years. In addition, hunting muskoxen was banned from 1917 to 1969, resulting in more observations of, and discussion surrounding caribou. As well, as emphasized by Nangat Idlout, it must be remembered that people had other things going on in their lives at different periods (e.g., raising children, having full-time employment). For example, both Nangat Idlout (NI) and Liza Ningiuk (LN) had many children and when asked to recount memories of caribou and muskoxen sometimes they replied ‘I don’t know, I had children then’. For some interviewees, employment or southern education meant that they could not go out on the land as much and memories may have faded to be replaced by more important life events.

These factors mean that less information about wildlife during specific periods of time cannot be used to suggest that caribou or muskoxen were not present at a given location during such times. Instead, the observations must be taken for what they are; a recounting of what people saw or did not see in a specific location at a specific time by a specific interviewee. The persons who shared this information never claimed that these observations could be generalized or applied on a broader scale. However, these

characteristics should not discount its credibility. Nevertheless, their collective observations do describe important local changes in distribution and abundance, circumstances surrounding change (e.g., change in snow cover, presence of parasites in animals, condition of animals, etc.) and insight into caribou and muskoxen behavior.

4.1 Interpreting Abundance

Interpreting a numerical value from an interviewee's description of animal abundance is not straight-forward. As explained by Ferguson et al. (1998), terms describing abundance depend on personal experience. For example, if a person has never seen caribou within an area, 5 animals may seem like a 'lot', while to a person who regularly sees twenty or thirty animals it may seem like a 'few'. As well, S. Akeeagok (2004 pers. comm.) explained that words such as 'enough' or 'not enough' differ between people as well. The interpretation for these words will vary based on individual circumstances. For example, a hunter who relies mainly on country foods will view the number of caribou available differently than a hunter whose family relies mainly on purchased food.

For this reason, descriptive words (e.g., 'few' and 'lots') used by the interviewees have been kept within the context of the findings presented here. Some interviewees were familiar and comfortable estimating the number of animals that they observed and those numbers are also provided. Descriptive words provide us with a general impression of the abundance and, in some interviews, indicated a change in abundance. In order to provide a numerical base to reference these terms it is important to have an understanding of general Peary caribou and muskoxen grouping dynamics.

Miller et al. (1977) believe that, due to forage availability, Peary caribou do not congregate and migrate in large groups like southerly, mainland populations of caribou. Since the High Arctic islands have limited vegetation, animals apparently disperse in small groups to maximize their chances of finding food. However, the size of caribou groups generally fluctuates seasonally and, according to Miller et al. (1977), the size of the seasonal congregation could also be influenced by the amount of forage on an island. Seasonal behavior influencing group dynamics of caribou is explained in Inuktitut in six different time periods within a given year (Table 3.2).

Seasonal group sizes tend to increase from late winter to late summer (Ferguson 1991). Group sizes observed in an aerial study by Miller et al. (1977) on Bathurst, Melville, Prince Patrick and Eglinton Islands ranged from two to sixty. However, smaller groups of animals of two to eighteen were most frequently observed.

The average group size of muskoxen tends to decrease in size between late winter and summer (Ferguson 1991). During rut in Aujaq, larger groups begin forming. In this period muskoxen herds have been known to range from two to one hundred and ten animals with an average group size of approximately thirteen muskoxen. While in the spring and early summer these groups disperse and have been known to range from two to thirty-eight animals with an average group size of approximately nine (Miller et al. 1977).

4.2 Observed Population and Distribution Trends of Caribou

Interviewees shared their observations of caribou for seven islands and one peninsula: Somerset, Prince of Wales, Russel, Cornwallis, Bathurst, Devon and Ellesmere Islands, and Boothia Peninsula. Interviewees from Resolute Bay provided the

majority of the observations for Somerset, Prince of Wales, Russel and Cornwallis Islands and Boothia Peninsula. Alternately, interviewees from Grise Fiord provided the majority of the observations for Ellesmere and Devon Islands. The amount of information for each region reflects the interviewees' ability to travel to different locations and their choice of hunting areas for a specified period.

4.2.1 Somerset, Prince of Wales and Russel Islands, and Boothia Peninsula

Somerset Island

1900-1949

Interviewees' personal observations of caribou on Somerset and Prince of Wales islands did not begin until the 1960s. However, Simon Idlout (SI) remembers his father, Timothy Idlout (TI), telling him that caribou were present in large numbers in the 1920s on the island and people from the Netilling area hunted on the island until sometime between 1928 and 1930 when a large number of caribou died. Despite this occurrence, caribou presence was noted in a message written in the fall of 1937 by Major McKeand to the Director of the Department of Mines and Resources that stated, '*All hands enjoyed tramping on Somerset Island saw Caribou to-day.*' (Department of Indian and Northern Affairs (DIANA) 1937). Also, reports of 'a few' caribou observed on Somerset in 1947 by A. Stevenson's expedition aboard the S.S. North Pioneer indicate that caribou were present prior to this date (DIANA 1947- 1950).

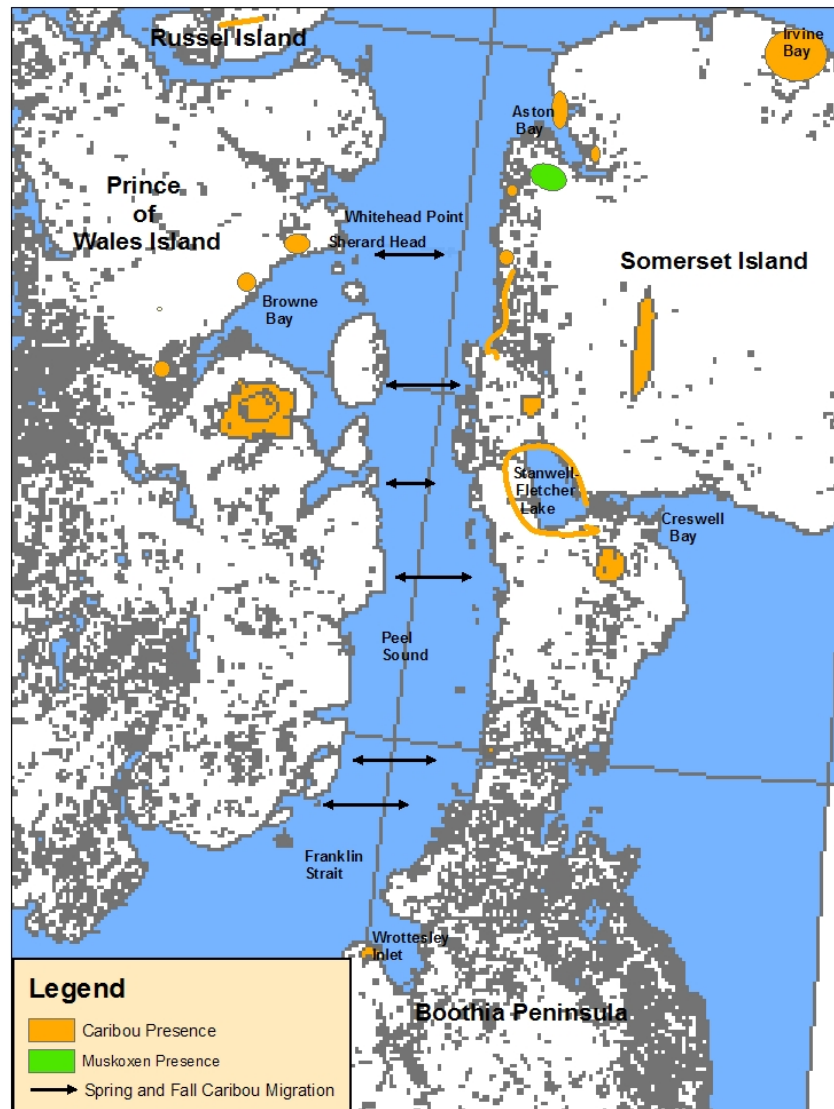
1960-1969

In the early 1960s, David Kalluk (DK) and TM remember that caribou were present in small numbers on Somerset Island. Caribou were observed in Ukiuq on the southwest part of the island, around Stanwell-Fletcher Lake (Fig. 4.1), and some moved

north along the west coast in Upingaaq and Aujaq (TM, DK). However, according to TM, ‘...*back in those days you really had to look for them. There weren’t lots of caribou the first time when I was young so that is why we had to go to Prince of Wales to hunt caribou*’. There were more caribou on Prince of Wales than on Somerset and the majority of caribou on Somerset would migrate to Prince of Wales across Peel Sound in Ukiq and some would return to Somerset Upingaksaaq. In Aujaq, male caribou tended to stay closer to the coast while females and calves were observed inland (DK). By the end of the 1960s the population of caribou on Somerset had increased and DK stated that, ‘*there was more than enough but not too many*’ (DK).

1970-1979

During the 1970s the abundance of caribou appeared to increase on Somerset. People hunting on Somerset no longer needed to go to Prince of Wales to hunt caribou in the summer. Around Stanwell-Fletcher Lake ‘...lots of caribou, enough for winter clothing...’ was available (SI). Between 1970 and 1975 groups of 10-20 caribou were observed in Upingaksaaq and Ukiq between Aston Bay and Creswell Bay, and around Irvine Bay (SA, LN) (Fig. 4.1).



4.1- Observed distribution of caribou and muskoxen for Somerset and Prince of Wales Islands and Boothia Peninsula, mid-1960s to mid-1970s (SI, TM, DK, HK, SA).

1980-1989

In the early 1980s DK observed an increase in caribou on the small islands surrounding Somerset:

I use to see caribou pretty well all over that area reaching to Creswell Bay.... The little islands, they all had caribou. There was a lot of caribou and they were closer to each other, they weren't that distant from each other (DK).

Caribou ranges also appeared to have shifted. Although the abundance of caribou was increasing, TM could not find caribou inland (north of Creswell Bay) where he had found them in the summers of previous years.

As the number of caribou increased, SI's father, Timothy Idlout (TI), predicted that sometime in the near future the caribou would drastically decline. This prediction was based on a similar occurrence that TI had observed when he was a young man in the 1920s.

In the mid 1980s, SI and TM both observed round, white spots on the meat of caribou harvested from around Creswell Bay and the west-coast of the island. However, not all animals had these spots. Healthy caribou were harvested from the northwest coast in the summer and around Stanwell-Fletcher Lake and Creswell Bay in Ukiaq (Fig. 4.2) (TM, SI).

During the mid 1980s TM observed four dead caribou on the ice off the west coast of the island. He did not believe that these deaths could be attributed to old age or wolf predation, but was unsure what had caused their demise. In the mid- to late 1980s, TM and SI observed the occasional, single barren-ground caribou (*Ranger tarandus groenlandicus*) from Boothia Peninsula grazing with Peary caribou around Creswell Bay (TM, SI).

By the late 1980s hunters observed a decrease in the abundance of caribou. Areas previously occupied by caribou on the northwest and central areas of the island were now occupied by muskoxen (SI, TM).

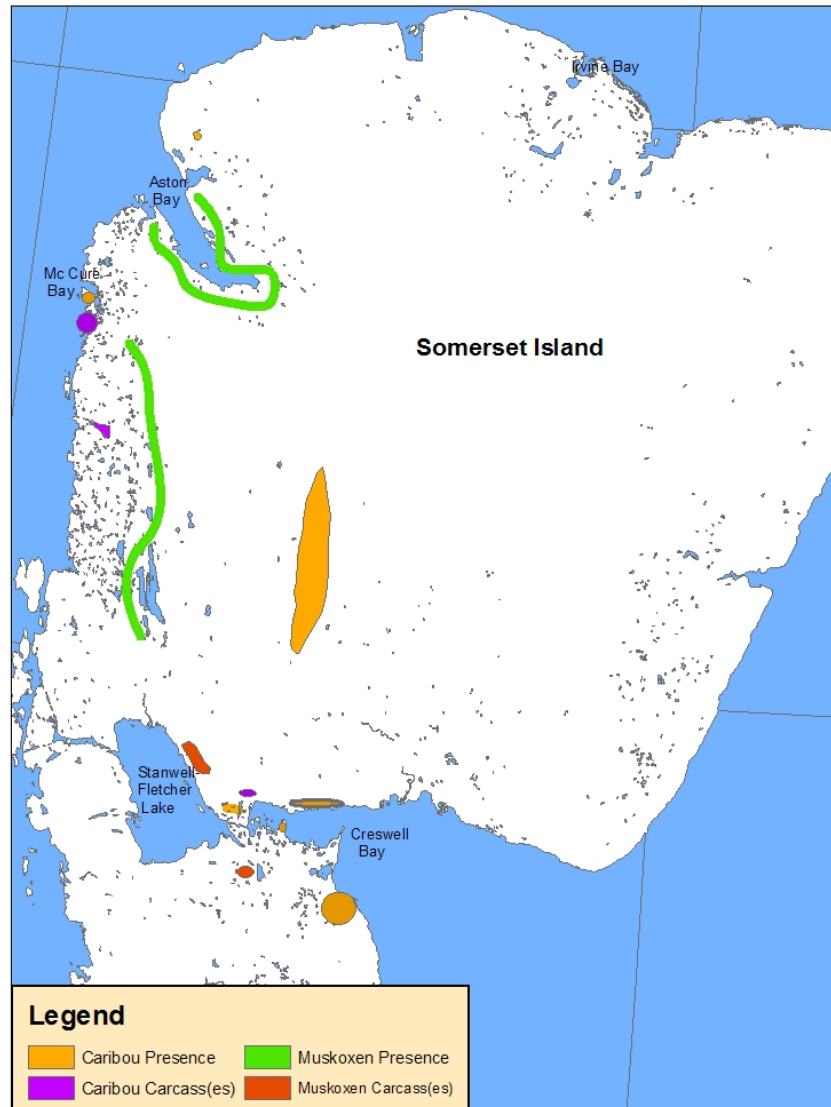


Fig. 4.2- Observed distribution of caribou and muskoxen, and locations of caribou carcass(es) for Somerset Island, 1980-1990 (DK, SI, TM, HK).

1990-1999

In the early 1990s hunters traveling around Creswell Bay, Aston Bay and along the west coast could not find caribou (SI, DK). However, SI continued to see an increase in the number of caribou on small coastal islands and scattered caribou

around the west and north coast, where he had never seen them before. SI explains what he saw:

The caribou are hardly around that area anymore [inland along west side of island]. Because of the Musk-ox being in the area, the caribou don't stay in the area, they only pass through it. The caribou were here, mostly all in this area [along the west coast]. The caribou are moving down that way [south along west coast and north of Creswell Bay], where they never use to be at, because the Musk-ox has taken over the area that the caribou use to roam. This area [around Stanwell-Fletcher Bay] is where the caribou use to be at, and there's hardly any now. They are moving to the coastal areas. These islands are loaded with caribous. Once you got around here, you started to see Musk-ox and the caribou started to disappear from the area and the Musk-ox started to roam the area. (SI)

Sometime between 1993 and 1995, SI observed many dead caribou and muskoxen around McCure Bay (Fig. 4.3). Some of the caribou carcasses were found in a sitting position. SI believed that they had not died of starvation. In Upingaksaag during the late 1990s, TM saw no caribou along the west coast of the island but observed muskoxen all the way down to Creswell Bay.

2000-2003

In Upingaksaag of early 2000 DK could not find caribou or signs of caribou (tracks or droppings) to indicate that they had been around Aston Bay that season. Instead he saw muskoxen all down the island to Creswell Bay while SI observed muskoxen along the northern end of Somerset.

Prince of Wales and Russell Islands

1950-1959

In the late 1950s Herodier Kalluk (HK), DK and TM hunted caribou on Prince of Wales Island. HK also stated that other Inuit had been hunting caribou on the island in the early 1950s. TM was also able to find caribou on Russel Island in 1959.

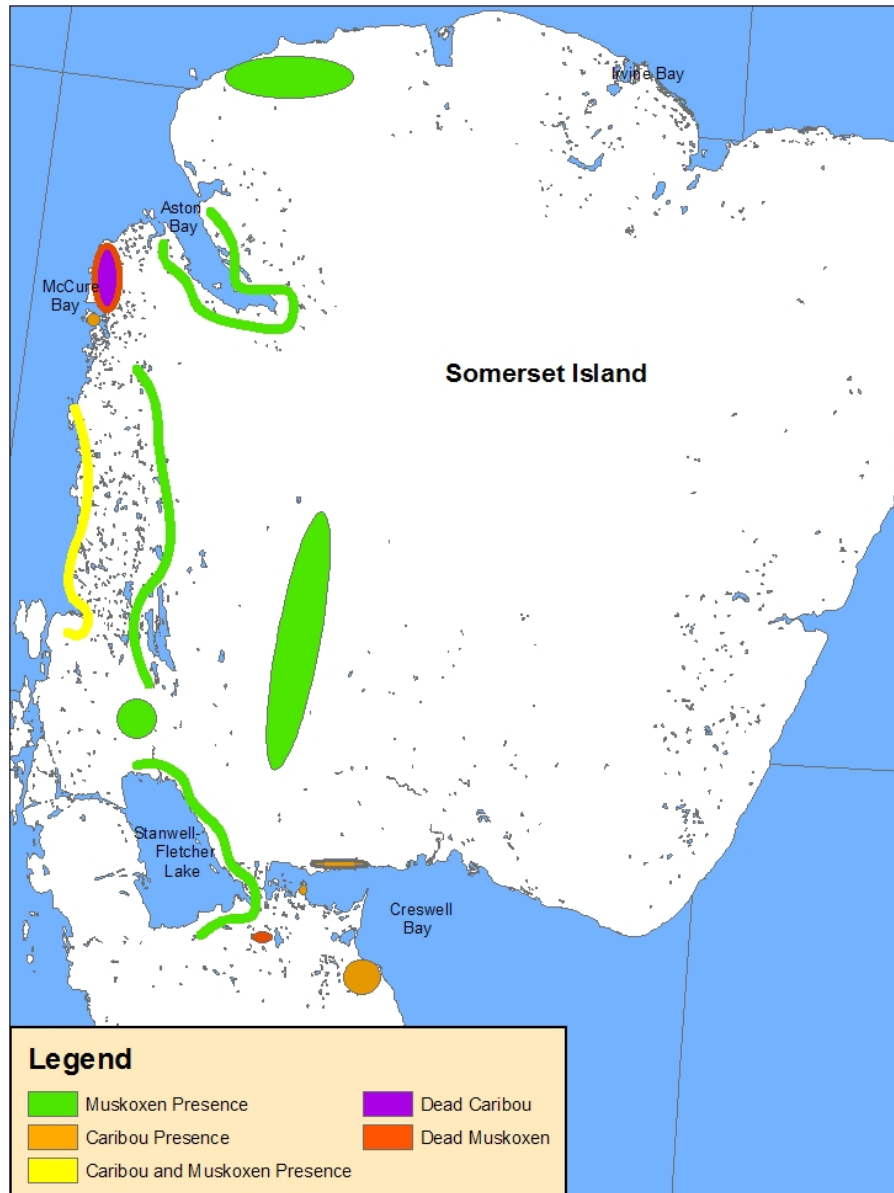


Fig 4.3- Observed distribution of caribou and muskoxen, and locations of caribou carcass(es) for Somerset Island, 1990-2000 (TM, SI, DK, HK).

1960-1969

Intermittently, throughout the 1960s TM hunted caribou with his family on Prince of Wales Island in Upingaksaag, on the east coast, west of Whitehead Point and Sherard Head, and in the Ukiaq on the east coast, south of Brown Bay (Fig. 4.1). As well, TM

was still able to find caribou on Russell Island during his hunts in Upingaksaag in the late 1960s.

1970-1979

SI was able to find ‘a good amount’ of caribou all along the east coast of Prince of Wales Island. TM also observed groups composed of five and eight caribou in Upingaksaag of the early 1970s on Lowther Island.

1980-1989

At the end of Upingaaq in the early to mid-1980s, while fishing on the southern tip of Prince of Wales, DK observed caribou with new calves in the hills:

In the hills [Fig. 4.4] we were able to see them having calves. It is hilly there. We were able to sight calves that still couldn't stand. They were so young that they couldn't stand. We didn't disturb them so that we could use them for clothes later on when they were bigger. (DK)

In Ukiajsaaq, DK reported that he observed ‘too many’ caribou around Back Bay (Fig. 4.4) and down around Browne Bay. In Ukiaq most caribou would cross Peel Sound and across Browne Bay to Somerset Island to spend Ukiuq, and return back to Prince of Wales Island in Upingaksaag. Bulls would stay along the coast while cows moved further inland towards the north and south. In the mid 1980s, SI also saw two dark or mainland caribou that he believed to have come from Boothia on the island. As well, in Upingaaq, TM observed a group of 12 caribou who appeared to be just about to calve on Young Island (Fig. 4.4).

During the late 1980s, as observed on Somerset Island, hunters became concerned with the growing number of caribou on the island. DK and SI believed that there were ‘too many’ caribou on the island. White spots, which had rarely been seen in the past, were found more frequently on the meat of caribou harvested on Prince of Wales. In the mid 1980s, the number of muskoxen appeared to be increasing as well. SI observed

numerous herds of muskoxen on the north central part of the island '*wherever there was grass*'.

In the late 1980s the number of caribou began to decrease. One year in the late 1980s, DK observed a few carcasses of caribou that appeared to have died in a sitting position. He did not believe that they had died from starvation.

1990-1999

One year in the early 1990s (likely 1990 or 1991) it rained in Ukiaq and caribou appeared to move to different areas and to smaller islands (DK). This decline was so drastic that many hunters stopped going to Prince of Wales to hunt caribou (DK and SI). The disappearance of caribou from the island was observed by Miller (1997) in an aerial survey conducted in the spring of 1996. During his survey he was only able to find five caribou on the island and none on Russell Island.

2000-2003

In early 2000, small numbers of caribou were occasionally observed on the south end of the island (SI and DK).

Boothia Peninsula

People from Resolute Bay do not usually hunt on Boothia Peninsula therefore observations of caribou are limited within this area. However, observations from Boothia Peninsula are important because it is believed that caribou move to and from this area between Somerset and Prince of Wales Islands (SI, TM, DK).

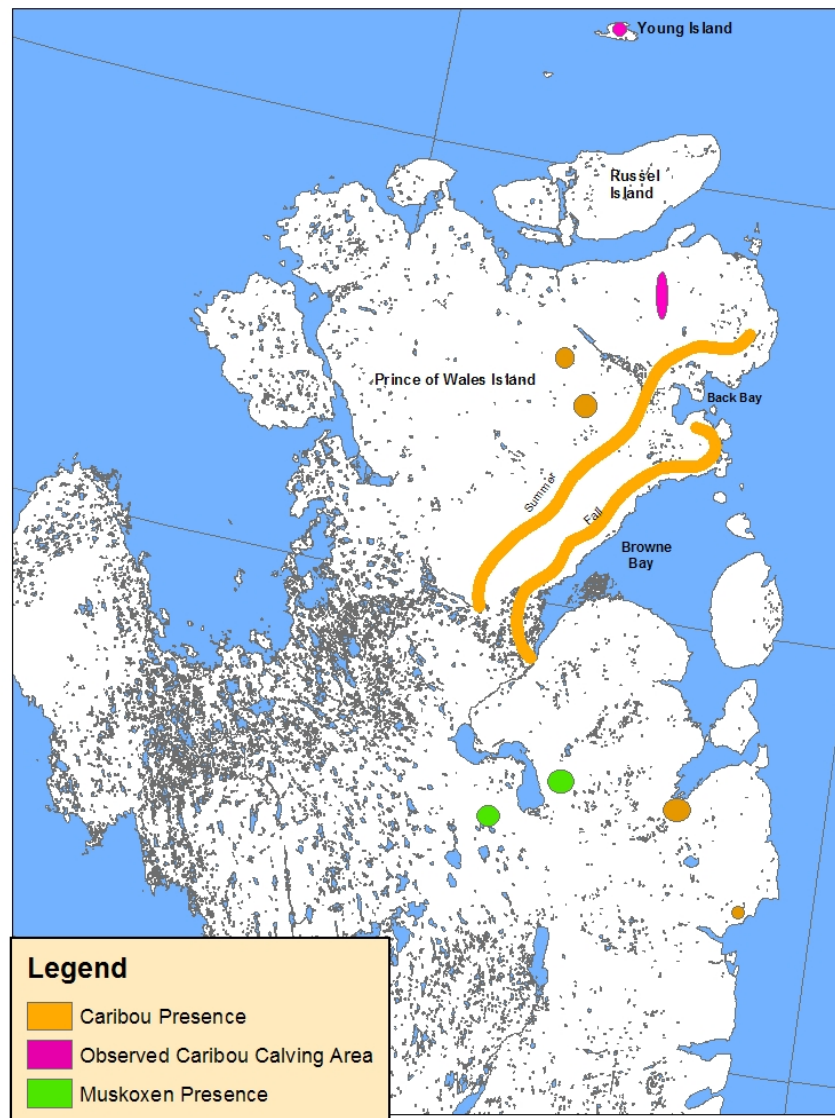


Fig. 4.4- Observed distribution of caribou and muskoxen and caribou calving areas for Prince of Wales Island, 1980-1989 (DK, SI, TM).

1950-1959

On Boothia Peninsula, RCMP game reports made from 1949 to 1952 state that the number of caribou (Barren-ground and Peary) on the north end of the island appeared to be increasing. Additionally, the observed seasonal pattern of caribou movement on the peninsula is that animals drift inland in the summer while they tend to congregate along the coast in the fall. Caribou are thought to be most numerous on the peninsula in February, March and April (Ukiuq) (DIANA 1953; DIANA 1949). Peary caribou were

also observed on northern Boothia Peninsula in the mid 1950s by SI who observed two animals.

1960-1969

In the 1960s Peary caribou were observed in Upingaksaag and Ukiaq on the west side of Wrottesley Inlet (TM) (Fig. 4.1). One Upingaksaag, during this time period, a female caribou and her calf were observed on the ice of Franklin Strait with tracks leading away from Boothia Peninsula (TM).

1985-1995

During the decline of caribou on Somerset and Prince of Wales islands in the 1980s and 1990s, SI was communicating with friends in Taloyoak (a community on southern Boothia Peninsula) who reported the appearance of Peary caribou that were similar in appearance to caribou of nearby northerly islands; i.e., Bathurst, Somerset and Prince of Wales (SI).

Summary

Caribou have been observed moving among these islands and the Boothia Peninsula. It is believed by interviewees that the majority of caribou on Somerset Island migrate across Peel Sound to Prince of Wales Island during Ukiaq and return to Somerset Island during Upingaksaag. Additionally, it was observed that male caribou on Somerset and Prince of Wales islands stayed along the coast during Ukiuq while females and calves were observed further inland.

In the 1970s the number of caribou on Somerset Island had increased enough that hunters from Resolute Bay no longer found it necessary to travel to Prince of Wales Island to hunt. However, those interviewees that did travel to Prince of Wales believed that there was a healthy population of caribou on the island. In the early 1980s the

abundance of caribou had increased to such an extent on Somerset and Prince of Wales Islands that hunters believed that there were ‘too many’ caribou. By the mid 1980s white spots were frequently found on the meat of caribou on Somerset and Prince of Wales Islands. SI and TM also observed a change in the ranges of caribou and in their size, as they were increasingly found on smaller coastal islands. TI predicted that the abundance of caribou would soon decline, as he had witnessed in the late 1920s.

Indeed, during the late 1980s and into the early 1990s the abundance of caribou had declined. Many areas that caribou had previously frequented were now occupied by muskoxen. However, caribou were still occasionally found on the west coast of Somerset Island and on smaller surrounding islands. According to reports from people in Taloyoak there was an influx of Peary caribou on the southern end of Boothia Peninsula. Additionally, there was an increase in the number of caribou carcasses observed.

In the early 1990s the decline in the abundance of caribou on the islands continued and hunters continued to observe carcasses of caribou on Somerset. In 1990 or 1991 after a rain in Ukiaq the ground was covered in ice and caribou were found dead on Prince of Wales Island. Hunters decided to stop hunting on the island.

More recently, (i.e., 2000-2003), there were no signs of caribou on Somerset Island and only an occasional caribou was observed on Prince of Wales Island.

4.2.2 Cornwallis and Bathurst Islands

Cornwallis

1945-1949

RCMP records indicate that caribou were observed in September 1947 around the weather station on the southern end of the island. In the summer of 1947 and 1948 neither

caribou nor signs of caribou were observed around Resolute Bay but a few caribou were thought to be on the northern end of the island during the summer (DIANA 1947-1950).

1950-1959

In the late 1950s DK was able to find caribou around Cape Airy in Upingaksaag (Fig. 4.5).

1960-1969

In the 1960s observations of caribou in small numbers (e.g. 1-3) were made in all seasons. Caribou were observed on the west side of the island in Ukiuq and Upingaksaag, in more northerly locations in Aujaq and were sighted moving south in the Ukiaq (Fig. 4.5) (TM, DK, HK). Caribou were also occasionally seen traveling towards smaller surrounding islands in the Upingaksaag (DK). In the mid and late 1960s, HK found it harder to find caribou on the island. He also began to notice caribou that appeared skinny and believed that they were unable to find sufficient food on the island.

1970-1979

Throughout the 1970s interviewees found it difficult to find caribou on the island. However, hunters visiting from Grise Fiord in the late 1970s found a few caribou on the west side of the island during Ukiaq and Ukiuq (Cape Rosse) (KK, SAK, TM, HK). Caribou were also found on the north east side of the island in the early and late 1970s (SAm). In the late 1970s interviewees observed approximately ten or more caribou traveling through town. These animals appeared to be in very poor condition and were believed to be starving (SAK, HK).

1980-1989

In the early 1980s a single caribou was observed on Browne Island, just off the west coast of Cornwallis Island (TM). In the late 1980s an increasing number of starving caribou and carcasses were observed (HK, SI).

1990-2003

TM did not see any caribou in the late 1990s when he traveled along the west coast of the island. Although many interviewees live on the island, none reported any observations of caribou during the period 1990-2003. However, there was one significant and well documented exception. In October of 1995, an extremely large group of caribou, estimated at approximately 100 individuals, arrived on Cornwallis Island near Resolute Bay. It was thought that these animals had come from Bathurst Island (Struzik 1996; DK).

Bathurst Island

The caribou on Bathurst Island have received the greatest attention in terms of structured aerial surveys. The reason for this may be due to the large interest in petroleum deposits on the island and the island being a primary caribou hunting area for Inuit from Resolute Bay during the 1960s and early 1970s (Ferguson 1991). However, interviewee's observations of the caribou and muskoxen populations on Bathurst Island are limited due to a drastic decline in the caribou population in the 1970s and subsequent self-imposed restrictions on harvesting (Ferguson 1987).

1950-1959

In the late 1950s caribou were hunted by people from Resolute Bay along the southeast coast of the island from Ukiuq to Upingaksaaq (DK).

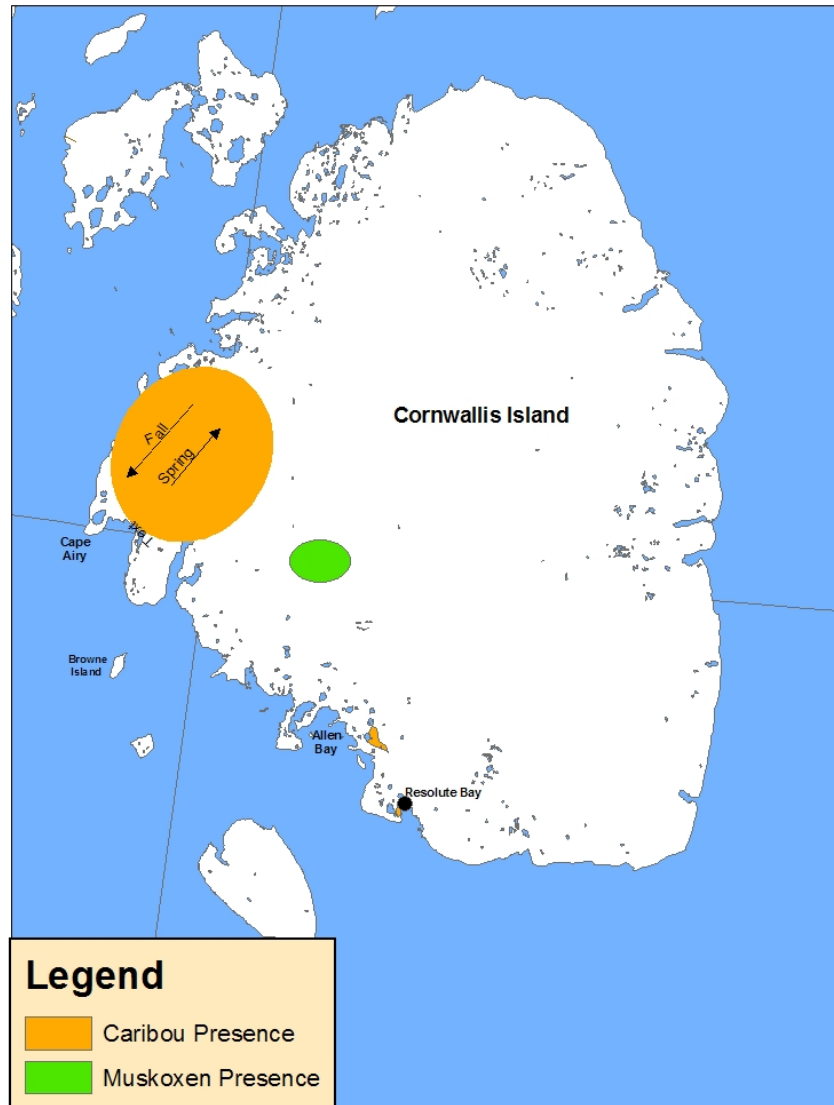


Fig. 4.5- Observed distribution of caribou and muskoxen for Cornwallis Island, 1950- 1969 (DK, HK, TM).

1960-1969

In Aujaq of the early 1960s HK remembered seeing male and female caribou on the southern coast of the island. At this time he was able to obtain just enough caribou for winter clothing. By the mid 1960s it became harder to find caribou in this area (HK).

1970-1979

In the late 1960s and early 1970s caribou presence was observed on nearby Little Cornwallis and Garrett Islands. The presence of caribou on Garrett Island was thought to be unusual because the island has very little vegetation (TM). TM also traveled to Loughheed Island during Upingaksaaq of 1970 or 1971 and found plenty of healthy caribou.

In the early 1970s, while working on Bathurst Island, TM occasionally saw multiple groups of two to five caribou during Aujaq around Freeman's Cove (Fig. 4.6). In Ukiaq and Ukiuq he generally saw a few caribou on the south end of the island and in Upingaksaaq caribou were observed on the north of the island around Young Inlet (TM).

During the 1970s HK found that caribou were becoming harder to find on the island. HK also found carcasses of dead caribou (HK). A report written by Freeman (1974) states that hunters were finding emaciated caribou on Bathurst Island and offshore islands. In one account, when hunters approached two caribou on Lowther Island, neither animal made any attempt to move away or stand up. When butchered it was found that both animals were extremely emaciated and unfit for consumption. During this time hunters from Spence Bay believed that many caribou from Bathurst Island had moved to Boothia Peninsula (Freeman 1974).

In 1974 Inuit hunters in Resolute Bay were concerned with the low abundance of caribou and suspended their harvesting of caribou on Bathurst Island in 1975. Aerial surveys suggest that the population of caribou on the island had declined by 90% respectively (Miller et al. 1977).

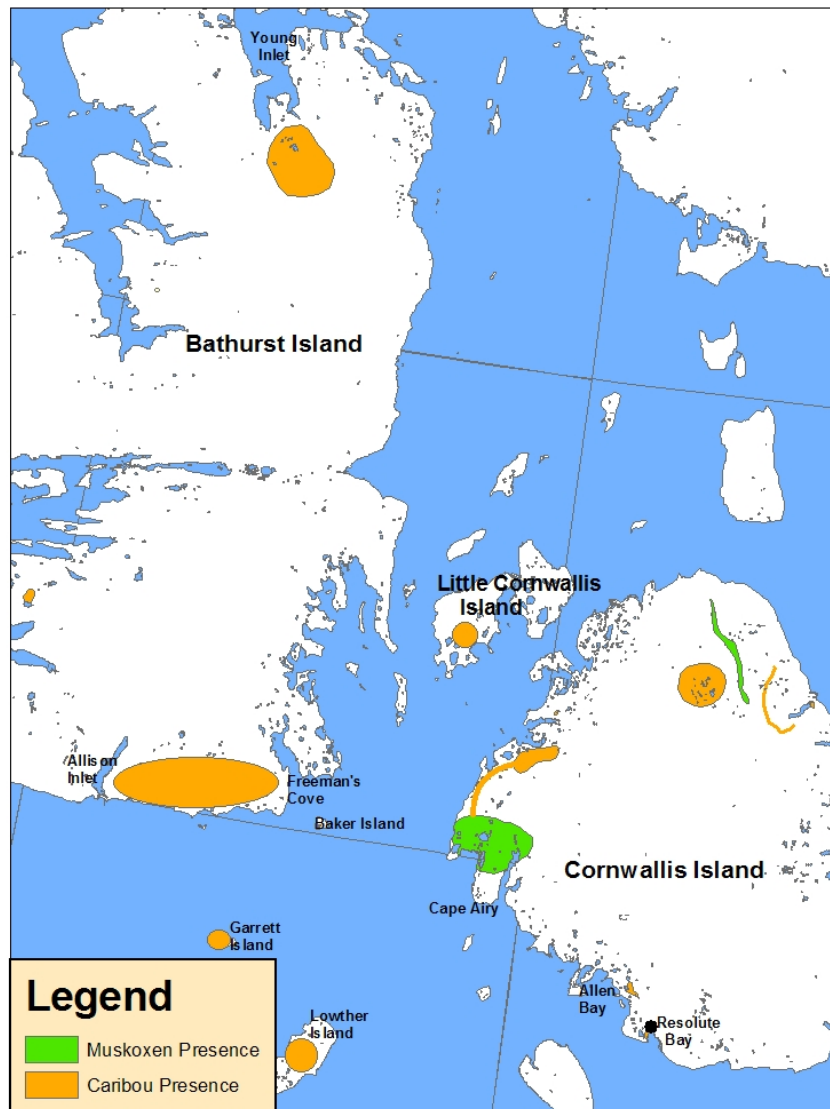


Fig. 4.6- Observed distribution of caribou and muskoxen for Bathurst, L. Cornwallis and Cornwallis Islands, 1965-1979 (DK, HK, SI, TM, SAM)

1980-1989

This low abundance continued into the 1980s, as did the hunting ban (Ferguson 1987). Hence, few interviewees reported observations on the island before the early 1990s (Fig. 4.7). However, in the mid-1980s, two caribou were observed on nearby Baker Island (TM).

1990-1999

In the late 1980s hunters returned to Bathurst Island. SAK observed 20 or more male and female caribou in Ukiq on the east side of Allison Inlet. DK now believed that the population of caribou was now sufficient to allow for a limited hunt but the population was still thought to be less than those on Prince of Wales Island. However, in the early to mid-1990s a large number of caribou and muskoxen died after a rainy period in the Ukiuq. Carcasses of muskoxen and caribou were found on the south and southeast coasts of the island and on Little Cornwallis Island (SI, DK, SAm). DK describes what he saw:

After the rain it was as if someone went to clean up the place, there was no more caribou, no more muskox. I went there after the rain in the winter. We saw dead caribou and muskox (DK)

It was suggested by Miller (1997) that the rain and death of caribou and muskoxen occurred during the winter of 1994/1995. Following this decline, the number of caribou was so low that interviewees stopped going to Bathurst Island to hunt and did not report any further observations on the island (SI, DK). During aerial surveys by Miller and Gunn (2003) in 1998 only 43 caribou were observed, indicating that the population of caribou on the island was extremely low at the time of the survey.

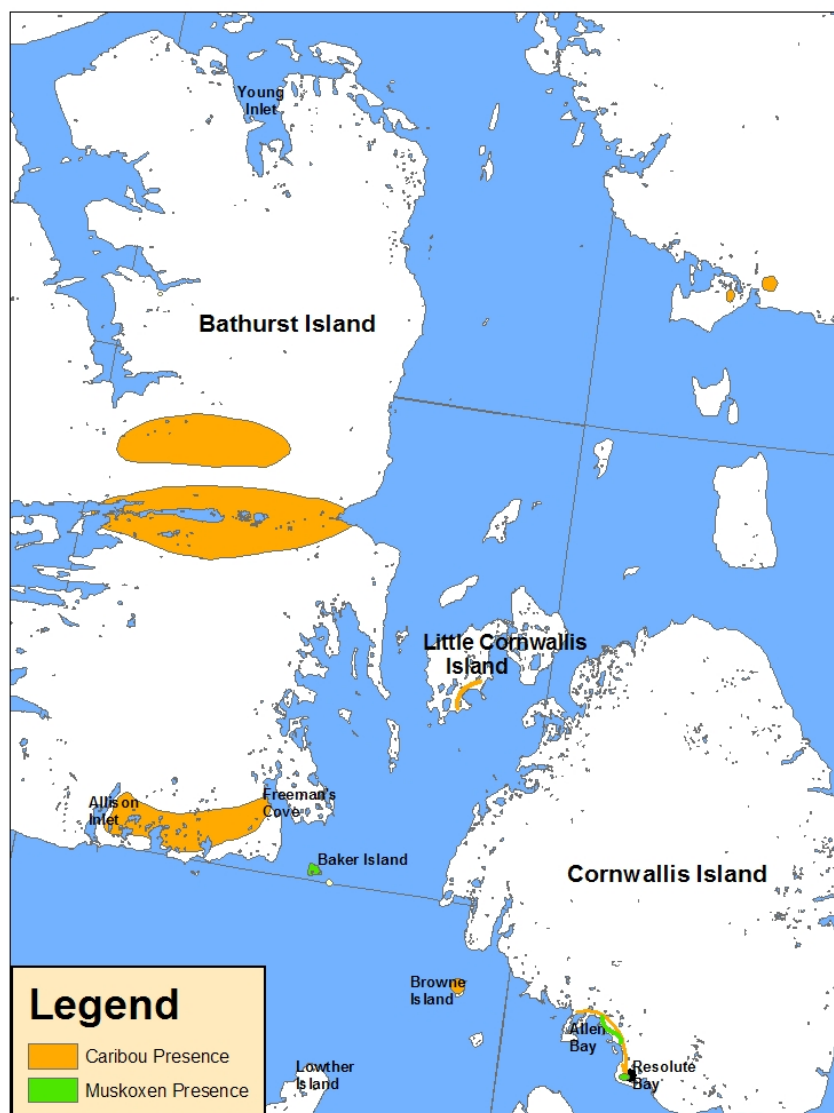


Fig. 4.7- Observed distribution of caribou and muskoxen for Bathurst, L. Cornwallis and Cornwallis Islands, 1980-1999 (DK, HK, SI, TM).

Summary

Caribou were hunted on Cornwallis and Bathurst Islands in the 1950s. In the early 1960s, caribou were observed in small numbers but hunters were able to find ‘enough’ caribou on Bathurst Island for their needs. In the mid to late 1960s interviewees had a harder time finding caribou on either island. Caribou that were found on Cornwallis Island were skinny. In the late 1960s and early 1970s caribou were seen emigrating from

Bathurst Island to smaller surrounding islands, such as Garrett, Lougheed and Little Cornwallis Islands. In the late 1970s a large number of caribou were observed moving from Bathurst Island to Cornwallis Island. Interviewees report that the animals appeared to be in extremely poor condition due to starvation. Hunters from Resolute Bay decided to suspend their hunting on Bathurst Island in 1974, in order to allow the caribou to recover.

On Cornwallis Island in the late 1980s, caribou that were occasionally observed were either starving or dead. In the late 1980s there was thought to be enough caribou on Bathurst Island to resume hunting. As a result, hunters returned to the island and were able to obtain enough caribou. In the mid-1990s, following a freezing rain during Ukiuq, hunters observed many caribou carcasses. Additionally, approximately 100 caribou were observed emigrating from Bathurst Island to Cornwallis Island in October 1995 (Ukiaq). Following this event interviewees stopped going to Bathurst Island and did not observe any more caribou on Cornwallis Island.

4.2.3 Devon Island

1920-1949

RCMP patrol records and regional wildlife records from Dundas Harbour (established in 1924) document the observations and perceived status of animals on Devon Island from the mid 1920s to the late 1940s. Throughout the records, caribou are not mentioned until March 1949 when Officer Nelson stated that the only signs of caribou that year were tracks of four animals between Dragleybeck Inlet and Viks Fiord (DIANA, 1949-1950).

1950-1959

During the 1950s the lack of caribou was again noted and emphasized by a request that one-hundred and twenty five caribou skins be shipped for winter clothing. However, four caribou were caught on Grinnell Peninsula in the early 1950s and caribou tracks were, again, observed in the mid-1950s from Cape Sparbo to Dragleybeck Inlet (DIANA 1954-1963, DIANA 1954- 1963).

As a young boy in the late 1950s IN remembers being able to find caribou in Upingaksaaq around Cape Sparbo (Fig. 4.8). However, there were many more muskoxen than caribou at that time.

1960-1969

During Upingaksaaq in 1962, IN harvested two caribou on Princess Royal Island (just north of Grinnell Peninsula) (Fig. 4.8). Around this time he also observed many caribou, i.e., approximately 50 animals on Grinnell Peninsula. In the mid 1960s SAK traveled with his father during Upingaksaaq to an area known to have caribou just east of Dragleybeck Inlet and they were successful in harvesting caribou at this time. However, during the same time period, IN believed that the overall number of caribou on northern Devon Island was declining. During Upingaksaaq in 1969, SAK was unable to find caribou, where they had found them previously, on the northeast coast of the island between Truelove Inlet and Cape Hardy.

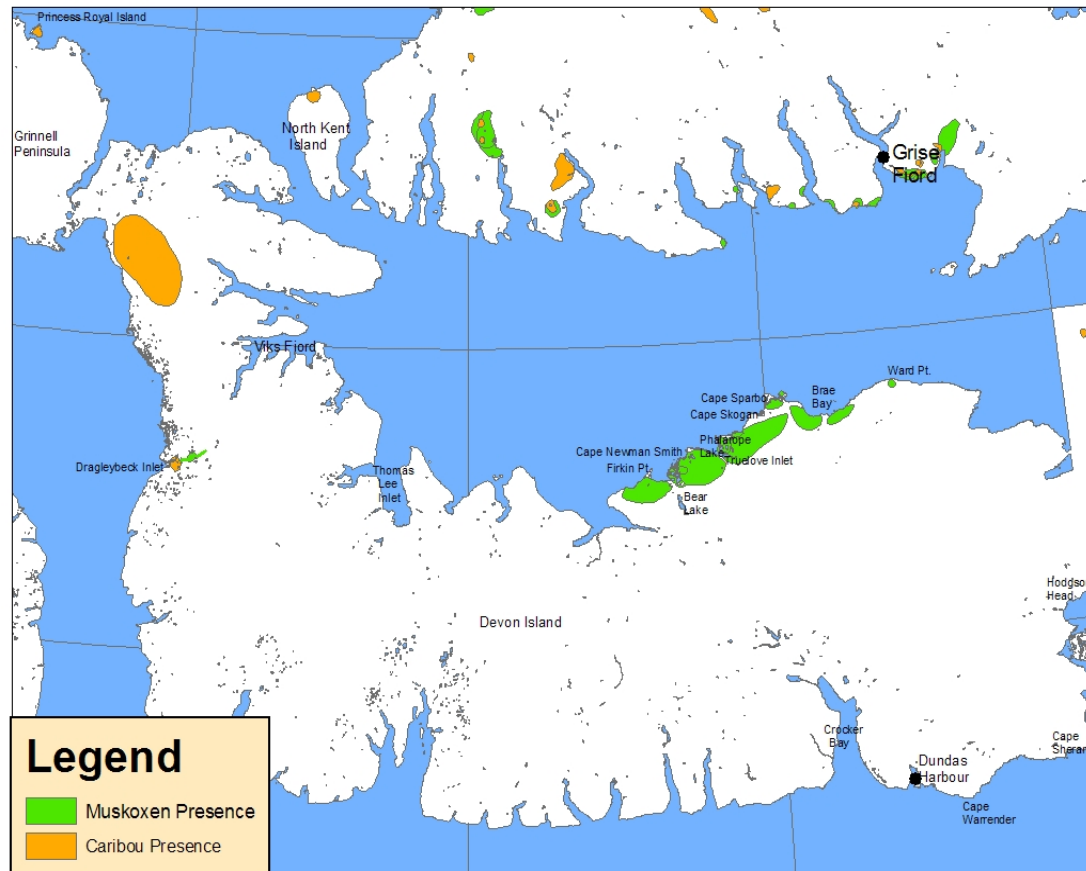


Fig. 4.8- Observed distribution of caribou and muskoxen for Devon Island, 1950- 1969 (IN, SAK).

1970-1979

Throughout the 1970s IN hunted polar bear during Upingaksaaq on Jones Sound. On these trips he traveled along the northern coast of Devon Island, between Cape Skogan and Brae Bay but did not see any caribou or signs of caribou.

1980-1989

Throughout the 1980s SAK traveled along the coast between Brae Bay and Phalarope Lake, and around Truelove Inlet but did not see any caribou in this region. In the mid 1980s a few caribou were present on the northeast side of the island. One Aujaq, LN caught one caribou on the east side of Ward Point (Fig. 4.9).

Hunting trips were also made to the west side of the island during the mid 1980s. On this side of the island Aujaq, LN caught caribou around Prince Alfred Bay

and SAK observed three caribou on the eastside of Grinnell Peninsula during Aujaq (Fig. 4.9).

1990-1999

No observations of caribou were reported for Devon Island during the early 1990s. However, during this time period SAK found caribou antlers just past Cape Warrender (Fig. 4.10). In May of the mid to late 1990s male and female caribou were observed in small numbers (2-3) south of Cape Newman Smith, south of Cape Skogan and around Bear Lake (SAk, LN, KK). Caribou tracks were also observed west of these locations at Skruis Point (SAk).

On his trip north along the coast SAK passed Cape Sherard, the east coast of Philpots Island, Hodgson Head and Cape Parker but did not observe any caribou. However, he noted that between Hodgson Head and Cape Parker there was suitable vegetation that he believed would be attractive forage to caribou.

2000-2003

In the early 2000s caribou were observed more frequently than in the past. On a trip to Devon Island DK observed a few caribou around bays and coastal areas on the southwest part of the island. Along the northern coast and specifically north of Bear Lake caribou were often seen in small numbers (IN, SAK). SAK believed that they were either moving to a new location or that they were returning to an area they had used in the past.

He states:

But the other thing that....is that we are seeing them [caribou] more frequently on northern Devon. I never thought that I would see tracks over there but I have. It proved to me that either they are moving somewhere else or going to places where they had been before (SAk)

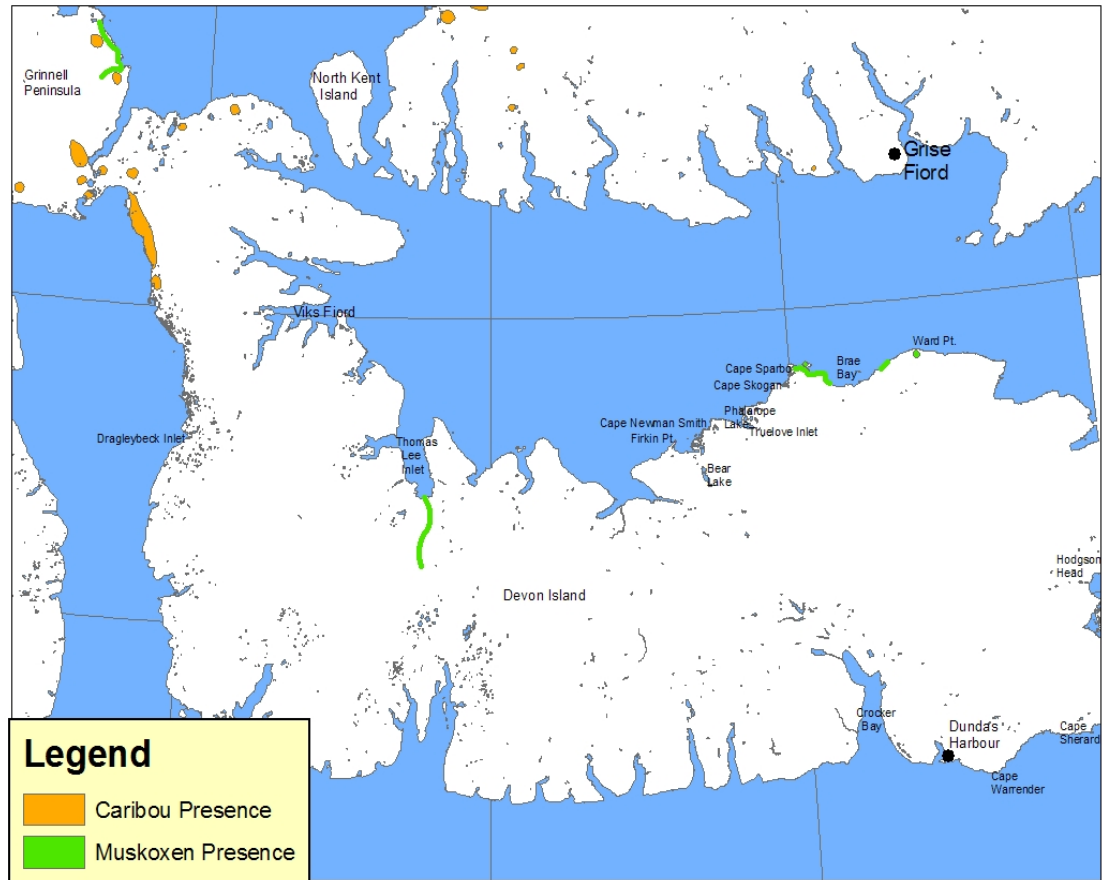


Fig. 4.9- Observed distribution of caribou and muskoxen for Devon Island, 1980-1989 (LN, SAK).

Summary

During the period of 1920 to 1949, reports by RCMP indicate that there were very few caribou on the east or west side of Devon Island. In the 1950s the lack of caribou on the east side of the island is emphasized by a request by the RCMP for caribou skins to be sent to Dundas Harbour for winter clothing. However, a few caribou did range along the northwest coast to the central west coast. In the late 1950s caribou were observed on the northeast coast.

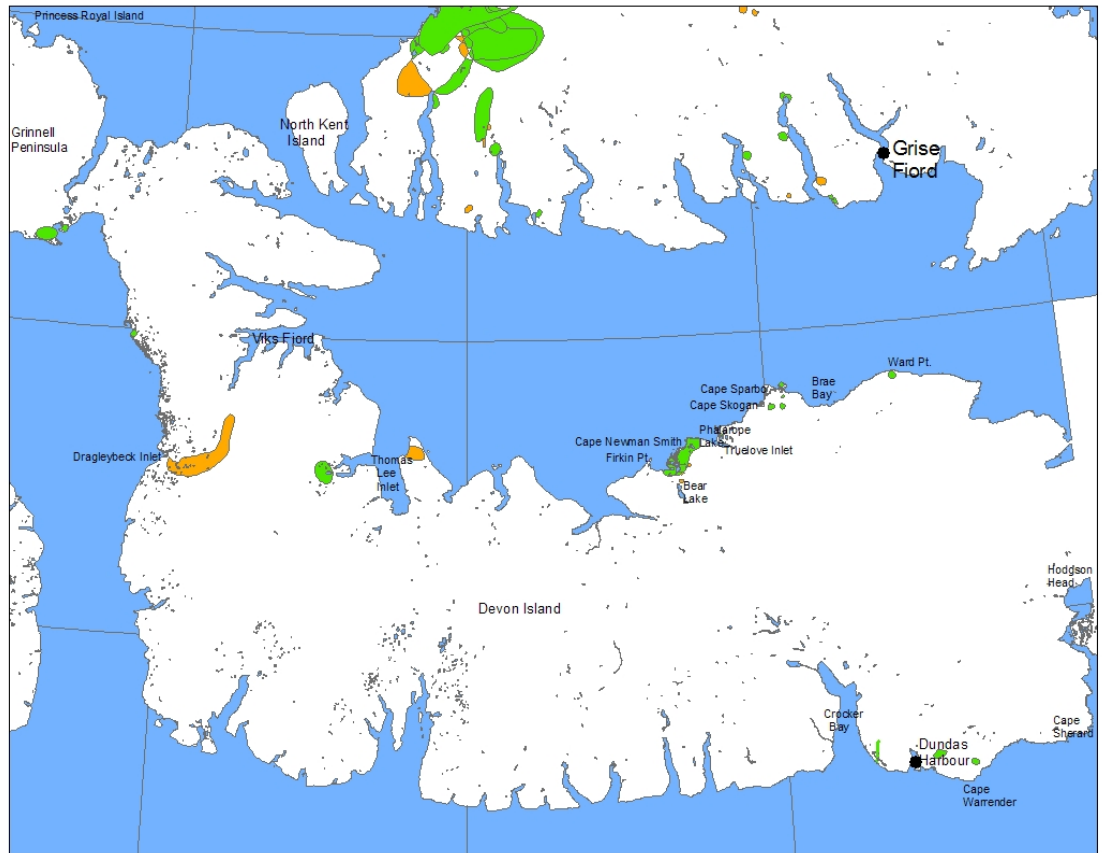


Fig. 4.10- Observed distribution of caribou and muskoxen for Devon Island, 1990-1999 (SAK, LN, KK).

During the 1960s, hunters harvested caribou from the west side of the island. There were locations on Grinnell Peninsula and down the west coast that were known to reliably have caribou. However, by the end of the 1960s hunters were unable to find caribou where they had previously found them on the northeast coast and IN believed that the number of caribou on the entire island was declining. Hunters continued to be unable to find caribou or signs of caribou on the northeast coast until the mid 1980s when a few caribou were observed. During this time caribou were also observed on the east coast of Grinnell Peninsula.

Interviewees did not report seeing caribou again until the mid to late 1990s when a few (2-3) caribou were observed on the east coast of the island. A few were also present

on the west side of the island. However, no caribou were observed on the south east coast.

During the period 2000-2003, caribou were more frequently observed on the north east coast, and SAK believed that the animals were either moving to a new range or returning to an area they had previously used.

4.2.4 Southern, Central and Northern Ellesmere Island

With an area of 196,236 km² Ellesmere Island is the largest island within the QEI complex (Natural Resources Canada 2004). For this reason, interviewees' observations of the island have been divided into three spatial categories: Southern Ellesmere (south of 78°), Central Ellesmere (78° to 80°) and Northern Ellesmere (north of 80°).

In 1910 it was estimated that over 500 caribou had been killed in less than thirty years on Ellesmere Island to provide meat and skins for expedition parties (Dick 2001). It is possible that the population of caribou have had a difficult time returning to the numbers once reported by early expeditions.

Within this study, the majority of observations were made on Southern Ellesmere as Grise Fiord is within this area. Interviewees, generally, only traveled to Central and Northern Ellesmere Island when working at Alert or Eureka or assisting biologists. A few hunters occasionally chartered planes for hunting trips beyond their usual hunting areas on Southern Ellesmere.

Southern Ellesmere Island

On the basis of the presence of old antlers, LN believes that caribou once ranged along the southern coast of Ellesmere in a greater abundance than in recent years,

between Muskox Fiord and Baad Fiord. However, by the time Grise Fiord was established, caribou were scarce in the area (Freeman 1976).

1950-1969

From 1953 and into the late 1960s hunters found caribou from Starnes Fiord along the coast to Craig Harbour, and on Stewart, Smith and Cobourg Islands (Fig. 4.11). Caribou within these areas were not abundant but a few could generally be found during Upingaksaq (SAk, AN, LN, IN). According to RCMP reports, a total of 26 caribou were killed by hunters in 1954 and 29 caribou in 1955. In 1954 it was also noted that Inuit hunters had reported that the majority of females observed in the fall (Ukiaq) had calves with them (DIANA 1954-1963). A. Ningiuk (AN) recalls that although the animals were not plentiful they seemed to be in good condition:

One of the two RCMP officers used to thaw out caribou for dog food at his house. Looking back at it, I remember they had a good amount of fat on them (AN).

RCMP records also note that during the winter (Ukiuq) caribou moved away from the coast and then return to the coast in late June and early July (Upingaaq); males returning first, followed by females and calves. The Officer at the Craig Harbour Detachment in 1955 also believed, based on his own observations and those of Inuit hunters, that there was a circular migration of caribou on the southeast side of the island in the winter months, from Fram Fiord east to Wilcox Glacier then west along the south coast across the sea ice to Smith and Cone island to King Edward Point, and then returning to Fram or Starnes Fiord (DIANA 1954-1963).

During the early to mid 1960s, caribou were observed at Anstead point and Fram Fiord during the Aujaq. To LN and IN the abundance of caribou appeared to be less than the previous decade and their past presence in larger numbers was indicated by old tracks and antlers (LN, IN). However, in the 1962-1963 hunting season, RCMP recorded the

taking of 28 caribou, similar to the numbers recorded in the mid-1950s. Twenty-two of these animals were obtained between Lee Point and Jakeman Glacier, while six were obtained in the region around Craig Harbour (DIANA 1954-1963). In 1962, IN also remembers observing caribou west along the coast of Southern Ellesmere and on Kent Island (Fig. 4.11) in Upingaksaag of 1962 (IN).

By the end of the 1960s caribou were rarely seen around Anstead Point and Fram Fiord but the number of muskoxen appeared to be increasing (SAk, IN, LN). LN also returned to Smith Island in the late 1960s and she did not see any signs of caribou.

Closer to the community of Grise Fiord, a few caribou were observed north of Muskox Fiord in Upingaksaag but none were seen on South C, Anstead or Lee Points, Heim or Lindstrom Peninsulas (LN). Along Starnes Fiord, caribou were not observed but caribou antlers along the coast indicate that they were once present (LN).

In the early 1960s, hunters also began traveling to southern Baumann Fiord, around Sor and Stenkul Fiords looking for caribou in the Upingaksaag and Ukiaq. Caribou were also observed in early spring on the south end of Bjorne Peninsula. Throughout the 1960s caribou could be reliably found in this region (IN, LN). IN recalled being able to obtain, on average, eight caribou on each visit. However, he indicated that there were more caribou present than harvested, since they were sometimes limited by the amount they could haul on dog sled and, later, snowmobiles. In the late 1960s caribou were still present within this area (LN).

Around Piliravijuk Bay, in the early 1960s, two caribou were observed in the Upingaksaag (IN). IN believed them to be the only caribou in this area at the time. Throughout the 1960s caribou in this area were not observed by interviewees again but

antlers and droppings on the west side of the bay indicated that they had been present in the area (LN).

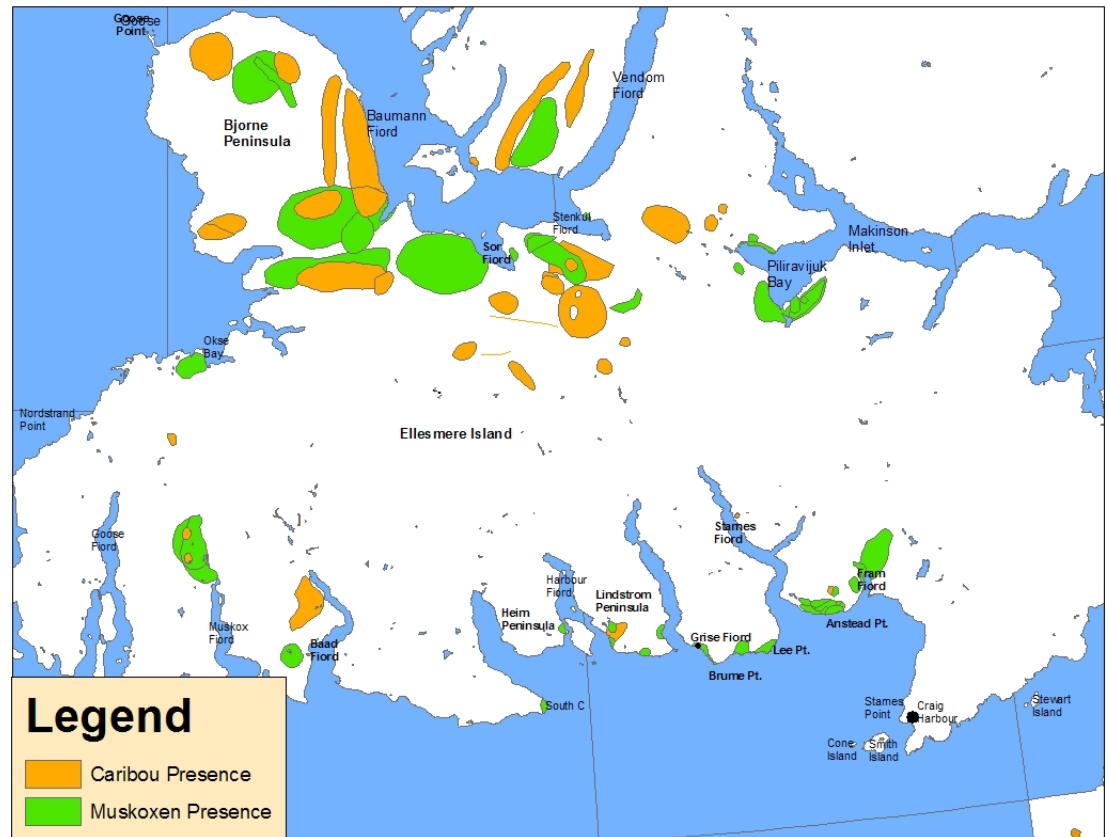


Fig. 4.11- Observed distribution of caribou and muskoxen for southern Ellesmere Island, 1950-1969 (SAk, LN, IN, AN).

1970-1979

Few caribou observations were made within the vicinity of the community of Grise Fiord, except for the unusual occurrence of seven caribou appearing in the hamlet and twenty or more caribou being observed on Brume Point during Ukiaq of 1974 (SAk). As well, a single caribou was observed on the southern tip of Lindstrom Peninsula in the mid-1970s (Fig 4.12)(LN).

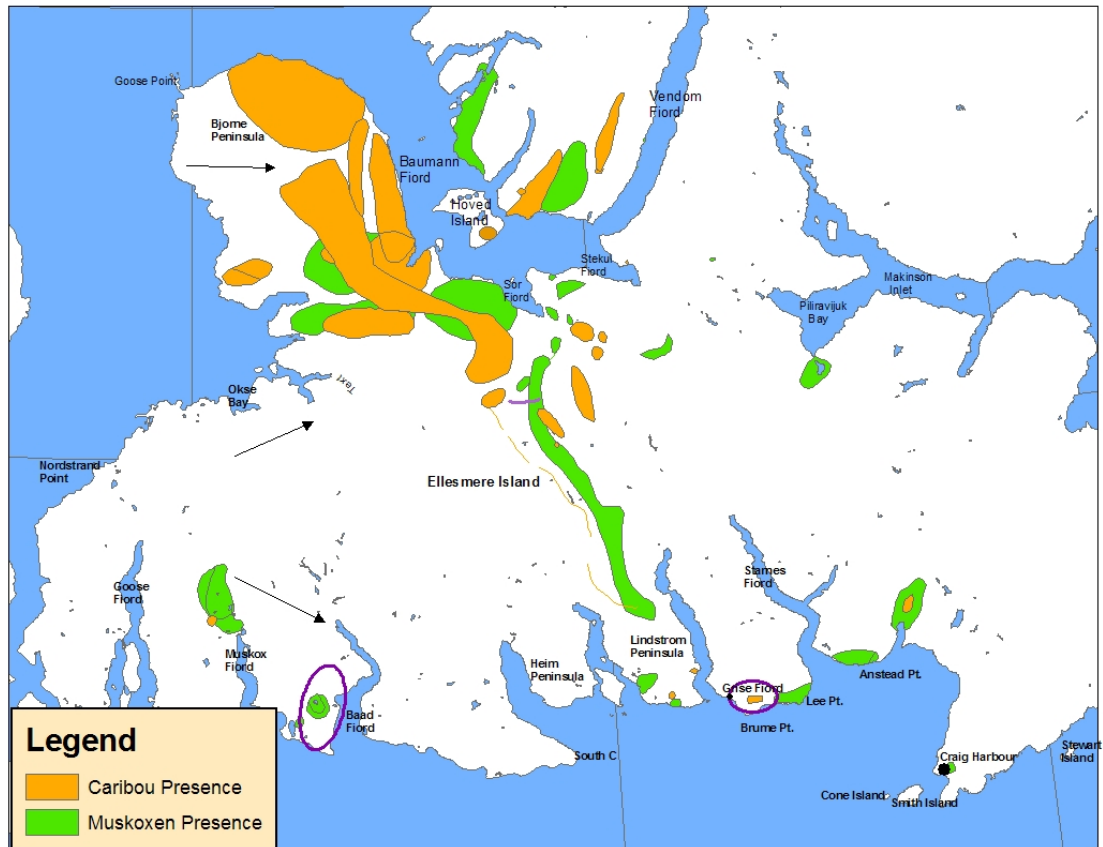


Fig. 4.12- Observed distribution of caribou and muskoxen for southern Ellesmere Island, 1970-1979. Arrows indicate movement of caribou during seismic activity and purple circles indicate areas with a significant increase in abundance during this time period (LN, KK, SAK, IN).

During Ukiaq of the 1970s, SAK, IN and AN regularly found caribou along a trail north of Grise Fiord to Baumann Fiord. In this area they were able to generally find five to 15 caribou on hunting trips (SAK).

In the late 1970s an increasing number of caribou tracks were seen southeast of Sor Fiord during Ukiaq (KK, LN). In the same season during this time period, up to twenty male and female caribou were seen south of Baumann Fiord (KK). According to Freeman (1976), some Inuit hunters believed this area to be a convergence point for a

short fall migration for caribou residing on Bjorne Peninsula and around Vendom Fiord (Fig. 4.12).

During this time period caribou were rarely seen around Piliravijuk Bay and Makinson Inlet but tracks of one to three animals were observed in Upingaksaaq and Ukiaq (KK, LN, SAK). In April during a year in the late 1970s SAK saw the tracks of 5 caribou on the northern coast of Makinson Inlet. This was an unusual place to see caribou because it is a mountainous region composed of glaciers and very little vegetation. However, SAK said that the animals appeared healthy for that time of year.

1980-1989

In the early 1980s a few caribou tracks were observed in Upingaaq just northwest of Piliravijuk Bay (Fig. 4.13) (KK). However, on the same trip, KK could not find any sign of caribou in an area southeast of Piliravijuk; where he had observed them in the 1970s.

In Upingaksaaq in the late 1980s LN observed ten male and female caribou between Nordstrand Point and Okse Bay on the southwest coast of Ellesmere Island (Fig. 4.13). In the same season caribou were also observed in the lowlands between Hourglass Bay and Okse Bay (LN).

During this time period KK and LN believed that the abundance of caribou from the south end of Bjorne Peninsula south to Sor Fiord was decreasing. However, caribou could still be found in small numbers converging for Ukiaq on the southern tip of Svendsen Peninsula and north of Stenkul Fiord (KK).

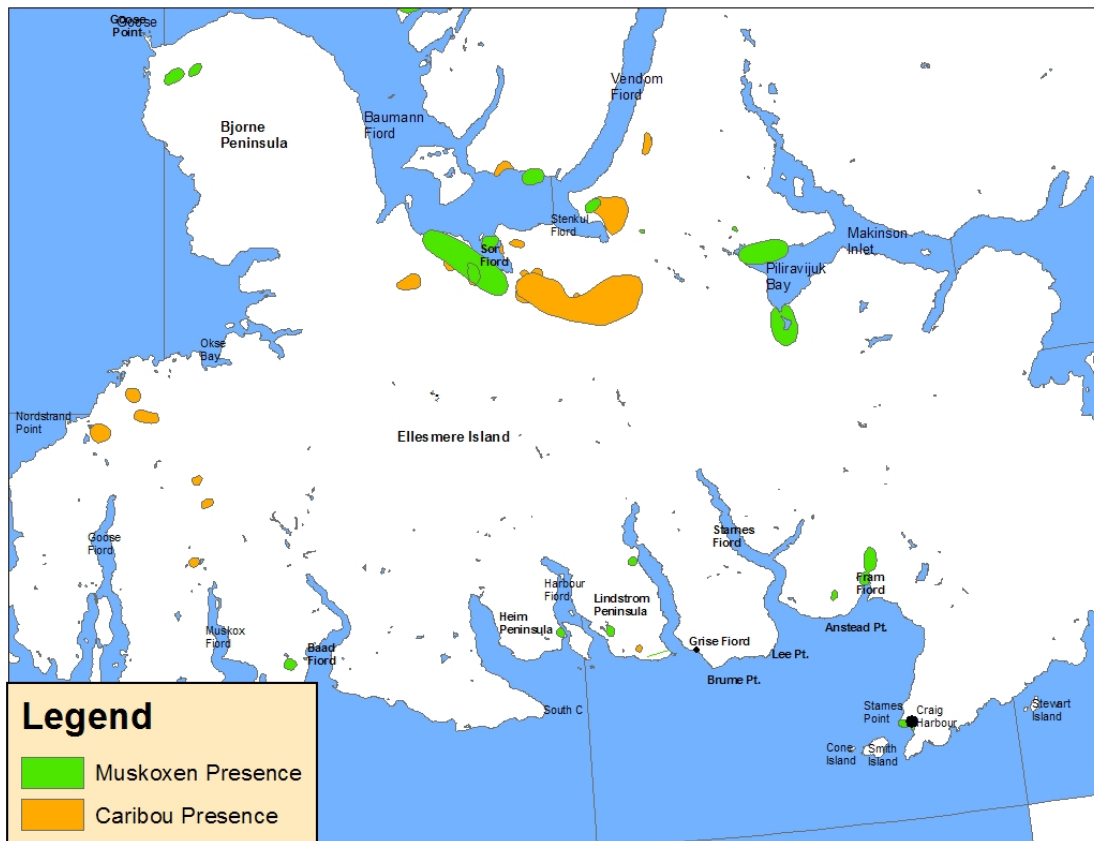


Fig. 4.13- Observed distribution of caribou and muskoxen for southern Ellesmere Island, 1980-1990 (LN, KK).

1990-1999

In the early 1990s, small numbers (i.e., 1-2) of caribou were increasingly seen around Grise Fiord and along the coast to Fram Fiord in the Upingaksaq and Ukiaq (LN, KK, SAK). Caribou were also observed southeast of Grise Fiord, on the south end of Lindstrom Peninsula, Lee point and Heim Peninsula (Fig. 4.14) (IN, LN).

In Ukiaq during the early 1990s caribou tracks were observed all around the valley northwest of Muskox Fiord by SAK while on a hunting trip. However, only a single caribou was observed on this trip (SAK). From SAK's observations made on the west side of the island, from the early to late 1990s, caribou were present inland and north of

Norstrand Point and around Goose Fiord in the Ukiajsaaq and Upingaksaag. According to SAK, ‘caribou are never abundant...like lots but they are usually there every year’.

In the early 1990s SAK also traveled northeast of Stenkul Fiord in Aujaq and observed caribou on the hillsides and mountains (SAK). During this time a dead caribou and two dead muskoxen were found on the ice just off the west side of Bjorne Peninsula. SAK stated that they were extremely skinny and thought that they had died due to disease or starvation. During this period 15 caribou were observed in Upingaksaag on Goose Point. In the same season, caribou were also seen moving north across Norwegian Bay on

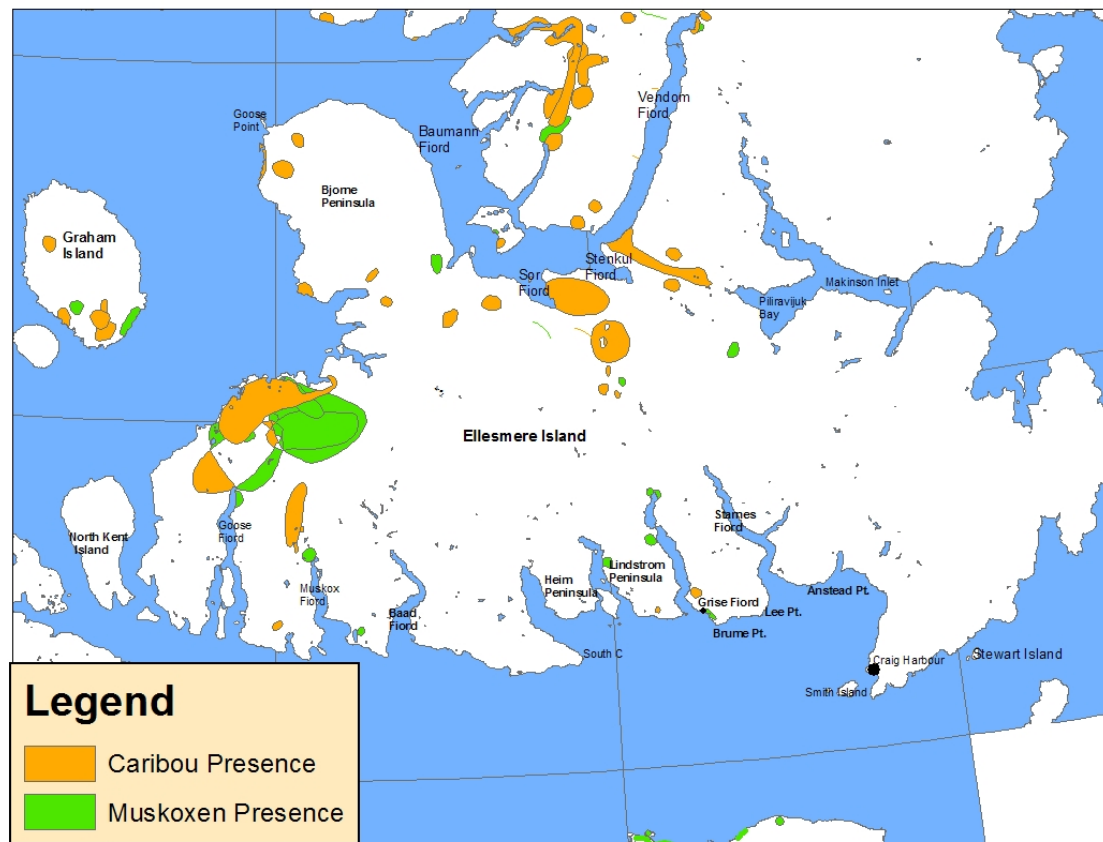


Fig. 4.14- Observed distribution of caribou and muskoxen for southern Ellesmere Island, 1990-1999 (LN, IN, KK, SAK).

the ice between Goose Point to Sherwood Head on Axel Heiberg (SAK). 15 caribou were also observed on Graham Island in the mid-1990s (Fig. 4.14).

By the end of the 1990s caribou were still observed around Sor Fiord, north of Stenkul Fiord and Vendom Fiord, however they continued to be increasingly difficult to find (KK, SAK). East of this region LN believed that throughout the 1990s, the caribou population south of Makinson Inlet and around Piliravijuk Bay remained constant.

2000-2003

In the early 2000s, observations of 32 caribou along the coast of Simmons Peninsula and frequent sightings in the valley between Okse Bay and Hourglass Bay, and around Muskox Fiord led LN, KK and SAK to believe that the abundance of caribou within this area was increasing (Fig. 4.15) (SAK, KK). Following a rain during Ukiuq of 2002, the ground froze and KK observed two dead muskoxen. Around the same time LN also observed a dead caribou and skinny muskoxen near Sor Fiord. KK believes that the muskoxen he saw starved to death because they could not access forage due to the layer of ice on the ground (KK). In 2000 SAK made a trip to Piliravijuk Bay but did not observe caribou or any signs of caribou.

Central Ellesmere Island

1948

In 1948, reports from the Eureka Weather Station indicate that a few caribou were present within the vicinity of the station. The abundance of caribou was low within this region and weather station employees believed it necessary to request to hunt muskoxen (instead of caribou) at this time (RCMP: Kelsall 1948).

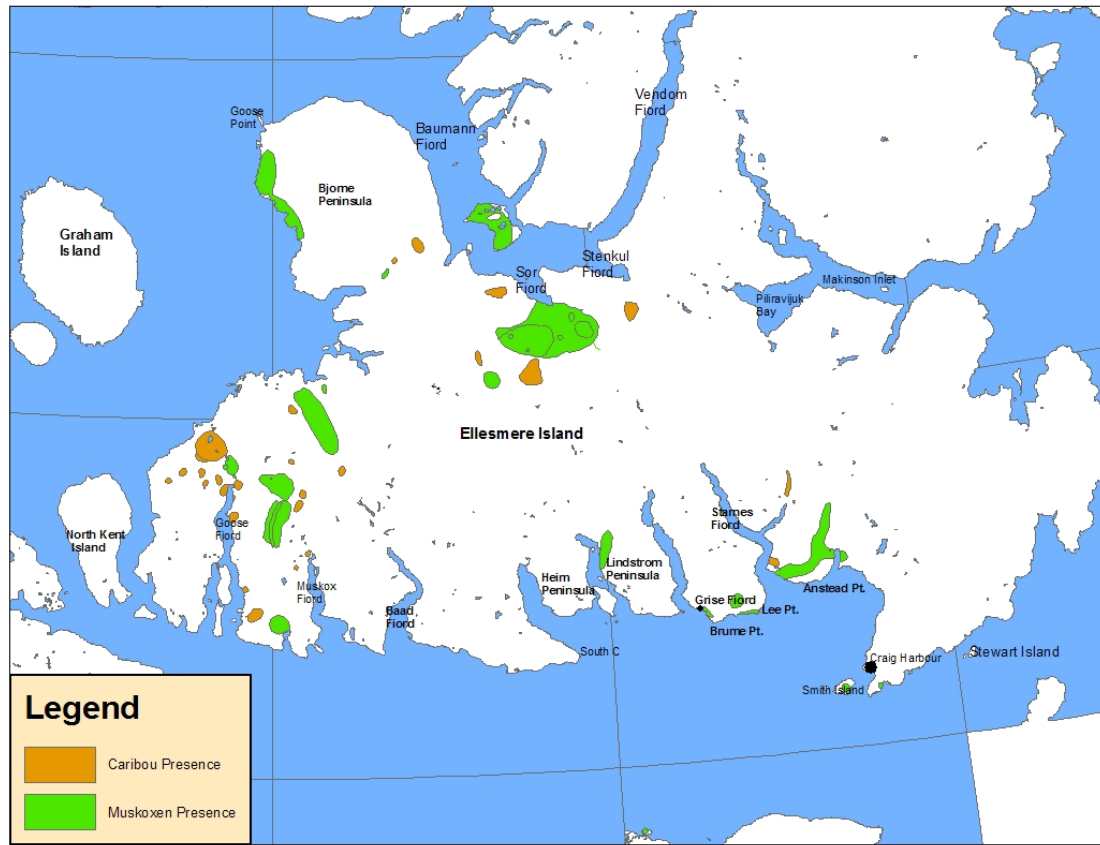


Fig. 4.15- Observed distribution of caribou and muskoxen for southern Ellesmere Island, 2000-2003 (LN, SAK, KK).

1952

In August of 1952 biologist, Dr. Troelsen did not observe any caribou while traveling between Canon Fiord and the Eureka Weather Station but did see tufts of caribou hair indicating that they were present (DIANA 1917- 1953).

1961

A survey conducted by biologist J. Tener in 1961 indicates that the population of caribou stayed relatively constant in contrast to the earlier decade when very few caribou were observed on central Ellesmere. Small numbers of caribou were observed on Raanes Peninsula, around Bay Fiord and Fosheim Peninsula (Tener 1963). In 1961 observations were also made by Akeeagok on a trip from Grise Fiord to Alert (Freeman 1976). He

reported seeing no caribou tracks on the sea ice where he traveled, nor on land around Eureka. This concerned him because he had observed caribou tracks in this area in previous years.

1973

In 1973 a relatively large concentration of caribou were observed around Blind Fiord on Raanes Peninsula, where it is believed that 300 caribou were present (Freeman 1976).

1985-1989

During Upingaaq in the late 1980s, KK observed a total of 17 caribou, in groups of four, six and seven on the northern end of Fosheim Peninsula (Fig. 4.16). Six caribou were observed on the coast of Eureka Sound on Axel Heiberg Island. Two groups of ten and eleven caribou were observed on the south end of Raanes Peninsula in Upingaksaaq (KK).

1995-1999

In the late 1990s, relatively large numbers of male and female caribou with calves were observed in Aujaq on the north end of Svendsen Peninsula (LN, SAK).

2000-2003

In early 2000, LN did not observe any signs of caribou around Eureka (LN). In Upingaksaaq, caribou and caribou tracks were observed in small scattered groups on mid to northern Svendsen Peninsula (LN, SAK).

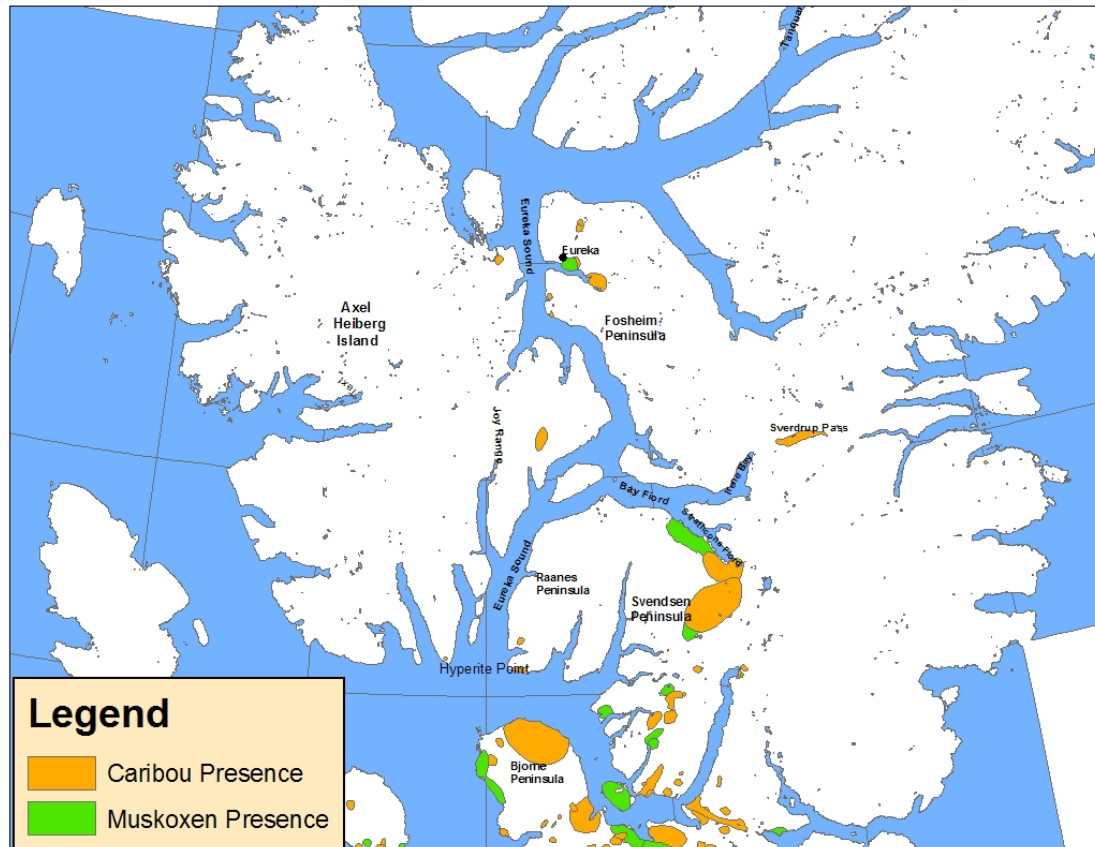


Fig. 4.16- Observed distribution of caribou and muskoxen for central Ellesmere Island, 1980-2003 (KK, SAK, LN).

Northern Ellesmere

1890-1909

Due to its distance from Grise Fiord and mountainous landscape very few interviewees have traveled to northern Ellesmere. Records of hunting by Robert Peary's expeditions indicate that a few caribou were present in the area between Fort Conger to Lake Hazen and northwest of Lake Hazen (Dick 2001).

1961

In 1961 Tener (1963) observed a few caribou on higher plateaus between Lake Hazen and Alert.

1985-1989

During Upingaaq of the late 1980s, KK flew with biologists in order to survey the numbers of caribou and muskoxen. He observed a few caribou on the east coast of Ellesmere. KK also looked for caribou northwest of Lake Hazen in Upingaaq and Aujaq, north of Tanquary Fiord in Aujaq, along the MacDonald River and around Lake Hazen during the 1990s but none appeared to be present (LN).

1995-1999

In the late 1990s, LN observed caribou feces north of Tanquary Fiord along the Air Force River (Fig. 4.17).

2000-2003

Signs of caribou could still be found during this period, north of Tanquary Fiord along the Air Force River. While on a trip to the east coast, LN also found signs of caribou on Bellot Island (south of Fort Conger) (Fig. 4.17). LN also traveled south to Carl Ritter Bay around Cape L Von Buch and found no signs of caribou.

Summary

According to interviewees there is no indication that major population declines (as seen on Bathurst, Somerset and Prince of Wales islands) have occurred on Ellesmere Island since they have inhabited the island. However, interviewees' observations do indicate that the abundance of caribou has fluctuated in different areas on the southern part of the island.

Caribou presence on the southeast of the island appears to have shifted from east to west over the observed period. The only location on central Ellesmere that is known to have had a change in caribou presence is around Eureka. Here, caribou were reported to have been observed during the 1940s and 1950s, but not through the 1960s nor in 2000. However, they are still present on Svendsen Peninsula. Additionally, observations on

southern and central Ellesmere also indicate that migration between Ellesmere and Axel Heiberg may occur.

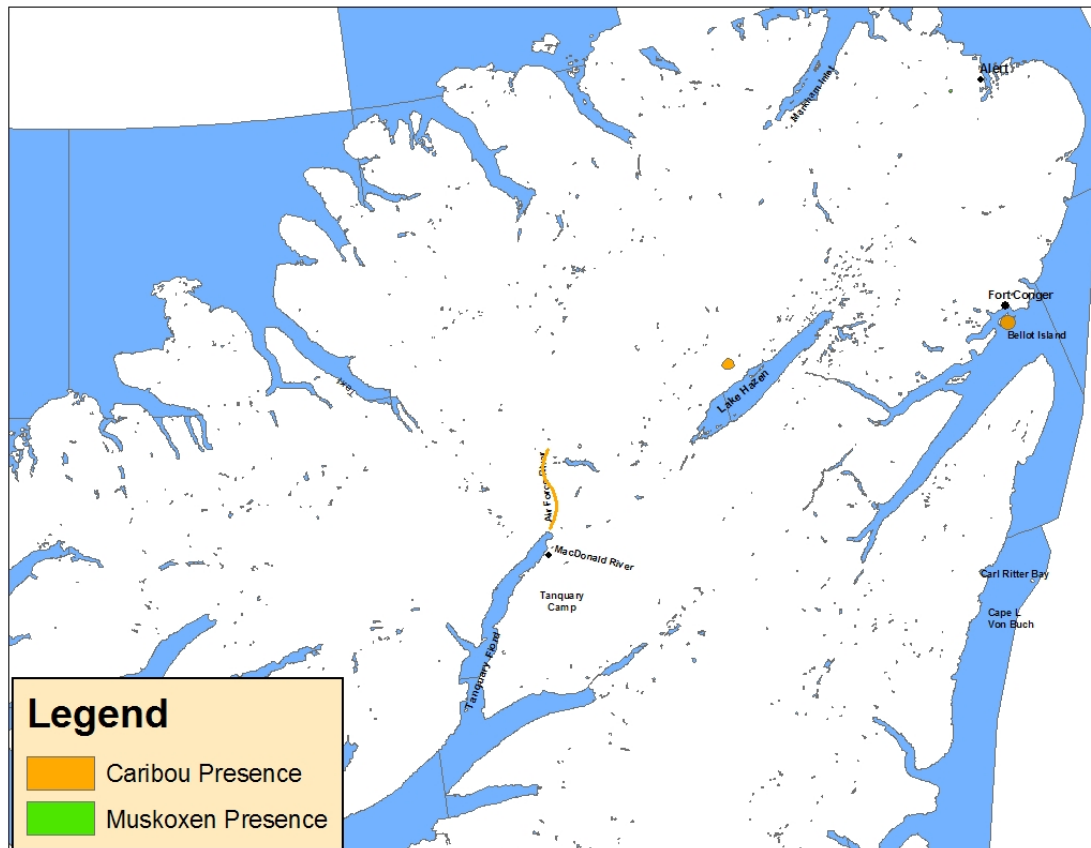


Fig. 4.17- Observed distribution of caribou and muskoxen for northern Ellesmere Island, 1980-2003 (KK, LN).

In the early to mid 1970s there was an unusual distribution of caribou, when a significant movement of caribou eastward on southern Ellesmere occurred. Additionally, during the same time an unusually large group of caribou (approx. 300) was observed on Raanes Peninsula. Interviewees attributed this movement to seismic work occurring over a large area on the west side of the island.

In 2003, interviewees believed that the abundance of caribou on southern Ellesmere, specifically from Simmons Peninsula to Muskox Fiord, was increasing.

4.3 Observed Population and Distribution Trends of Muskoxen

Due to the hunting ban and interviewee's general preference for caribou the observations for muskoxen are not as extensive as those for caribou. However, their observations cover seven islands: Somerset, Prince of Wales, Russel, Cornwallis, Bathurst, Devon and Ellesmere.

4.3.1 Somerset, Prince of Wales and Russel Islands

Somerset Island

1900-1949

Prior to the 1950s few interviewees had traveled to Somerset Island. However, according to TM, elders had told him that they had observed muskoxen on the island sometime in the early 1900s. These reports coincide with RCMP records that claim that 14 muskoxen were killed on northern Somerset Island in the spring of 1924 (DIANA, 1917-1953). According to SI, his father told him that muskoxen died, along with caribou, in large numbers sometime between 1928 and 1930.

1950-1959

In the mid to late 1950s, TM and SI did not see any sign of muskoxen on the island when they traveled across the north coast and down the east coast to Creswell Bay and around Stanwell-Fletcher Lake. The abundance of muskoxen was thought to be low on the entire island. According to Barr (1991) the low number of muskoxen was most likely due to unregulated commercial hunting by fur traders and whalers in the late 19th and early 20th centuries.

1960-1969

Muskoxen were rarely seen on Somerset Island in the 1960s. TM did not see any muskoxen while hunting on the island in the early 1960s and DK did not see any muskoxen when he lived on the island in 1965. In 1966, TM saw three muskoxen on Somerset Island for the first time, and SI only knew of three muskoxen living on the island prior to 1970.

1970-1979

During the 1970s the abundance of muskoxen appeared to increase on Somerset Island. A few muskoxen, in small numbers, were observed between 1970 and 1975 between Aston Bay and Creswell Bay, and around Irvine Bay in Upingaksaaq and Ukiuq (Fig. 4.1) (SAk, LN).

1980-1989

The abundance of muskoxen continued to increase on Somerset Island in the 1980s. Muskoxen presence was specifically noted around Creswell Bay in 1986 and 1987 where TM observed four dead muskoxen, three of which he believed had died in the early 1980s and one in the last year (Fig. 4.2). He was unsure what caused their deaths but other muskoxen in the area appeared healthy.

By the late 1980s, caribou hunters became concerned with the increase in the abundance of muskoxen occurring in areas previously occupied by caribou. Besides potentially expanding from Prince of Wales and Russell Islands, muskoxen and their tracks were also observed coming from more northerly islands (e.g., potentially Cornwallis or Bathurst Islands). Initially muskoxen were observed in grassy areas on the northwest and central areas of the island (TM, SI). By the end of the 1980s, SI believed that '*muskox were all over the island*'.

1990-1999

In the early 1990s hunters traveling around Creswell Bay, Aston Bay and along the west coast observed a continued increase in the abundance of muskoxen, whereas caribou seemed to become scarce on the island (SI, DK). Sometime between 1993 and 1995, SI observed a few dead muskoxen around McCure Bay, however the population appeared to continue to be abundant (Fig. 4.3). In Upingaksaaq during the late 1990s, TM saw muskoxen all along the west coast of the island all the way down to Creswell Bay.

2000

In the spring of early 2000 DK also traveled along the coast and observed muskoxen all the way to Creswell Bay. During this time period SI also observed muskoxen along the northern end of Somerset Island.

Prince of Wales and Russell Islands

1950-1959

SI remembers muskoxen being present on Prince of Wales in the late 1950s. However, he could not remember much about their whereabouts because the hunting of muskoxen was restricted at this time. Muskoxen presence was also noted earlier in the decade in RCMP Game Reports, which stated that ‘a few’ muskoxen were observed on the island in 1952 (DIANA 1917-1953).

1990-1999

One year during the early 1990s (likely 1990 or 1991) muskoxen carcasses were found after rain in Ukiaq that formed an ice crust on some parts of the island. However, the number of muskoxen appeared to continue to increase and they could be found around many of the small inland lakes (SI, DK).

2000-2003

In early 2000, muskoxen continued to be observed in large numbers, especially around the coast and inland lakes on Prince of Wales Island (SI, DK).

Summary

The abundance of muskoxen on Somerset and Prince of Wales Islands has experienced significant fluctuations over approximately the last 80 years. According to SI's father, in the late 1920s the muskoxen living on Somerset had experienced a large decline. However, a low abundance of muskoxen was known to persist until 1966 when only three individuals were known to inhabit the island. In the 1970s and 1980s the abundance of muskoxen greatly increased. It was believed that muskoxen from Prince of Wales and Russel Islands, and potentially other northern islands were migrating to Somerset Island. The abundance of muskoxen continued to increase into the early 1990s when hunters believed that they were abundant in all parts of Somerset Island. In the early 1990s muskoxen carcasses were found on both Somerset and Prince of Wales islands after freezing rain in Ukiq. However, the abundance of muskoxen continued to increase, especially around the coasts and inland lakes, on both islands into the early 2000.

4.3.2 Cornwallis and Bathurst Islands

Cornwallis Island

1945-1955

Observations made by the RCMP and Royal Canadian Air Force (RCAF) indicate that herds of muskoxen ranging in size of two to thirty were occasionally observed on the

island from spring to fall during the period 1947 to 1953 (DIANA 1917-1953; DIANA 1947).

1970-1979

In the early 1970s a few muskoxen would occasionally be seen close to the community of Resolute Bay for two or three weeks in the Ukiuq (TM). One year during the late 1970s, SAK observed muskoxen around Allen Bay, an area where muskoxen had not been observed earlier in the decade. SAM also observed muskoxen on the north west side of the island in Ukiuq (Fig. 4.5).

1990-2003

In the 1990s a small number of muskoxen were occasionally observed around Allen Bay and along the east coast, north of Resolute Bay (Fig. 4.7) (TM, SAK). Sightings of one or two muskoxen near town occurred during the period 2000-2003.

Bathurst Island

As mentioned above, the caribou (and musk oxen) on Bathurst Island have received the greatest attention in terms of structured aerial surveys. This may be attributed to the large interest in petroleum deposits on the island and the island being a primary caribou hunting area for Inuit from Resolute Bay during the 1960s and early 1970s (Ferguson 1991). However, interviewee's observations of the caribou and muskoxen populations on Bathurst Island are limited due to a dramatic decline in the caribou population in the 1970s and subsequent self-imposed restrictions on harvesting (Ferguson 1987).

1950-1959

The presence of muskoxen on Bathurst Island was noted in RCAF records in the spring, summer and fall of 1952 to 1953 (DIANA 1917-1953).

1970-1979

By the early 1970s the number of muskoxen appeared to be declining but they were observed on the southern end of the island in the Ukiaq (TM). Aerial surveys suggest that the population of muskoxen had declined by 85% (Miller et al. 1977).

1980-1989

The low numbers observed in the 1970s continued into the 1980s, as did the hunting ban for caribou (Ferguson 1987). Hence, few interviewees visited the island during this time.

1990-1999

In the early to mid 1990s muskoxen were present on the island as indicated by a large number of dead muskoxen being observed after a rainy period in the Ukiuq. Carcasses were found on the south and south east coasts of the island and on Little Cornwallis Island (SI, DK, SAm).

Summary

In the 1950s muskoxen were observed on Bathurst and Cornwallis islands in herds of two to 30. In the 1970s and 1980s the abundance of muskoxen declined on Bathurst, however some were observed on the south end of the island in Ukiaq. During this same time the distribution of muskoxen on Cornwallis appeared to change and a few muskoxen occasionally appeared around Resolute Bay where they had not been observed previously.

On Bathurst a large number of dead muskoxen were observed dead following a rainy period in Ukiuq. During and following this time muskoxen were observed on the

south and south east coast of Little Cornwallis and the occasional muskox is observed on the east coast and north of Resolute Bay on Cornwallis Island.

4.3.3 Devon Island

1920-1949

RCMP patrol records and regional wildlife records from Dundas Harbour (established in 1924) document the observations and perceived status of muskoxen on Devon Island. Throughout the 1920s muskoxen were observed around Dundas Harbour (south east coast of the island) and other unspecified locations on the island. In 1935 Corporal Kearney observed 33 muskoxen on his visit to the island. In 1947-1948 RCMP officers observed 54 muskoxen on Cape Sparbo (northeast coast), four animals on Camp Newman Smith and twenty animals between Viks Fiord and Dragleybeck Inlet (central west side of island) (DIANA, 1917-1953).

1950-1959

During the mid-1950s, RCMP officers noted that they believed muskoxen were slowly increasing on the island, especially around Cape Sparbo and Dragleybeck Inlet (DIANA 1954-1963). In the late 1950s, IN visited the island yearly in Upingaksaaq and remembers a large herd of muskoxen around Cape Sparbo and the surrounding coast (Fig. 4.8). RCMP Officer Sargent recorded a total of 80 muskoxen observed around Cape Sparbo and seven in a herd near Dragleybeck Inlet in April (Upingaksaaq) of 1958. Officer Sargent also recorded the number of muskoxen carcasses that he found during that year. On Devon, one muskox was found on the sea ice between Cape Sparbo and Grise Fiord and one around Fram Fiord (DIANA 1954-1963).

1960-1969

One year in Upingaksaaq during the mid-1960s, SAK traveled with his father to hunt caribou. During their travels, many muskoxen were observed just north of the inlet around Baring Bay and around Cape Sparbo (Fig. 4.8). IN also observed large herds of muskoxen in the same areas during the same time period and season.

A survey conducted by Freeman (1971) in 1967 found the number of muskoxen on northern Devon to be unexpectedly large (i.e., 450 animals), in comparison to a previous survey in 1958 (i.e., 200 animals on the entire island). In 1969, following the reinstatement of muskoxen hunting, SAK traveled to the northeast coast of the island and found an abundance of muskoxen between Truelove Inlet and Cape Hardy (Fig. 4.8).

1970-1979

In the early 1970s KK regularly traveled during Upingaksaaq to the northeast coast of Devon. During this time, KK often observed muskoxen in groups of four to twenty animals just west of Cape Newman Smith.

1980-1989

Throughout the 1980s, many muskoxen could be found along the coast between Brae Bay and Phalarope Lake, and around Truelove Inlet (Fig. 4.9) (KK, SAK). Hunting trips were also made to the west side of the island during this period and in the mid-1980s SAK observed a large number of muskoxen on the east side of Grinnell Peninsula. He also observed ten dead muskoxen in this area but stated that this was '*not unusual to find*'.

1990-1999

Throughout the 1990s muskoxen were plentiful along the north coast between Firkin Point and Brae Bay during the Ukiuq and Upingaksaaq (Fig. 4.10) (KK, IN, SAK, LN). During this time the number of muskoxen in the area appeared to be stable (LN).

On the northeast coast of Devon Island ‘lots’ of muskoxen were observed between Dundas Harbour and Lemieux Point throughout the early to mid-1990s (SAk). To the east of Dundas Harbour, and during the early 1990s, SAK was stranded on a glacier by weather. At this time, he observed a single muskox come down off of the glacier. The muskox proceeded to eat continuously for an entire day (SAk).

On a trip along the southeast end of the island and up the east coast, SAK passed Cape Sherard, the east coast of Philpots Island, Hodgson Head and Cape Parker but did not observe any muskoxen (SAk). However, he noted that between Hodgson Head and Cape Parker there was suitable vegetation that he believed would be attractive forage to muskoxen.

On the southwest side of the island in the mid-1990s twenty muskoxen were observed in a single group east of Dragleybeck Inlet (SAk). On his travels up the coast SAK saw a live muskox with a dead muskox and another dead muskox around Prince Alfred Bay.

2000-2003

In the early 2000s muskoxen were present around the northeastern coast and around bays and lakes within this area. Their presence was specifically noted with caribou, around Prince Alfred Bay and Bear Lake (IN, DK, SAK).

Summary

From the 1950s to 2000, muskoxen have consistently been observed on Devon, and appear in large groups, mainly around the islands' coasts. SAK believes that there are still areas that could provide good forage to which they could expand on the island, such as Cape Sherard, Phipots Island, Hodgson Head and Cape Parker.

4.3.4 Southern, Central and Northern Ellesmere Island

Similar to the above discussion regarding caribou, interviewees' observations of muskoxen for the island have been grouped into three spatial categories: Southern Ellesmere (south of 78°), Central Ellesmere (78° to 80°) and Northern Ellesmere (north of 80°).

Historically, through hunting records kept by explorers, large herds of muskoxen were known to inhabit the northern part of the island in the late 1800s (Dick, 2001). In 1910 it was estimated that over a 1000 muskoxen had been killed in less than thirty years on Ellesmere Island to provide meat and skins for expedition parties. Large-scale hunting of muskoxen by Greenland Inughuit is believed to have continued to 1914. Following the ban on hunting muskoxen it is believed the population slowly increased. As mentioned in the previous section, the majority of observations of muskoxen (and caribou) were made on Southern Ellesmere due to Grise Fiord being located within this region.

Southern Ellesmere Island

1920-1949

Prior to 1953, muskoxen were observed around Fram Fiord in the spring and summer of 1923 (31 animals), 1947 (26 animals) and 1952 (46 animals); Bjorne

Peninsula in 1932 and ‘many’ were observed around Craig Harbour in 1947 (DIANA, 1917-1953).

1950-1959

In the late 1950s, muskoxen were observed around Fram Fiord throughout the year (Fig. 4.11) (LN).

1960-1969

During the early to mid-1960s, many muskoxen were present around Anstead Point and Fram Fiord during Aujaq, and at Lee Point during Upingaaq and Ukiuq (Fig. 4.11) (LN, IN). By the end of the 1960s the number of muskoxen appeared to be increasing within these areas (SAk, IN, LN). Additionally, an increasing number of observations were made closer to Grise Fiord in the late 1960s. During Upingaaq and Aujaq, muskoxen were observed around Grise Fiord, Muskox Fiord and Baad Fiord, and Heim and Lindstrom Peninsulas during Upingaaq and Aujaq. Muskoxen were also observed year round at Lee and Anstead Points and during Upingaksaaq at Fram Fiord (LN, IN, SAk).

In the early 1960s, hunters also traveled to southern Baumann Fiord, around Sor and Stenkul Fiords looking for caribou in the Upingaksaaq and Ukiaq (Fig. 4.11). Although hunting caribou they also observed muskoxen in this area into the late 1960s (IN, LN).

During the 1960s hunters also traveled to Bjorne Peninsula. In Upingaksaaq many muskoxen were observed with their calves along the coast of Baumann Fiord (SAk). On the south end of Bjorne peninsula muskoxen were observed during Upingaksaaq (IN).

Around Piliravijuk Bay, in the early 1960s, a few muskoxen were observed in Upingaksaaq (IN). The presence of muskoxen was noted during Upingaaq and Aujaq

months, and the number of muskoxen within this area appeared to increase from an average abundance of muskox to many by the end of the decade (LN, SAK, KK).

According to S. Akeeagok muskoxen consistently frequented this area in the 1960s:

There was always evidence of muskox being around that lake. Every time I went there, there were always tracks. If there are no animals there are always tracks (SAk)

1970-1979

Throughout the 1970s muskoxen continued to be observed between Muskox Fiord to Baad Fiord during Ukiuq and Upingaksaaq (Fig. 4.12). Lots of muskoxen were seen around Lee and Anstead points during Upingaaq and Aujaq and around Fram Fiord during the Upingaaq. The occasional muskox passed the town site and Brume Point during the Upingaaq and Aujaq (KK, SAK, IN, LN). Hunters in search of caribou also observed muskoxen and signs of muskoxen along a trail from Grise Fiord to Baumann Fiord during Ukiaq throughout this decade (SAK, IN, AN)

In Upingaaq, during one year in the early 1970s, ten muskoxen were found dead on the southwest side of Baad Fiord. LN believed that they starved to death when they fled to the glacier because they were afraid of the seismic work that had begun on the west side of the island. Based on observations made in the late 1970s and into the early 1980s, KK also believes that the abundance of muskoxen within this area decreased on the west side of Baad Fiord. He concluded that muskoxen were driven away by increased helicopter traffic. These observations coincide with stated dates and locations of the exploration activities of Kenting Exploration and Panarctic Oils Limited (Fig. 4.12) (Riewe 1973).

In the late 1970s, KK and LN observed numerous muskoxen during Upingaksaaq and Ukiaq on Vendom Fiord, the east coast and southern end of Bjorne Peninsula and southern Svendsen Peninsula. In late Ukiuq, muskoxen were also observed on Hoved

Island (LN). Additionally, there were numerous sightings of wolves and the remains of wolf kills in this region (KK, LN).

A few muskoxen were also observed during the Upingaksaaq and Ukiaq around Piliravijuk Bay and Makinson Inlet throughout the 1970s (KK, LN, SAK).

1980-1989

In the early 1980s numerous muskoxen were observed during Upingaaq just northwest of Piliravijuk Bay (Fig. 4.13) (KK). However, on the same trip, KK could not find any sign of muskoxen in an area south east of Piliravijuk; where he had observed them in the 1970s.

Throughout the 1980s LN and KK believed that the abundance of muskoxen in the region around the south end of Bjorne Peninsula south to Sor Fiord was increasing. Muskoxen could also be found during Ukiaq on the southern tip of Svendsen Peninsula and north of Stenkul Fiord (KK). During Upingaksaaq in the late 1980s LN also observed small groups of muskoxen between Nordstrand Point and Okse Bay on the southwest coast of Ellesmere Island (Fig. 4.13).

1990-1999

From the 1980s to the 2000s it was common to see small numbers (i.e., 1-3) of muskoxen during Upingaaq and Aujaq around Grise Fiord and east along the coast to Fram Fiord (LN, KK, SAK). By the end of the 1990s the number of muskoxen within this region appeared to be increasing (LN, KK, SAK). On the east side of the island muskoxen were also observed in Upingaksaaq in the early 1990s crossing Glacier Strait towards the coast of Ellesmere.

On a hunting trip to the southwest side of the island in Ukiaq during the early 1990s, SAK observed muskoxen all around the valley northwest of Muskox Fiord

(Fig.4.14). IN and SAk also traveled regularly along the southwest coast during Upingaksaaq and Aujaq from the early to late 1990s. During this time they observed muskoxen in great abundance. According to both men muskoxen appeared to be *everywhere* along the southwest coast from Norstrand point to Goose Fiord (SAk, IN).

In the early 1990s SAk traveled northeast of Stenkul Fiord in Aujaq and observed muskoxen in many of the grassy valleys. During this time two dead muskoxen and a dead caribou were found on the ice just off the west side of Bjorne Peninsula. SAk stated that they were extremely skinny and thought that they had died due to disease or starvation.

Based on observations made during Upingaksaaq and Ukiaq, KK believed that the number of muskoxen increased throughout the 1990s along the trail to Baumann Fiord and around Sor and Stenkul Fiords (Fig. 4.14). South of Makinson Inlet and around Piliravijuk Bay, IN believes that the muskoxen population in this region remained steady.

2000-2003

In early 2000 SAk saw a muskox on Smith Island during Ukiuq, which was later found dead on the ice of Jones Sound heading towards Devon Island. During this time period muskoxen were observed from the northern end of Bjorne Peninsula down the east coast, south to Sor Fiord, on Hoved Island and on Gunners Island (Fig. 4.15)(LN, SAk). In 2002 and 2003 LN observed numerous dead and unhealthy muskoxen. She believed them to be unhealthy because: (i) one muskox on southern Bjorne Peninsula had dry stomach contents; and (ii) the muskoxen south of Sor Fiord demonstrated strange behavior and appeared to be physically weak. Ill and skinny muskoxen were also observed on the eastside of Sor Fiord (LN, J. Qaunaq). Muskoxen were still observed in the valleys around Piliravijuk Bay in 2000 (SAk).

Central Ellesmere Island

1932

In 1926 the RCMP established a detachment on Bache Peninsula in order to assert and enforce Canadian sovereignty (Dick 2001). In April of 1932, Corporal H. Stallworthy led a patrol that predominately covered central and southern Ellesmere. His records of the number of muskoxen he observed indicate that muskoxen herds were present along the west side of Ellesmere from Nansen Sound down to Raanes Peninsula (DIANA 1917-1953).

1948

In 1948, a request was submitted by the regional mammalogist in the interest of employees of the Eureka Weather Station for permission to hunt muskoxen, instead of caribou, due to the fact that muskoxen appeared to be plentiful, while caribou were rarely observed within the area at the time (DIANA 1947- 1950).

1950-1959

In 1950, a wildlife survey observed 420 muskoxen around Slidre Fiord (DIANA 1954-1963). A population of approximately 200 animals was recorded in August of 1952 by Dr. Troelsen between Canon Fiord and the Eureka Weather Station (DIANA 1951-1953). Muskoxen are also observed in the early 1950s in small abundance on the east coast of Axel Heiberg Island across from Eureka (DIANA 1917-1953).

1961

A survey conducted by biologist J. Tener in 1961 indicates that the population of muskoxen stayed relatively constant in the central region in contrast to what was observed in the earlier decade (Tener 1963).

1970-1975

In the early to mid-1970s large numbers of muskoxen were thought to be present on Raanes Peninsula (Freeman 1976).

1985-1989

In June of one year during the late 1980s, KK observed 14 muskoxen on the northern end of Fosheim Peninsula (Fig. 4.16). During Upingaksaaq, six muskoxen were observed on the south end of Raanes Peninsula (KK).

1995-1999

In Aujaq of the mid-1990s, a few muskoxen and horns were observed by LN on the south coast of Bay Fiord. In the late 1990s, LN also observed many old and new muskoxen horns around Strathcona Fiord up to Irene Bay. Tracks and droppings along Sverdrup Pass also indicate that muskoxen were present during the previous Ukiuq (SAk).

2000-2003

Early in the new millennium (2000-2003), a number of muskoxen were observed around Eureka (LN). During Upingaksaaq, LN and SAk observed muskoxen on the northern half of Svendsen Peninsula (LN and SAk). Twelve muskoxen were also observed during Aujaq east of Joy Range on Axel Heiberg Island to Eureka Sound (LN).

Northern Ellesmere

1890-1909

Due to its distance from Grise Fiord and mountainous landscape very few interviewees have traveled to northern Ellesmere. Records of hunting by Robert Peary's expeditions indicate that muskoxen were plentiful in the area from Fort Conger to Lake Hazen and northwest of Lake Hazen (Dick 2001).

1934

In 1934 Edward Shackleton, with the support of the RCMP, headed a land expedition to northern Ellesmere (Dick 2001). During this time he reported seeing small numbers of muskoxen around Alert, Markham Inlet and Lake Hazen (DIANA, 1917-1953).

1961

In 1961 Tener (1963) observed a large number of muskoxen in valleys between Lake Hazen and Alert.

1985-1989

During Upingaaq of the late 1980s, KK flew with biologists in order to survey the numbers of caribou and muskoxen. He observed a large abundance of muskoxen on the southeast coast of Ellesmere. Many were also observed northwest of Lake Hazen in Upingaaq and Aujaq. On this same trip, muskoxen were observed in the valleys north of Tanquary Fiord during Upingaaq and early Aujaq but they moved out of the region in late Aujaq (KK).

1990-1999

Muskox were still seen in the valleys north of Tanquary Fiord and along the MacDonald River and around Lake Hazen during the 1990s (Fig. 4.17)(LN). In the late 1990s LN traveled south to Carl Ritter Bay around Cape L Von Buch and found no signs of muskox.

Summary

Muskoxen have consistently increased on southern Ellesmere since at least the 1930s and have also regularly moved to and from different valley and coastal locations on the island and possibly southern Axel Heiberg. However, in the 1970s it is believed

that muskoxen on the southwest part of the island were disturbed by seismic exploration and significantly changed their distribution to avoid these activities. Additionally, ten muskoxen were thought to have died when they fled to a nearby glacier to escape the disturbance and as a result starved to death. However, it does not appear that the overall abundance was affected by these activities.

4.4 Conclusion

Over the period of time observed by interviewees it is evident that caribou and muskoxen have experienced the largest fluctuations on the more southerly islands, especially Bathurst, Somerset and Prince of Wales Islands, where few caribou were known to range during most recent time period (i.e., 2000-2003). In comparison, caribou and muskoxen have experienced smaller, local fluctuations on the northern islands of Devon and Ellesmere Islands where caribou and muskoxen exhibit greater abundance.

Interviewees from both Grise Fiord and Resolute Bay indicate that fluctuations in population abundance and changes in distribution were influenced by regular population cycles, weather and human disturbances. Large die-offs of caribou on the southern islands were mainly attributed to a combination of population cycles and unusual weather, e.g., rain in fall or winter which created ice lensing on the ground surface. However, interviewees also indicate that seismic work on Bathurst Island may have also influenced changes in distribution on this island. On the northern islands significant changes in caribou and muskoxen distribution were attributed mainly to seismic activities.

Overall, the populations of caribou and muskoxen on Ellesmere and Devon Islands appears to be stable. On the other hand, the populations of caribou on Somerset, Prince of Wales and Bathurst Islands seems to be extremely low and unstable.

Chapter 5

Results and Discussion:

Inuit Knowledge of Peary Caribou and Muskoxen

On first sight, a map is often viewed as a method of imparting knowledge based upon spatial attributes and/or a visual representation of decisions or policies pertaining to land use. However, upon closer examination, through the names of streets, places and structures, even the most basic map can reveal stories of human history and characteristics of a culture (Rundstrom 1993).

In the previous chapter, the presence (or possible absence) of caribou and muskoxen within particular regions of the Canadian High Arctic was presented. This fairly objective documentation has its benefits for local HTAs and wildlife biologists by providing a reference that will assist in making decisions related to future research and resource management and development. Historically, this was often the extent of Inuit knowledge used within scientific research. The majority of the individual and cultural context of this information would be ‘suppressed’ under the desire to create impartial knowledge. In recent years, it has been recognized by researchers that Indigenous peoples’ environmental knowledge has many more layers that should be, and in fact, must be discussed.

Within this chapter, elements of caribou and muskoxen ecology derived from interviews and Inuit cultural perspectives are presented. Through the visual presentation of this information, the maps begin to come alive with the movement of caribou, muskoxen and people through the narratives of the interviewees.

5.1 Caribou Calving

Interviewees knew only a little about the circumstances surrounding the calving of caribou. Calves are generally born in late spring (Upingaaq) (DK, SS). Similar to caribou that are restricted year-round to Arctic tundra such as on Baffin Island (Ferguson 1989), Peary caribou do not appear to congregate in a common calving location. SAK suggested that the location in which a cow chooses to calve appears to be dependent primarily upon external factors that influence her decision annually.

However, there are certain areas where interviewees generally observed caribou calving over the years. People from Grise Fiord and Resolute Bay have reported seeing caribou calving around Strathcona Fiord (Ellesmere), Makinson Inlet (Ellesmere), Baumann Fiord (Ellesmere), northern Prince of Wales (Fig. 4.4), Young Island and southern Bathurst Island (TM, DK, LN, SI; Freeman 1976).

According to SI, caribou prefer to calve in cooler areas and in higher areas (as opposed to valleys). However, he has occasionally witnessed young calves on islands in lower areas that tended to be warmer.

5.2 Differences between Caribou throughout the Study Area

Caribou are slightly different between High Arctic islands.... in the Bathurst region caribou and Prince of Wales and Somerset caribou are different (HK)

According to various interviewees there are perceptible differences between caribou living throughout the islands within the study area. Generally, interviewees explained that the further north a caribou lives, the smaller it is physically (SI, DK, SAK). Boothia Peninsula is inhabited by two subspecies of caribou; mainland caribou and on the north end, Peary caribou. The majority of caribou found on Boothia Peninsula are mainland

caribou and are physically larger, with longer faces and darker fur (DK, SI). According to SI, Peary caribou found from Boothia Peninsula to Bathurst Island possess a similar shape; however as you move from the peninsula upwards, the bones of the caribou become smaller and their fur has a finer texture. Further north of Bathurst Island features that are unique to Peary caribou become more pronounced; i.e., the heads are smaller, their noses are shorter and pushed-in, their bodies appear more compact with shorter legs and their fur is a lighter colour (SAk, DK, SI). SAk believes that these northerly caribou are actually a different type of Peary caribou. Although interviewees have seen mainland caribou among or close to herds of Peary caribou on Boothia Peninsula, the larger and darker mainland caribou has only very rarely been seen on Somerset and Prince of Wales islands (TM, SI, DK). SI emphasized that the caribou on SI and PWI are Peary caribou and that mainland caribou could not survive for very long on these islands because the high arctic forage could not support the larger caribou (Ferguson pers. comm.)

The taste and texture of caribou differs between islands. As a connoisseur of Peary caribou meat, SI has experienced different tastes and textures in caribou caught on different islands.

If I eat [mainland] caribou fat from the Boothia area it is like eating a cracker but if I eat caribou in exactly the same month from Prince of Wales I can't eat very much because it is too fat (SI)

SI believes that the availability of various plants growing on different islands, and hence the different vegetation that caribou eat, influences the composition of their fat and muscle tissue. For example, on Somerset Island there are blueberry plants (that do not grow berries) and heather that caribou consume. The caribou caught on this island have meat that is lean and the fat is only slightly oily. On the other hand, Peary caribou on Prince of Wales Island forage on grasses during summer and tend to have more oily fat during this season (SI).

Bathurst Island caribou tongues are tastier than Prince of Wales caribou tongues (HK)

Other interviewees reported similar experiences in the variety of caribou meat obtained from different islands and locations; often they expressed this by stating that they enjoyed meat from different regions more than others. Generally, the further north caribou were caught the more tender the texture of their meat (LN, IN, SA, SI).

According to KK, this trend of larger caribou with tougher meat in more southerly locations was also applied to caribou outside of the study area. KK compared caribou on Baffin Island to caribou around Grise Fiord stating that they are bigger with proportionally larger heads and their meat and tongues are tougher than Peary caribou. Caribou on Baffin Island are of the same sub-species as the large caribou on Boothia Peninsula, i.e. *R.t. groenlandicus* (Banfield 1961). In recent years, interviewees have observed a change in the distribution of the different caribou on the islands.

When I was a child, this area had its own kind of caribou. Today, just like us, not too long ago I saw a herd of caribous that were mixed together, different kind of caribous in the same area (SI).

Using the analogy of the increase in non-Inuit and Inuit people having children in the north and the subsequent increase in inter-racial people, SI explained that the increase in observed caribou across the islands appear to be inter-mixing. In the past, large and dark mainland caribou from southern Boothia Peninsula occasionally were observed within herds of smaller and lighter coloured Peary caribou on northern Boothia Peninsula. In recent years, this appears to be happening more frequently on Boothia Peninsula (SI, TM). However, SI pointed out that caribou on Prince of Wales Island, Somerset Island and islands farther north are still exclusively Peary caribou.

SAk and KK also believe that the Peary caribou around Devon Island and Ellesmere Island have changed. In the 1970s they remember caribou that were small and

white, with pushed in noses. Today, they very rarely see these caribou and instead, they see caribou that have traits somewhat similar to caribou from more southerly locations such as Iqaluit and Pangnirtung on Baffin Island.

5.3 Relationship between Muskoxen and Caribou

...muskox and caribou kind of take turns in numbers. Like for some period it will be the muskox's turn to multiply but then when they begin to die-off or disappear the caribous turn will come. They never multiply in large numbers at the same time. (TM)

Over time it has been observed that on Somerset and Prince of Wales Islands when there is an increasingly high number of muskoxen, there is a corresponding low number of caribou. Such observations were made in the late 1980s and into the 1990s on Somerset Island and Prince of Wales Island. According to Inuit knowledge, the trend may be so extreme that the growth of muskoxen on an island has been accompanied by the complete disappearance of caribou on the island (SI, TM, TI). The reason for this occurrence is unclear to interviewees and biologists (Vincent and Gunn 1981; and TM, LN).

Some interviewees stated that caribou and muskoxen feed on different vegetation and therefore do not compete directly for forage. This would suggest that there is indirect competition through displacement or avoidance. However, they tend to inhabit different habitats; generally caribou forage in higher areas and muskoxen in lower valleys (LN, DK, TM, SI). Biologists agree that this is usually true; however, it has been suggested by biologists that during some severe winters caribou will inhabit valleys and when other vegetation has been depleted both ungulates will eat willow (Parker 1978; Miller 1997; Ferguson 1991). This competition for food may have a greater impact on caribou who SAK believes are picky eaters, while muskoxen eat a wider variety of vegetation.

The muskox, they stink and that is one of the reasons (KK)

Similar to their name, muskoxen have a distinct, and to many, unpleasant musky odor. Most interviewees offered this as one of the reasons for caribou and muskoxen staying in different places (LN, TM, DK, SI, SAK, IN). Caribou are thought to be sensitive to smells and perhaps they find the smell of muskoxen undesirable and move away from them. T. Mullin (2004 pers. comm.), the Wildlife Officer in Resolute Bay explained that when doing field studies out on the land they had to be careful not to use spray paint on the ground because caribou do not like the smell and she worries that they will leave the area if it is used.

5.4 Natural Population Fluctuations

Many species experience a natural cycle in which their numbers increase, peak and decline (Wilson 1997). It has been suggested by interviewees that Peary caribou and muskoxen populations go through such fluctuations (TM, LN, IN, SI, KK, SAK). Many interviewees believe that the increases and decreases in the caribou and muskoxen numbers that have been witnessed in recent history are part of a natural pattern.

They [older relatives] said it was normal because some years you get a certain period where you just get caribou building up and up and then when they seem to reach a point when it seems like they can't get anymore then they go down almost to nothing (TM)

As stated by TM, older hunters had told him that these fluctuations had taken place in the past. SI was told the same thing by his father, Timothy Idlout (TI), who had experienced a fluctuation in which caribou increased to large numbers and then decreased to almost nothing over a period of approximately thirty years. Through what TI experienced and by what he was told by his elders, he fairly accurately predicted the population decline of caribou in the late 1980s and 1990s on Somerset and Prince of Wales Islands (SI).

When LN was younger she hunted with her father and they sometimes saw remains (antlers or horns) of caribou and muskoxen. Her father told her that even though there were no caribou/muskoxen at that time, they would return when she was older. This happened between Muskox and Baad Fiords on Ellesmere Island:

...there are some antler remains, before we arrived, all that area use to have caribou. There use to be caribou there, now they are slowly returning (LN)

KK has traveled all over Ellesmere Island over the last thirty years and generally believes that the overall caribou population on the island has remained steady. Like LN, he believes that it is natural for caribou to leave an area for some time and then return again. He believes that caribou and muskoxen are resilient:

I hear that caribou are now an endangered species. I, myself, don't believe that...myself, like we all think differently, but there are so many archeological sites in this area. They did that for 4000 years and before our time those people they lived on muskox and caribou....those caribou and muskox have been used for survival in this area before us and explorers have used caribou and muskox before we started hunting. It's taking time, it is taking especially caribou time....to grow back to the normal population how it used to be. This is my own personal view (KK).

5.5 Parasites

According to LN and SAK, parasites are rarely observed in Peary caribou living within the High Arctic and interviewees from Grise Fiord, have rarely, if ever, seen parasites or diseases in caribou. Interviewees from Resolute Bay have only seen widely spread parasites on Peary caribou on Somerset Island, Prince of Wales Island and Boothia Peninsula during the late-1970s to early-1980s, not on islands to the north (TM, SI).

It is unknown exactly what type of parasite was observed but they were described by interviewees as round, dime sized, white spots embedded in the meaty tissue of the caribou (TM, SI, DK). Based on interviewees' descriptions and parasites that are known to occur in Nunavut, it is possible that the interviewees saw *Taenia*, a tapeworm cyst that

is found in the muscle and heart tissue. *Taenia* larvae are ingested when caribou are grazing. They grow into adults in the intestines of foxes and wolves, after the cysts in caribou are ingested by these scavengers and predators. Animals with these parasites usually appear healthy (Northwest Territories Environmental and Natural Resources 2005).

TM suggested that these parasites could have come from Barren-ground caribou that mingle with Peary caribou on Boothia Peninsula. The parasite could then possibly be carried to Somerset and Prince of Wales by migrating Peary caribou.

This parasite appeared in caribou when the population had grown so large that it was described by interviewees as being ‘too many’ for the area to support (DK, TM, SI). Following this incidence of parasites observed in caribou tissue, the number of caribou within these areas plummeted. Although it is unknown whether or not this parasite played a role in the decrease in the number of caribou, TM believes that there is a relationship between the large number of caribou and the presence of these parasites:

...maybe it is my own thinking but when you get lots of caribou that is when they get some kind of a sickness. Because the caribou around Somerset, when there were very few they were always healthy (TM)

5.6 Weather

The possible impacts of extreme seasonal climatic variation has been the general focus of biological discussions regarding Peary caribou and muskoxen population fluctuations (Miller et al. 2003; Mech 2000; Parker 1975).

Is there really global warming overall or is the phenomena just the cyclical variations of the weather that has been observed by the elders and passed down for the knowledge of the next generation? (Peter Ernerk, 1994)

Ernerk, an Inuk from Rankin Inlet, summarizes the tension that some interviewees expressed when discussing the effects of weather. Interviewees generally supported the idea that climate has an impact on caribou and muskoxen, but did not mention global climate change as the primary factor influencing the fluctuations in animal numbers. The degree of influence that interviewees believed weather to have on caribou varied between individuals:

I think that the caribou will slowly come back in the islands here as long as the weather doesn't freeze up again. I think that is the thing that affects them more than anything else. If they can't get at their food they can't eat (TM)

The snow, the weather, I don't think it has any effect on the animals, it is their way of life, they are outside animals, they live in the snow....it is the movements of mining and oil explorations, high noises of airplanes, I think those are the things that effect the animal (LN).

For these two individuals the difference in opinion may likely be due to what they have observed within their different hunting areas. The residents of Resolute Bay have observed weather patterns that they believe have had a much more dramatic impact on caribou and muskoxen. Interviewees from Grise Fiord generally did not believe that weather has had the same impact on caribou on Ellesmere (LN).

Biologists have attributed many of the declines in caribou and muskoxen numbers on the QEI to 'unfavorable snow and ice conditions' (Parker et al. 1975; Miller 1991; Miller & Gunn 2003). Similarly, many interviewees felt that freezing rain over deep snow or the partial melting of snow in warm weather followed by cold temperatures that quickly freeze the wet snow had an impact on the ability of caribou and muskoxen to access food.

There were two years in a row that had freezing rain in the fall after the snow- I think that did away with a lot of caribou either some of them died off or moved away. (TM)

The second rain reached the ground below the snow, we couldn't climb hills with our snow machines, because it was icy. After the second time it rained, then the following spring it snowed a lot, and lots of snow on the ground. We use to come across snow

banks, that were dug by caribous, when we were traveling through Ujarasiuvik¹⁵ the area that hunters from Resolute Bay hunt for caribous. Here, at the time the caribous were dying off in great numbers (SI).

As a result, caribou and muskoxen would try and move to an area where they might be able to access food, and if unsuccessful they would starve to death (TM, LN, SI, DK, KK). This could be partially responsible for the number of carcasses found on the ice between islands.

....but all of them don't die off when it starts to freeze up, like raining and freezing after, some animals die off but not all of them (LN)

Many interviewees emphasized that the effects of icing over vegetation had the ability to cause caribou and muskoxen to starve but they did not believe that it killed all of the animals (DK, SI, TM, LN).

Weather on the QEI varies within larger islands and between islands (Woo et al. 1999). Interviewees speculate that caribou that survived moved to other areas or islands in which they could access forage (SI, TM and DK).

5.7 Wolves

The high arctic wolf (*Canis lupus arctos*), a subspecies of the grey wolf, is known to inhabit many of the QEI and is thought to follow caribou and muskoxen when they shift their range (DK; Miller et al. 1995). In the Grise Fiord hunting areas, LN and SAK believe that wolves prefer muskoxen over caribou. Besides humans, wolves are the only known predator of caribou and muskoxen within the study area. People have expressed concern with wolves killing caribou when caribou populations are low (Miller 1997).

This concern was shared by SAK who stated: *'Wolf, I consider them to be killers more than human beings there are some years when there are more wolves than others. So far we have been*

¹⁵ Ujarasiuvik means 'the place to look for rocks'.

able to manage them'. If wolves do have a deleterious impact on ungulate populations, they may have more of an impact on muskoxen; which appear to SAK and LN to be killed more often by wolves than caribou.

Most interviewees saw wolves as part of the natural system and did not believe that they had a major impact on the large declines observed in caribou populations (TM, LN, SI, DK, KK).

Wolves, wolves...I don't think that the wolves have ever killed off all the caribou (TM)

There were some wolves and wolves usually follow where there are caribou...The decrease is not caused by wolves, there were wolves but they certainly would not finish off the caribou. The only time the wolves kill caribou is when they are hungry, they do not kill caribou just for sport (DK)

In fact, KK indicated that wolves may positively impact muskox and caribou herds because they generally kill the weak and sick animals.

5.8 Petroleum Exploration

Exploration activities by petroleum companies and their subsidiaries have been a long standing concern for many of the interviewees. With the increasing need for fuel resources the QEI may be a future site for increased mining and drilling. There has been very little environmental research conducted in the past to assess the impact of these activities on caribou and muskoxen, or the surrounding ecosystems in general (Freeman, Hackman et al. 1975).

Seismic exploration in the QEI was conducted using loud explosives to determine the different types of rock formations and properties (Richardson and Malme 1993). For example, over a one month period in 1973, approximately 195 miles of seismic lines traversed Bathurst Island. In addition to this activity, five land camps and four airstrips on

the sea ice along the shoreline were constructed (Riewe 1973). During this time DK observed caribou moving on the island:

PanArctic was doing some seismic work from the north and as they were moving further south the caribou started moving out, there were three drilling sites at Bathurst Island and therefore in the spring time caribou started moving away (DK)

Beginning in the 1960s, LN and KK believed that caribou and muskoxen were moving away from exploratory work on northwestern Ellesmere Island. They believed that the noise and smell of the explosions frightened the animals, and accompanying disturbances, such as aircraft and land vehicles, and residual materials, such as oil drums and garbage, also caused the animals to vacate these areas.

I think from the noise and the odor, like from the machinery effects their [caribou] feeding habits (KK)

As soon as this area was being explored, this area [southwest Ellesmere] has a glacier, if muskoxen flee they can starve. Caribou are the same, as soon as this area where they feed on is tampered with, they flee through the long glacier area and starve to death (LN)

Interviewees believe that these activities frightened the caribou and muskoxen causing them to move away from good grazing areas to poor grazing areas and possibly to starve. Additionally, some interviewees believe that the animals that did stay within the area became physically unhealthy.

Seismic work causes caribou to move because they don't like the smell of it and the ones that stayed were unhealthy (HK)

Some interviewees suggested that the smoke from seismic explosions and fuel leaking from oil drums made the animals sick (LN, SI, KK, DK). While the scientific community has done little to examine the impacts of petroleum and mineral exploration on caribou and muskoxen, and what studies have been done have been inconclusive, other Inuit also believe that these activities are detrimental to caribou (Miller and Gunn 1979; Freeman 1974). Some Inuit from the Kititkmeot region in Nunavut believe that these activities are

stressful to Bathurst caribou especially during calving and migration periods. Their views are similar to those of interviewees within this study:

I am worried that if there is too much mining going on up here in the North, caribou might just change their route and not come around completely....It is going to be harder for everyone up north to go hunting (Anonymous C 1998, in Thorpe et al., 2001: 109)

One interviewee suggested that that the mining and oil drilling did not disturb some of the caribou and perhaps some adjust to the activities:

I worked on the oil rigs. There were caribou around the rig...if they were afraid of them they would be running away so I think that they might get used to it if they hang around the area...of course some of them do move away but they are always doing that anyway even though they are not disturbed ...so you can't really say it doesn't bother them...if they were afraid they would be running away...when I was working on the oil rig there were caribou around outside...maybe some go away but it doesn't kill them off (TM).

This belief was shared by a resident of the Kititkmeot region:

Those mining companies....do not bother the caribou, so I do not mind them....When the caribou are not being bothered, they do not run away. The caribou usually stand outside the building of the mines (May Algona 1999, in Thorpe et al., 2001:109)

On Ellesmere Island, LN recently observed a return of caribou to areas that they left thirty to forty years ago when exploratory work was being conducted. Now that this work has stopped for many years she believes that caribou are returning to the southwestern part of the island.

5.9 Motorized Disturbances: Planes, helicopters and snowmobiles

I know they run away from planes, if you fly low enough... and helicopters and snowmobiles (TM)

Concern regarding the impacts of motorized vehicles and planes was expressed by some interviewees. As observed by TM, through immediate contact caribou will generally flee from motorized vehicles and planes. Muskoxen have been

known to either run or form a defense formation when planes or helicopters fly overhead (Miller and Gunn 1979; Gray 1974). This behaviour indicates that the presence of motorized vehicles elicits a behavioral response that demonstrates that the animals are stressed.

Some interviewees believe that repetitive interaction with motorized vehicles and planes causes muskoxen and caribou to leave the areas in which these vehicles are prevalent (KK, TM, LN, SAK).

Muskox in this area [lower southwest side of Ellesmere], we started seeing less muskoxen in this area and that time from what I can remember, helicopters and more activities started in this area that's when I noticed they were starting to get less muskox in this area..they just moved (KK)

On northern Ellesmere Island, LN, KK and SAK believe that the increase in air traffic going to Quttinirpaaq National Park, Alert and Eureka has caused caribou to leave these areas. LN has been told by Greenlandic people that there has been an increase of Peary caribou in recent years. She believes that caribou from Ellesmere Island have crossed over the ice to Greenland due to the increase in air traffic.

5.10 Research, Caribou and Muskoxen

Animals, if they are not going to be taken for food, animals shouldn't be harassed by anyone, or by any person...When they are testing or counting or collaring that is what I am concerned about. They are going to decrease the caribou numbers (LN)

There are numerous points of contention between the actions and beliefs of scientists and holders of traditional knowledge. During interviews and community discussions, interviewees and other community members often expressed deep concern about the handling of caribou for scientific research (LN). In January 2005, Grise Fiord HTA made their concerns public in an article entitled 'Keep hands off caribou, hunters urge scientists' (CBC News North 2005). Within this article, interviewees expressed specific concern about directly handling the animals and collaring animals (LN, JAK and

CBC News North 2005). As stated by JAK, 'Western science may help certain individuals however it also creates some impact on wildlife. One of the few Inuit knowledge, IQ, information passed on to me...if at all possible never have human-animal contact and then release that animal because wildlife are vulnerable' (Jaypatee Akeeagok in CBC News North 2005). LN also suggested that the handling and collaring of caribou is an added stress on an animal that biologists already claim to be under duress.

Some research involving Peary caribou and muskoxen on the QEI has been invasive. However, biologists have only drugged or net-gun less than 20 of each species in the past 10 years on the QEI ¹⁶. While biologists' intention is to find out information about the caribou and muskoxen in order to help them, these techniques come into conflict with traditional Inuit values (LN, JAK). Other Indigenous people, Dene from Tadoule Lake, Naskipi of northern Quebec and Cree from James Bay, have expressed concern over the practice of collaring caribou (Anonymous 'Caribou News' 1996). Peoples concerns vary from the fit of the collar to the stress caused by the helicopter, but generally there is a common ethic that asserts that wild animals should not be handled or disturbed by people (LN, JAK). As LN states:

'Live animals, shouldn't be toyed with like that, we know that already...when they are bothered they disappear... When Inuit are hunting for food, hunting caribou they get what they see only and not harass the rest of the population. They only kill what is needed and they are not scaring them. Inuit are watchful, careful of their food. Like Qalunaats look after their farms really well. Inuit are just like that about their animals, food. Handling only what they are going to eat and careful not to harass the rest of them' (LN)

Although only discussed by one interviewee within this study but documented in previous papers regarding wildlife management there is also a concern with hunting regulations that state that only large male caribou should be hunted (LN). It is believed

¹⁶ Net-gunning is the method used in capture and release activities. It involves the use of a gun to shoot a net onto an animal, generally from a helicopter.

that male caribou play an important role in herd survival. As explained in an article by Freeman (1985), male caribou have experienced behaviors to guide the group and the strength to dig through snow for food. Additionally, older animals are more passive and can have a calming effect on younger animals within the group. These behavioural traits are important due to the critical role that energy balance plays within ungulate population dynamics.

5. 11 Conclusion

Maps can visually display where an attribute is located at a specific period in time. What maps cannot tell us is the detailed characteristics of attributes and why an attribute may change its location. Through the understanding of Inuit knowledge this chapter illustrated specific characteristics of caribou; and provided insight into the behavior to caribou and muskoxen in the high Arctic. Additionally, interviewees shared how they see these animals and the relationship they have with them. This knowledge allows us to have a greater comprehension of the ecology of caribou and muskoxen.

Chapter 6

Conclusion and Recommendations

For this study, sixteen local experts from Resolute Bay and Grise Fiord were interviewed to reconstruct a history of muskoxen and caribou population patterns. As a result, information derived from these interviews was used to map and document an accumulation of approximately fifty years of observations and expertise concerning Peary caribou and muskoxen. Interviewees indicated that the populations of muskoxen on Somerset, Prince of Wales, Devon and Southern Ellesmere Islands have increased, whereas muskoxen populations on Cornwallis and Bathurst Islands have been consistently low. On the other hand, interviewees from Resolute Bay have observed severe fluctuations in the abundance of caribou on Somerset, Prince of Wales, Russell, Cornwallis and Bathurst Islands, and Boothia Peninsula.

Although noticeable changes in the distribution of caribou have occurred on Devon Island and southern Ellesmere Island, interviewees from Grise Fiord have indicated that the changes in abundance have not been severe. Overall, interviewees expressed that changes, small and large, in caribou and muskoxen numbers is normal. However, interviewees continue to be concerned about the negative impact which they believe significant human disturbance has had, and could have on caribou populations. Interviewees also suggest that factors such as weather, presence or absence of forage and the handling of animals influenced the distribution, local abundance and health of caribou and muskoxen.

Interviewees also discussed the ecology of caribou. They explained that there is variation in Peary caribou physical characteristics throughout the high Arctic; that

overall, caribou are not negatively impacted by wolves and that a large presence of muskoxen often results in the decline in the population of caribou in a specific area.

The collection and documentation of this information was not without difficulty, largely due to the somewhat limited time available for interviews. It should be noted that this research was not able to capture a complete representation of a lifetime of knowledge of local Inuit. This, is in part, because the research was conducted by a non-Inuit with limited background in Peary caribou or muskoxen population biology. Instead, this research represents a preliminary examination of what Inuit from Resolute Bay and Grise Fiord have observed or know about Peary caribou and muskoxen. This work should be considered an initial step towards documenting Inuit knowledge of Peary caribou and muskoxen, as well as an expansion and challenge to the traditional paradigm of resource management.

Future research involving caribou and muskoxen within the QEI should continue to reflect the interests of the HTA members and other community members. Due to the possibility of future development of petroleum deposits and increased human presence in the study area, it is suggested that a detailed examination of key caribou and muskoxen habitat be conducted so they can be clearly identified and characterized and so that human activities can be properly managed within these designated areas.

As provided under the NLCA, Inuit knowledge should continue to be recognized as a valuable reference in the management of wildlife within Nunavut. In order to successfully use the expertise of Inuit in Grise Fiord and Resolute Bay in the management of Peary caribou and muskoxen further research focusing on the incorporation of this knowledge (and subsequent ethics and beliefs) within current management frameworks requires examination.

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Appendix A
Letter of Information

INSERT: Letter of Information (pp.1- English)

INSERT Letter of Information (pp. 2 English)

INSERT LETTER OF INFORMATION (Inuktitut- PP. 1)

Appendix B
Consent Form

INSERT Consent form (English) 3 pages
INSERT Consent form (Inuktitut) 3 pages

