

Statutory Report on Wildlife to the Legislative Assembly of Nunavut

**Section 176 of the
Wildlife Act
2018**



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INTRODUCTION

The Government of Nunavut (GN), through the *Nunavut Agreement* and the *Wildlife Act*, has legal responsibility for managing wildlife and wildlife habitat in Nunavut through research and monitoring, harvest management, habitat management, land-use planning, and environmental impact assessment. The GN's Department of Environment (DOE) Wildlife division carries out most of these activities.

In Nunavut, these programs and projects are handled in collaboration rather than top-down programming. The *Nunavut Agreement* decision-making process specifies how wildlife management decisions are made. Co-management partners work together and apply the best available *Inuit Qaujimajatuqangit* (IQ) and scientific knowledge. These two sources of information complement each other and offer information at different scales and from different perspectives that contribute to a full understanding of Nunavut's land and wildlife.

The responsibility for stewardship of the land is shared by many organizations and individuals in Nunavut. This includes Inuit organizations, land and resource boards, wildlife co-management organizations such as the Nunavut Wildlife Management Board (NWMB), Regional Wildlife Organizations (RWOs) and Hunters and Trappers Organizations (HTOs) and several levels of government. This co-management system makes Nunavut a world leader in dealing with the complex relationships among traditional lifestyles, modern conservation practices, and industrial development.

Effective co-management of Nunavut's wildlife is particularly important during Nunavut's rapid growth in population and the resulting changes to the landscape. Nunavut's abundant wildlife resources have sustained Inuit for generations. However, the impact of increased human numbers and development must be managed if traditional harvest practices are to persist for future generations. All co-management partners play a role in ensuring the long-term sustainability of Nunavut's diverse wildlife populations. Nunavummiut depend on wildlife for the health and well-being of their families and their unique way of life.

Conservation governance occurs at local, territorial, national, and international levels. At each of these levels a different set of competing interests and values come into play (e.g. political, economic, and social factors). Reconciling these many perspectives requires sound and reliable information as well as a responsive and functioning governance system. Our co-management system encourages a balance between environmental protection, sustainable harvesting, and industrial development.

To meet this goal, the DOE Wildlife Division gathers the necessary scientific information and associated IQ to support the planning and management of Nunavut's wildlife and habitats. We consult with our partners in Wildlife management, which include Elders, local users and people holding IQ, the NWMB, HTOs, RWOs, and other Inuit organizations, to make joint decisions that support the sustainable management of our wildlife. Some species move across borders into other territories, provinces, or countries. In such situations, DOE works with neighbouring

jurisdictions (e.g. Greenland, Québec, Ontario, Saskatchewan, Newfoundland and Labrador, Manitoba, and Northwest Territories) to ensure that appropriate wildlife decisions and environmentally sound projects move forward.

This report is an update of activities in DOE's Wildlife Division that have taken place since the previous report. It outlines progress in the leadership role Nunavut has created for itself with its collaborative processes.

EXECUTIVE SUMMARY

Statutory Report on Wildlife to the Nunavut Legislative Assembly Section 176 of the *Wildlife Act*, February 2019

This report on Wildlife to the Nunavut Legislative Assembly from the Department of Environment (DOE) Wildlife Division includes reviews of the co-management system, trends for wildlife populations, and research achievements carried out in the specific wildlife research programs with highlights for particular species included. Research update sections contain a description of methods for gathering information about wildlife to help make well informed co-management plans and decisions.

Co-Management

In the past few years, there have been many successful co-management initiatives and important wildlife management decisions. These decisions and activities have been informed by data and support from Government of Nunavut (GN) scientists, and information from Inuit Qaujimajatuqangit (IQ) holders, elders, Hunters and Trappers Organizations (HTOs), Regional Wildlife Organizations (RWOs), Nunavut Tunngavik Incorporated (NTI), and other government organizations. All of these sources of information are essential components of a unique system to conserve and manage wildlife in Nunavut for the benefit of Nunavummiut. Information gathering and decision-making are continuously improving to better support the needs and priorities of Nunavummiut. These improvements include assisting with the development of industry (particularly exploration and resource extraction) for the economic benefit of Inuit in ways that reduce or prevent negative impacts from these types of land-use on wildlife species and habitat.

Research and Management Planning for Caribou and Muskoxen

Research includes monitoring, estimating population numbers, and analyzing all available information to inform decision-making. DOE has carried out population surveys for a range of species using a wide range of methods. The size of the Territory, combined with its general lack of transportation infrastructure, creates many challenges when assessing wildlife populations. Inuit hunters also contribute to this work by providing information they gather when harvesting, assisting in surveys, and sharing their knowledge of the land and its wildlife.

Where there are indications of population declines (e.g. decline of caribou on Baffin Island), best management practices requires detailed, up-to-date information. In 2014, the population estimate for Baffin Island caribou confirmed a significant decline, mostly in north Baffin, and following a short moratorium for the whole island, a Total Allowable Harvest (TAH) of 250 male only caribou was implemented for all communities in the region. Most caribou herds in Nunavut are currently showing declines and require increased monitoring effort. Diseases such as brucellosis have affected other herds, which led to continued disease and health monitoring with

the assistance of local harvesters. Additionally, increases in development, concerns around the impacts of climate change, and information gaps in predator/prey interactions, have resulted in focused research on caribou movements, improved identification of core habitats and migration corridors, and assessments of the impacts of predators in core caribou ranges. Many muskox populations are increasing. There are some communities where caribou numbers are very low, and HTOs are encouraging more muskox harvesting to reduce the pressures on caribou herds and allow the caribou numbers to recover.

While Inuit are an integral part of the Arctic ecosystem, the population of Nunavut is increasing and food security has become a major concern, especially due to declines of caribou herds and access to caribou meat. Careful management of wildlife is imperative to ensure Nunavummiut have access to country food, now and in the future.

Polar Bears, Grizzly Bears, and Wolverines

Nunavut manages or shares management of 12 of the world's 19 polar bear subpopulations using a sustainable harvest system. TAH levels are set for each subpopulation based on the best available information and the harvest is closely monitored and managed. If the number of polar bears that are harvested exceeds the TAH in a given year, the TAH the following year is adjusted to compensate. After several decades of good polar bear management practices, many communities are reporting that they are seeing more bears on the land and around communities. While it is important to manage for viable and sustainable polar bear populations, it is also important to ensure public safety is a high priority within the management system. Many improvements and advances have been made to wildlife deterrence programs in Nunavut with the safety of individuals and communities as the driving force.

Barren ground grizzly bears have very large home ranges and exist at relatively low densities in Nunavut, which makes them difficult and expensive to study. Grizzly bears are long lived and slow reproducing and this make them very vulnerable to overharvest. Information is being collected from harvested animals, genetic hair snagging, and IQ. A Nunavut Grizzly Bear Co-Management Plan was developed with a high level of input from communities, and aims to improve the management of grizzly bears through management strategies such as the protection of family groups and denning bears. The NWMB approved the plan in 2017. In an effort to reduce harvesting pressures on grizzly bears, a limit was put on the number of sport hunts for the species in Nunavut. DOE's Wildlife Operations Section continues to work with communities to implement deterrence programs and minimize nuisance bear mortalities.

Wolverine research is carried out through carcasses collection programs and genetic hair snagging projects. The research that has been done to date has allowed the Research Section to establish a baseline database of wolverine densities in the Kitikmeot and Kivalliq regions. Numbers to date support Inuit observations that wolverine populations are abundant, productive, and meeting harvest demands.

Operations and Enforcement

The Operations Section has a wildlife office in each community in Nunavut. Conservation Officers serve as a community liaison for the DOE, and provide wide-ranging services to their communities. This includes ensuring legislative and regulatory compliance, investigating alleged violations of Acts or regulations, issuing licences and permits, performing wildlife deterrence and assisting Nunavummiut in applying to DOE support programs. They often participate in wildlife research activities in their area, and assist DOE biologists with the regular collection of biological samples. They work with co-management partners to ensure the conservation of Nunavut's wildlife species.

Education and Research Programs

Conservation Officers carry out many educational programs in the communities where they are stationed. They provide school presentations, community workshops, radio announcements, and posters. They answer people's questions about the legislation that they enforce and attend many community and HTO meetings when invited. The Conservation Officers are the frontline face of the Wildlife Division in many communities

Some informal education programs have begun to encourage young people to learn about wildlife and its management by including them in survey work. Aerial surveys have offered opportunities for Inuit hunters to learn how this type of research is carried out and how it helps to determine population numbers, wildlife ranges, and occupancy of habitat types. In other studies, Nunavummiut provide valuable support to ground-based research projects. To learn about Nunavummiut priorities with respect to wildlife, DOE staff try to maintain close working relationships with communities and carry out frequent consultations to ensure community concerns and knowledge are incorporated into research projects.

The size of the territory, remote nature of the work, complicated logistics, and limited field seasons make research and monitoring more challenging and expensive in Nunavut than in other jurisdictions. As both development pressure and the demand for healthy, reliable country food continue to increase, so does the need for more focused research with an improved balance between IQ and science. Although Nunavut makes a strong financial commitment to its wildlife research and management programs, a great deal of the resources required to sustain existing programs is raised through grants and partnership funding with other agencies, universities, environmental non-governmental organizations and private industry.

There is a need for increased species and ecosystem monitoring and a need to enhance co-management cooperation to improve the management of wildlife in Nunavut. There are challenges associated with recruiting and retaining Wildlife Division staff in Nunavut, especially in some of the more remote communities. Notwithstanding these challenges, the Wildlife Division will continue to focus and improve its efforts to provide reliable and timely information to guide sound conservation practices and establish effective environmental protection measures.

1. WILDLIFE DIVISION ROLES AND RESPONSIBILITIES

The GN has a legal mandate for the management of terrestrial wildlife species in Nunavut. The DOE's Wildlife Division fulfills GN obligations under Nunavut's *Wildlife Act* and its associated regulations. It also fulfills GN responsibilities under a wide range of federal legislation as well as both national and international agreements and conventions, including on-going responsibility for the co-management of Nunavut wildlife as obligated under the Nunavut Agreement.

One of the primary goals of the Division is to achieve a balanced approach to wildlife management that meets legislative requirements, uses both IQ and science, reflects the values and needs of Nunavummiut, and contributes to the continued persistence of wildlife in Nunavut. The Division's objectives are to provide current and reliable information from various sources (including IQ and in-house scientific research) and to make management recommendations to co-management partners in order to make effective, but not overly restrictive, wildlife management and land use decisions. Other objectives are to develop wildlife management plans with co-management partners in order to protect wildlife populations, meet national and international obligations, provide support and resources to co-management partners and harvesters, and ensure legislative and regulatory compliance through education and enforcement.

Partners in this unique system of wildlife management include NWMB, HTOs, RWOs and NTI. Although co-management partners have their own processes and projects, we all work cooperatively towards developing policy and influencing decisions on wildlife and habitat protection, food security, economic potential, and the continued use of wildlife in traditional lifestyles and economies.

2. WILDLIFE DIVISION ORGANIZATION

The Wildlife Division is comprised of two sections: Wildlife Research and Wildlife Operations.

Wildlife Research Section

The Wildlife Research Section is decentralized and regionalized. The Research Section is primarily based in Igloolik, with regional offices in Kugluktuk, Arviat, and Pond Inlet. Nine full-time biologists and a social science researcher report to the Manager of Wildlife Research, with ten full-time technical staff supporting regional and species-specific projects, policy and legislative issues, collection and incorporation of IQ, and public opinion research. Additional personnel are hired seasonally to support field and laboratory work. Contractors are also used when specialist expertise and laboratory analysis are not available in Nunavut.

Wildlife Operations Section

The Wildlife Operations Section is even more decentralized with there being a wildlife office located in each of the territory's twenty-five communities. There are nine Conservation Officer Level IIIs (CO3s), twenty-one Conservation Officer Level IIs, and three Wildlife Clerks spread across the four regions – Kitikmeot, Kivalliq, North Baffin and South Baffin. Four regional wildlife managers, based in Arviat, Iqaluit, Kugluktuk and Pond Inlet, report to the Senior Manager, Wildlife Operations. There is also a Wildlife Deterrent Specialist reporting to the Coordinator, Operations and Regulations, who in turn reports to the Senior Manager, Wildlife Operations. Both the Manager of Wildlife Research and the Senior Manager, Wildlife Operations, report directly to the Director of Wildlife.

3. WILDLIFE ACT AND REGULATIONS

The Nunavut *Wildlife Act* (S.Nu. 2003, c.26) came into force in 2005. DOE is responsible for fulfilling GN responsibilities under the Act. The purpose of the Act is “to establish a comprehensive regime for the management of wildlife and habitat in Nunavut, including the conservation, protection and recovery of species at risk, in a manner that implements provisions of the *Nunavut Agreement* respecting wildlife, habitat and the rights of Inuit in relation to wildlife and habitat. (Section 1 (1))”

Extensive work on the part of all co-management partners went into the development of the comprehensive regulations package required to fully implement the new Act. These regulations were introduced and came into effect on July 1, 2015. The following regulations were introduced:

- Assignment Regulations
- Conservation Areas Regulations
- Fees Regulations
- Game Harvesting and Possession Limits Order
- Harvesting Regulations
- Licences and Tags Regulations
- Open Seasons Order
- Repealed Wildlife Regulations
- Reporting Regulations

In addition to these regulations coming in to force, amendments were also made to the *Summary Conviction Procedures Regulations*, which set specified penalties for offences under the *Wildlife Act*. This allows for Summary Offence Ticket Informations (SOTIs) to be issued under the *Wildlife Act*, which was not an option before the regulations were introduced.

4. WILDLIFE CO-MANAGEMENT

Nunavut's Wildlife Co-Management System: An Overview

Pursuant to the *Nunavut Agreement*, the responsibility for managing wildlife and its habitat is shared by many organizations and individuals. This includes Inuit organizations, wildlife co-management organizations such as the RWOs and HTOs, land and resource boards established under the *Nunavut Agreement*, as well as several levels of government. Within Nunavut there is a commitment to working closely and collaboratively to ensure effective co-management through land-use planning, environmental impact assessment and wildlife management at the territorial, regional and community levels.

Progress Report: Wildlife Co-Management

The overall goals of the co-management system are to be governed by and implement the principles of conservation, fully acknowledge and reflect the primary role of Inuit in wildlife harvesting, and to serve and promote the long-term economic, social and cultural interests of Inuit harvesters. Additional goals include integrating the management of all species of wildlife as far as practical and inviting public participation while promoting public confidence, particularly among Inuit.

Wildlife Co-Management: Successes and Challenges

Successful co-management can be defined as multiple stakeholders with common interests working together toward common goals and objectives. All stakeholders share in the decision-making process, resulting in long-term sustainability of Nunavut's wildlife resources, using best available knowledge. Success is measured not only by the outcome of specific projects, but also by reduced conflict between wildlife co-managers due to shared understanding of roles, approaches, and interests that complement each other to achieve common goals. Ultimately, success occurs in achieving long-term sustainability of wildlife through communication, consensus and informed decision-making.

Achievements

Communications and Outreach Programs: In 2008, an Environmental Education Specialist position was created within DOE's Policy Division, to generate effective and engaging public communication, education and outreach, including a variety of educational materials and programs to raise awareness. Over the past five years, this position has been responsible for creating many educational initiatives for Nunavummiut. This includes the Junior Conservation Officer and Hunter Education Programs, as well as educational materials on harvesting in Nunavut. The position also coordinated the creation and development of a series of books and videos containing titles such as *Hunting Polar Bear in Winter*, *Hunting Seal in Spring*, and *Hunting Caribou in Fall*. A new video and book about narwhal harvesting will be released at a future date.

Participation in Workshops, Meetings and Research: The Division has worked to continually improve communication and participation with all partners. There have been many collaborative meetings and workshops to develop community-based species-specific management plans (for example, the Dolphin and Union caribou management plan, the grizzly bear management plan and the Peary caribou management plan). Advice from NTI, HTOs, RWOs, and the Elders Advisory Committee is continually being sought to incorporate IQ and Inuit information into prioritizing, planning, and carrying out research and monitoring initiatives.

Inter-Jurisdictional Agreements and Partnerships: Nunavut shares the management of many populations of wildlife with neighboring jurisdictions. A number of Agreements and Memoranda of Understanding (MOUs) have been developed or initiated with the appropriate governments or management organizations. These include the MOU that created the Canada-Greenland Joint Commission on Polar Bears, as well as inter-jurisdictional agreements between GN and the Government of Northwest Territories (GNWT) for caribou and polar bear management, and between Nunavut and the Beverly and Qamanirjuaq Caribou Management Board (BQCMB).

Challenges

All partners in any co-management system face some difficulties in fulfilling their mandate. This is true as well in Nunavut where many co-management partners, sometimes with opposing views and objectives, have to work together. Financial and human resource capacity issues also hamper the engagement of some organizations and co-management partners. A rapidly changing environment demands more research and monitoring with limited funding and personnel. Despite the challenges, through collaboration, partners continue to find ways to advance important issues.

Overcoming the misunderstanding that IQ and science are incompatible or that scientific studies attempt to replace or supplant IQ are important goals. As well, understanding and overcoming any apparent or real differences between national/international obligations and local interests might speed decision-making and acceptance of these decisions outside of Nunavut. Efforts to improve consultation and collaboration between industry and wildlife co-managers are also needed to further advance Territorial goals.

5. RESEARCH AND MANAGEMENT INITIATIVES BY REGION AND SPECIES

The DOE Wildlife Research Section gathers scientific and IQ information about wildlife resources as part of the collaborative management process to ensure sustainable wildlife management. The traditional pursuits of hunting, trapping, and fishing continue to contribute to the land-based economy of Nunavut. Country food is highly valued by most Nunavummiut and harvesting activities are an important cultural, social, and economic activity of Inuit life.

Territorial, national, and international wildlife values are evidenced by the efforts to protect northern ecosystems through the proposed establishment of new protected areas (e.g. Tallurutiup Imanga National Marine Conservation Area, and several proposed Territorial parks). Competing interests include the exploration and development of mineral and petroleum resources and the shipping routes. The influences of climate change include the reduction and thinning of summer Arctic sea ice, which has opened up potential for increased and extended land and sea transportation routes to facilitate extraction of mineral and energy resources. Proposed land-use activities could result in negative impacts to wildlife productivity and increase the harvest pressure on Nunavut's terrestrial wildlife species. Due primarily to remoteness, challenging weather conditions, and associated high research costs, a number of wildlife information gaps exist. Wildlife research and management priorities depend on the GN (DOE) responsibilities identified by the *Nunavut Agreement*, local concerns, and emerging issues. Wildlife research priorities are considered annually as part of the budget planning cycle.

5.1 Qikiqtaaluk Region Research and Management Initiatives

The Qikiqtaaluk Region is the largest region in Nunavut (1,040,418 km²) and spans from the islands in James Bay to the south and to the northern reaches of Ellesmere Island. With the exception of the Melville Peninsula, the entire region consists of islands within the Arctic Archipelago. The Arctic Archipelago supports a variety of fauna. Caribou (*Rangifer tarandus*) are an iconic, keystone terrestrial species of nutritional and cultural significance to Inuit. Across the Arctic Archipelago two subspecies are present, Peary caribou (listed as Endangered under the *Species at Risk Act*, February 2011, assessed as Threatened by Committee on the Status of Endangered Wildlife in Canada (COSEWIC), November 2015), and Barren-ground caribou (assessed as Threatened by COSEWIC, November 2016). The High Arctic islands are also inhabited by muskoxen. More than half of Nunavut's total population lives in the Qikiqtaaluk Region, with 8 of 13 communities on Baffin Island. Baffin Island, over 500,000 km², represents about half of the region's terrestrial land mass.

5.1.1 Baffin Island Research and Management Initiatives

Baffin Island Caribou Distribution and Abundance

As a result of reported population decline by HTOs, DOE conducted an abundance survey in 2014 of barren-ground caribou for Baffin Island and ancillary islands, and Northern Melville Peninsula. The survey was in response to confirmation of a decline in caribou in the North Baffin by a 2012 DOE survey. The survey was improved using IQ and local knowledge from 10 communities known to harvest caribou on Baffin Island. An aerial survey was conducted across the island, except where local caribou experts indicated that caribou do not currently inhabit. In addition, ground surveys were conducted in close proximity to communities.

Results of this survey confirmed the decline in caribou abundance across Baffin Island and ancillary islands. The 2014 survey produced a population estimate of 4,652 (3,462-6,250; 95% CI) caribou on Baffin Island, including the nearby Prince Charles Island in Foxe Basin. Most of these caribou were concentrated in south Baffin and Prince Charles Island (Table 5.1, Figure 5.1). This corresponded to a population decline of more than 95% based on the 1991 qualitative estimate derived from IQ. As of March 2014, there were 159-622 (95% CI) caribou in North Baffin. Caribou in the north part of Baffin are particularly vulnerable to further declines.

Table 5.1. Estimates of caribou abundance by survey area from the February and March 2014 Baffin Island survey.

| Strata (Survey Area) | Caribou estimate | 95% Confidence Limit (caribou estimate range) |
|--|------------------|---|
| <u>North Baffin</u> | | |
| Borden Peninsula | 6 | 1-30 |
| Mary River | 224 | 96-521 |
| North Central Baffin | 85 | 31-230 |
| Total | 315 | 159-622 |
| <u>South Baffin</u> | | |
| Central Baffin | 1,091 | 662-1,798 |
| Foxe Peninsula | 216 | 48-972 |
| Hall Peninsula | 887 | 467-1,686 |
| Meta Incognita Peninsula | 539 | 256-1,138 |
| Prince Charles Island | 1,603 | 1,158-2,220 |
| Total (+ Prince Charles Island) | 4,337 | 3,169-5,935 |
| Total (- Prince Charles Island) | 2,734 | 1,777-4,207 |
| Baffin Island Total | 4,652 | 3,462-6,250 |

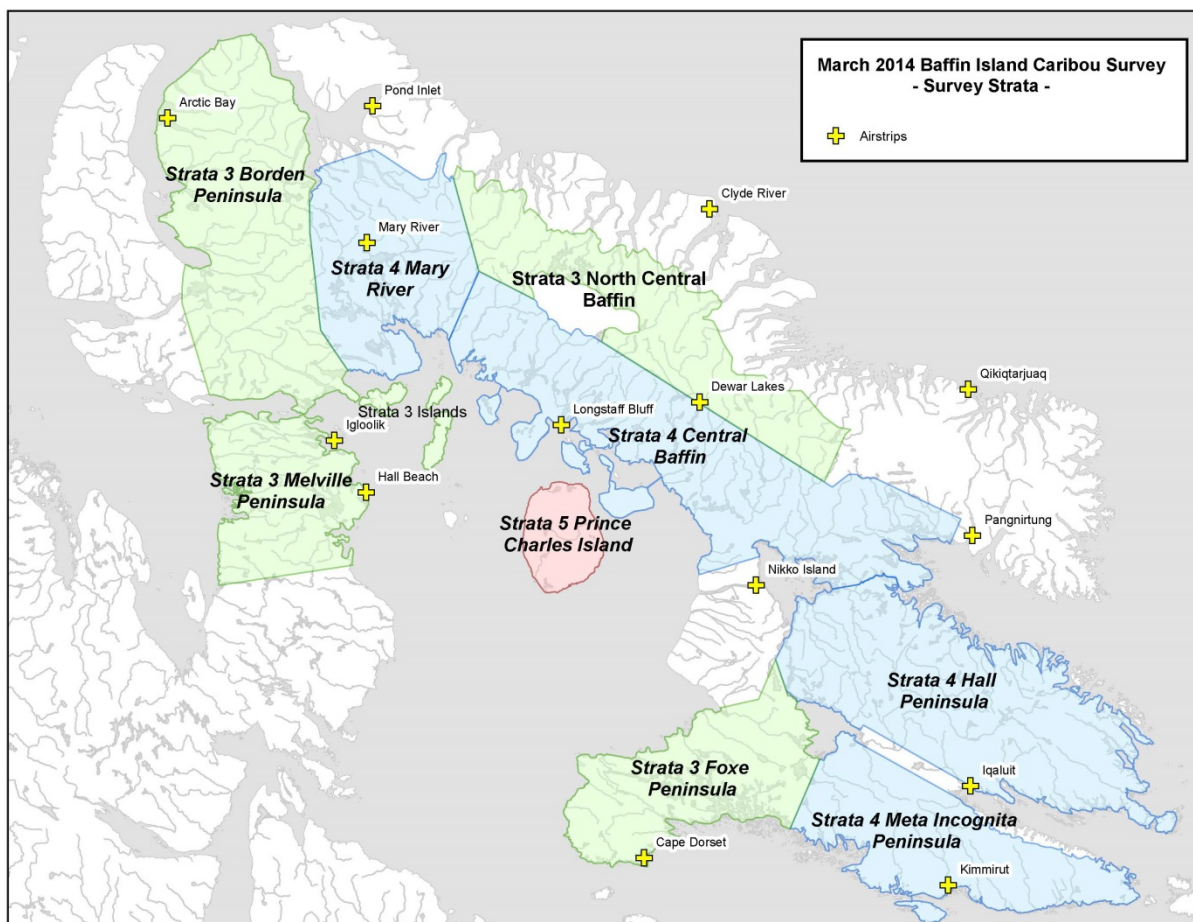


Figure 5.1. Survey areas for the Baffin Island caribou survey – March 2014 corresponding to population and sustainable harvest estimates.

Although there is widespread agreement amongst Inuit hunters and scientists that there are much fewer caribou on Baffin now than in the 1990s, what happened to them remains a matter of debate. Following the 2014 survey results, management actions, including an eight-month hunting moratorium and a TAH have been put in place to prevent negative effects of hunting on the caribou population on Baffin Island and to allow for a timely recovery. The current TAH for Baffin Island caribou is 250 male only caribou.

Baffin Island Spring and Fall Caribou Compositions

As a result of the non-quota limitation of male only harvest and the TAH allocation (Table 5.2), the DOE has conducted fall and/or spring aerial composition surveys from 2015-2018 as a means to monitor productivity and relative densities of caribou across Baffin Island. Composition surveys are designed to:

- 1) determine the vigor of the population based on productivity and demographic composition;
- 2) determine the trajectory of productivity of the population based on the demographic composition, and with spring composition results, determine if an index of calf productivity and overwinter survival suggests an increasing or decreasing trend;
- 3) monitor bull ratios to ensure that the male only harvest is not reducing bulls to a proportion that could interfere with rutting success;
- 4) build a database with which to estimate the current population trend through demographic modeling, utilizing all demographic composition data to project a trend from the 2014 population estimate; and
- 5) Inform on management discussions regarding current TAH levels.

Table 5.2. Bull-only tag allocation by community and number of individuals harvested from 2015/2016 to 2018/2019 on Baffin Island.

| Year | TAH | Harvest Allocation | | | Caribou Harvested | | | Total Caribou Harvested | Females Harvested* |
|---------|-----|---------------------------|-----------------------------|---------------------------|---------------------------|-----------------------------|---------------------------|-------------------------|--------------------|
| | | North Baffin ¹ | Central Baffin ² | South Baffin ³ | North Baffin ¹ | Central Baffin ² | South Baffin ³ | | |
| 2015/16 | 170 | 50 | 60 | 60 | 42 | 71 | 74 | 187 | 19*** |
| 2016/17 | 250 | 67 | 92 | 91 | 56 | 87 | 90 | 233 | 10 |
| 2017/18 | 250 | 66 | 90 | 94 | 52 | 88 | 92 | 233 | 14 |
| 2018/19 | 250 | 66 | 90 | 94 | 1** | 0** | 9** | 10** | 0** |

* Females harvested are included in the "Total Caribou Harvested"

**total harvest to date (July 1-August 31, 2018)

*** 5 of the females harvested are suspected and not confirmed

¹North Baffin allocation divided between communities of Pond Inlet, Igloolik, Arctic Bay and Hall Beach. Hall Beach had an allocation of zero for 2015-2018.

²Central Baffin allocation divided between communities of Clyde River, Pangnirtung and Qikiqtarjuaq.

³South Baffin allocation divided between communities of Iqaluit, Kimmirut and Cape Dorset.

The results from the 2015-2018 composition surveys (Table 5.3) indicate that calf to cow ratios (calves per 100 cows) generally indicate a stable or increasing population trend across the island, compared to suggested baseline ratios for other populations. Bull to cow ratios (bulls per 100 cows) in the fall suggest an appropriate number of bulls exist in the population to ensure cows are effectively bred. Baffin Island consultations, on the results from the 2015-2018 composition survey work, are planned to take place in early 2019.

Baffin Island Caribou Management Plan

The draft Baffin Island Caribou Management Plan was initiated in 2013 through a series of co-management workshops and community consultations. Many of the information gaps that were identified at the time have been addressed through the 2014-2018 Baffin Island caribou survey work. In light of updated information and knowledge, the draft management plan is in the process of being updated and presented to communities through consultation before it is finalized and submitted to the NWMB for approval.

Table 5.3. Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

| Year | 2015 | | | | 2016 | | | | 2016 | | | | 2017 | | | | 2017 | | | | 2018 | | | |
|--|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|---------------------|-----------------------|-----------------------|---------------------|
| Season | Fall | | | | Spring | | | | Fall | | | | Spring | | | | Fall | | | | Spring | | | |
| Location | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island | North Baffin Island | Central Baffin Island | Prince Charles Island | South Baffin Island |
| Calves Observed | 55 | 28 | 133 | 49 | Not completed | 23 | 82 | 49 | 54 | Not completed | Not completed | 81 | 47 | 1 | 114 | 92 | 86 | Not completed | Not completed | Not completed | 21 | 18 | 31 | 155 |
| Cows Observed | 77 | 39 | 189 | 64 | | 67 | 328 | 222 | 94 | | | 196 | 120 | 1 | 351 | 249 | 139 | | | | 36 | 33 | 161 | 401 |
| Calves/100 Cows | 71 | 72 | 70 | 77 | | 34 | 25 | 22 | 57 | | | 41 | 39 | 100 | 32 | 37 | 62 | | | | 58 | 55 | 19 | 39 |
| Yearlings Observed | N/A | N/A | N/A | N/A | | 10 | 76 | 29 | N/A | | | 42 | 23 | 0 | 57 | 75 | 17 | | | | 5 | 7 | 37 | 100 |
| Bulls Observed | 76 | 29 | 126 | 46 | | 25 | 204 | 151 | 54 | | | 126 | 64 | 6 | 133 | 181 | 74 | | | | 38 | 40 | 73 | 277 |
| Bulls/100 Cows | 99 | 74 | 67 | 72 | | 37 | 62 | 68 | 57 | | | 64 | 53 | 600 | 38 | 73 | 53 | | | | 106 | 121 | 45 | 69 |
| Bull + Cows | 153 | 68 | 315 | 110 | | 92 | 532 | 373 | 148 | | | 322 | 184 | 7 | 484 | 430 | 213 | | | | 74 | 73 | 234 | 678 |
| Adults + Yearlings Observed | 153 | 68 | 315 | 110 | | 102 | 608 | 402 | 148 | | | 364 | 207 | 7 | 541 | 505 | 230 | | | | 79 | 80 | 271 | 778 |
| Total Observed (Calves, Yearlings and Adults) | 208 | 96 | 448 | 159 | | 125 | 690 | 451 | 202 | | | 445 | 254 | 8 | 655 | 597 | 316 | | | | 100 | 98 | 302 | 933 |

5.1.2 High Arctic Research and Management Initiatives

Peary Caribou and Muskoxen Surveys

Peary caribou and muskoxen surveys indicated significant declines on some Arctic islands, primarily due to severe weather events. For other populations, periods of decline and recovery were evident but the magnitude and frequency varied among islands. Overall, foundation information on the distribution and abundance of many Peary caribou and muskoxen populations was infrequent or absent.

From 2013 to 2018 the GN conducted aerial surveys to estimate densities and abundance of Peary caribou and muskoxen on the Bathurst Island Complex, Devon Island, southern and central Ellesmere Island, Loughheed Island, Prince of Wales Island, and Somerset Island. The results from all of the island group surveys between 2013 and 2018 were presented to local communities for their input and interpretation. Information from these studies supports the development of IQ and scientifically-based management and monitoring plans. It also contributes to recovery planning as required under the 2011 addition of Peary caribou to Schedule 1 of the federal *Species at Risk Act*.

Results of these studies are/have been used to review harvest rates and capacity, recommend and inform caribou and muskoxen conservation and management measures, and for environmental impact assessments. Opportunistic sample collection contributes to a Region wide genetic and diet study (see below).

Peary Caribou Landscape Genetics

In collaboration with other agencies, the GN has worked to better understand the population structure of Peary caribou using genetic techniques. Results support IQ and previous research indicating regular movements between many Peary caribou island groups, but that some groups have been isolated from each other for generations. For example, there appears to be a group of animals near Ward Hunt Island that have been isolated from other populations for many years, whereas Peary caribou in the Ringnes Islands, southern Axel Heiberg Island, Devon Island, and the Bathurst Island Complex appear to consist of a population group. Further sample collections from areas like southern Ellesmere Island and Melville Island would provide a clearer picture of how these Peary caribou groups are related.

Ungulate Health Monitoring Programs

The overall decline in Peary caribou, the parallel and periodic die-off of Peary caribou and muskoxen, and the potential negative impacts of climate change, highlight a need for routine monitoring that will provide relevant information to scientists, wildlife managers, and stakeholders. Due in part to the remote location, harsh weather, and logistical constraints of working in the Arctic, research on ungulates and their range has been infrequent and spatially limited. Local harvesters have on-going contact with caribou and muskoxen and a profound relationship with the environment. This unique knowledge is captured by working with Inuit

hunters to collect both samples and data from animals that they already harvest and their habitat. The goal is to establish baseline values for basic ecological and health-related parameters, with a focus on long-term monitoring for the detection of change. By developing community-based monitoring programs we hope to address some of the unique challenges of conducting northern research while engaging community members, wildlife managers, co-management partners, and scientists in a collaborative effort that combines resources and knowledge.

Future Research Directions

Future research initiatives on Peary caribou could include long-term telemetry studies, habitat investigation, resources selection, and simulation modeling to consider impacts from harvest, climate change, and periodic icing events. Finally, research on inter-specific relations including the impact of wolf populations is necessary to ascertain whether predation might exacerbate a decline or dampen recovery of small Peary caribou populations.

Peary Caribou Management Planning

DOE, working with the communities of Resolute Bay, Arctic Bay, and Grise Fiord, produced a draft management plan for Peary caribou based on IQ and scientific data in 2014. The draft plan was also presented to Kugaaruk, Taloyoak, Gjoa Haven, and Cambridge Bay to include the knowledge and concerns of Kitikmeot communities. Since that time, work has continued on the plan and we anticipate submitting it to the NWMB for its approval in 2019. Co-management partners will share information and responsibilities for implementing the plan, and meet regularly to discuss the latest information and potential management actions.

Muskox Management Planning

Using the successful consensus-based Kivalliq muskox management plan as a template, DOE developed a High Arctic Muskox Management Plan in collaboration with Arctic Bay, Grise Fiord, Resolute Bay, and NTI. Consultations were held in March 2012, feedback was incorporated into the Plan, and all communities supported the final draft. The plan was submitted to the NWMB in March 2013, and was approved on June 13, 2013.

This management plan outlines a community-based consensus approach, in which ground surveys, conducted on a rotating basis among island groups are required, can influence management actions or detect a need for more detailed information, between aerial survey abundance estimates. Regular meetings with all stakeholders drawing on the most recent local and scientific knowledge will be used to determine management objectives and direction, and allow for rapid response to changes in populations. Work on a renewed version of the High Arctic Muskox Management Plan will begin in 2019.

5.2 Kitikmeot Region Research and Management Initiatives

The Kitikmeot region is the least populated region of Nunavut. More than half the people rely heavily on hunting wildlife for food and other sources of income such as the sale of meat, fish, furs, and guiding for sport hunting. The primary industries in the Kitikmeot are mineral exploration and mining activities, which provide employment and economic benefits. Sound land use, wildlife planning, and co-management are important for the region to protect some critical areas including migratory corridors that extend onto the sea-ice. All research initiatives and their results are shared with co-management partners through regular meetings with affected HTOs and RWOs.

Muskoxen Surveys

Between 2013 and 2014 Muskox Management Unit MX-07 (Figure 5.2) was assessed through systematic strip transect surveys on the Nunavut portion of Victoria Island to determine the abundance and distribution of muskox. During the survey 17,454 km² were flown, representing 13% coverage of the study area of 134,934 km². Survey observers recorded 1,296 adult muskoxen on transect, resulting in an estimated number of 10,026 (9,429-10,623, 95% CI) for the study area. This result represented a decline in MX-07 from what the previous estimate had shown, but the result is consistent with local observations. Muskoxen were mostly uniformly distributed throughout the management unit.

A systematic strip transect survey of Boothia Peninsula (MX-08) (Figure 5.2) was conducted in 2017 to determine the abundance and distribution of muskox in that management unit. The survey took place from August 7 to August 12. During the survey 8,318 km² were flown which represented 20% coverage of the total management unit (43,238 km²). Survey observers recorded 702 adult muskoxen on transect, resulting in an estimated number of 3,649 (3,333-3,965, 95% CI). Calves represented 14% of the adult muskoxen seen and the average adult per group was small. The estimated density was 0.084 muskox/km² in the management unit. The results indicated an increase in muskox for MX-08, and they are consistent with the reported local knowledge.

The muskoxen in the West Kugluktuk management unit (MX-09) (Figure 5.2) are the westernmost indigenous muskoxen in North America. A systematic strip transect survey took place in August 2017 to determine the abundance and distribution in this management unit. The survey participants flew 8,591 km² of the survey area, which represents 16% coverage of the management unit (53,215 Km²). During the survey, 87 adult muskoxen were recorded on transect, resulting in an estimated number of 539 (389-689, 95% CI) muskoxen in MX-09. The population in this management unit has been mostly stable since 1994, and the survey results are consistent with local observations. Muskox distribution had not changed from the historical results. The muskoxen have taken advantage of the wetter and lower-lying areas in the Rae-Richardson River Valley that is within the proximity of uplands that provide them with suitable forage and a refuge from predators. The calf to adult ratio was 38% and the average number of adults per group was relatively low. Muskox density in MX-09 was estimated to be 0.010 muskox/km², which was the lowest density observed within the Kitikmeot region since 2013.

Based on the low numbers of muskox in this area, the regional biologist recommended that the next survey should be carried out no later than 2023 so that the harvest can be reassessed.

Between September 9 and 17, 2013, a systematic strip transect survey was completed for the west side of the Coppermine River to the northwest of Contwoyto Lake, including the islands along the coast (MX-11, subdivision Kugluktuk) (Figure 5.2) to determine the abundance and distribution of muskox. The survey participants flew 35,564 km² in two separate strata. The southern strata of 12,271 km² represented 20% of the management unit, and the northern strata of 23,292 km² represented 25% of the management unit. Calves represented 10% of the adult muskoxen seen and the average adult per group was 23 (3-43, 95% CI). During the survey 1,331 adult muskoxen were recorded on transect, resulting in an estimated population of 6,746 (5,842-7,650, 95% CI). The next survey of the management unit is tentatively scheduled to be completed in 2019.

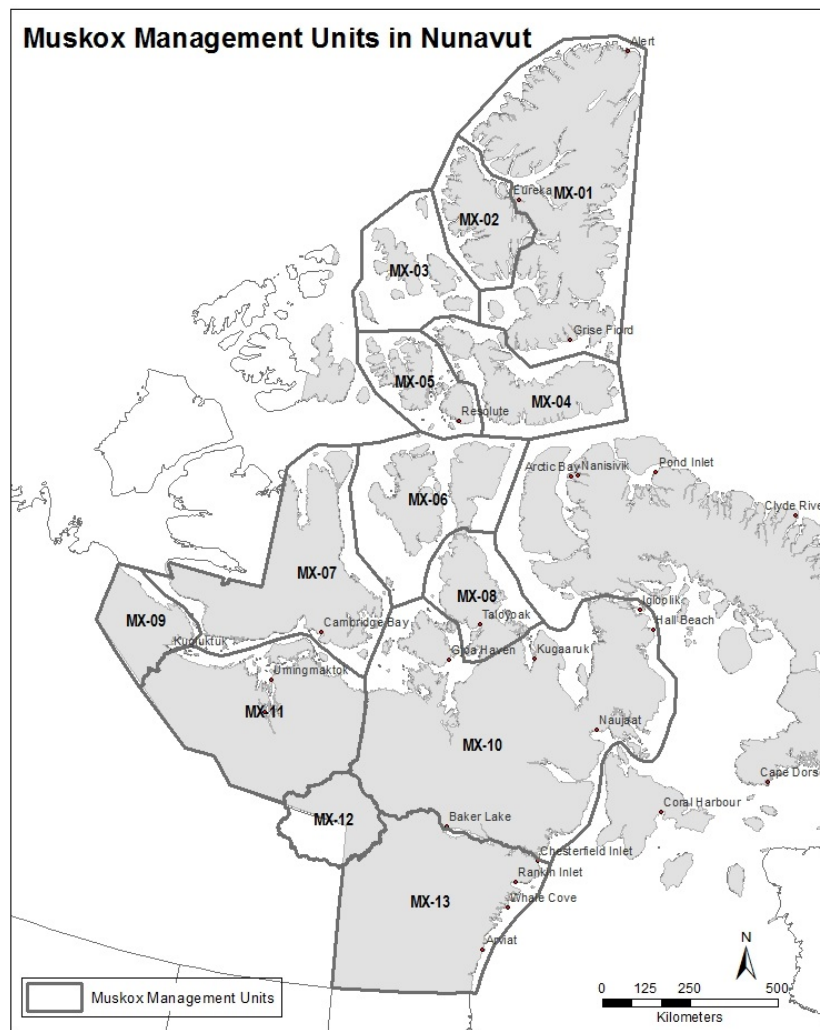


Figure 5.2. Muskox Management Units in Nunavut.

Dolphin and Union Caribou Surveys

Dolphin and Union caribou (*Rangifer tarandus groenlandicus x pearyi*) have a large distribution covering Victoria Island and the northern region of the Canadian mainland. This paler and smaller caribou, similar to Peary caribou in appearance, are genetically distinct from other Barren-ground caribou herds in addition to displaying unique behaviours. A population estimate survey and composition surveys were carried out between 2015 and 2017. The main objective of the survey projects was to provide a population estimate, as well as highlight the demographics of the Dolphin and Union caribou (DUC) herd. In fall of 2015, the total estimate of the final visual strata was 14,730 (13,223-16,237, 95% CI) caribou (1 year or older), resulting in

an extrapolated population estimate of 18,413 (11,664-25,182, 95% CI) by using real time collar locations. This estimate shows a reduction to 66% of what was estimated in the 2007 survey (z-test, $Z=-2.19$, $p=0.036$). This translates to a statistically significant annual rate of decline of 4% (CI=1-7%) since the 1997 survey. The yearly collared female survival estimate from the Program MARK was 0.70 (0.55-0.82, 95% CI). In the fall of 2016, the DUC calf to cow ratio (calves per 100 cows) was 0.25 while calf survival dropped to 0.11 in the following spring of 2017 following composition surveys. Laboratory analyses of female feces, collected from collared caribou, were analyzed to determine the pregnancy rate. The pregnancy rates were consistent between years (2015 and 2016) with 88%. Though pregnancy rates appear normal, calf to cow ratio and calf survival rates show little indication of recovery for the DUC population since the last population survey; the low calf survival even suggests that further decline is likely to occur.

Bathurst and Bluenose East Caribou Surveys

The Bathurst caribou herd is a shared herd harvested by hunters in the Northwest Territories (NWT) and Nunavut (Kugluktuk, Cambridge Bay, Bathurst Inlet, and Umingmaktok (Bay Chimo)). Long-term monitoring has been on-going in collaboration with the GNWT to provide an updated population estimate for the Bathurst barren-ground caribou. In 1986, the Bathurst caribou herd was reaching its historic high with close to a half million individuals. In June 2015, a population survey was conducted to capture the population estimate of the herd. Consistent with previous calving ground photographic surveys, data from collared caribou and reconnaissance surveys at 5-10 km intervals within the core area were used to delineate the core calving area, to assess calving status, to allocate sampling to geographic strata of similar caribou density, and to time the photographic survey plan to coincide with the peak of calving. The survey was conducted between June 2 and 9, 2015. The extrapolated herd estimate (using direct estimates of adult females) was 19,769 caribou. In 2016, the Minister of Environment varied an NWMB decision to implement a TAH of 30 male only caribou from the Bathurst caribou herd in Nunavut. Following the 2015 population estimate, the GNWT imposed a moratorium on all harvest from the herd in NWT. Since 2017, the DOE has been actively part of coordinating, developing and providing technical support to an inter-jurisdictional (Nunavut and Northwest Territories) management plan for the Bathurst caribou herd.

The Bluenose East caribou herd is a shared herd, harvested by hunters in the NWT and Nunavut (Kugluktuk). A calving ground photo survey of the Bluenose East caribou herd was conducted in June 2015. The main objective of the study was to obtain an estimate of breeding females that could be compared to estimates from previous calving ground surveys. Consistent with previous calving ground photographic surveys, data from collared caribou and reconnaissance surveys at 5-10 km intervals within the core area were used to delineate the core calving area, assess calving status, allocate sampling to geographic strata of similar caribou density, and to time the photographic survey to coincide with the peak of calving. The 2015 total population estimate was 38,592 caribou. This was a significant decline from the 2013 population estimate of 68,000 caribou and represents a 21% annual decline rate. The Bluenose East caribou herd has shown a declining trend since 2000, with a continuous decline from 2010 to 2015. During this period the herd declined from 123,000 to 38,500. As a result of the 2015

population survey results, the Minister of Environment accepted an NWMB decision to implement a TAH of 340 caribou for Nunavut.

New population estimates were provided for both the Bathurst and Bluenose East caribou herds using a calving ground photographic survey and fall composition surveys. The studies were carried out in summer and fall of 2018, with the GNWT as the lead jurisdiction. The 2018 population estimate for the Bathurst caribou herd, based on the results of this study, was approximately 8,200 caribou, which represents a decline of nearly 60% from the 2015 population estimate. The new population estimate for the Bluenose East caribou herd was approximately 19,300, which represents a decline of 50% from the 2015 estimate. Based on the alarming declines in both these caribou herds, the GN and GNWT have agreed to work in close collaboration to continue monitoring these herds going forward to ensure conservation issues and Inuit basic needs concerns are addressed.

Ungulate Health Monitoring Program

Since 2013, a muskox and caribou monitoring program investigating disease and body condition has been established with the University of Calgary. This program takes place annually and is done through engaging with the community members to collect sample kits (feces, hair, blood, and lower legs). There are currently six graduate students working exclusively on these samples. Their studies focus on gaining a better understanding of the mechanisms causing the generalized declines of ungulates (mainly caribou), especially the role of nutrition, disease, and parasite interactions in population dynamics. This program also provides an exclusive opportunity to screen for the common diseases which impact access to healthy food sources in a region with a high rate of food insecurity.

Management Plans

The Kitikmeot Muskox Management Plan has been developed cooperatively with co-management partners to improve muskox management in the Kitikmeot region from 2013 to 2017. This plan is intended to provide guidance and direction to the co-management partners when making management recommendations for the muskox management units in the Kitikmeot region. Improved communications, stakeholder participation, and cooperation are fundamental to the success of the plan. This plan will guide the Research staff in ensuring sustainability of all the management units and ensure the survival of the species and harvest opportunities for future generations. The plan describes the regional management goals and objectives for the muskox as well as the recommended approaches to achieve those objectives. Balance between science and IQ and increased Inuit participation in all aspects of management are central to the goals of this plan.

The DUC play an essential role in the lives of Inuit and Inuvialuit people. It is essential to have a plan to sustain this population to help ensure the survival of the DUC for future generations. An inter-jurisdictional (GNWT, GN, and Environment and Climate Change Canada) management plan was developed from 2015 to 2017. The plan describes management goals and objectives for DUC as well as recommends approaches to achieve those goals and objectives. The plan

was accepted by the NWMB and the Minister of Environment in 2017. The plan recognizes the shared responsibilities for management under the land claims agreements and species at risk legislation, and gives equal consideration to IQ, traditional knowledge, and scientific knowledge.

5.3 Kivalliq Region Research and Management Initiatives

Ungulate Monitoring

Caribou are critically important to people in the Kivalliq region. Monitoring caribou and all the factors affecting them and developing management and action plans for the herds are needed to ensure an adequate supply of healthy caribou. Some of the greatest threats to the long-term viability of Kivalliq caribou herds include: development effects, such as roads, internet sales of caribou meat and the associated increased harvest, predators within modified and fragmented landscapes, and cumulative impacts. Though muskoxen are not as abundant or as heavily relied upon as caribou, they are becoming more important as an alternative country food source in the face of observed declines within many Kivalliq caribou herds. Table 5.4 reviews the most recent status of Kivalliq caribou and muskox herds and subpopulations, and provides an assessment of current trends.

Understanding the effects of human activities on caribou herds is difficult because they migrate and are also affected by seasonal and geographic changes. The effects of change accumulate over time, so that site-specific monitoring of herds is not enough to detect or monitor more than anecdotal behavioural changes or animal death. As well, caribou abundance varies over time based on a number of factors, but most often by stress caused by changes to their habitat and behavioural disruption (natural and human-caused).

A broad-scale analysis of information collected over several years from caribou collars was recently completed. This project was initiated to confirm information from different sources about caribou seasonal range use and migratory patterns and corridors. The study supported local knowledge and helped to explain changes in herd distribution noted but not well understood by scientists. The results were produced by the GN and accepted by regional co-management organizations as the accepted distribution of barren-ground caribou herds on the Nunavut mainland (Figure 5.3). As well, agreement was reached on the locations and boundaries of concentrated yearly calving areas and migratory corridors amongst other important seasonal range. This information can be used for environmental impact assessments, to help coordinate survey efforts and protect critical caribou habitat (Figure 5.4).

Table 5.4. The status of ungulate populations and subpopulations within the Kivalliq region of Nunavut.

| Species | Subpopulation Identification | Most Recent Abundance Survey (year) | Estimate | 95% Confidence Interval | Coefficient of Variation (%) | Index of Population Trend | Statistically Verified Trend |
|-----------------------|------------------------------|-------------------------------------|----------|-------------------------|------------------------------|---------------------------|------------------------------|
| Barren-Ground Caribou | Ahiak | 2011 | 71,340 | 63,623 - 79,056 | 5.4 | Unknown | Unverified |
| | Beverly | 2011 | 124,189 | 95,999 - 152,378 | 11.3 | Declining | Declining |
| | Coats Island | 2010 | 4,089 | 2,157 - 5,221 | 14.0 | Declining | Unverified |
| | Lorillard | Not Surveyed | NA | NA | NA | Unknown | Unverified |
| | Qamanirjuaq | 2017 | 288,244 | 242,121 - 334,367 | 7.8 | Declining | Declining |
| | Southampton Island | 2017 | 10,272 | 8,826 - 11,953 | 7.7 | Declining | Unverified |
| | Wager Bay | Not Surveyed | NA | NA | NA | Unknown | Unverified |
| Muskox | Central Kivalliq Muskox | 2016 | 4,437 | 3,383 - 5,491 | 11.6 | Stable | Stable |
| | Northern Kivalliq Muskox | 2012 | 2,341 | 1,796 - 2,886 | 11.7 | Increasing | Increasing |

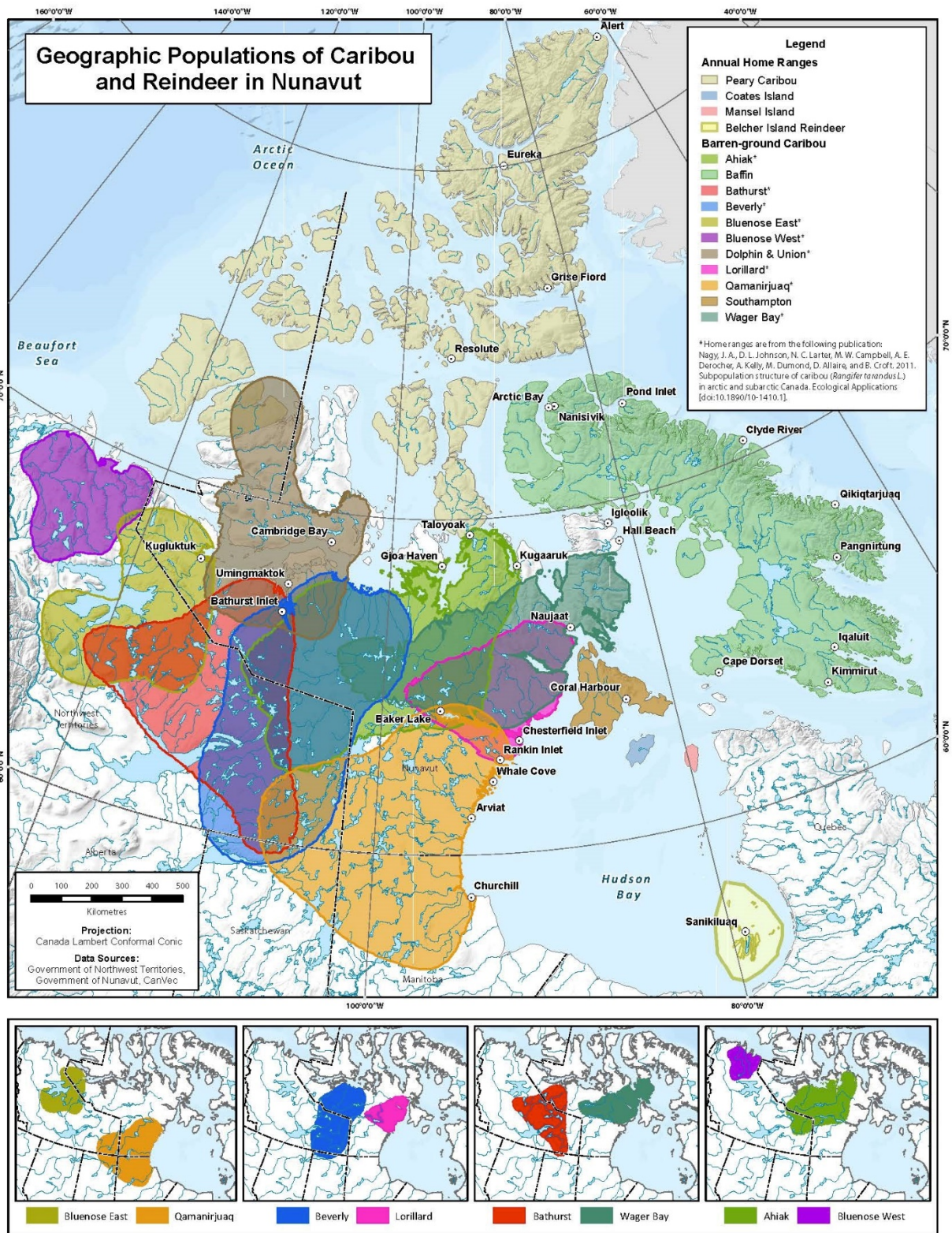


Figure 5.3. Barren-ground caribou populations in Nunavut

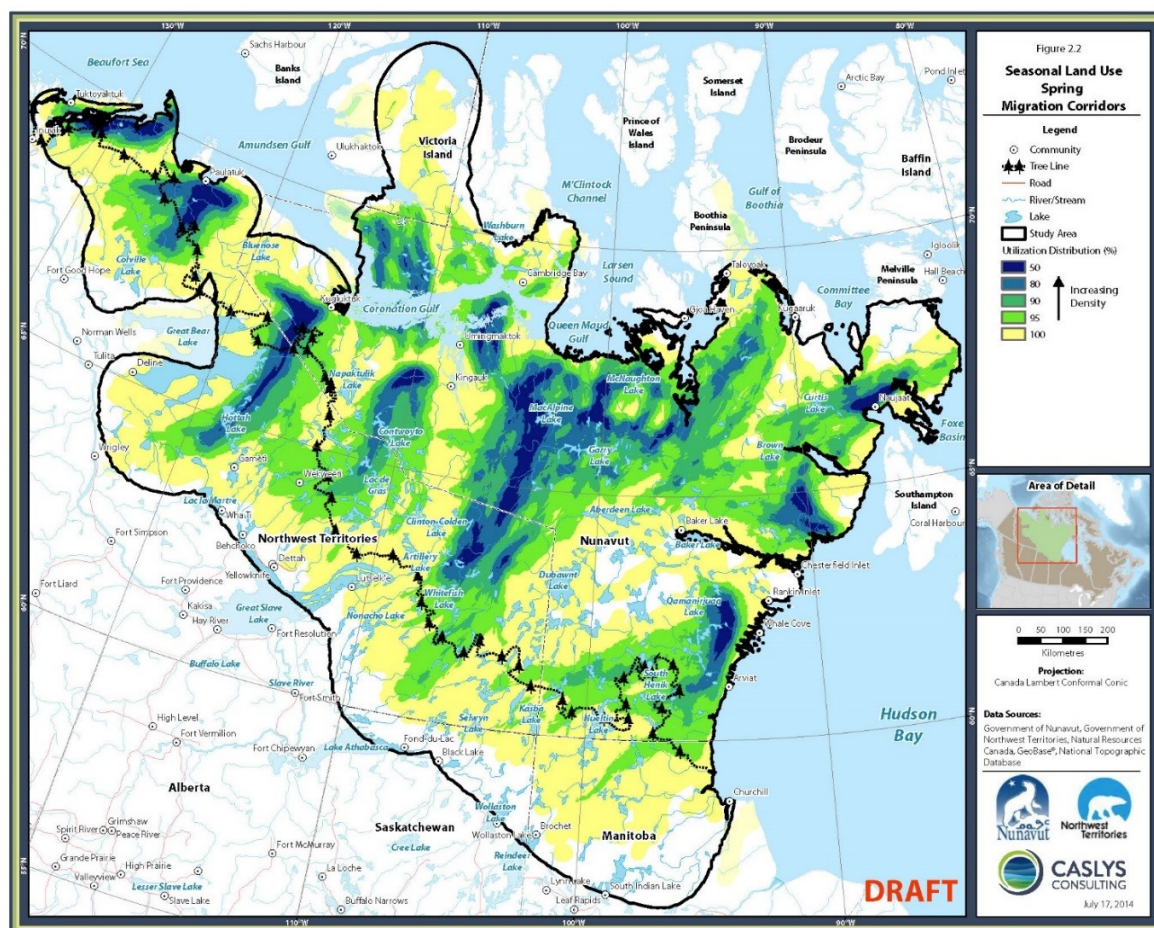


Figure 5.4. Barren-ground caribou spring migratory corridors across Nunavut.

Qamanirjuaq Caribou Surveys

The Qamanirjuaq Caribou Monitoring Program includes spring classification and satellite telemetry studies, and abundance surveys (Figure 5.5). These investigations were undertaken with input and support from many partners in Nunavut and NWT.

Knowing where caribou are located is key to developing effective research programs and making effective management decisions for caribou. Up to 50 Qamanirjuaq caribou cows are collared over a two year period on their spring range (Figure 5.6). The objectives of this project are to monitor distribution and seasonal range use and establish an important habitat data-base for the Qamanirjuaq caribou which includes location and activity, vegetation, hydrology and topography. As well, telemetry can provide resource users, RWOs, territorial and inter-jurisdictional management boards, information for management decisions related to appropriate land-use activities. A third objective is to locate concentrations of caribou, including calves during the spring to determine herd composition. This helps to index whether the herd is

growing or declining. Additionally, the monitoring of the health of the population, in light of a confirmed decline, has been ongoing.

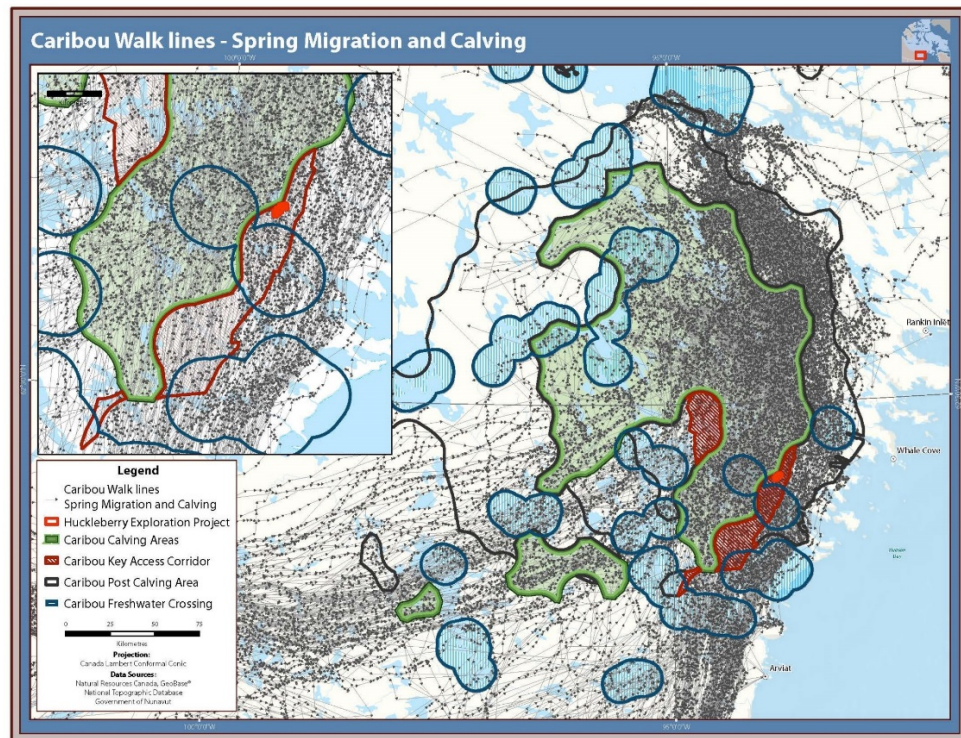


Figure 5.5. Telemetry data used to track the movements of Qamanirjuaq caribou onto and off of the core calving grounds and key access corridors. In this example, collars are being used to assess risk on proposed developments within the key access corridor.



Figure 5.6. A collared female Qamanirjuaq caribou.

Studies for trends in composition between 1994 and 2017 looked at the number of calves, of the Qamanirjuaq caribou herd, which had survived the winter. These studies provide an index of productivity that, when analyzed over time, provide insight into herd trend and amplitude. Thus far, all overwinter calf survival indices indicate a declining trend in calf production. Composition studies on Qamanirjuaq caribou are now conducted annually.

The Qamanirjuaq monitoring program includes calving ground reconnaissance surveys every 24 months to determine trends in abundance. Intensive estimates take place when a survey indicates a significant decline in calf numbers. Surveys are proposed to continue every two years until trends indicate sustained growth. Since the June 2008 survey, the Qamanirjuaq calving ground has been surveyed at the reconnaissance level in 2010 and 2012, and full abundance surveys have been flown in 2014 and 2017 (Figure 5.7). During abundance surveys, females were directly estimated and this was used in combination with fall composition results to determine total herd size. Initial information collected following the June 2017 estimate suggests the Qamanirjuaq caribou herd has continued declining in numbers.

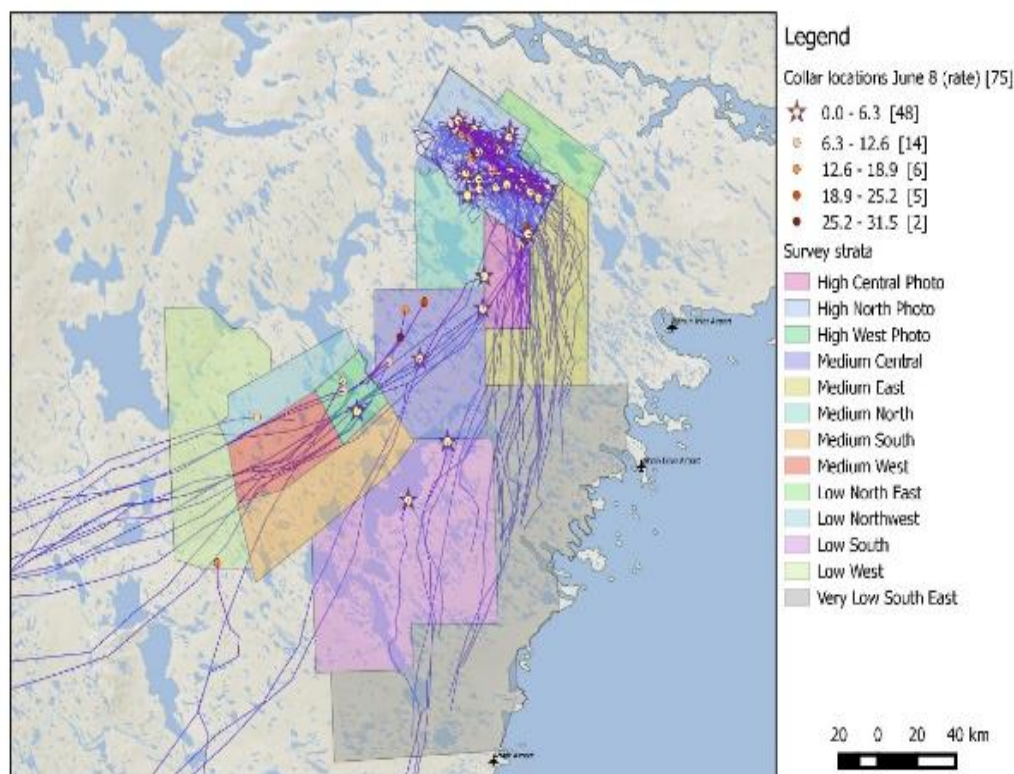


Figure 5.7. The Qamanirjuaq caribou herd June 2017 survey area, strata and collared caribou movements.

Qamanirjuaq Caribou Management

A management plan has been developed by the BQCMB with involvement from the governments of Canada, Saskatchewan, Manitoba, NWT, and Nunavut. The board includes two

voting members chosen by the Kivalliq Wildlife Board (KWB) as well as one voting member from the GN.

The present plan uses the results of the Qamanirjuaq Monitoring Program, as well as survey results, to make recommendations to all jurisdictions included in the Qamanirjuaq caribou range. Study results have been used to review harvest rates, coordinate exploratory aerial and ground operations, enforce Kivalliq Inuit Association (KIA) and Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC) caribou protection measures, and for environmental impact assessments.

Disease and Condition Monitoring Program

Part of the Qamanirjuaq Caribou Monitoring Program investigates disease and condition. It takes place annually, with local harvesters collecting blood and tissue samples for analysis. All blood samples are screened for reproductive status as well as diseases including Brucellosis (a reproductive disease). Teeth, muscle tissue, and a rumen sample are also collected for analysis. Based on the past five years of sampling, Brucellosis is not currently present in high proportions within the Qamanirjuaq caribou herd.

Multiple cases of hoof rot began appearing in spring and fall 2011. These were confirmed by Canadian Cooperative Wildlife Health Center (CCWHC). Early studies suggest this disease infected thousands of caribou just prior to fall migration. The area with the most sightings and confirmed cases included a corridor from Rankin Inlet west to Peter Lake and south to Whale Cove. Evidence of limping caribou dropped sharply south of Whale Cove near Sandy Point, north of Arviat on Hudson Bay's west coast. From 2011 to 2017 a high prevalence of hoof rot has not been observed, however, other disease indicators such as sepsis, round worm infections, *Besnoitia*, and various tapeworm cysts all seem to be on the increase.

Beverly and Ahiak Caribou Surveys

The Beverly and Ahiak Caribou Monitoring Program responsibilities are shared with the GNWT, which maintains the telemetry program, spring and fall composition studies and disease and condition monitoring for the Beverly population of mainland migratory barren-ground caribou. DOE manages the telemetry program for the Ahiak herd of tundra-wintering barren-ground caribou, June reconnaissance surveys and June abundance surveys for both the Beverly and Ahiak herds. These research initiatives have been carried out in partnership with local HTOs and other provincial and territorial governments.

The Nunavut components of the Beverly and Ahiak Monitoring Program are the same as those for the Qamanirjuaq Caribou Monitoring Program though spring recruitment studies have yet to be initiated. At present, reconnaissance and abundance surveys are the GNs primary methods for monitoring these herds.

In 2011, DOE completed an examination of the entire calving area known to be occupied by both the Beverly and Ahiak caribou populations. Its purpose was to obtain current numbers of breeding females in the Beverly herd of boreal forest-wintering caribou and the Ahiak herd of

tundra-wintering caribou. Initial findings confirm the Beverly herd breeding females are in significant decline and are fewer than half the 1994 estimate of breeding females. Since June 2011, reconnaissance surveys were flown over the Beverly calving extents in June 2013 and 2016, and a second abundance survey flown in June 2018 (Figure 5.8), which is still in the analysis stage. A trend analysis of the 2011, 2013, and 2016 Beverly reconnaissance surveys showed a declining trend along with an eastward shift in the calving distribution (Figure 5.9). The reconnaissance trend results were used to trigger the June 2018 Beverly survey. Limited financial and human resources have limited the ability to follow up on the Ahiak herd status since the 2011 survey effort. An increase in monitoring intensity and frequency with the Ahiak and neighbouring herds to the east (Lorillard and Wager Bay caribou herds) is recommended.

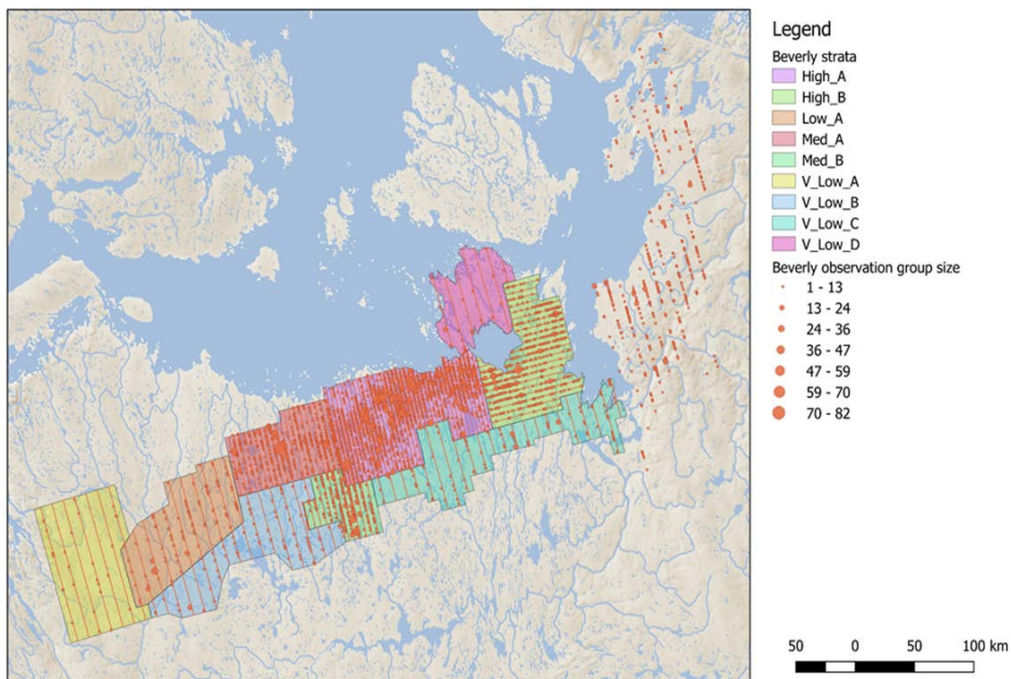


Figure 5.8. The June 2018 Beverly Herd survey area and abundance observations.

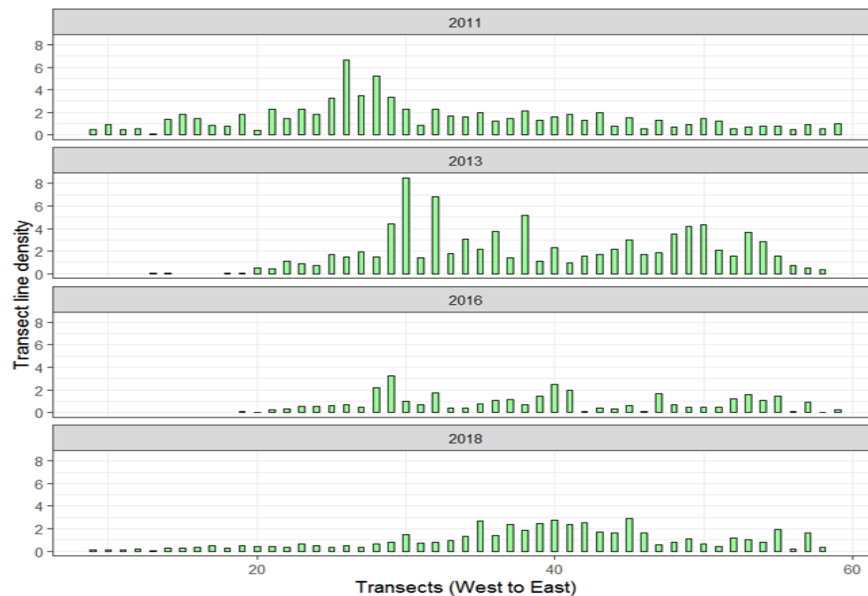


Figure 5.9. Reconnaissance survey transect observations from 2011 to 2018. Noted are the declining relative transect densities and the gradual shift east.

Beverly and Ahiak Caribou Management

As with the Qamanirjuaq caribou herd, a management plan was developed by the BQCMB. The results of the Beverly Caribou Monitoring Program are used to make management recommendations to all jurisdictions that share the Beverly caribou range. Results have also been used to review harvest rates, coordinate exploratory aerial and ground operations, enforce Nunavut Impact Review Board (NIRB), KIA and CIRNAC caribou protection measures and for environmental impact assessments.

The plan analyzes the sustainability of the present harvest and makes management recommendations to all jurisdictions harvesting from the Beverly caribou herd. The BQCMB coordinates the management of the herd, acting as the single forum for management decisions and is authorized to pursue partnerships for the herd's conservation. Information on herd size is an integral part of the BQCMB management plan to use “enhanced management actions” when the herd is declining. Further management actions are required if herd size cannot meet subsistence needs levels.

A management plan for the Ahiak caribou herd has not been developed to date. Confusion about herd status and distribution has complicated and delayed the process, though new information about distribution and abundance was received in 2011. An Ahiak caribou herd management plan will likely result following the next complete population assessment of the Northeast Mainland caribou herds including Ahiak, Wager Bay and Lorillard herds.

Northeast Mainland Caribou Surveys

Reconnaissance surveys and a telemetry study of the Lorillard and Wager Bay caribou herds on the Northeastern mainland of Nunavut took place in cooperation with local HTOs between 1999 and 2006. Since then only the Ahiak caribou herd was studied (June 2011). There has been no long-term monitoring program of these caribou herds. Interestingly, some collars placed on female caribou in 2011 ended up moving to the Lorillard caribou calving range, likely due to Lorillard caribou moving beyond their usual boundaries during that winter and mixing with the Ahiak caribou herd, which was the focus of the survey.

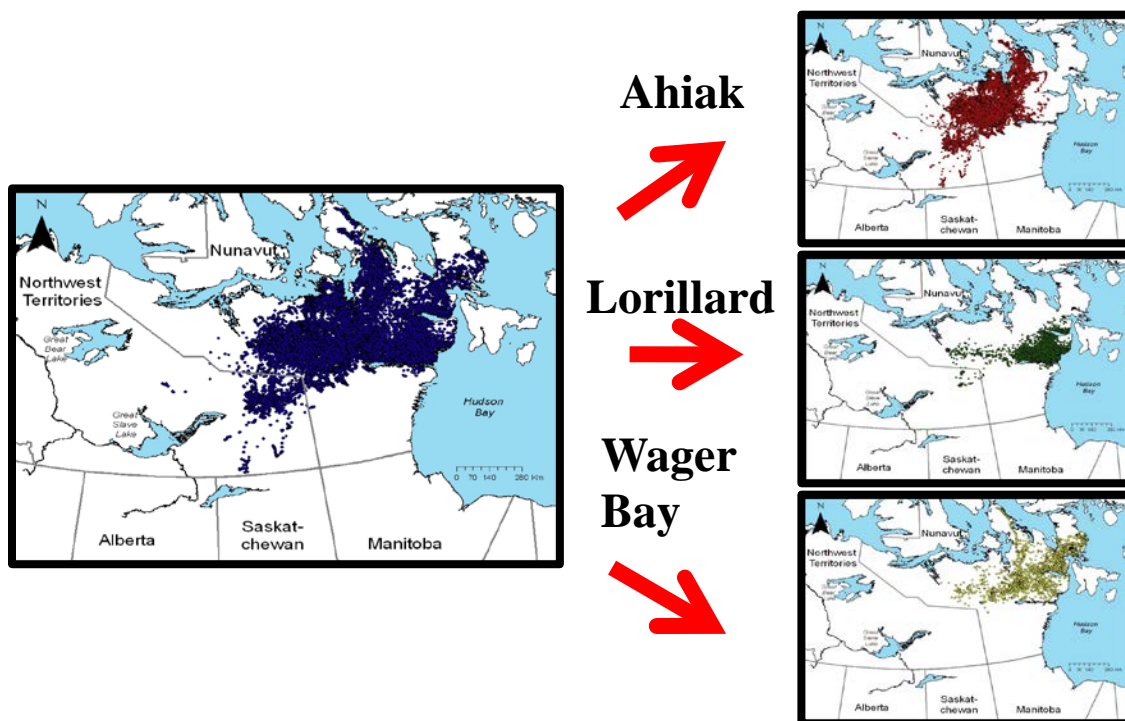
Since the completion of the Wager Bay and Lorillard caribou herds' telemetry program in 2006, no additional telemetry work was undertaken until spring 2010 when 15 collars were deployed on female Ahiak caribou. In spring 2014, while collaring caribou aggregations east of the Meadowbank all weather road, 15 collars were deployed on female Lorillard caribou (Figure 5.10). This predominantly Lorillard deployment continues to present. The knowledge gathered from the collaring program is currently being used to update seasonal range maps as well as study the effects of the Meadowbank all weather road on caribou movements and distribution. Additionally, collar locations are being used to guide aerial survey and aerial composition survey efforts (Figure 5.11).

A low coverage reconnaissance survey of the entire Northeast Mainland caribou herds was flown in 1996. Since this period, two reconnaissance surveys on the Ahiak caribou herd were flown in 2010 and 2011; three reconnaissance surveys on the Lorillard caribou herd were flown in 1999, 2001, and 2003; and three reconnaissance surveys were flown on the Wager Bay caribou herd in 2000, 2002, and 2004. Since this period, no surveys have been flown over the Lorillard and Wager Bay caribou herds calving grounds. During an October 2018 KWB meeting, an assessment of the abundance of the Northeast Mainland caribou herds was identified as a priority.



Figure 5.10. Caribou calving ground aggregations as seen from the survey aircraft.

Figure 5.11. An analysis of herd affiliations of the Northeast Mainland barren-ground caribou herds using telemetry data.



Southampton Island Caribou Surveys

The Southampton Island Caribou Monitoring Program is operated in partnership with the Coral Harbour HTO, the KWB, DOE and the NWMB. The study objectives were designed to manage the herd for both commercial and subsistence harvesting. The main objective is determining the status and trend of the Southampton Island caribou population, which has been affected by a high prevalence of Brucellosis and years of commercial and subsistence harvesting. The study examined the herd's condition up to 2011 in order to determine if or how changes relate to range condition, availability and/or area.

Since 2003, the Southampton Island caribou herd has been surveyed every two years to estimate numbers (Figure 5.12). In 2012 and 2013, extra surveys were conducted to confirm a severe decline below sustainable harvesting levels. Aerial surveys have tracked abundance to update an established management plan. The most recent survey was flown in May 2017. The results over the last five years have shown an increase in abundance between May 2013 and 2015, followed by a decline in 2017 (Figure 5.13). The initial increase between May 2013 and 2015 was confirmed through IQ and genetic analysis to have been caused by an immigration event from the mainland onto Southampton Island. The cause of the most recent declines are unknown though hunters are reporting healthier caribou with fewer signs of disease.

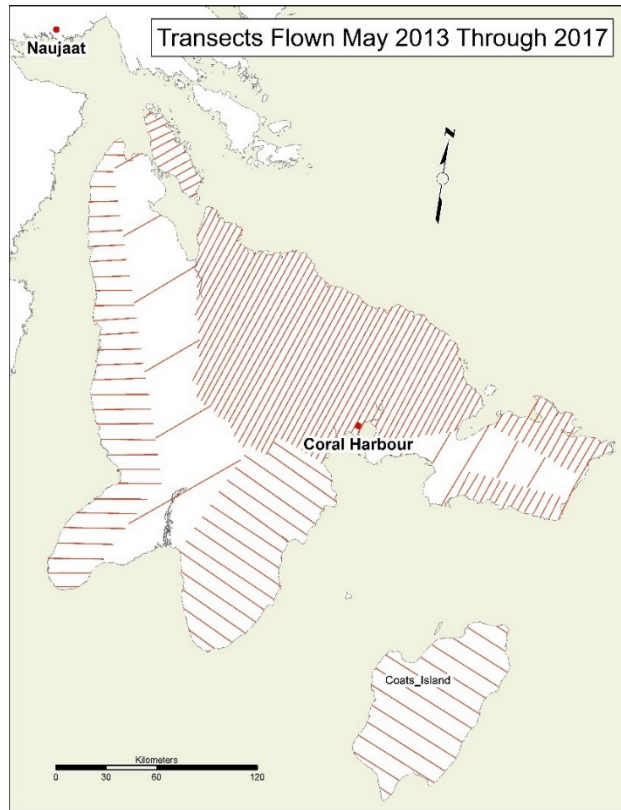


Figure 5.12. Survey study area, strata, and flight transects for Southampton Island caribou survey.

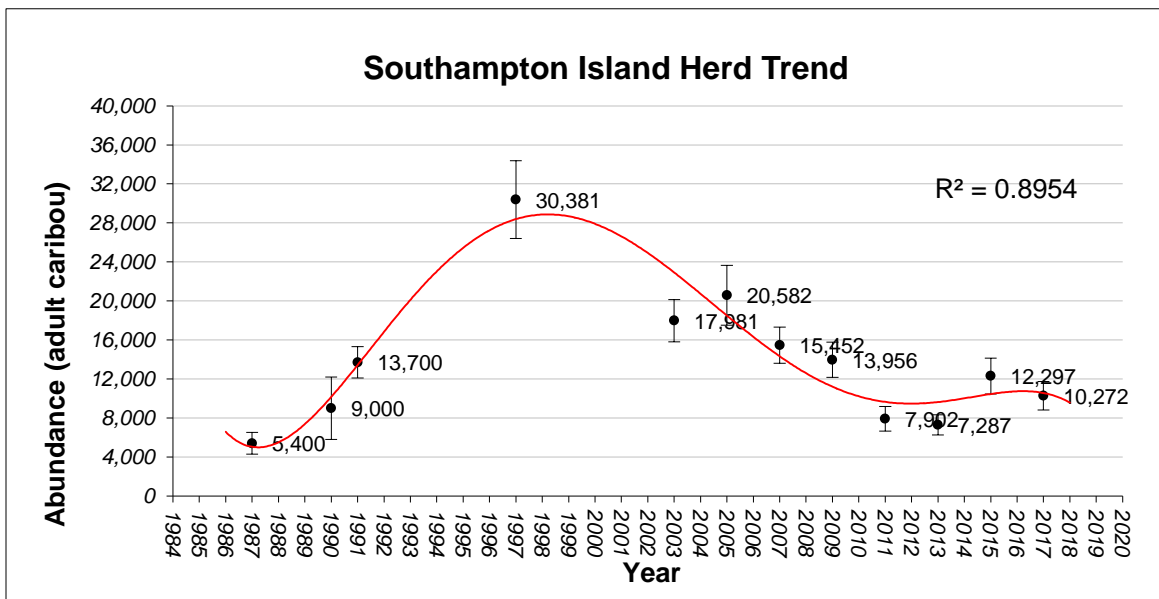


Figure 5.13. A history of abundance of the Southampton Island tundra wintering barren-ground caribou population.

Overall declines are believed to have resulted from reduced pregnancy rates due to brucellosis, and a large-scale local harvest, primarily for selling caribou meat to Baffin Island communities. A TAH of 1600 caribou was put in place for the Southampton Island caribou herd following the increases observed between the 2013 and 2015 abundance surveys. Results of the 2017 abundance survey suggest the current harvest is unsustainable and the TAH should be lowered.

Disease and condition studies have been conducted annually from 2007 to 2011. In a meeting with the Coral Harbour HTO in 2011, it was decided that continued harvesting to check the condition of the herd may contribute to the decline in the herd and the harvest of 100 caribou for study was stopped until there is evidence of recovery. In its place, a harvester-sampling program was developed and initiated in 2012 and 2013 to track disease levels, general condition and pregnancy rates. The lack of success of this program lead to it being replaced by a voluntary reporting of caribou condition and reproductive status. However, this voluntary program has been mostly unsuccessful as well. At present, a paid sample collection and reporting program is being discussed with the community of Coral Harbour.

Southampton Island Caribou Management

Barren-ground caribou were reintroduced to Southampton Island from Coats Island in 1968 following herd extirpation from Southampton Island in the early 1950s. Since its introduction, the herd has grown from the 48 original animals to its peak of approximately 30,000 animals by 1997. The herd has been harvested extensively both commercially and domestically since 1968. In 2003, the herd began to decline and continued on this trend until 2011. Commercial harvesting for the sale of meat was ended by 2009. Due to the “founder effect” of the low number of individuals (48) that were the progenitors of the current caribou herd, Southampton Island caribou have relatively low genetic diversity. Low genetic diversity can increase susceptibility to disease and parasites, which may have contributed to the widespread infection with brucellosis first detected in the Southampton herd in 2000. The incidence of brucellosis rose to 58.8 percent in 2011 and was partly responsible for the drop in pregnancy rates since 2000. Most of the herd decline has occurred in the last five years.

By 2011, recommendations to close all commercial harvesting were made by the Coral Harbour HTO. Despite the continued decline and recommendations from the Coral Harbour HTO and DOE to reduce the harvest to subsistence only, the sale of Southampton Island caribou meat to Baffin Island communities started using the internet and subsidized country food shipping programs. This export of meat increased the overall harvest by an estimated 30 percent. Significantly lower herd numbers indicate that this additional harvest will push herd numbers well below the level required to sustain the domestic subsistence harvest. The Coral Harbour HTO and DOE developed and agreed to a management plan for the Southampton Island caribou herd in January 2012. In this plan, management actions rely on meaningful consultation, IQ, and timely results from scientific research. The plan has been ratified by the Coral Harbour HTO, KWB, and DOE.

Coats Island Caribou Surveys

There is no monitoring program planned for the Coats Island caribou herd, given the extreme cyclical nature of its abundance and the relatively low harvest rates. However, when time and budget permits, while surveying Southampton Island, Coats Island is assessed for abundance. Despite the lack of a rigid survey schedule for the Coats Island caribou herd, visual surveys have taken place in September 2010 (during a polar bear visual survey), May 2013, May 2015, and May 2017 in association with the Southampton survey efforts. This has provided evidence of a dramatic die-off during winter 2010, which was confirmed in 2013 when survey results showed a dramatic reduction in abundance. This declining trend has continued up to May 2017.

Disease and condition studies were started on Coats Island with mixed success. Blood serum screening shows no sign of brucellosis. Tissues are being submitted for genetic analysis. HTOs can assist with collecting this information. There have been requests from the Coral Harbour HTO to start a management program for Coats Island caribou due to the pressure from increased harvesting, transferred from the Southampton Island caribou herd, which is also in decline.

Kivalliq Muskox

The Kivalliq muskox population was hunted to near extinction in the early 1900s. Protection was put in place in 1917 but there were few sightings until the late 1970s and 1980s. In the early 1980s, management began for a few established groups in Central Kivalliq to extend their range back into its historic boundaries – the entire Kivalliq mainland. The goal continues to be access to healthy established muskox populations for all Kivalliq communities without lengthy travel. This has received considerable support in theory. However, a shorter growing season and thicker snow cover in the eastern Arctic could make muskoxen expansion challenging if harvest levels are high.

Since the 1996 harvest, Kivalliq hunters have noticed muskox closer to their communities and beyond existing management boundaries. Continuing reports of their expansion has prompted frequent surveys to adjust management regulations and reflect increasing numbers and range. More information is needed since there now appears to be two populations of muskox, but co-managers have yet to determine the potential long-term effects of new management zones and quotas on these populations.

Central and Northern Kivalliq muskox populations (MX-13 and MX-10 respectively) are an important part of the Kivalliq muskox management plan (2009) designed to maintain healthy, accessible muskox populations (Figure 5.14). The collection and incorporation of IQ and scientific knowledge is also important to keep the management plan current. Most of the monitoring is done using aerial surveys and IQ to determine the trends and abundance of muskox and distribution changes. Also included in the survey are the relative numbers of predators, calf abundance, and general health and range condition. These studies were designed to complement proposed muskox surveys in the Kitikmeot region and the Thelon Game Sanctuary. Results of these IQ and scientific studies continue to be used to set sustainable harvest quotas, range, Non-Quota Limitations (NQLs), and re-establish muskox in

its historic range. To date, there has been a successful partnership between NWMB, DOE, and the communities of the Kivalliq region in the co-management of this species.

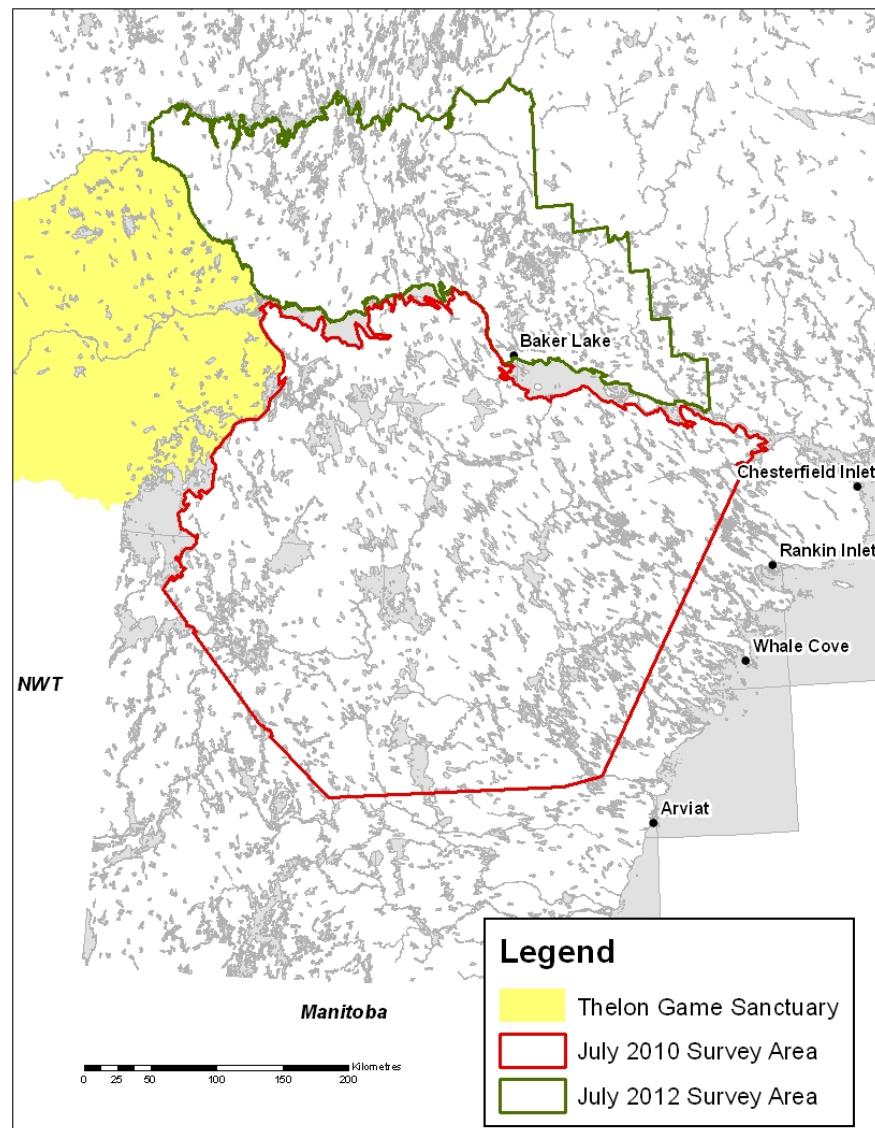


Figure 5.14. The central (MX-13) and northern (MX-10) Kivalliq muskox survey study areas.

Since 1996, re-assessments through aerial surveys of both the Central and Northern Muskox management units have used IQ and local knowledge from HTO members to develop survey areas and general trends. As well, these surveys provide training for new observers. Since July 1999, the MX-13 population has been reassessed in July 2010 and July 2016. Since July 2000, the MX-10 population has been reassessed in July 2012 and July 2017. The investigations indicate a significant increase in muskox abundance from 1999 through to 2010 for the MX-13 population and from 2000 through 2012 for the MX-10 population. The most recent assessment

of abundance for both populations suggest stability. Through this survey period, there has been a dramatic expansion in muskox range in both populations, predominantly to the east but also south for the MX-13 population (Figure 5.15). This expansion is thought to have facilitated a concurrent range expansion of barren-ground grizzly bears, though this has not yet been proven. The 2017 MX-10 survey results are still being analyzed.

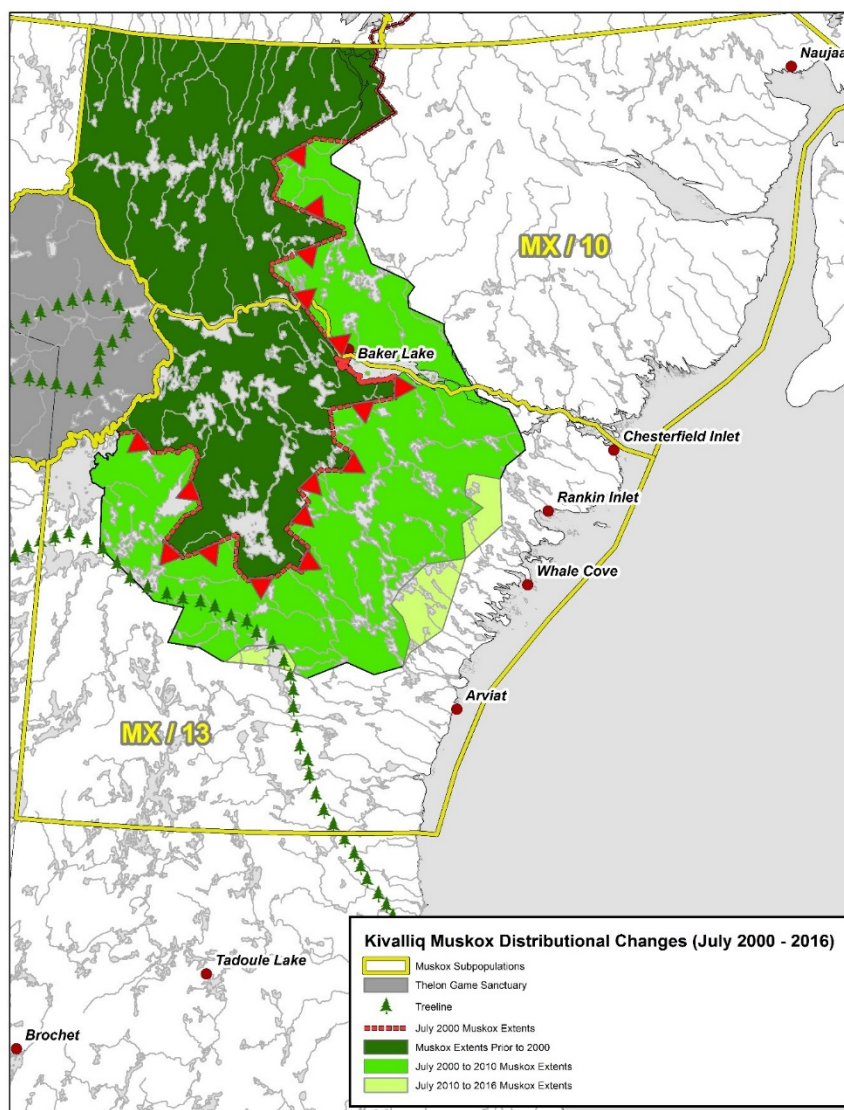


Figure 5.15. Range expansion and/or distributional shifts in muskox range through time.

Kivalliq Muskox Management

The Kivalliq Muskox Management Plan is designed to assist the co-management partners – the KWB, DOE, and NTI. Members of Arviat, Whale Cove, Rankin Inlet, Chesterfield Inlet, Baker Lake, Naujaat, and Coral Harbour communities harvest muskox from the two populations of muskox (MX-10 and MX-13) and are represented on the KWB by their respective HTO chairs.

IQ and community consultations have been used throughout the development of the management plan to help define the direction of muskox harvesting in the region. The goals of the management plan are to protect, conserve, and manage the herd sustainably. The plan's priorities are to seek permanent changes to the Wildlife Act Regulations reflecting boundary alterations, to eliminate "seasons", to set TAH, and to adjust NQLs when and where appropriate and where agreed to by all parties (Figure 5.16).

An action plan was developed to identify the immediate needs of the KWB. However, the board intends to revisit the plan annually or as necessary if and when new information becomes available. There will be on-going consultation between the KWB and its partners regarding the Kivalliq muskox populations, which is neither a species at risk nor a conservation concern.

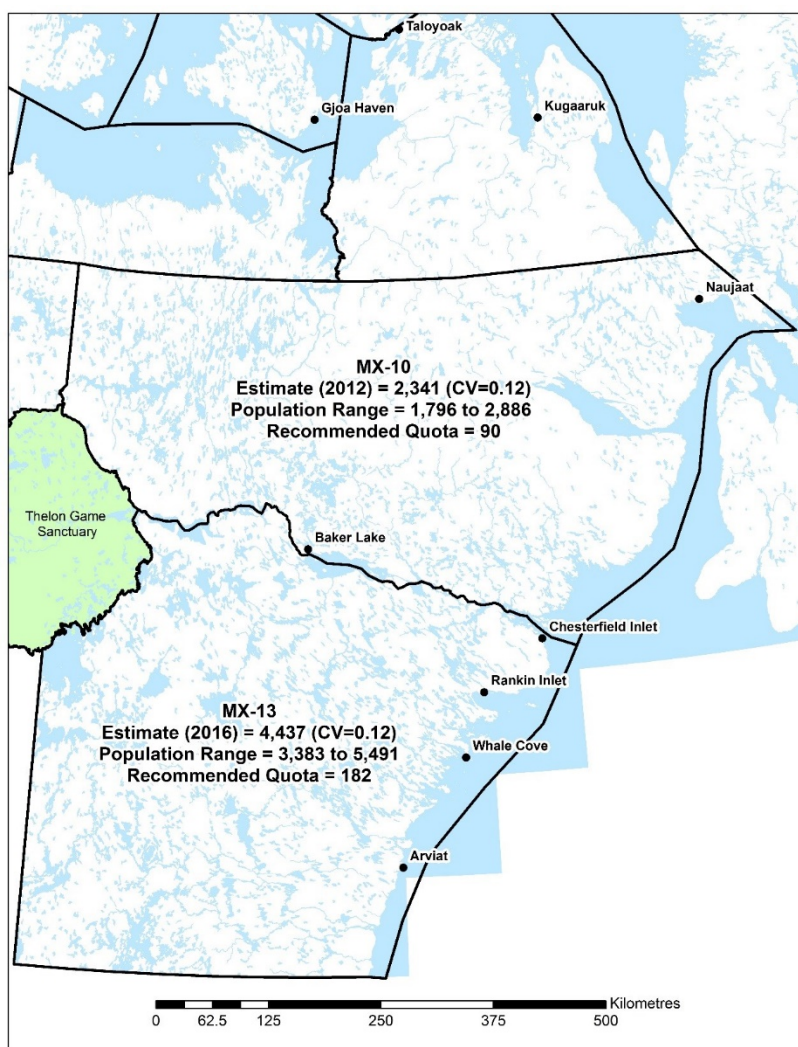


Figure 5.16. Central (MX-13) and Northern (MX-10) Kivalliq muskox management zones and assigned TAH.

Barren-ground Caribou Seasonal Range Analysis

The seasonal range maps developed for this initiative focus on the mainland migratory and tundra wintering barren-ground caribou herds of the NWT and Nunavut (Figure 5.17). The maps developed represent a synthesis of over two decades of telemetry studies and the most recent and sophisticated spatial analytical methods available, all combined to provide the most precise spatial representation of caribou seasonal range use to date. The purpose of this research is to provide an advanced level of spatial information and certainty to jurisdictions, their community based co-management partners, and the proponents of land use. This information will advise as to where anthropogenic activities will negatively affect our ability to sustain abundant, healthy caribou populations. Knowing where the caribou are throughout the year is essential to:

1. Mitigating seasonal land-use activities and/or regulating industrial development either permanently or seasonally within areas known to be annually and/or seasonally important to barren-ground caribou.
2. Regulate harvesting activities, which are herd specific, during periods of decline, or regulate the activities to prevent local depletion.
3. Monitor spatial changes and/or affiliations between herds through time to ensure up to date information is made available to all wildlife managers.
4. Keeping demographic monitoring studies cost effective by focusing efforts where the caribou are or are likely to be.

Though this effort represents an important first step toward our understanding of the spatial and temporal nature of mainland barren-ground caribou herds, it is our aim to encourage regular updates to the map atlas into the future to ensure effective management, and identify unnecessary restrictions through co-management actions. At present, the DOE is reassessing all seasonal range polygons using telemetry data current to December 2018.

Road Effects on Caribou

The intent of the proposed work is to determine the disturbance effects of roads and other linear structures on the behaviour and movement patterns of barren-ground caribou. Roads are considered one of the most significant threats to the long-term viability of migratory barren-ground caribou herds. Road structure, orientation to migratory routes, usage, and increasing access to caribou habitat, all play a role in the ultimate impacts of roads on the long-term viability of caribou populations. We are only beginning to understand the negative impacts of roads on caribou and more intensive research is required if managers are to understand how to mitigate the effects through proper road construction practices, placement, uses, as well as where prohibitions of roads are required due to inability to mitigate effects. This mitigation must also ensure that Inuit harvesting rights under the Nunavut Agreement are protected. This work represents an acceleration in our attempts to measure disturbance effects in the shadow of declining caribou herds across northern North America and dramatic increases in resource development interests on critical caribou habitat.

Wildlife-road interactions are complex and often involve effects across multiple scales, from changes in individual movement patterns, to shifts in seasonal distributions. Using the Kivalliq

Caribou Monitoring Program telemetry database, three approaches were applied to examine the potential effects of an all-weather mining road on caribou seasonal movement patterns: 1) trajectory characterization, 2) a biased-correlated random walk (BCRW) model, and 3) a mixed effects regression model. Preliminary results indicate an increase in road avoidance during the fall migration (after the road was constructed), demonstrated by an increase in the frequency of avoidance movements between the pre- and post-road construction periods. In the fall, the regression analysis identified higher tortuosity (meandering or non-linear movements), as caribou ventured closer to the road. The increased tortuosity represents greater milling behaviour (clustered movement) and avoidance movements (deflections to the north and south) by caribou within 36 km of the road (Figure 5.18). Slowed movement and avoidance of the road by caribou appears to indicate that the road may be acting as a semi-permeable barrier to movement. Further analyses of the zone of influence using higher frequency movement data, different definitions of distance to road, and the incorporation of traffic volumes into the regression analysis will assist to investigate the effects of mining and road infrastructure on caribou movement patterns.

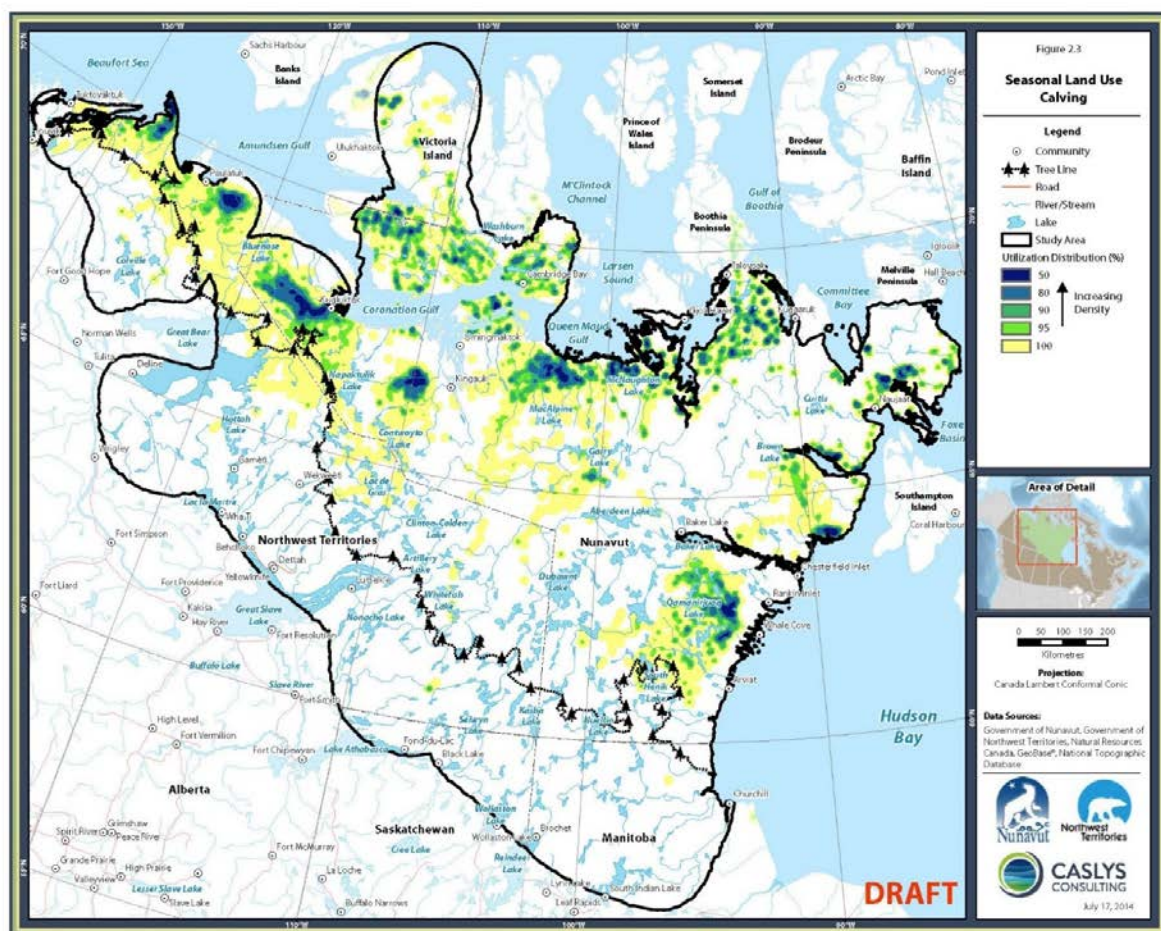


Figure 5.17. Core calving extents of Nunavut's mainland migratory barren-ground caribou herds.

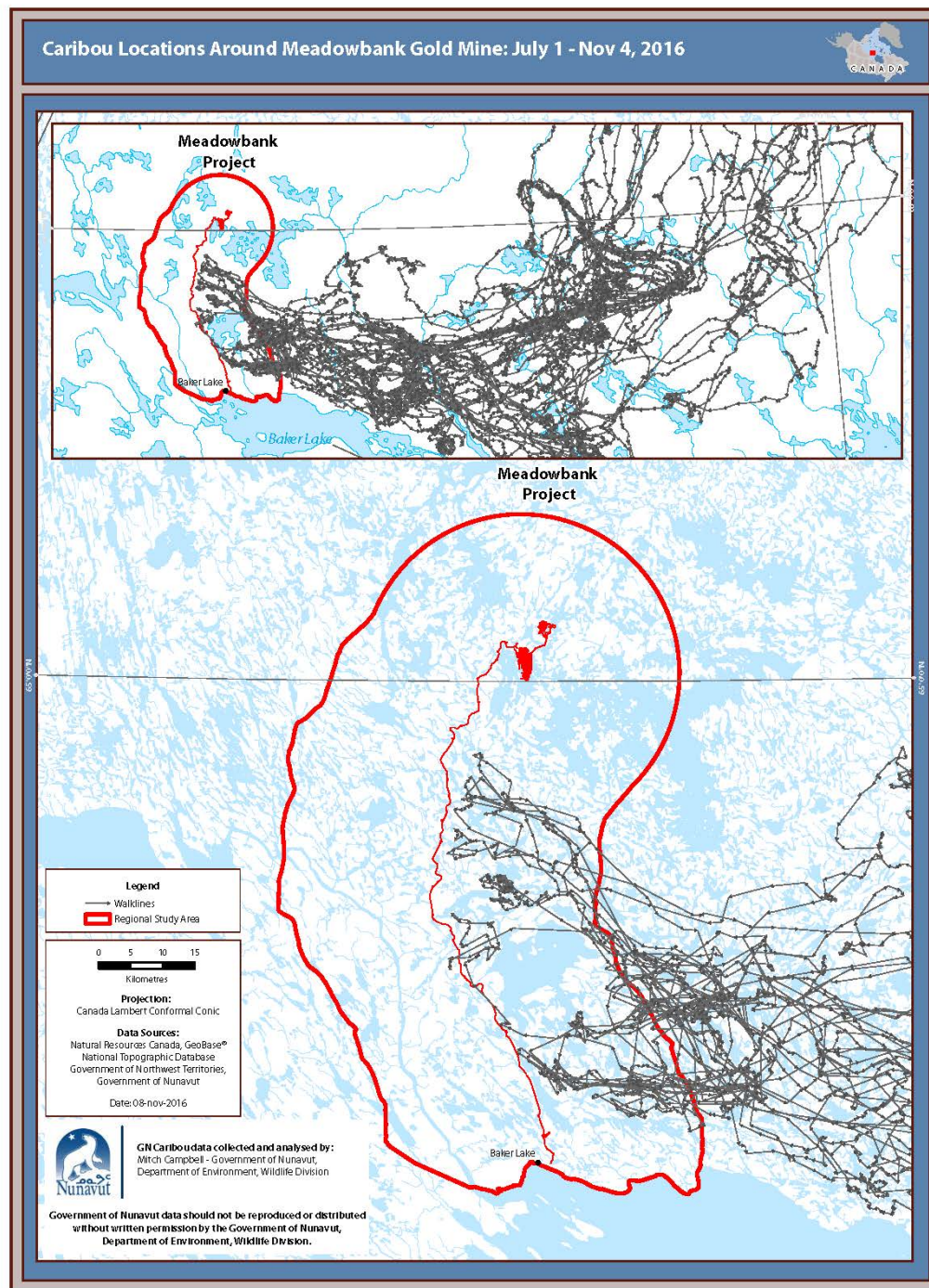


Figure 5.18. The deflection of barren-ground caribou from the Meadowbank all weather road.

5.4 Carnivore Research and Management Initiatives

Nunavut's carnivore research program currently focuses on grizzly bear, wolverine, and wolf.

Effects of Predation on Caribou Calving Grounds

The DOE investigated the extent of predation within the calving areas of the Qamanirjuaq herd (2010 and 2012) and the Beverly herd (2011 and 2013). This project was initiated in response to: 1) widespread population declines of barren-ground caribou herds across northern North America, and 2) local hunter reports of increasing barren-ground grizzly bear and wolf populations, and concerns regarding the extent to which predators may be reducing caribou numbers. Cause of death among newborn caribou calves was investigated by searching randomly selected transects for dead calves using helicopter. Transects were selected over calving areas with high and medium densities of breeding females.

Study results suggested that wolf-related calf mortality is relatively low at the calving grounds. The cause(s) of current declines in the Qamanirjuaq and Beverly caribou herds need to be investigated more closely and could include conflicts with predators elsewhere on their range and nutritional stress due to anthropogenic disturbance.

Wolverine Harvest Study

The wolverine was assessed as Special Concern across the Canadian range by COSEWIC in 2014, and in 2018 wolverine was listed as Special Concern under SARA. Inuit observations and recent harvest reports suggest that wolverine numbers in Nunavut are either stable or slightly increasing, and the species may be expanding its range eastward and northward. Currently, there is no limit on the harvest of wolverine by Inuit harvesters and the harvest in Nunavut contributes substantial numbers to the total national harvest. It is important to know the structure of the harvested population and its variations in order to provide meaningful management recommendations for a species that is potentially sensitive to over-harvest and habitat loss due to industrial development.

Initial findings of the harvest monitoring and carcass collection program suggest that there is higher harvest effort and success happening near communities. Remote areas, with little or no harvest, are producing animals that disperse and replenish harvested animals near communities. The high harvest of young animals, and the low proportion of adult females in the reported harvest, indicate that the population is healthy and likely not overharvested.

Wolverine Hair Snagging

Baseline wolverine population/density information is needed to make decisions about management actions, understand impacts of development, and to monitor species population trends in general. To establish a long-term DNA sample plot to monitor representative wolverine densities over time, a two-year study (2013-2014) was conducted northwest of Baker Lake (north of Aberdeen Lake) with the involvement of the Baker Lake HTO. Later in 2015-2016, a

two-year study was conducted near North Henik Lake with the Arviat HTO. For both studies, two approaches were used to establish a long-term DNA sample plot. First, the biologist interviewed wolverine hunters and elders from Arviat and Baker Lake to identify wolverine habitat and distribution and hunter harvest patterns, as well as caribou and muskox distribution. Second, future mineral resource development, potential linear developments, and long-term patterns of wolverine harvest in the Kivalliq region were considered.

Genetic analysis was used to identify sex and individual wolverines from hair samples collected through a study design that was science-driven, minimally invasive, and facilitated by local hunters. Hair snagging posts were placed in the study area in a grid formation and set up to collect hair samples from wolverines trying to retrieve bait placed on the top of the post. The posts in the grid were visited on regular intervals. Density estimates are study area size are presented in table 5.5.

Table 5.5. Estimates of wolverine density from Aberdeen Lake and Henik Lake studies, Kivalliq region, Nunavut.

| Density (Wolverine/ 1,000 km ²) | Precision (95% CI) | Study area size (km ²) | Location | Methods | Closure Correction |
|---|-----------------------|---------------------------------------|------------------|--------------------------------------|-----------------------|
| 2.3 | 2.09-3.33 | 3,344 | Aberdeen Lake | DNA hair capture & mark-recapture | Yes |
| 3.3-4.4 | 2.89-5.93 | 4,550 | North Henik Lake | DNA hair capture & mark-recapture | Yes |

The same approach was used to establish a long-term DNA sample plot to monitor representative wolverine densities over the long-term in Kitikmeot region. A study site near Napaktulik Lake, approximately 160 km southeast of the community of Kugluktuk, was selected for DNA sampling. In March/April, 2018, 143 (5x5 km grids) hair snagging posts were sampled and 22 wolverines (11 males: 11 females) were identified. Another sampling session will be repeated in the spring of 2019 following the same study design. After 2019 DNA results are available, both years of data will be combined for density estimates.

Grizzly Bear Harvest Study

COSEWIC assessed the grizzly bear (Western population) as Special Concern in 2012, and in May 2018, grizzly bear were listed as Special Concern under SARA. The monitoring of the harvest is an important component of the monitoring of the species overall. Grizzly bear harvest data have been collected since the early 1980s. Samples from harvested bears have been obtained from defense kills, sport hunts, and on a voluntary basis from bears harvested for subsistence. Between 2000 and 2018, the annual harvest of grizzly bears in the Kitikmeot region has fluctuated from 4 to 22 bears/year, with an average of 13 bears/year. The Kitikmeot average annual harvest has remained constant since the mid-1990s. Sex ratio and mean age of the harvest indicates no demographic change. However, grizzly bear harvest in Kivalliq has

increased substantially from a yearly average harvest of 6 bears between 2000 and 2007, to 18 bears between 2008 and 2018. Grizzly bears do not occur on Baffin Island.

Grizzly Bear Hair Snagging

Currently, there is some quantitative information about grizzly bear densities or population dynamics in Nunavut. This type of information is difficult, expensive, and labour-intensive to obtain due to the fact that grizzly bears occur in relatively low numbers, are wide-ranging, and widely dispersed. Collecting hair samples through hair-snagging posts is a relatively low-cost way to obtain genetic information over an extended period that can be used to estimate density information.

DOE planned a hair snagging study in the Kivalliq region, starting in 2014. For this study, a simulation exercise was conducted with a variety of grid configurations to gather density information for an area of interest in the Kivalliq region spanning 209,000 km². The primary goal of this study was to estimate the average density of grizzly bears across the region, with a secondary objective to determine how bears were distributed across the region and to identify the effects of habitat variables. The simulated sampling design recommended 6 grids, each of 49 posts at 10 km spacing, sampled across 2 years (12 grids total over the 2 years) with 3 sampling sessions each year. The sampling method involved the collection of hair samples for DNA analysis from barbed wire around tripod configuration wooden posts, during the summer months. On the grids, helicopters were used to visit each post 3 times with 12 days in between each sampling visit.

Resources were insufficient to carry out the full-recommended scale of the study in the span of 2 years. Partial sampling was conducted in 2016 (2 grids) and 2017 (2 grids). Recapture rates on the grids were low. In 2016, 28 bears were detected and an additional 7 bears were identified through occasional sampling from other locations in the region (old cabins and other surfaces that had snagged grizzly bear hairs). In 2017, 20 bears were detected on the sample grids. In addition to the sampling grids in 2017, 36 posts at 10 km spacing were sampled on the periphery of Henik Lake over 4 sessions by boat and involving hunters from Arviat. There were 19 bears identified on the Henik Lake sample posts. Analyses are underway using spatially explicit capture-recapture (SECR) methods, in order to produce an estimate of population density and recommendations for future sampling efforts.

Grizzly Bear Management

DOE worked cooperatively with the relevant HTOs, RWOs, communities and other stakeholders for their input into the Nunavut Grizzly Bear Co-Management Plan over the last five years. Initial consultations with HTOs focused on identifying management priorities and goals. The draft plan was developed based on input received in initial consultations and then taken back to communities and HTOs for final review and input. The NWMB approved the Nunavut Grizzly Bear Co-Management Plan in 2017. The management plan was developed to provide guidance and direction to the co-management partners and help with the decision making process and to identify goals and objectives for the management of the grizzly bear population in Nunavut. Ongoing communications between co-management partners, Inuit participation, and cooperation will be fundamental to the plan's success. The main actions of the plan, which were supported by the users voluntarily, include protection of family groups and bears in dens, harvest monitoring, and reduction of human-bear conflict.

Food Habits of Wolf, Wolverine, and Grizzly Bear

In partnership with the Kivalliq and Kitikmeot regional HTOs and the Université du Québec à Rimouski, a carcass collection program has been run for harvested wolves and wolverines in the Nunavut mainland communities (2010-2013). Hair and muscle samples were acquired from 2009 to 2013. During the study period, a total of 287 wolves and 375 wolverine carcasses, mostly harvested by rifle, were submitted to the program. Hunters received compensation for their contributions and they provided information on harvest location, time, and ecological observations. The food habits of these species were investigated using two complementary methods:

1. Stomach Content Analysis: provides a “snap-shot” of food items consumed, which were washed and weighed
2. Stable Isotope Analysis (SIA): allows the examination of assimilated food using isotopic signatures of carbon and nitrogen. SIA was run on tissues with different turnover rates; liver (days), muscle (approximately 2 months), and fur (summer).

Stomach content analysis showed that caribou was the main prey used by both wolves and wolverines followed by muskox as the second most common prey species. The consumption of fish, seal, and migratory birds were reported in very small quantity. It was found that wolf diet overlaps greatly with wolverine, on one part, and grizzly bears on the other part, while wolverines and grizzly bears were more different. Caribou was the principal prey utilized by all species. Wolves were found to have the greatest proportion of caribou in their diet (averaged up to 90%), followed by wolverine (up to 75%), and grizzly bears (up to 40%). Interestingly, the proportion of caribou prey in the diets of wolves and wolverines increased in the winter/spring, compared to the summer. These results varied across various regions of Nunavut; the proportion of caribou in the diet was higher in the southernmost areas and lower in the northernmost areas, concurrent with the declines in caribou herds. Some wolverines were found to have a high proportion of marine sources in their diet (mostly in the northernmost areas), while marine species were rarer in the diet of wolves and totally absent in the diets of grizzly bears. Grizzly bears had a greater proportion of small tundra herbivores (e.g. squirrels) in their diet when compared to the other predators. Small tundra herbivores were found to contribute up to 40% of the diets of wolves and wolverines in summer. Muskoxen represented an important prey base for wolves and wolverines that lived in north-western Nunavut (Kugluktuk and Cambridge Bay areas).

The isotopic niches of the three predator overlap due to the contribution of large herbivores (caribou and muskox) to their diets. Wolverine has the widest niche compared to wolves and grizzly bears and centered on large herbivores with the inclusion of marine species. Wolves benefited from a greater energy coming from migratory birds compared to the small tundra-dwelling prey preferentially used by grizzly bears.

Wolf and Arctic Fox

Arctic fox and wolf are two important furbearers in Nunavut’s culture and economy. The level of harvest is fluctuating annually depending on prey abundance, accessibility, and pelt price. DOE

used a number of methods to monitor the size of harvest (fur sales, export permits, and harvest sample collection). Initial findings of harvest monitoring suggest a healthy wolf and fox population in Nunavut. Further, they seem to be more readily adaptable to human developments than other furbearers. Arctic fox is valued for its fur but foxes are also a common carrier of the rabies virus, a potentially fatal virus for any mammals, including humans.

5.5 Polar Bear Program (PBP) Research Initiatives and Management

About 50-60% of the world's polar bears occur in Nunavut. Approximately 80% of the world's total harvest of polar bears takes place in Canada, mainly undertaken by the local Inuit but also by sport hunters. Of the 13 polar bear subpopulations in Canada (Figure 5.19), all but one is within or shared with Nunavut. These 12 subpopulations account for approximately 13,000 – 14,000 bears. Nunavut is therefore responsible for the majority of polar bear conservation, research, and management in the world.

The Polar Bear Program (PBP) focuses its research on population descriptions, recommending and implementing TAH decisions, population modeling (the study of groups of animals living in the same area and how they interact), and genetics (Table 5.6). It also includes foraging and habitat ecology, contaminants, harvest monitoring/reporting, and behavioural ecology for Nunavut's polar bear populations through collaborative research with academic institutions.

Human dimensions research (how individuals and societal groups contribute to, are influenced by, and mitigate and respond) for harvesting polar bears has also been carried out with the Baffin Bay polar bear subpopulation. In some areas, this has helped to ensure that Nunavut polar bear subpopulations are harvested and managed in a sustainable manner. There is also collaboration with various co-management organizations and neighbouring jurisdictions to meet the many research and monitoring demands for polar bears. This cooperative management helps provide resources to continue the program.

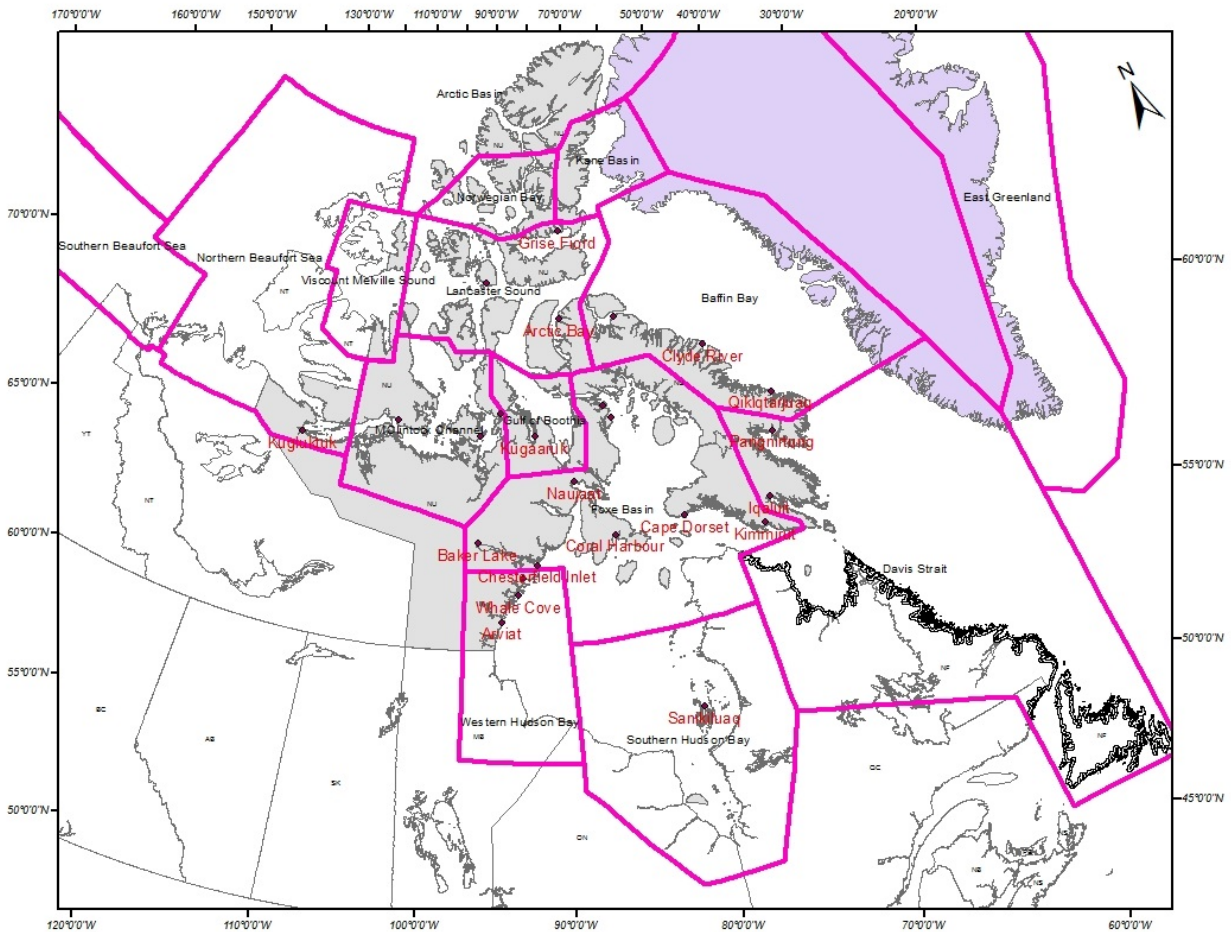


Figure 5.19. Canada's and Nunavut's (shaded area) polar bear subpopulations. BB: Baffin Bay, DS: Davis Strait, SH: Southern Hudson Bay, WH: Western Hudson Bay, FB: Foxe Basin, GB: Gulf of Boothia, MC: M'Clintock Channel, LS: Lancaster Sound, KB: Kane Basin, NW: Norwegian Bay, VM: Viscount Melville Sound, NB: Northern Beaufort Sea, SB: Southern Beaufort Sea.

Table 5.6. Polar Bear subpopulation statuses and trends in Nunavut.

| | |
|---|---|
| Baffin Bay Annual Removal (2016-2017): 64 Historical Annual Removal (5 year mean): 66 Most Recent Abundance Estimate: 2826 Recent Trend: Likely Stable TEK Assessment: Stable Year of Estimate: 2016 Year of Next Estimate: TBD | Davis Strait Annual Removal (2016-2017): 43 Historical Annual Removal (5 year mean): 47 Most Recent Abundance Estimate: 2158 Recent Trend: Likely Increase TEK Assessment: Increased Year of Estimate: 2007 Year of Next Estimate: 2019 (in progress) |
| Foxe Basin | Gulf of Boothia |

| | |
|---|--|
| Annual Removal (2016-2017): 96 Historical Annual Removal (5 year mean): 98 Most Recent Abundance Estimate: 2580 Recent Trend: Stable TEK Assessment: Increased Year of Estimate: 2009-2010 Year of Next Estimate: 2021 | Annual Removal (2016-2017): 61 Historical Annual Removal (5 year mean): 62 Most Recent Abundance Estimate: 1592 Recent Trend: Uncertain TEK Assessment: Increasing Year of Estimate: 2000 Year of Next Estimate: 2018 (Analysis stage) |
| Kane Basin | Lancaster Sound |
| Annual Removal (2016-2017): 0 Historical Annual Removal (5 year mean): 0 Most Recent Abundance Estimate: 257 Recent Trend: Increased TEK Assessment: Increasing Year of Estimate: 2016 Year of Next Estimate: TBB | Annual Removal (2016-2017): 78 Historical Annual Removal (5 year mean): 85 Most Recent Abundance Estimate: 2541 Recent Trend: Uncertain TEK Assessment: Increasing Year of Estimate: 1995-1997 Year of Next Estimate: 2019-2020 |
| M'Clintock Channel | Norwegian Bay |
| Annual Removal (2016-2017): 10 Historical Annual Removal (5 year mean): 6 Most Recent Abundance Estimate: 284 Recent Trend: Uncertain TEK Assessment: Stable Year of Estimate: 2000 Year of Next Estimate: 2018 (Analysis Stage) | Annual Removal (2016-2017): 0 Historical Annual Removal (5 year mean): 2 Most Recent Abundance Estimate: 203 Recent Trend: Uncertain TEK Assessment: Stable Year of Estimate: 1997 Year of Next Estimate: TBD |
| Southern Hudson Bay | Viscount Melville (Managed by GNWT) |
| Annual Removal (2016-2017): 20 Historical Annual Removal (5 year mean): 23 Most Recent Abundance Estimate: 784 Recent Trend: Likely Declining TEK Assessment: Stable to increasing Year of Estimate: 2016 Year of Next Estimate: 2021 | Annual Removal (2016-2017): 3 Historical Annual Removal (5 year mean): 3 Most Recent Abundance Estimate: 161 Recent Trend: Uncertain TEK Assessment: Increased Year of Estimate: 1992 Year of Next Estimate: TBD |
| Western Hudson Bay | LEGEND |
| Annual Removal (2016-2017): 19 Historical Annual Removal (5 year mean): 25 Most Recent Abundance Estimate: 842 Recent Trend: Likely Stable TEK Assessment: Increased Year of Estimate: 2016 Year of Next Estimate: TBD | TEK: Traditional Ecological Knowledge TBD: To be determined GNWT: Government of Northwest Territories |

Alternative Techniques to Traditional Capture-Mark-Recapture (CMR)

Since 2007, to reflect Inuit societal beliefs and values, the PBP has developed less and non-invasive alternatives to the traditional Capture-Mark-Recapture (CMR) studies in order to estimate population abundance. One method, DNA biopsy sampling, uses a small dart to remove a small skin sample without affecting the bear, but providing identification of individual

bears (Figure 5.20). This has been applied on a larger scale for the population re-assessments in Baffin Bay, Kane Basin, M'Clintock Channel, Gulf of Boothia, and Davis Strait.

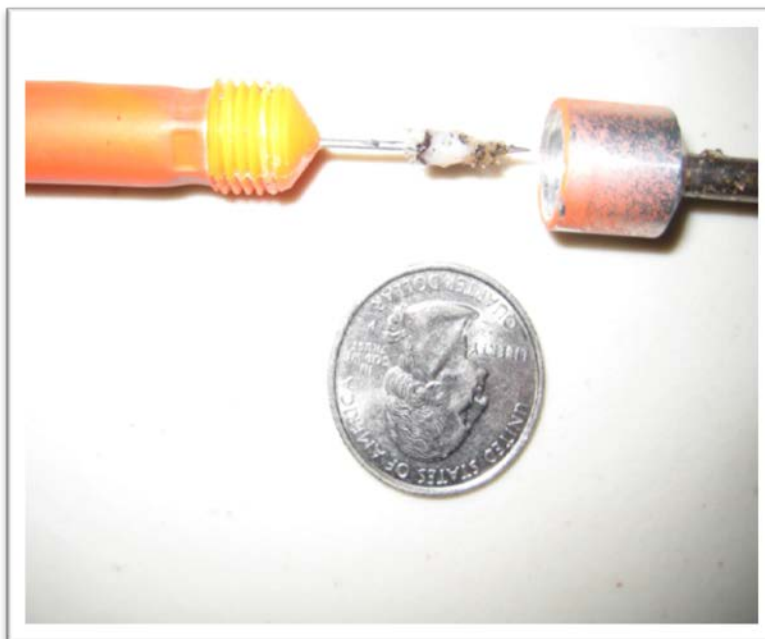


Figure 5.20. Example of a disassembled biopsy dart tip showing the extracted skin sample during the sampling process (Photo by S. Atkinson and S. Stapleton).

Another non-invasive approach has been the use of aerial surveys (AS), which until recently has been limited. Through collaborative effort with the University of Minnesota, DOE has applied this technique to estimate the population abundance for Foxe Basin (2009 and 2010) and Western Hudson Bay (2011 and 2016). The results clearly showed that aerial surveys could be used to determine polar bear numbers in specific regions (e.g. seasonally ice-free regions with little relief). While AS only provides a snapshot at a given time and place, repeated surveys can establish trends in population abundance and help measure the success of the prescribed management program.

Davis Strait Population Inventory

Within Canada, the Davis Strait (DS) polar bear subpopulation is shared by Nunavut, Quebec (Nunavik), and Newfoundland and Labrador (Nunatsiavut). The subpopulation was first inventoried in the 1970s but the survey likely underestimated its abundance because of poor aerial coverage. A comprehensive population study was conducted from 2005-2007, which found the abundance to be approximately 2,158 bears. The survey also suggested a decline in both productivity and population size in the future. The reduced productivity may in part be attributable to the effects of high bear densities, which came about during a period of population growth from the 1970s to 2007. In addition, an observed decline in sea-ice (i.e. longer open

water periods) has raised concerns that the polar bears have less access to seals and that this is contributing to declines in productivity which will result in a decline in the number of bears.

In recent years, Inuit have indicated that large numbers of bears are creating public safety concerns, especially for people going out on the land. Inuit believe that the bears are negatively affecting other wildlife by eating large numbers of young seals, and eggs in bird colonies. There is some uncertainty surrounding the current status of the DS subpopulation, in part of known changes to the sea-ice habitat, but it is believed that the population is either stable or has likely been increasing since the last inventory was completed in 2007. Given these factors, the co-management partners planned to conduct a new population study between 2017 and 2018 using genetic biopsy capture-recapture techniques. Both field seasons of this study were completed where 2017 was a successful field season; unusually bad weather during 2018 hampered having a complete field study in Nunavut. If the data collected during the 2018 field season is not sufficient, there may need to be a third field season to ensure adequate sampling is accomplished for the best possible scientific and statistical analysis and interpretation. The department is also conducting a traditional knowledge study on DS polar bears so that all available information (e.g. scientific and local knowledge) will be incorporated when a new TAH is recommended.

Western Hudson Bay (WH) Population Inventory/Aerial Survey

The Canadian Wildlife Service (CWS), in collaboration with the Manitoba government, regularly inventories part of the polar bear population in Western Hudson Bay (WH). Different types of surveys since 1999 indicated that this subpopulation was in decline because of lowered survival rates, reproduction, and body condition, which are all attributed to earlier sea-ice breakup from climate change. This prompted the GN to undertake an aerial survey in 2011, which found that the numbers and condition of bears were better than expected, but births were low, calling for increased monitoring of this subpopulation. It also appeared that a shift in distribution occurred, which could have led to previous abundance estimates that were lower.

In 2016, a follow-up aerial survey for WH was conducted to infer a possible trend, and to establish the status of the polar bear population. Data was collected using mark-recapture and distance sampling protocols using an independent double-observer pair platform. The 2016 mean abundance estimate of 842 bears was 11% lower than the comparable mean estimate from 2011 of 949 bears, indicating a non-significant decline. Reproductive parameters (proportion of cubs-of-the-year [coy] and yearlings) remained similar to proportions recorded in 2011, especially for yearlings (coy: 11.5%, yearlings: 2.9%). Analysis of post-stratified age-sex groups suggest a decline in the adult females with offspring segment of the population compared to adult males. As the environment continues to change rapidly, management agencies are expected to respond promptly. In 2017, the Minister accepted a TAH increase from 28 bears to 34 bears. Following an NWMB in-person public hearing held in Rankin Inlet in January 2018, the Minister accepted an NWMB decision to increase the TAH from 34 bears to 38 bears. The rationale given by the NWMB for both increases was to address concerns around public safety in Western Hudson Bay communities. With local residents voicing concerns over

bear-human interactions, efforts are underway to continue the established bear monitoring and relocation/diversion program.

Kane Basin (KB) and Baffin Bay (BB) Population Reassessment

Stakeholders have expressed concerns about the status of the Kane Basin (KB) and Baffin Bay (BB) polar bear subpopulations in the past. Therefore, the Canada-Greenland Joint Commission on Polar Bears (JC) made it a priority that a re-assessment of numbers be conducted.

The last demographic study estimated KB to have 164 bears but this subpopulation was thought to be declining due to unsustainable harvest levels. As well, sea-ice conditions raise questions about the current KB subpopulation boundaries. Recent analyses of the BB subpopulation estimated that there were 2,074 bears with the projections indicating a decline to fewer than 1,600 bears. Changes in sea-ice conditions, coupled with high harvest rates in Greenland raised concern about the status of the subpopulation.

A research plan was proposed to the JC to re-estimate abundance and composition. Included in the proposal was a review of vital rates of the KB and BB subpopulations and a re-evaluation of their boundaries, as well as locations with respect to ice conditions, food availability, and distribution. A collaborative research project between Nunavut and Greenland began with satellite collars and spot ear tags being placed on animals from both subpopulations on the Greenland side to obtain information on movements. As well, DNA samples were collected through biopsy darting. The study was completed in 2013 and provided a great diversity and quantity of data (e.g. distribution, reproduction, abundance, temporal changes, etc.).

The Scientific Working Group (SWG) was created by the JC and they were tasked with preparing a detailed report of the results of the study, which was finalized in 2016 and shared with all stakeholders (e.g. members of the JC, HTOs, RWOs, NTI, and NWMB). The SWG scientific study report indicated an increase in absolute numbers of the population estimates from the previous studies for both the KB and BB subpopulations but productivity levels for BB were found to be lower than levels reported in previous studies. The current KB population estimate, from the 2011-2014 study is 357 bears, whereas the current BB population estimate, from the 2011-2014 study, is 2,826 bears.

In order to determine management goals for these two shared polar bear subpopulations, consultations with stakeholders were held, and subsequently harvest risk analyses for BB and KB were performed based on directions given to the SWB by the JC. The harvest risk analyses report was completed in July of 2017 and results were shared thereafter with all parties. The objectives of the BB harvest risk assessment was to assess a low-to-medium risk tolerance for the BB polar bear subpopulation with a management objective of maintaining a subpopulation size that is in balance with the number of bears the environment can support. Based on that assessment, a new TAH of 80 bears at a 1:1 male to female harvest ratio for Nunavut was suggested (160 bears for the whole subpopulation). The DOE consulted on the TAH recommendations with HTOs from the communities that harvest from the BB subpopulation (Pond Inlet, Clyde River, and Qikiqtarjuaq) in February 2018. The NWMB made a decision to adopt the TAH recommendations submitted by the GN and the Minister accepted the decision

with implementation to occur for the 2018/19 polar bear harvest season. It is particularly worth mentioning that the selected harvest rate for BB reflects the particular population demographics for this subpopulation, and these rates cannot be applied across all other Nunavut polar bear subpopulations. Baffin Bay currently has a strong potential for population growth and has relatively healthy litter production. Each polar bear subpopulation is managed on a case-by-case basis and management recommendations are dependent on the specific population demographics. As a result of the new study findings, the Negative Non-Detriment Finding for the BB polar bear subpopulation was removed, which resulted in the trade ban being lifted as of July 1, 2017. Bears harvested from July 2013 to June 2017 were also allowed to enter trade as the most recent survey results indicate that harvest during that time was sustainable.

The KB results suggested that this subpopulation is relatively healthy at this time. Members of the JC agreed to allow the TAH recommendations be the decision of each jurisdiction. The GN recommended to the NWMB that the KB TAH of 5 bears remain the same. The NWMB agreed with the GN recommendation and the Minister accepted this decision in 2018.

M'Clintock Channel (MC) Population Re-assessment

M'Clintock Channel (MC) is a smaller polar bear subpopulation managed by Nunavut. This subpopulation is currently hunted by residents of Gjoa Haven, Taloyoak, and Cambridge Bay, with a TAH of 12 bears/year. Past harvests of 34 bears/year from 1979-1999 were unsustainable, and a moratorium from 2001/2002 - 2003/2004 was implemented, followed by a reduction in the TAH. The subpopulation has been managed to achieve recovery, and in fact, local traditional knowledge confirms that there are more bears being seen in recent years. The past abundance estimate for MC, based on physical mark-recapture study (1998-2000) was 284 bears. At such low abundance levels, the population remains at risk. Residents have been reporting more bears, and there was the desire to have an increase in the TAH. As a response, DOE began a new 3-year genetic mark-recapture study from 2014-2016 to reassess size and status of this subpopulation. The field component of this study was completed in 2016. However, the analyses proved to be very challenging in part because of the small sample sizes obtained during the fieldwork, the low densities of bears in the study area, and the presence of migrants. In addition, it was difficult to track and find all older samples (e.g. samples of bears that were captured during the 1998-2000 study and were still alive) that had been sent to various research locations in Canada. All possible samples have been located, and were genotyped. It is anticipated to have new estimates available in 2019.

Gulf of Boothia (GB) Population Re-assessment

The GB subpopulation occurs entirely in Nunavut. The last subpopulation inventory work for GB was completed in 2000, where abundance was estimated to be 1592 bears. Based on the latest GB inventory and results, the population is considered to be stable or very likely increasing due to high recruitment and survival rates, however, caution is warranted regarding long-term trends, especially when one considers observed environmental changes in other polar bear subpopulations (e.g. Foxe Basin, Baffin Bay, Davis Strait, and Western Hudson Bay). The GB subpopulation is currently harvested at an annual TAH of 74 bears (mean harvest of 61 bears

between 2005/06 and 2010/2011). Although no genetic similarities between MC and GB were detected in a past genetic study, in recent years the distinction between the MC and GB subpopulations has been put into question by Inuit hunters, and new genetic analyses suggests some considerable interchange between both subpopulations.

The current data for GB are dated, and in accordance with commitments under the 2005 Polar Bear MOU for GB, a new 3-year study (2015-2017) involving genetic mark-recapture was conducted to reassess the size and status of the GB polar bear subpopulation. All field components of this study were completed in 2017 but as in the case of MC, many of the older physical samples could not be located to begin a genetic analysis. All possible GB samples have been located and were genotyped. It is anticipated to have a new estimate available in 2019.

Polar Bear Harvest Program (PBHP)

The polar bear harvest program is an important and integral part of the overall PBP. Through it, harvest data from every human-killed polar bear within Nunavut is collected along with about 2,000 research samples each year (Figure 5.21). Payment to harvesters is made through the PBHP. The PBHP sets the annual quota for each of the communities using harvest data. It is a flexible quota, which allows for maximum harvest, by requiring a selective harvest biased toward males.

Every year a harvest report is produced and annual quota recommendations are presented to the NWMB and the national Polar Bear Technical Committee (PBTC). The harvest program is also responsible for handling, archiving, and distributing collected samples. This has become a large research database requiring continual maintenance and entry of new information to be useful for any present and future polar bear research.

Trends in Polar Bear Harvest

Polar bears from the 12 subpopulations, which are either shared or entirely within Nunavut, are harvested by all 25 communities. All human-caused mortalities (e.g. regular hunts, sport hunts, defense of life and property kills, accidental kills, and illegal kills) are recorded for each subpopulation. The total harvest rate is regulated by a sex-selective quota system that allows maximum sustainable harvest rates. It accommodates over-harvesting with a resulting harvest reduction the following year. Polar bear harvesting is an important part of Inuit culture, as well as a potential source of income. Demand for polar bears includes the subsistence use of meat and other parts by Inuit communities, the sale of hides both in Canada and internationally, and sport hunts (a significant source of income in some communities).

The TAH for each of Nunavut's 12 polar bear subpopulations is set at a level that ensures the long-term conservation of polar bears. This will result in a sustainable harvest of the subpopulations for present and future generations of Nunavummiut. Since detailed harvest recording began for polar bears in Nunavut several decades ago, communities' harvest levels have been very close to TAH limits (Figure 5.21).

The average annual removal of polar bears in Nunavut from all subpopulations over the past five years is 444. Working groups for both Southern Hudson Bay and Western Hudson Bay were established to work cooperatively with all affected stakeholders to examine harvest risk and to determine harvest levels that allow hunting opportunities but also ensure viable polar bear populations into the future.

International pressure to change the listing of polar bears from Appendix II to Appendix I of the Convention on International Trade in Endangered Species (CITES) would remove polar bears from the international market but could contribute to illegal hunting. In 2013, Nunavut and Inuit were successful for the second time in defending our sustainable polar bear harvest against a proposal by the United States to up-list polar bears under CITES. The GN worked successfully with the Government of Canada and Inuit organizations to oppose the proposal to up-list. Sufficient information was provided to CITES where the CITES Animals Committee determined in 2015 that polar bears do not meet the Appendix I criteria as trade is not a significant threat. The GN and co-management partners will continue to work to educate people outside of Nunavut, including animal rights groups and environmental activists, to show that polar bears are managed sustainably.

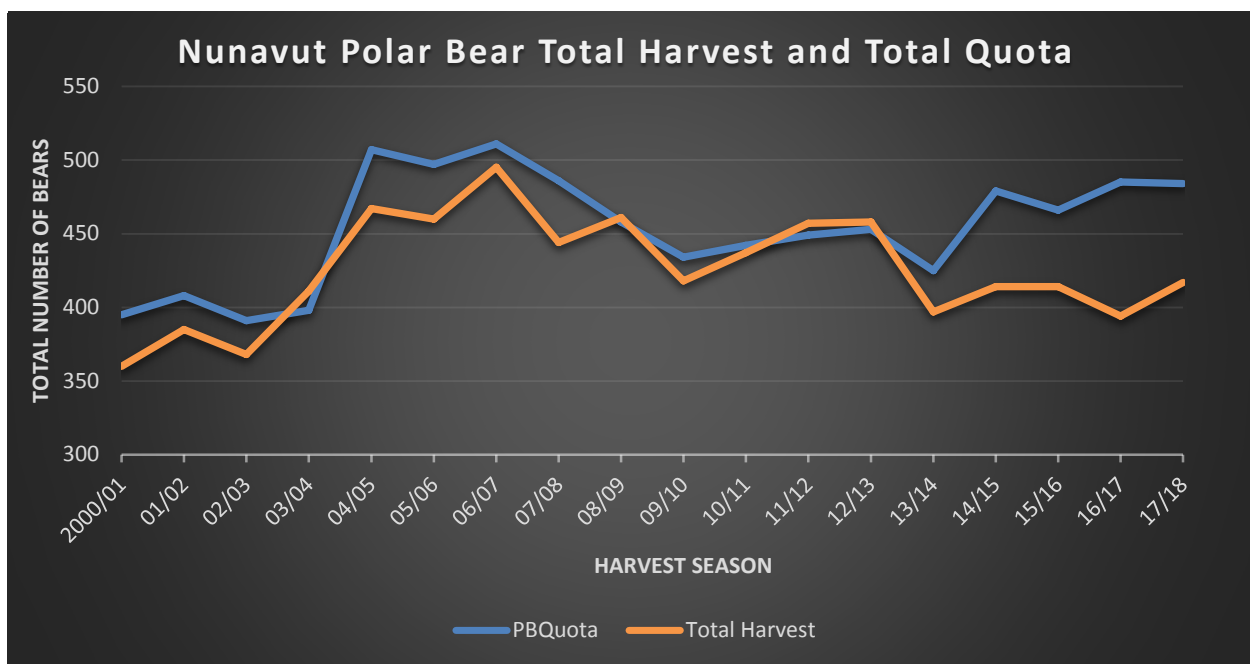


Figure 5.21. Overview of the Nunavut polar bear quota and harvest between 2000 and 2017. The total harvest rarely surpassed the Total Allowable Harvest.

Other Research/Collaborations

The department collaborate with other government organizations, university departments, and environmental interest groups such as the World Wildlife Fund. The government organizations

may be foreign (e.g. Greenland), federal (e.g. Environment and Climate Change Canada), or provincial/territorial (e.g. Québec, Manitoba, NWT). In some cases, the department is the lead on a research project and in other cases the GN plays a supporting role.

Population Inventory Cycle

The primary mandate of the PBP is to determine sustainable harvest levels within Nunavut and to set a TAH for each subpopulation. The TAH is developed from population inventories, birth/death rates, Indigenous knowledge of population trends, and animal health. HTOs and RWOs are consulted and recommendations are made to the NWMB. When agreement is reached, the RWO decides how the TAH for each subpopulation will be divided among the communities that traditionally harvest from them. The local HTOs and RWOs administer the harvest within their region and communities.

The PBP conducts inventories of each of the 12 polar bear subpopulations that are shared or within Nunavut on a rotating schedule (Table 5.7). A population inventory includes geographic delineation, age, sex, and population size and the inventory occurs on an average cycle of 10-15 years. Some inventories need to be completed more frequently dependent on past research methods employed so that changes in abundance can be detected and any required management practices can be applied. Inventories of subpopulations that are shared with other jurisdictions are often conducted in collaboration with the DOE.

Before research begins, local HTOs are consulted in order to obtain and incorporate the most up to date IQ into the survey. During the study, HTO and community members are involved during field operations. Once the study is completed, the PBP consults with the HTOs and RWOs to report on the results and determine appropriate TAH level and management practices.

Table 5.7. Schedule of polar bear inventories in Nunavut.

| Population | Last inventory completed | Next inventory scheduled to begin ^{a)} |
|---------------------|--------------------------|---|
| Davis Strait | 2007 | Underway ¹ |
| Baffin Bay | 2013 | 2021 |
| Kane Basin | 2014 | 2021 |
| Norwegian Bay | 1998 | 2019 |
| Lancaster Sound | 1998 | 2019 |
| Foxe Basin | 2011 | 2020 |
| Southern Hudson Bay | 2016 | 2021 |
| Western Hudson Bay | 2016 | 2021 |

| | | |
|-----------------------|------|-----------------------|
| Gulf of Boothia | 2000 | Underway ² |
| M'Clintock Channel | 2000 | Underway ² |
| Viscount Melville | 1992 | Underway ³ |
| Northern Beaufort Sea | 2006 | Underway |

¹⁾ Both field components completed Aug – Oct 2017 and 2018

²⁾ Field components and genetic analyses completed; awaiting statistical analyses.

³⁾ Analyses underway by Government of Northwest Territory.

^{a)} This inventory schedule is tentative and depends on methods of previous inventory, traditional observations about population abundance and other environmental concerns that might indicate that monitoring should occur more frequently.

Polar Bear Management

In Nunavut, polar bears have been managed under Memoranda of Understanding (MOUs) between the GN and each HTO for each subpopulation. When polar bears were designated as a Species of Special Concern under SARA in 2011, it triggered the requirement for a national management plan within three years. In 2013, DOE organized a focus group comprised of representatives from RWOs, NTI, and NWMB to guide the development and implementation of a management plan for Nunavut. A plan to move forward, including what the management plan should contain was brought to all Nunavut communities during consultations in spring of 2014. After an initial draft of the management plan was prepared, review of the draft plan occurred, involving RWOs and other stakeholders. The co-management plan incorporated community and local concerns and was constructed by and for Nunavummiut. A finalized draft Nunavut Polar Bear Co-Management Plan was submitted to the NWMB for decision in June of 2015. The NWMB held a written public hearing during October 2015 where additional constructive comments were provided and ultimately addressed in the plan after the NWMB adjourned the hearing. The latest draft of the Nunavut Polar Bear Co-Management Plan was submitted to the NWMB for decision in January 2017, which was followed by an in-person public hearing in November 2018. The NWMB will take all information collected during the public hearing into consideration when making recommended changes to the co-management plan. A decision from the NWMB is anticipated in 2019.

5.6 Other Species – Programs and Activities

Other species for which the GN is responsible include all raptors, Arctic hare, Arctic ground squirrel, voles and lemmings, as well as resident birds such as ptarmigan and ravens. There is currently no direct DOE research into these species except for raptors. There are low harvest levels for most of these species.

A long-term ecological monitoring project was initiated in the Kivalliq region in 2012 but due to staff turnover and divisional priorities there were a few years where data was not collected and left gaps in the monitoring. The project study area was established on the calving grounds of the Qamanirjuaq caribou herd. Due to the emergence of climate change as an identified threat for declining caribou herds, having long-term monitoring at the ecosystem level would help identify whether changes over time to habitat features were a major contributing factor to population changes in caribou herds. In 2017, DOE decided there was a need to initiate a collaborative research relationship with the University of Alberta to re-start this research project and maintain it over the long-term to ensure that the data trends would be available. The project assesses vegetation, birds, insects, small mammals, temperatures, precipitation, and other ecological features. By collaborating with universities on these types of projects, it addresses some of the capacity issues faced by the Wildlife Research section.

In addition to a database of raptor nests in Nunavut, DOE has supported a long-term study of peregrine falcons that breed near Rankin Inlet (Figure 5.22). Studies involving this population have provided information on the ecology of and detection of poisons in these birds. This project is among the longest studies of Arctic breeding raptors anywhere in the world. Occupancy, reproductive performance and pesticide amounts in breeding-aged peregrines have been studied. The proportion of occupied sites remained stable between 1980 and 2010, and though the number of eggs laid varies each year, egg production levels remain unchanged. However, the number of chicks that hatch and the number of chicks surviving to banding age have both declined. Climate factors such as increased precipitation are considered possible causes. The Peregrine falcon was reassessed as Not at Risk by COSEWIC in November 2017. The SARA listing process, based on the new COSEWIC assessment, has not been completed.

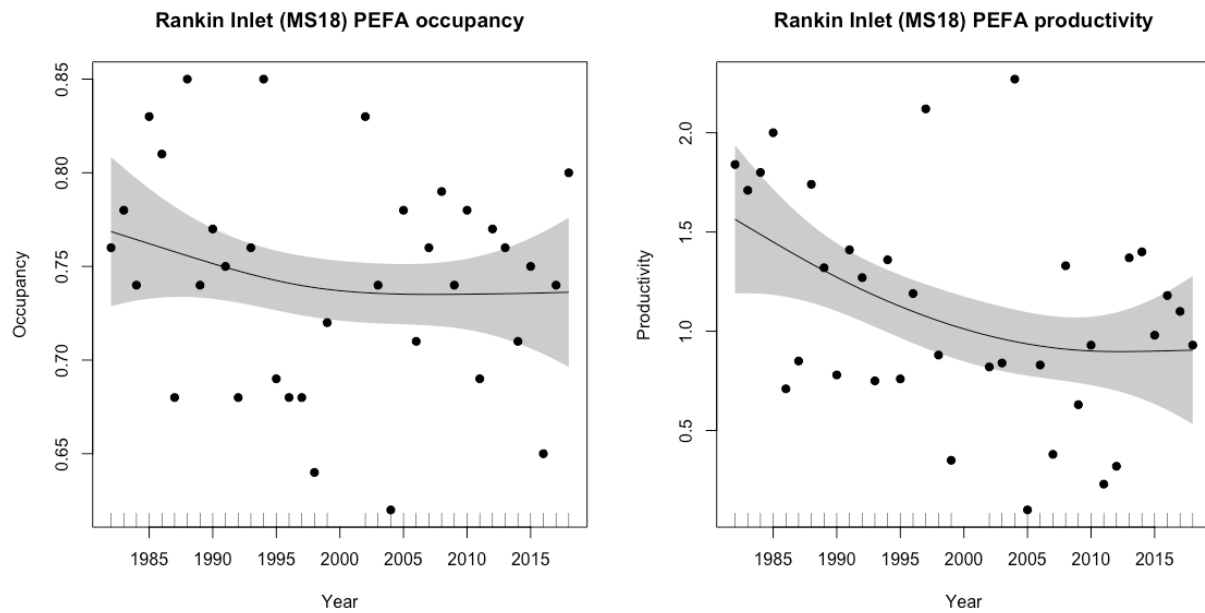


Figure 5.22. General additive results for occupancy and productivity for peregrine falcons monitored near Rankin Inlet, Nunavut from 1982-2017. Model results indicated that occupancy has remained stable throughout the monitoring period.

6. CAPABILITY OF NUNAVUT WILDLIFE RESOURCES TO MEET ANTICIPATED DEMANDS

Nunavut has 12 caribou herds, 1 reindeer herd, 12 subpopulations of polar bears and 13 subpopulations of muskox. Many of these subpopulations are shared with other adjacent jurisdictions. Systematic monitoring (occurring at scheduled intervals) of most species in Nunavut is limited due to the size and remoteness of populations, the price of survey work, and the human capacity of the divisional research staff. Given the recent declines in most of the caribou herds, consideration needs to be given to increasing the frequency of population assessments, disease monitoring, and other factors that could negatively impact recovery

There is a national/international proposed inventory schedule and a general GN commitment to a 15-year inventory cycle for polar bears contained in the memoranda of understanding for harvest from each polar bear subpopulation. The memoranda of understanding continue to be followed until the Nunavut Polar Bear Co-Management Plan is finalized and implemented. According to the 2016 Canadian Census results, there has been a 12% increase in the human population in Nunavut since the previous national census done in 2011. With the increase in human population, the demand for country food has increased as well. There has been increasing amounts of resource development in Nunavut and the impacts of some development activities on wildlife populations is not well known at this time but could be having some negative impacts.

The following tables show a general estimate of the current ability of some Nunavut wildlife populations to meet the current and future demands for those resources. The tables focus on the main big game species that are harvested by Nunavummiut and managed by DOE. The estimates are based on general population trends, harvest trends, and anecdotal evidence for each species. As harvest reporting for most game species in Nunavut is not mandatory, it is difficult to quantify levels of demand and capacity. By using IQ, observational data, expert opinion of professional biologists, and general population trends, a qualitative estimate is used to assess the demand and capacity for each species.

Table 6.1 Estimated demand for big game and carnivore species, excluding polar bear and caribou, and the estimated level of capacity of that species to meet the demand.

| Wildlife Species | QIKIQTAALUK | | |
|------------------|----------------------|----------------------|--|
| | Demand | Capacity | Comments |
| Grizzly Bear | N/A | N/A | There are no grizzly bears reported to be in this region. |
| Wolverine | Low | Stable | There are few wolverine in this region and a low demand |
| Wolf | Low | Stable | Due to low populations of caribou, there are few wolves in most parts of the region and low demand in the high arctic. |
| Muskox | Low | High | Muskox are only found in the high Arctic and the capacity exceeds the demand, mostly due to distribution. |
| | KIVALLIQ | | |
| Grizzly Bear | Low to increasing | Low | Grizzly bears occur in low densities in this region and harvest is incidental with a small sport hunt component. |
| Wolverine | Low | Stable | Wolverine populations are healthy and meeting the minimum demands. |
| Wolf | Medium to increasing | High | There are a high number of wolves to meet demand for fur harvesters. Wolves are also targeted as a way to reduce predation on caribou herds. |
| Muskox | High | Stable to increasing | Muskox are being harvested as an alternative food source to caribou. Populations are stable to increasing. |
| | KITIKMEOT | | |
| Grizzly Bear | Increasing | Low | Grizzly bears occur in low densities in this region and harvest is incidental with an increasing demand for sport hunts. |
| Wolverine | Low | Stable | Wolverine populations are healthy and meeting the minimum demands. |
| Wolf | Medium to increasing | High | There are a high number of wolves to meet demand for fur harvesters. Wolves are also targeted as a way to reduce predation on caribou herds. |
| Muskox | High | Stable to increasing | Muskox are being harvested as an alternative food source to caribou. Populations are stable to increasing. |

Table 6.2 Estimated demand for caribou, by herd, and the estimated level of capacity of that species to meet the demand.

| Herd | Region | Demand | Capacity | Comments |
|------------------------------|------------------------|---------------------|---------------------------------|---|
| Barren-ground Caribou | | | | |
| Baffin Island | Qikiqtaaluk | High and increasing | Very low | Due to the significant decline in this population of caribou, a TAH has been implemented. Capacity will likely remain very low due to slow herd recovery and human population growth. |
| Qamanirjuaq | Kivalliq | High to increasing | Stable but decreasing | The population is showing a declining trend and there has been a significant increase in harvest for meat sales. The majority of meat sales are to the Qikiqtaaluk region where capacity is far below demand. |
| Lorillard | Kivalliq | Likely increasing | Uncertain but likely decreasing | The population trend for this herd is uncertain due to the lack of a population estimate, but the trend is likely declining. Demand is likely increasing due to human population growth. |
| Southampton Island | Kivalliq | High | Below demand and decreasing | The herd is showing a recent decline and the current harvest limits may need to be reduced. |
| Coats Island | Kivalliq | Medium | Stable but likely decreasing | The population trend for this herd is uncertain due to a lack of recent population estimate. |
| Beverly | Kivalliq and Kitikmeot | High | Stable but decreasing | The population is showing a declining trend and there has been a significant increase in harvest to meet increasing human population growth. |
| Ahiak | Kivalliq and Kitikmeot | High | Stable but likely decreasing | The population trend is uncertain due the amount of time since it was last surveyed. Demand is high because of increasing human population growth. |
| Wager Bay | Kivalliq and Kitikmeot | Likely increasing | Low and likely decreasing | The population trend for this herd is uncertain due to the lack of a population estimate, but the trend is likely declining. Demand is increasing due to human population growth. |

| | | | | |
|----------------------------------|--------------------------------|--------|--------------------|---|
| Bluenose East | Kitikmeot | High | Very low | The herd has experienced significant declines and a TAH has been implemented to address conservation concerns. |
| Bathurst | Kitikmeot | High | Very low | The herd has experienced significant declines and a TAH has been implemented to address conservation concerns. |
| Dolphin and Union Caribou | Kitikmeot | High | Low and decreasing | The herd has shown a declining trend and may become a conservation concern. This population of caribou has been assessed by COSEWIC as " <i>Endangered</i> ". |
| Peary Caribou | Qikiqtaaluk | Low | High | This population mainly occurs in the high Arctic regions of Nunavut and very few communities harvest from this population. |
| Reindeer | Belcher Islands/ Sanikiluaq | Medium | Stable | This population only occurs on the Belcher Islands and it is locally managed by the Sanikiluaq HTO. |

Table 6.3 Estimated demand for polar bear, by subpopulation, and the estimated level of capacity to meet the demand.

| Subpopulation | Base Allocation | Demand | Capacity | Comments |
|---------------------|-----------------|----------------|----------------|---|
| Baffin Bay | 80 | High | High | This subpopulation has shown a significant increase in bears and can support a higher harvest than in previous years. The harvest is shared with Greenland. |
| Davis Strait | 61 | Medium to high | Medium to high | This subpopulation is stable and supports harvest from multiple jurisdictions. |
| Foxe Basin | 120 | High | Medium to high | This subpopulation is likely stable or slightly increasing. |
| Gulf of Boothia | 74 | High | Uncertain | The population trend is uncertain. Recent survey results are still in the analysis stage. |
| Kane Basin | 5 | Low | High | This subpopulation is increasing. Low demand is a result of difficulty in accessing the subpopulation. |
| Lancaster Sound | 85 | High | Uncertain | This subpopulation has not been surveyed in over 10 years. New survey in planning stage. |
| M'Clintock Channel | 12 | High | Uncertain | The population trend is uncertain. Recent survey results are still in the analysis stage. |
| Norwegian Bay | 4 | Medium | Uncertain | The population trend is uncertain. New survey to take place after Lancaster Sound. |
| Southern Hudson Bay | 25 | High | Low | This subpopulation is likely declining and supports harvest from multiple jurisdictions. |
| Western Hudson Bay | 38 | High | Low | This subpopulation is likely stable. Communities who harvest from this subpopulation experience higher levels of human-bear conflict. |
| Northern Beaufort | 6 | Low | Uncertain | The population trend is uncertain. This subpopulation is managed by the Government of the Northwest Territories. |
| Viscount Melville | 3 | Low | Uncertain | The population trend is uncertain. This subpopulation is managed by the Government of the Northwest Territories. |

7. THE STATE OF BIODIVERSITY IN NUNAVUT

Factors that could reduce biodiversity in Nunavut include human population growth, which is higher than most of the rest of Canada, a consequent need for enhanced economic growth in the territory (largely resource development but also tourism), and climate change. To help with stewardship, and to fulfill its responsibilities, the DOE had conducted a general status assessment of all Nunavut wildlife such as animals, plants, fish, and insects. Since the initial assessment in 2000, there have been subsequent reports every five years with the last report in 2015. Each new report has updated previously assessed species and expanded the number of species assessed. The reports can be found at www.wildspecies.ca.

The assessment now includes the general status ranks of all of Nunavut's vascular plants, four invertebrate groups (freshwater mussels, dragonflies, damselflies, and tiger beetles), terrestrial vertebrate species (amphibians, reptiles, birds, and mammals), and macro-lichens, mosses, black flies, and mosquitoes.

Plants and animals known to or suspected to exist in Nunavut:

- *Vascular plants* – 692 species known in Nunavut of the 5111 known in Canada;
- *Freshwater mussels* – two species known in Nunavut of the 54 known in Canada;
- *Insects (including bees, mosquitoes, and beetles)* – 301 species known in Nunavut of the approximately 55,000 found in Canada;
- *Spiders* – 96 species known in Nunavut of the 1400 known in Canada;
- *Moths and Butterflies* – 134 species known in Nunavut of the 302 resident species in Canada;
- *Amphibians* (including frogs, toads, newts, and salamanders) – 8 species known in Nunavut of the 47 species found in Canada;
- *Reptiles* – only the Common Garter snake is known or suspected in Nunavut of the 48 species found in Canada;
- *Terrestrial Mammals* – 34 species known in Nunavut of the 169 terrestrial mammals in Canada;
- *Birds* – 278 species known in Nunavut of the 664 bird species in Canada; 41% is considered “accidental” because breeding has not been confirmed. There are 12 bird species listed under the Species at Risk Act in Nunavut: Buff-breasted Sandpiper (Special Concern), Common Nighthawk (Threatened), Eskimo Curlew (Endangered), Harlequin Duck (Special Concern), Horned Grebe (Special Concern), Ivory Gull (Endangered), Olive-sided Flycatcher (Threatened), Peregrine Falcon (Special Concern), Red Knot (Endangered), Ross's Gull (Threatened), Rusty Blackbird (Special Concern), and Short-eared Owl (Special Concern);
- *Bryophytes (mosses)* – 403 species found in Nunavut of the 1006 mosses found in Canada. One species is listed under the Species at Risk Act, Porsild's Bryum (Endangered); and
- *Macro-Lichens* – 269 species are found of the 862 species known in Canada.

Species at Risk and COSEWIC

In 2003, the federal Species at Risk Act (SARA) was proclaimed to protect wildlife species at risk in Canada. Within the Act, COSEWIC was established as an independent body of experts responsible for identifying and assessing wildlife species considered to be “at risk”.

Table 7.1. Species at Risk that fall under the GN mandate – current legal (SARA) status.

| WILDLIFE SPECIES | COSEWIC DESIGNATION | SARA STATUS |
|---------------------------|----------------------------|------------------------|
| Peary Caribou | Threatened (2015) | Endangered (2011) |
| Porsild's Bryum | Threatened (2017) | Threatened (2011) |
| Polar Bear | Special Concern (2018) | Special Concern (2011) |
| Barren-ground Caribou | Threatened (2016) | No Status |
| Dolphin and Union Caribou | Endangered (2017) | Special Concern (2011) |
| Wolverine | Special Concern (2014) | Special Concern (2018) |
| Peregrine Falcon | Not at Risk (2016) | Special Concern (2012) |
| Short-eared Owl | Special Concern (2008) | Special Concern (2012) |
| Grizzly Bear | Special Concern (2012) | Special Concern (2018) |

In Nunavut, the *Wildlife Act* has provisions for listing species, community consultations, and protection of listed species – the Nunavut Species at Risk Committee (to make assessments) and recovery processes. Although passed into law, this has currently not been implemented.

Recovery of Species at Risk

SARA sets very explicit timelines for recovery and management planning for listed species. Nunavut participates in the recovery planning process for species that occur within the territory.

8. OPERATIONS SECTION AND ENFORCEMENT

Overview

The Operations Section has a wildlife office in each community in Nunavut. Conservation Officers (COs) serve as a community liaison for the DOE, and provide wide-ranging services to their communities. This includes ensuring legislative and regulatory compliance, investigating alleged violations of acts or regulations, issuing licences and permits, performing wildlife deterrence and assisting Nunavummiut in applying to the DOE support programs. They often participate in wildlife research activities in their area, and assist DOE biologists with the regular collection of biological samples. They work with co-management partners to ensure the conservation of Nunavut's wildlife species.

The Operations Section also provides support and resources to harvesters and other co-management partners through the following programs offered by DOE:

- Wildlife Damage Prevention Program
- Wildlife Damage Compensation Program
- Disaster Compensation Program
- Support for Active Harvesters Program
- Fur Program

The Operations Section fulfills GN responsibilities under a wide range of territorial legislation, which include the *Wildlife Act*, *Environmental Protection Act*, *Territorial Parks Act*, *Forest Management Act*, *Forest Protection Act* and *Herd and Fencing Act*. The Operations section is also responsible for enforcement of some federal conservation legislation through memoranda of understanding with GN. This legislation includes the *Migratory Birds Convention Act*, the *Fisheries Act* and the *Wild Animal and Plant Protection and Regulation of International and Inter-provincial Trade Act* (WAPPRIITA)

Compliance and Enforcement

One of Operation Section's main roles is to ensure people comply with legislation and regulations. Compliance has three main components: education, prevention and enforcement.

Nunavut Conservation Officers promote conservation education through providing school presentations, community workshops, radio announcements and posters to the communities where they serve. They assist in the delivery of the Nunavut Hunter Education Program, as well as providing education materials at the wildlife offices. They are available to answer people's questions about legislation that they enforce.

Prevention is largely carried through Conservation Officer patrols – that is being “out on the land,” talking with people and being seen by resource users. An officer's presence often acts as a deterrent to illegal activity.

Enforcement is required where education and prevention have failed. There are numerous enforcement options available to COs in Nunavut. These include: verbal warnings; written warnings; HTO discipline of a member; summary offence (misdemeanor) ticket information (SOTIs); long form information (court) and other alternative measures.

Table 8.1. Summary of Enforcement Actions 2013-2018 (based on best available data at time of report)

| | |
|------------------------------------|-------------|
| Occurrences | 2410 |
| Investigations | 244 |
| Enforcement Action Used | |
| Unresolved | 23 |
| No Offence Committed | 356 |
| Verbal Warning | 22 |
| Written Warning | 46 |
| HTO Resolved | 13 |
| Summary Offence Ticket Information | 31 |
| Long-Form Information | 1 |
| Alternative Measures | 29 |

Table 8.2. Investigation Overview 2013-2018 (based on best available data at time of report)

| Type of Investigation | Number of Instances |
|-------------------------------|----------------------------|
| Defence of Life or Property | 91 |
| Wastage | 50 |
| Illegal Possession | 12 |
| Harvesting Without a Licence | 10 |
| Harvest of Family Group | 8 |
| Wildlife Harassment | 8 |
| Dangerous Harvesting | 8 |
| Contravening Minister's Order | 7 |
| Export without a Permit | 5 |

Conservation Officer Development

Since the writing of the last report, the Operations Section has made huge progress in improving the training and resources available to its Conservation Officers, starting with the creation of an Operations Manual for DOE Enforcement Officers (Conservation Officers, Environmental Protection Officers, Park Officers). This document provides the Conservation Officers with a resource covering all the aspects of a Conservation Officer's jobs. This manual was developed to supplement the implantation of an improved, made in Nunavut, officer training program.

Several training programs are delivered to Conservation Officers in Nunavut. These include:

- Introduction to Law Enforcement and Compliance;
- Use of Force Training;
- Conflict Intervention and De-escalation Training;
- Firearms Training;
- Small Vessel's Operators Proficiency; and
- Spill Response Course.

For many years, it was common practice to fly enforcement instructors to Nunavut from southern jurisdictions to provide training to Conservation Officers, as there was no training capacity in Nunavut for the Operations Section to deliver the training itself. Also, training delivered by outside instructors was often training developed for southern jurisdictions, and did not address the environmental and cultural considerations that are unique to Nunavut. Starting with the development of the *Introduction and Law Enforcement Compliance Course*, the Operations Section has since taken over both the development and delivering of its training programs. This ensures that the training is specific and relevant to Nunavut, and that it is delivered primarily by instructors that both work and reside in Nunavut. This has resulted in a marked improvement in both the competence and confidence demonstrated by Conservation Officers in their jobs.

Community Relations

Nunavut Conservation Officers maintain positive working relationships between hunters, co-management partners and DOE. Joint patrols have been operated in some communities with other agencies (DFO, Parks Canada, and RCMP). As well, some communities have successfully hired bear monitor personnel to assist Conservation Officers with deterring polar bears, or by providing bear deterrence in the absence of a community Conservation Officer. This has been effective in several communities, such Arviat, Hall Beach, Grise Fiord and other areas.

Some Conservation Officers are involved with after school programs and in-school programs in their communities including outdoor school trips, archery programs and GPS use. Conservation

Officers have assisted people in setting up their GPS units, SPOT units and similar technology to enhance safety when traveling on the land.

Conservation Officers have been involved in wildlife research projects, including logistics, arranging local participation with the HTO, and direct participation in the field work. Conservation Officers also assist search and rescue activities as required.

Future Plans for Wildlife Operations

The Operations Section is close to introducing a Biological Samples Collection System. This is to help facilitate the Support for Active Harvesters Program and will allow harvesters to receive payment directly at a wildlife office for providing mandated wildlife samples and information. This program is based very closely to the Fur Tracking System, and will streamline the process for harvesters to receive payment for their provided samples.

The Operations Section continues to look to improve its efficiency, and a big part of this is adopting new methods technologies. An electronic enforcement and licence database is being developed, which will improve the efficiency of enforcement activities and streamline the process in how COs conduct investigations. Licencing and permitting is also being incorporated into the system, which will allow for greater accountability for Department issued licences and permits. It will also enhance the Department's ability to track enforcement activities and statistics more efficiently. This will assist in future decision-making for the section.

9. WILDLIFE DETERRENCE PROGRAM

The Wildlife Deterrence Program is in place to mitigate human-wildlife conflict in Nunavut. Human-wildlife conflicts can have negative social and economic impacts. The preservation of human life and safety remain the program's top priority and continues to guide the allocation of resources that aid Nunavummiut in the pursuit of traditional lifestyles.

Program updates

Community-based bear-human conflict mitigation plans encourage key stakeholders within communities to collaborate and develop community specific mitigation efforts. Significant effort has been placed on community level stakeholder consultation where roles are defined and agreed upon. Improved data collection and analysis has allowed for enhanced predictive capabilities and preparedness. Over the last year the program has made significant progress in working on community bear plans to incorporate local and traditional knowledge along with identifying areas where programs and funding can contribute to conflict mitigation. Plans for all communities are expected to be finalized in early 2019.

The Wildlife Damage Compensation Program (WDCP) issues direct compensation to Nunavummiut whose property has been damaged by wildlife. A total of \$23,000.00 has been granted since 2013 (Figure 8.1), distributed among 28 individual applications. Damage to cabins by polar bears has made up the majority of claims, with the average applicant receiving \$849 in compensation. Plywood, new windows and miscellaneous camp equipment are items most frequently damaged and for which compensation is granted. Applicants are encouraged to take measures that prevent future damage, such as accessing funding for deterrents and passive conflict reduction equipment, keeping cabin areas free from unsecured attractants and reinforcing structures. Efforts to create awareness of programs available to Nunavummiut are being developed.

The Wildlife Damage Prevention Program (WDPP) provides funding to individuals and non-profit organizations who wish to take steps to prevent property damage by wildlife. Interest in the program has increased steadily between 2013 and 2018 (Figure 8.1). A total of \$79,952.00 has been contributed to 38 individuals and non-profit organizations with an average contribution of \$2,078. Bear-resistant food storage bins, cabin reinforcement, pyro-technique deterrents and electric fences are the most frequently requested items. Efforts are underway to further increase awareness and usage of WDPP funding.

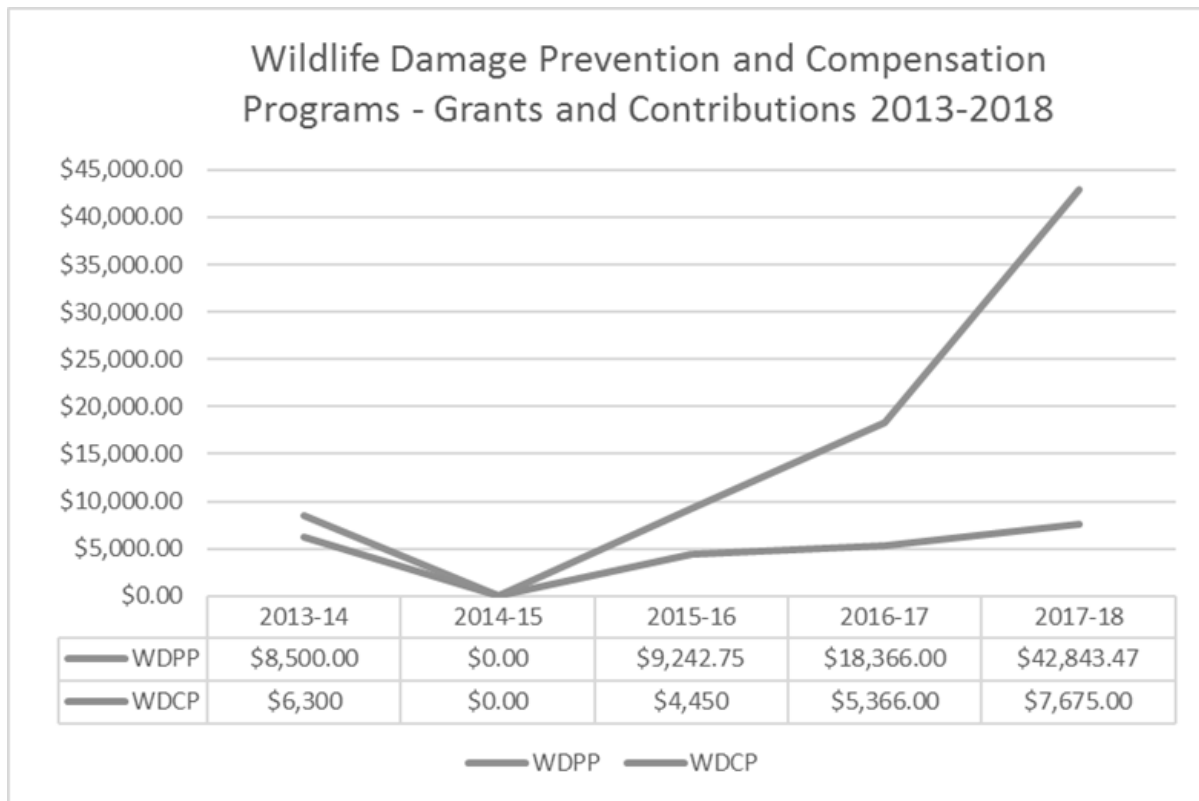


Figure 9.1. Wildlife Damage Prevention and Compensation Programs – Grants and Contributions 2013-2018.

As part of an enhanced data collection strategy, the Wildlife Deterrence Program has been working closely with the enforcement section to design and implement a centralized data base that will enable the operations division to collect more detailed information on occurrences and provide reports to managers on a more frequent basis. A working prototype is expected in early 2019. The wildlife deterrence program has been developing communication tools that encourage reporting of sightings, conflict, and damage to property by wildlife. A poster campaign complimented by social media materials are expected in early 2019.

Experimental conflict mitigation projects and techniques are being explored and considerable data has now been collected on live trapping/relocating and large scale electric fencing projects. Live trapping is currently practiced in Arviat by conservation officers and has been determined to be a successful passive tool for preventing human-bear conflict. Other communities have expressed interest in adopting this practice and the department of environment is considering this as an option. Large-scale electric fencing projects for community meat caching sites have seen successful in Igloodik and the department is considering other projects in a number of other communities.

Partnerships and non-government organization activity

A partnership between the World Wildlife Fund Canada (WWF) and the Municipality of Arviat was established in 2011 and ran until 2017. The partnership came in the form of a grant from WWF to the Hamlet of Arviat in order to employ seasonal polar bear monitors, purchase mobile equipment, and supply deterrents/consumables. Grants averaged \$50,000/year. Polar bear monitors employed by the Hamlet worked closely with Conservation officers to deter bears from the community and conduct patrols during high risk times. With this partnership now ended, WWF and the hamlet of Whale Cove are in discussions to create a partnership similar to that of Arviat. This partnership is anticipated to begin in late 2019.

Defence of Life and Property Kills (polar bears)

There have been 223 defence of life and property kills (DLPK) of polar bears by Nunavummiut between June 30, 2013 and July 1, 2018 (Figure 8.2). One additional DLPK by seasonal researchers occurred in 2015 at a camp on Coats Island. A five-year average of 44.8 kills/year is consistent with the 18-year average of 44.4 kills/year. North Baffin saw the most DLPK's over the last 5 harvest seasons (96) followed by the Kivalliq, South Baffin and the Kitikmeot with 64, 41 and 23 respectively (Figure 8.3).

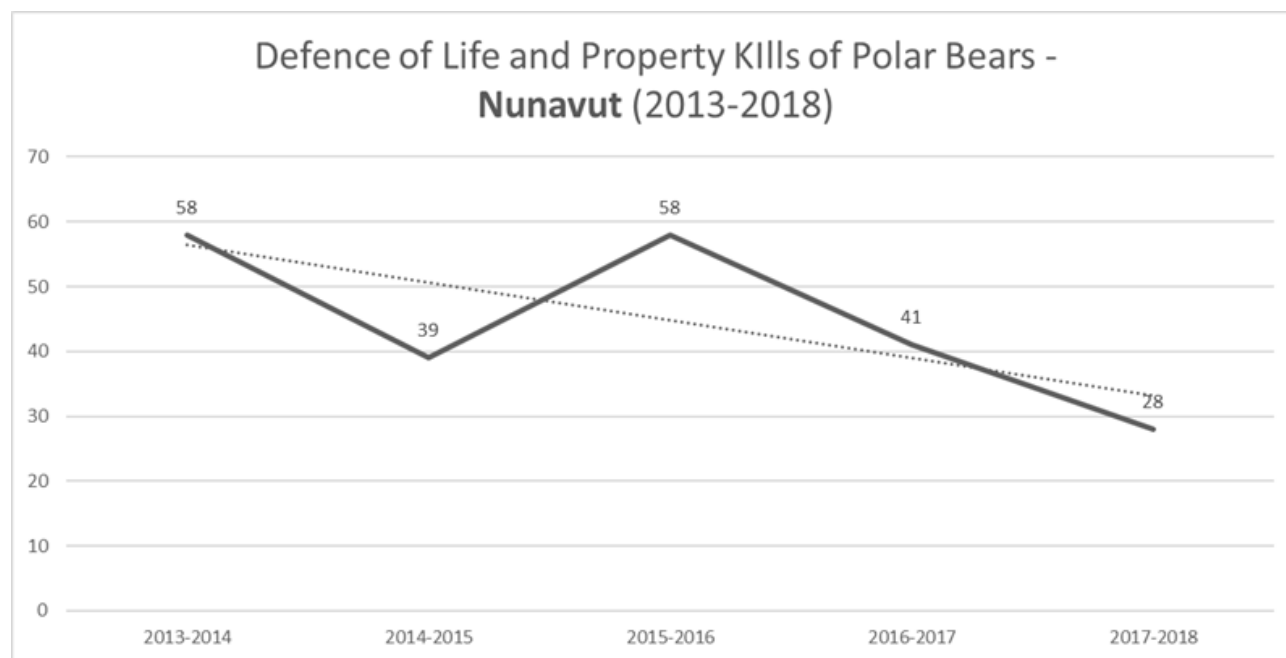


Figure 9.2. Trends in Defence of Life and Property Kills (DLPK) of Polar Bears in Nunavut from 2013 to 2018.

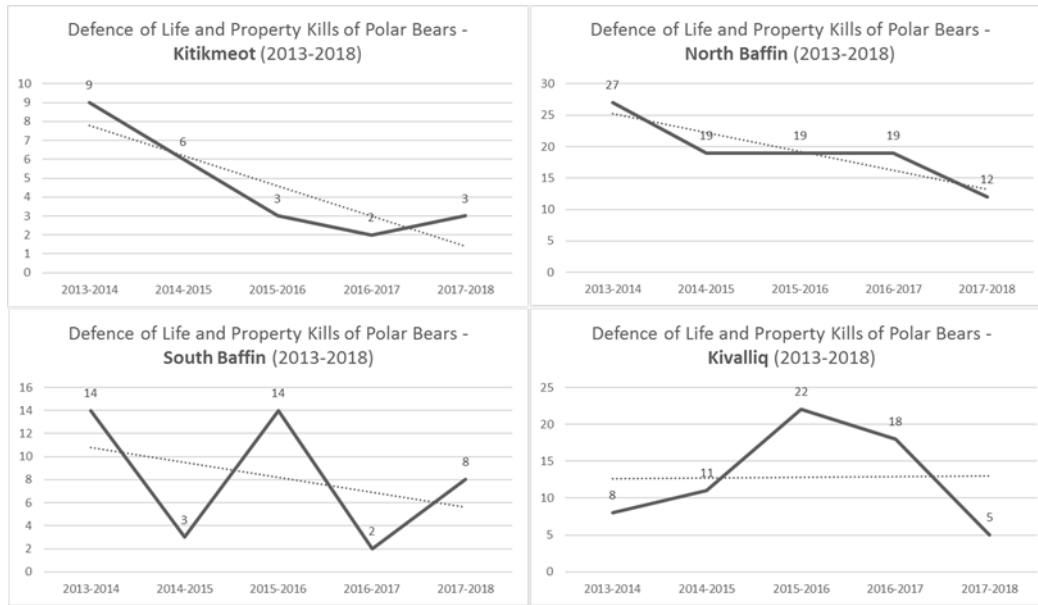


Figure 9.3. Trends in Defence of Life and Property Kills (DLPK) of Polar bears by region in Nunavut from 2013 to 2018.

Rabies in Nunavut

Between July 1, 2013 and June 30 2018 there have been 116 submissions (Nunavut wide) to the Canadian Food Inspection Agency (CFIA) where rabies has been suspected. Fluorescent Antibody Testing (FAT) determined that 60% (n=69) of those submissions were rabies positive cases. Samples were submitted by Conservation officers, By-law officers, and Public Health officers across the territory. Forty-three of 116 incidents reported human contact with infected or suspect infected animals. Of these, 19 cases reported human contact where an animal was confirmed to be rabid. The most common animal suspected and tested for the rabies virus was Arctic fox (n=69) followed by domestic dog (38) and Red fox (5). One hundred percent of Red foxes tested, yielded positive results for rabies followed by Arctic fox (75%) and domestic dog (36%). Seasonal trends (2013-2018) of occurrences of human-wildlife conflict, where rabies is suspected or confirmed, is consistent with long-term trends. Increases in conflict and positive test results spike dramatically in October and remain high until tapering off in June (Figure 8.4). The Department of Environment has been diligent in working with local and interdepartmental partners to investigate all cases and ensure public safety through effective communication strategies. Moving forward, community specific plans are being created to streamline sampling efforts and enhance safety messaging.

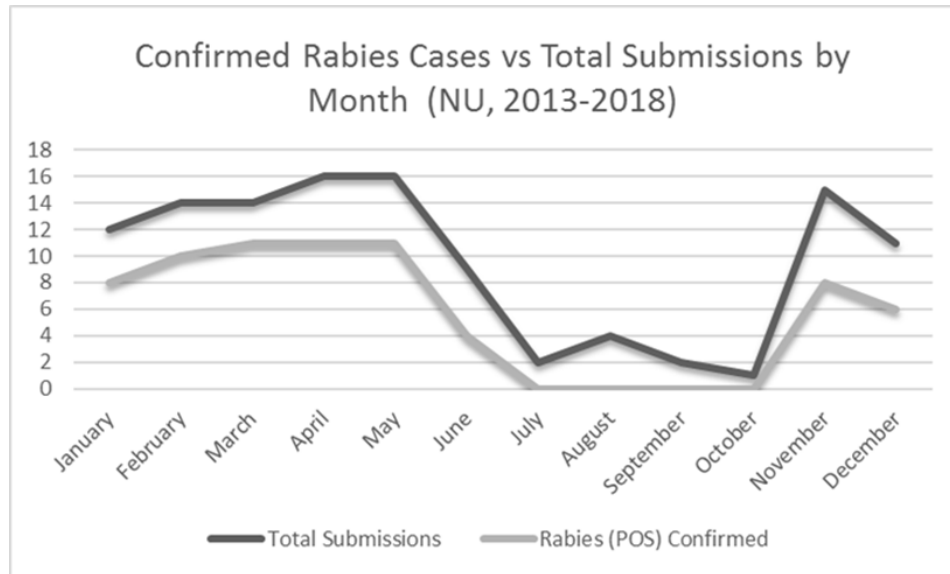


Figure 9.4. Confirmed cases of rabies versus the total submissions in Nunavut by month for the last five years.

Human Injury and Fatalities

Between 2013 and 2017, one polar bear attack was reported where human injury resulted. The incident occurred on May 22, 2014 while two men were camping along the floe edge near Arctic Bay. During the night, a polar bear attempted to enter their tent. Both men were mauled suffering injuries while attempting to retrieve a rifle that was 20 feet from the tent. The bear was destroyed and the injured parties recovered in hospital.

During the summer of 2018 two fatalities occurred as a result of human-polar bear conflict. The first occurred on July 4, 2018 outside of the community of Arviat. The second occurred on the land outside of Nauyasat where one person was killed and another was seriously injured.

The wildlife deterrence program recommends that those travelling and camping on the land carry personal deterrents and use early warning and detection devices when camping in high risk areas. Equipment can be acquired by Nunavummiut through contribution programs. The wildlife deterrence program has been making efforts to promote programs and address the specific needs of individuals through targeted applications.

10. WILDLIFE CONSERVATION

Through this report, the DOE Wildlife Division has offered both a contemporary “snapshot” and the historical development of wildlife co-management and stewardship in Nunavut. The environment is not constant and many wildlife populations fluctuate due to natural events that cannot be controlled by humans. Thus, wildlife management, as a goal, is an ongoing challenge. It is a dynamic activity that continues in perpetuity to ensure that future generations retain wildlife resources to the same or to a greater extent as people today.

Growing communities and more efficient hunting techniques, combined with converging environmental pressure such as climate change, environmental contamination, exotic species invasion, and development can potentially diminish the productivity of Nunavut wildlife over time. These impacts must be managed and hopefully mitigated to ensure that basic needs levels for wildlife can be met in the short term and the long term. The Department of Environment is committed to working in partnership with all Nunavummiut to ensure the retention of wildlife resources in the territory for their food and health benefits, and also to support Inuit cultural identity and the economy.

Polar Bear Harvests

The increasing interest in the status of polar bears internationally puts pressure on Nunavut, which is home to most of the polar bears in the world. A critical factor in building on the past success in sustainable polar bear management will be the collaborative development of the Nunavut Polar Bear Co-Management Plan, which relies on Inuit and scientific knowledge to secure the future of this important species in a rapidly changing environment while also addressing the priority of human safety.

Grizzly Bear Harvests

To ensure a sustainable harvest of grizzly bears for Inuit within Nunavut, DOE made recommendations to the NWMB to establish a limit on sport hunting of grizzly bear in both the Kitikmeot and Kivalliq regions. As a starting point, the sport hunting limits set reflected the historical limits that were used by the GNWT before the creation of Nunavut. As more scientific information and IQ is collected, the limitations on sport hunting can be reassessed to reflect the best approach to balance Inuit harvest and sport hunting activities. Programs focused on wildlife deterrence will also help to prevent and/or deter human-grizzly bear encounters and conflicts.

Monitoring Caribou and Muskox Populations for Best Conservation Practices

Caribou populations require regular monitoring and a better understanding of how herd fidelity, migration patterns, health, and predation changes at various stages of their demographic cycles. Of particular interest is the importance of specific calving grounds to ensure herd persistence. Continuing study of the abundance, genetics, and movements of caribou and

muskox are needed to ensure that harvests are management sustainably because decisions that affect one herd may have an effect on others. Harvest practices must be adjusted as herd abundance fluctuates. These species appear to be vulnerable to brucellosis and in some regions there are conservation concerns around harvest levels when the herd populations are low. Co-management partners will be carefully establishing, monitoring, and adjusting harvest levels as appropriate to ensure that populations remain healthy and productive. This is important for all in Nunavut who depend on country food and subsistence harvesting.

Muskox in the High Arctic are susceptible to abrupt changes in population size resulting from die-offs and sometimes reduced productivity due to unpredictable severe weather events. We must establish and maintain community-based and scientific monitoring programs to determine population trends and adjust management actions accordingly.

Industrial Development, Land-Use Planning and DOE Research

As industrial exploration and development activities increase, and municipal infrastructure expands to meet the demands of growing communities, land-use planning must be informed by conservation information provided by DOE research. Monitoring of wildlife populations, vegetation mapping, and identification of critical habitats will assist wildlife managers and environmental assessment programs in trying to determine any potential effects of land-use activities on wildlife. Industry representatives, economic development agencies, and wildlife co-management partners must work closely to ensure that research is addressing knowledge gaps in our understanding of the impacts of development on wildlife and habitat.

Climate Change Dynamics

Climate change in Nunavut can lead to issues with permafrost thawing, increased wetland drainage, soil and surficial sediment loss on the land. Climate change can also cause changes to the major ecosystems in Nunavut as there are changes to vegetation cover, insect biodiversity and abundance, and invasive species. Changes to ecosystems can mean positive changes for some wildlife species while having very negative impacts on other species. These changes are also not consistent throughout the territory meaning that some of the consequences of climate change could negatively impact a species in one region of Nunavut while offering improved habitat for the same species in a different region (e.g. southern Nunavut vs. the High Arctic region of Nunavut). One of the impacts of climate change that is being closely monitored is the changes to sea-ice conditions and how that is affecting polar bears and other wildlife species that cross the ice in seasonal migrations or use the ice for finding food.

Future of Nunavut Wildlife Co-Management

Enhanced IQ and scientific knowledge of wildlife and their habitats in Nunavut, together with stewardship and management actions, contributes to a future where wildlife populations are abundant, productive, and secure. The Department will continue to play a key role, together with its co-management partners, in managing the delicate balance between public safety, environmental protection, wildlife conservation, and economic growth.

ACRONYMS USED IN REPORT

| | |
|-----------|---|
| BQCMB | Beverly and Qamanirjuaq Caribou Management Board |
| CCWHC | Canadian Cooperative Wildlife Health Centre |
| CHM | Caribou Health Monitoring |
| CGJC | Canada-Greenland Joint Commission on Polar Bear |
| CITES | Convention on International Trade in Endangered Species |
| CMR | Capture-Mark-Recapture |
| CO | Conservation Officer |
| COSEWIC | Committee on the Status of Endangered Wildlife in Canada |
| CWS | Canadian Wildlife Service |
| DFO | Department of Fisheries and Oceans Canada |
| DOE | Department of Environment |
| DU | Dolphin and Union Caribou Herd |
| GN | Government of Nunavut |
| GNWT | Government of the Northwest Territories |
| HTO | Hunters and Trappers Organization |
| CIRNAC | Crown-Indigenous Relations and Northern Affairs Canada |
| IQ | Inuit Qaujimajatuqangit |
| ITK | Inuit Tapiriit Kanatami |
| KHTA | Kitikmeot Hunters and Trappers Association |
| KIA | Kitikmeot Inuit Association |
| KWB | Kivalliq Wildlife Board |
| MOU | Memoranda of Understanding |
| NIRB | Nunavut Impact Review Board |
| NQL | Non-Quota Limitation |
| NTI | Nunavut Tunngavik Incorporated |
| NWMB | Nunavut Wildlife Management Board |
| PBP | Polar Bear Program |
| PBHP | Polar Bear Harvest Program |
| PBTC | Polar Bear Technical Committee |
| RWO | Regional Wildlife Organizations |
| SARA | Species at Risk Act (federal) |
| SOTI | Summary Offence Ticket Information |
| TAH | Total Allowable Harvest |
| TEK | Traditional Ecological Knowledge |
| WAPPRIITA | <i>Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act (federal)</i> |

NOTE: PLEASE SEE PAGE 53 FOR POLAR BEAR SUBPOPULATION ACRONYMS AND ACCOMPANYING MAP.