Statutory Report on Wildlife

to the

Nunavut Legislative Assembly

Section 176 of the

Wildlife Act

2023

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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 (ENV) carries out 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 holistic 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 global 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 as Nunavut's population increases. 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 two wildlife divisions of ENV (Wildlife Operations and Wildlife Research) gather the necessary scientific information and associated IQ to support the

planning and management of Nunavut's wildlife and habitats. Consultation occurs with partners in wildlife management, which include Elders, local users and traditional knowledge holders, the NWMB, HTOs, RWOs, and other Inuit organizations, to make joint decisions that support the sustainable management of Nunavut wildlife.

Some species however cross borders into other territories, provinces, or countries. In such situations, ENV works in close collaboration with neighbouring jurisdictions (e.g. Greenland, Québec, Ontario, Saskatchewan, Newfoundland and Labrador, Manitoba, and Northwest Territories (NWT)) to ensure that appropriate wildlife decisions and environmentally sound projects move forward.

This report is an update of activities from ENV's wildlife divisions that have taken place since the previous report. It highlights the progress in the leadership role Nunavut has created for itself with its collaborative co-management regime.

EXECUTIVE SUMMARY

Statutory Report on Wildlife to the Nunavut Legislative Assembly
Section 176 of the *Wildlife Act*, April 2023

This report on wildlife to the Nunavut Legislative Assembly from the ENV 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 species included. Research update sections include details on methodologies used to gather wildlife information, aiding in the formulation of informed co-management plans and decisions.

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 GN scientists, and information from traditional knowledge holders, Elders, HTOs, RWOs, Nunavut Tunngavik Incorporated (NTI), and other government organizations. All 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 involves monitoring, estimating population numbers, and analyzing all pertinent information to inform decision-making. ENV has carried out population surveys for a range of species using a wide range of methods. The vast territory and limited transportation infrastructure present numerous challenges in assessing wildlife populations. Inuit hunters play a crucial role in this endeavour, sharing insights gathered during harvesting, participating in field programs like aerial surveys, and contributing their extensive knowledge of the land and its wildlife.

In situations where there are indications of population declines effective management practices necessitate detailed and current information. For instance, in 2014, the population estimate of Baffin Island caribou confirmed a significant decline. Subsequently, a short moratorium was imposed from January to August 2015 across the entire island, followed by the implementation of a Total Allowable Harvest (TAH) of 250 male only caribou. This TAH was amended in 2019 to allow for a limited hunt of up to twenty-five

females, and further modifications were made for the 2022-2023 harvest season, based on a progressive increase until 2032.

As discussed further in this report, these measures appear to be having positive impacts on the recovery of Baffin Island caribou. Many caribou herds in Nunavut are presently experiencing declines and thus demand heightened monitoring efforts. Diseases like brucellosis have impacted various herds, prompting ongoing disease and health monitoring with the collaboration of local harvesters.

Moreover, rising industrial development, concerns regarding the effects of climate change, and information gaps in predator-prey dynamics have spurred focussed research on caribou movements, enhanced identification of core habitats and migration corridors, and assessments of predator impacts within core caribou ranges. Several muskox populations, including MX-08 and MX-11, are experiencing growth. In areas where caribou numbers are severely depleted, HTOs are promoting increased muskox harvesting to alleviate pressure on caribou herds and facilitate their recovery.

Inuit play a vital role in the Arctic ecosystem, and with Nunavut's population growing, ensuring food security has become a significant concern. This is particularly critical due to declines in caribou herds and limited access to caribou meat. It is essential to manage wildlife carefully to ensure that Nunavummiut continue to have access to traditional country food, both presently and in the future.

Polar Bears, Grizzly Bears, Wolves and Wolverines

In Nunavut, management or co-management of 12 out of the world’s 19 polar bear subpopulations is conducted through a sustainable harvesting system. TAH levels are established for each subpopulation based on the best available information, and rigorous monitoring and management practices are implemented to ensure sustainable harvesting.

If the number of harvested polar bears exceeds the annual TAH in a given year, any available accumulated credits are used, or the TAH for the following year is adjusted accordingly to compensate. After decades of effective polar bear management practices, numerous communities are noting increased bear sightings both on the land and around communities. While maintaining viable and sustainable polar bear populations remains crucial, prioritizing public safety within the management framework is equally important. Significant strides have been achieved in wildlife deterrence programs in Nunavut, prioritizing the safety of individuals and communities as the primary objective.

Barren ground grizzly bears have very large home ranges and exist at relatively low densities, posing challenges and making them expensive for study efforts. Their longevity and slow reproductive rates heighten their vulnerability to overharvesting. Information is

being collected from harvested animals, genetic hair snagging, and IQ. A Nunavut Grizzly Bear Co-Management Plan was developed with extensive community input, aiming to enhance grizzly bear management strategies such as the protection of family groups and denning bears. ENV continues collaborating with communities to implement deterrence programs and minimize nuisance bear mortalities.

Wolverine research is carried out through a skull collection program and genetic hair snagging projects. The research that has been done to date has allowed the Research Division to establish a baseline database of wolverine densities in the Kitikmeot and Kivalliq regions. Current data substantiate Inuit observations that wolverine populations in Nunavut are abundant, productive, and meeting the demands of harvesting

To aid in the recovery of the Bathurst and Bluenose-East caribou herds, the Nunavut Department of Environment initiated a wolf sample collection program. This effort began in the Kitikmeot Region during the 2018–2019 season and was subsequently expanded across all of Nunavut in the 2019–2020 season.

Nunavut wolf hunters demonstrate significant effectiveness, achieving substantial annual harvests in certain communities. Hunters often travel considerable distances, particularly later in winter and towards areas with higher caribou densities. The age distribution of harvested wolves suggests intensive exploitation of accessible segments of the wolf population. Continued monitoring and analysis are planned to assess the program's impact as part of ongoing efforts.

Operations and Enforcement

The Department of Environment maintains a wildlife office in every community throughout Nunavut. Conservation Officers act as community liaisons for ENV, offering comprehensive services to support their communities.

This encompasses ensuring adherence to legislative and regulatory requirements, investigating reported violations of Acts and regulations, issuing licences and permits, implementing wildlife deterrence measures, and aiding Nunavummiut in applying for ENV harvester support programs. They often participate in wildlife research activities in their area and assist ENV 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 conduct various educational initiatives within their communities. They deliver school presentations, facilitate community workshops, make radio announcements, and distribute posters. They also respond to inquiries about the legislation they enforce and participate in community and HTO meetings upon invitation.

Serving as frontline workers, Conservation Officers often serve as the initial point of contact with ENV 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 community members 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 additional research endeavors, Nunavummiut offer crucial assistance to ground-based research projects. To understand community priorities regarding wildlife, ENV staff endeavor to foster strong working relationships with communities and conduct regular consultations. This ensures that community concerns and insights are integrated into research initiatives.

The vast size of the territory, its remote location, intricate logistics, and short field seasons contribute to making research and monitoring in Nunavut more challenging and costly compared to 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. While Nunavut demonstrates a significant financial commitment to its wildlife research and management programs, much of the resources needed to sustain these initiatives are secured through grants and partnerships with various agencies, universities, environmental non-governmental organizations, and private industry.

There is a pressing need to enhance species and ecosystem monitoring and strengthen co-management collaborations to enhance wildlife management in Nunavut. Recruiting and retaining Wildlife Division staff in remote communities poses significant challenges. Despite these obstacles, the Wildlife Division remains dedicated to refining its efforts, ensuring the delivery of dependable and timely information for informed conservation practices and effective environmental protection measures.

1. WILDLIFE DIVISIONS ROLES AND RESPONSIBILITIES

The GN has a legal mandate for the management of terrestrial wildlife species in Nunavut. The ENV fulfill GN obligations under Nunavut's *Wildlife Act* and its associated regulations. It also fulfills GN responsibilities under various federal legislation, as well as commitments to national and international agreements and conventions. This includes ongoing obligations for the co-management of Nunavut wildlife as stipulated in the Nunavut Agreement.

One of the primary goals of the Department of ENV 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.

ENV aims to deliver up-to-date and dependable information from diverse sources, including local knowledge (IQ) and internal scientific research. This informs management recommendations provided to co-management partners, aiming for effective wildlife management and land use decisions that are balanced and practical.

Additional objectives include collaborating with co-management partners to develop wildlife management plans aimed at safeguarding wildlife populations, fulfilling national and international commitments, and offering assistance and resources to co-management partners and harvesters. Furthermore, ensuring compliance with legislation and regulations through education and enforcement is a key focus.

Partners in this unique wildlife management system include the NWMB, HTOs, RWOs, and NTI. While each co-management partner operates with its own processes and initiatives, collaboration is central to collectively shaping policy and influencing decisions concerning wildlife and habitat protection, ensuring food security, exploring economic opportunities, and sustaining the traditional use of wildlife in local lifestyles and economies.

2. WILDLIFE DIVISIONS ORGANIZATION

In 2020, the Wildlife Management Division underwent restructuring and now consists of two separate divisions: Wildlife Research and Wildlife Operations.

Wildlife Research Division

The Wildlife Research Division is decentralized and regionalized. The Research Division 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, or the Division is unable to complete the necessary projects with available personnel. Both the Manager of Wildlife Research and the Senior Wildlife Advisor, report directly to the Director of Wildlife Research.

Wildlife Operations Division

The Wildlife Operations Division has further decentralized operations, establishing a Wildlife Office in each of Nunavut's twenty-five communities. There are nine Conservation Officer IIIs, twenty-one Conservation Officer 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, and two wildlife manager trainees, located in Arviat and Kugluktuk, who report to the Director, Wildlife Operations. There is also a Wildlife Deterrent Specialist reporting to the Coordinator, Operations and Regulations, who in turn reports to the Director, Wildlife Operations.

3. WILDLIFE ACT AND REGULATIONS

The Nunavut *Wildlife Act* (S.Nu. 2003, c.26) came into force in 2005. ENV 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 efforts from all co-management partners contributed to the development of the comprehensive regulations needed to fully implement the new Act. These regulations were introduced and came into effect on July 1, 2015. The following regulations were enacted:

- 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 into force, amendments were also made to the *Summary Conviction Procedures Regulations*, which set specified penalties for offences under the Wildlife Act. This includes the introduction of Summary Offence Ticket Informations (SOTIs), which were not previously available under the *Wildlife Act* prior to the regulations.

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 within the Inuit community.

Wildlife Co-Management: Successes and Challenges

Successful co-management can be defined as a collaborative approach where multiple stakeholders with common interests working together toward common goals and objectives. All stakeholders participate in the decision-making process, ensuring the long-term sustainability of Nunavut's wildlife resources, using the best available knowledge. Success is gauged not just by the outcome of individual projects, but also by reduced conflict among wildlife co-managers, facilitated by a shared understanding of roles, approaches, and complementary interests that complement each other to achieve common goals. Ultimately, success is achieved in ensuring the long-term sustainability of wildlife through effective communication, consensus and informed decision-making.

Achievements

Communications and Outreach Programs: In 2008, an Environmental Education Specialist position was created within ENV'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 such as:

- The Nunavut Hunter Education Programs consisting of the Online Hunter Education Course and the hunter education series of books and videos containing titles such as *Hunting Polar Bear in Winter, Hunting Seal in Spring, Hunting Caribou in Fall,* and *Hunting Narwhal in the Spring and Summer*.
- Environment centric levelled guided books for schools with titles *We Take Care of the Environment, My First Hunt, Air Pollution* and the recently completed *Kajjaarnaq: What Makes Nunavut Parks Special*.

We are presently developing a made in Nunavut trapper education program to further enhance our support for harvesters and advocate for sustainable furbearer harvesting practices.

Participation in Workshops, Meetings and Research: ENV has focused on enhancing communication and engagement with all partners. Several collaborative meetings and workshops have been held to develop community-based management plans for specific species, including Dolphin and Union caribou, grizzly bears, and Peary caribou. We regularly consult NTI, HTOs, RWOs, and the Elders Advisory Committee to incorporate traditional knowledge (IQ) and Inuit perspectives into the prioritization, planning, and execution of research and monitoring initiatives.

Inter-Jurisdictional Agreements and Partnerships: Nunavut shares the management of many populations of wildlife with neighboring jurisdictions. Several agreements and memoranda of understanding (MOUs) have been established or initiated with relevant governments or management organizations. These include the MOU establishing the Canada-Greenland Joint Commission on Polar Bears, as well as inter-jurisdictional agreements between the GN and the Government of Northwest Territories (GNWT) for caribou and polar bear management, and between Nunavut and the Beverley and Qamanirjuaq Caribou Management Board (BQCMB).

Challenges

All partners within a co-management system encounter challenges in fulfilling their mandate. This is also the case in Nunavut, where various co-management partners, each with their own perspectives and goals, must collaborate despite occasional differences. Financial constraints and limited human resources also hinder the engagement of certain organizations and co-management partners. In a dynamically evolving environment, increased research and monitoring are required, often with constrained funding and staffing. Despite these obstacles, collaborative efforts among partners persistently seek to advance important issues.

Addressing the misconception that traditional knowledge (IQ) and science are incompatible, or that scientific studies seek to substitute or diminish traditional knowledge,

is crucial. Additionally, comprehending and resolving perceived or actual discrepancies between national/international obligations and local interests could accelerate decision-making and foster broader 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.

Impacts of COVID-19 and Wildlife Research

The Government of Nunavut was impacted when the World Health Organization (WHO) declared the Coronavirus Disease 2019 (COVID-19) a public health emergency of global concern in January 2020; this later became a global pandemic, resulting in approximately 767 million reported cases and 6.9 million deaths worldwide. Numerous work stoppages and various operational restrictions, such as remote work arrangements, occurred during the pandemic. This resulted in the cancellation or postponement of several research projects and the loss of significant external research funding. In 2020, there was approximately $600,000 in lost funding from the Nunavut Wildlife Research Trust Fund alone. Research projects identified as high priority by communities and ENV were postponed to subsequent years, contingent upon available funding.

COVID-19 also affected our ability to effectively engage and consult with HTOs and other co-management partners. In-person research and community visits were significantly limited during the pandemic. We employed alternative approaches, such as teleconference meetings, to ensure ongoing communication on important priority issues with co-management partners throughout the pandemic.

Due to delays in previously scheduled research cycles, the Department is now several years behind. We must now carefully manage our research priorities within the constraints of available funding and capacity to complete these projects. This has posed challenges in fulfilling our mandate for wildlife research and monitoring.

5. RESEARCH AND MANAGEMENT INITIATIVES BY REGION AND SPECIES

The ENV Wildlife Research Division collects scientific and traditional knowledge (IQ) about wildlife resources as part of the collaborative management process aimed at ensuring sustainable wildlife management. Traditional practices such as hunting, trapping, and fishing remain integral to Nunavut's land-based economy. Country food is highly valued by many 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. Tuvaijuittuq Marine Protected Area, National Marine Conservation Areas, 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 populations 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 (ENV) 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, spanning 1,040,418 km², is the largest region in Nunavut and hosts over half of the territory's total population. It encompasses 8 out of 13 communities on Baffin Island. Baffin Island alone covers more than 500,000 km², representing approximately half of the region's terrestrial land mass. The region stretches from the islands in James Bay in the south 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 sustains a diverse range of wildlife.

Caribou (*Rangifer tarandus*) are an iconic, keystone terrestrial species of great nutritional and cultural significance to Inuit communities. Within the Arctic Archipelago, two subspecies are found: Peary caribou (*Rangifer tarandus groenlandicus x pearyi)*, listed as Threatened under the federal Species at Risk Act as of February 2023) and Barren-

ground caribou (*Rangifer tarandus groenlandicus*, assessed as Threatened by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) in November 2016). The High Arctic islands are also home to muskoxen (*Ovibos moschatus*).

5.1.1 Baffin Island Research and Management Initiatives

Baffin Island Spring Composition

Since the 2014 survey ENV has conducted fall and/or spring aerial composition surveys annually from 2015 to 2023, excluding the spring of 2020, to monitor the productivity and relative densities of caribou across Baffin Island. These monitoring efforts aim to achieve the following objectives:

1) Estimate the overall composition of the subpopulations, including the North Baffin grouping, South Baffin grouping, and Central Baffin grouping, e.g. what proportion of the population are young bulls, old bulls, cows, yearlings, and calves.
2) Estimate the trajectory of area specific relative densities of the three main groupings of the Baffin Island caribou population based on demographic composition. Using spring composition results, determine through a comparison between fall composition results, and where possible, similar tundra-wintering barren-ground subpopulations if an index of calf productivity (measured as calves per 100 cows) suggests an increasing or decreasing population trend.
3) Monitor the proportion of bulls in the population to ensure that the bull only harvest is not reducing bulls to a proportion that could interfere with breeding (rutting) success.
4) Build a database with which to estimate productivity trend through demographic modeling, to act as an index of population trend.
5) Provide information to inform management actions (including TAH) and monitoring plans and intensity.

The results from the 2019-2022 composition surveys suggest good productivity in most surveyed areas (Table 5.2 below) 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.

Table 5.1. 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		23	82	49	54			81	47	1	114	92	86				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

Not completed

Table 5.2. Number of observed caribou by demographic group during Baffin Island composition surveys 2019-2022. No survey completed in 2020 due to travel restrictions associated with COVID-19.**

Year	2019									2021									2022								
Season	Spring									Spring									Spring								
Location	North	Central	Prince Charles Island	Central Baffin + Prince Charles Island	South (Meta + Hall +Loks Land)	Meta Incognita Penninsula	Hall Penninsula	Loks Land	Hall + Loks Land	North	Central	Prince Charles Island	Central Baffin + Prince Charles Island	South (Meta + Hall +Loks Land)	Meta Incognita Penninsula	Hall Penninsula	Loks Land	Hall + Loks Land	North	Central	Prince Charles Island	Central Baffin + Prince Charles Island	South (Meta + Hall +Loks Land)	Meta Incognita Penninsula	Hall Penninsula	Loks Land	Hall + Loks Land
Calves Observed	not completed	not completed	not completed	not completed	347	203	71	73	144	55	not completed	not completed	not completed	379	220	58	100	159	not completed	not completed	not completed	not completed	618	376	133	109	242
Cows Observed					664	388	170	106	276	87				805	480	140	183	324					1137	686	271	180	451
Calves/100 Cows					52	52	42	69	52	63				47	46	41	55	49					54	55	49	61	54
Yearlings Observed					108	69	22	17	39	6				158	92	44	22	65					212	116	47	49	96
Bulls Observed					465	317	116	32	148	44				392	248	108	36	130					674	394	241	39	280
Bull + Cows					1129	705	286	138	424	131				1197	728	248	219	454					1811	1080	512	219	731
Adults + Yearlings Observed					1237	774	308	155	463	137				1355	820	292	241	519					2023	1196	559	268	827
Total Observed (Calves, Yearlings and Adults)					1584	977	379	228	607	192				1734	1040	350	341	678					2641	1572	692	377	1069

Caribou Health Monitoring Program

Due to public and HTO concerns regarding the potential impacts of development on toxicity levels in caribou and related health issues, ENV launched a caribou health monitoring program on Baffin Island. Biological samples were collected from harvested caribou on Baffin Island to assess the age structure and general health parameters, including disease levels. The results of the program showed that samples were consistent with that of other herds in Nunavut.

The program commenced in 2020; however, due to COVID-19 concerns, sampling was initially restricted to hunters in Pond Inlet. In the subsequent Baffin Island caribou harvest seasons of 2021-2022 and 2022-2023, the program was extended to encompass all communities participating in Baffin Island caribou harvesting. Due to increased interest, the program was expanded to include samples from the Wager Bay caribou herd during the 2022-2023 period. This program is ongoing and scheduled to continue into the foreseeable future.

GPS Telemetry Program

A GPS telemetry program was initiated in North Baffin in April 2021 and 7 collars were deployed on adult (3+) female caribou using aerial net-gunning (**Figure 5.1**). The program was planned but not conducted in 2022 due to community led concerns related to COVID-19. In April 2023, the program was continued in southern and central Baffin Island with a total of 29 collars being deployed. Twenty-five collars were deployed in south Baffin and 4 collars were deployed in central Baffin (**Figure 5.2**). Each deployed collar will continue to collect data for approximately 4-4.5 years when it is automatically released by a timed-release mechanism incorporated into the collar design.

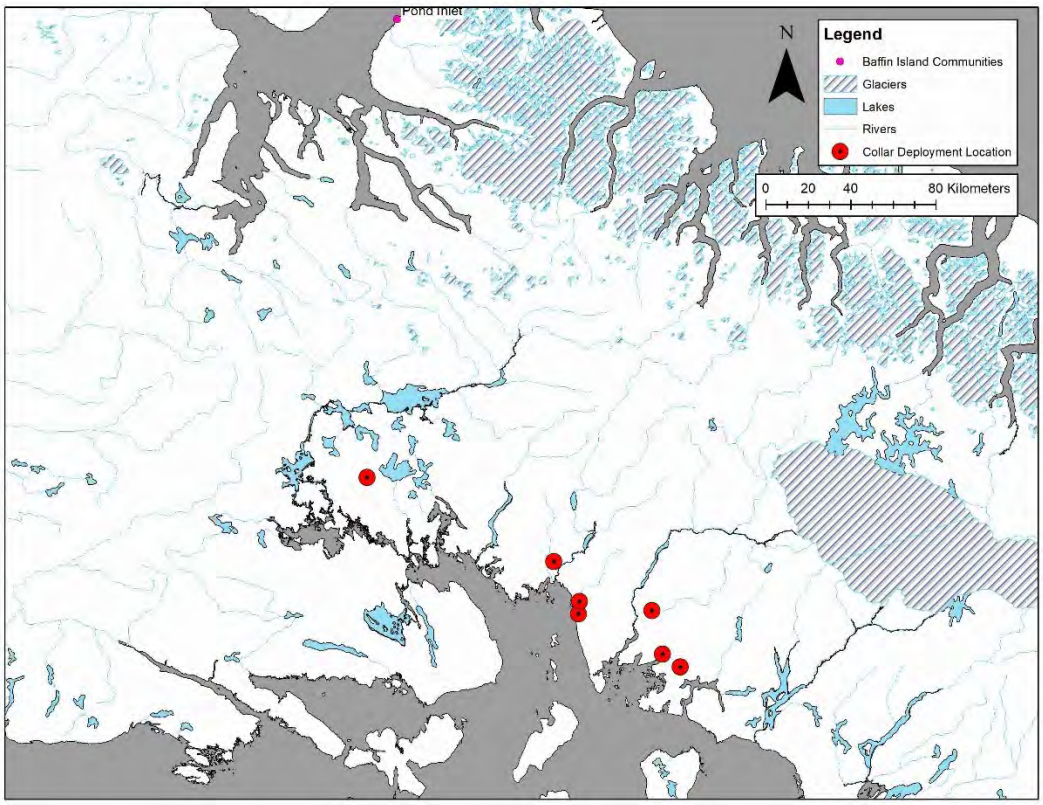


Figure 5.1. Collar deployment locations in North Baffin Island in April 2021.

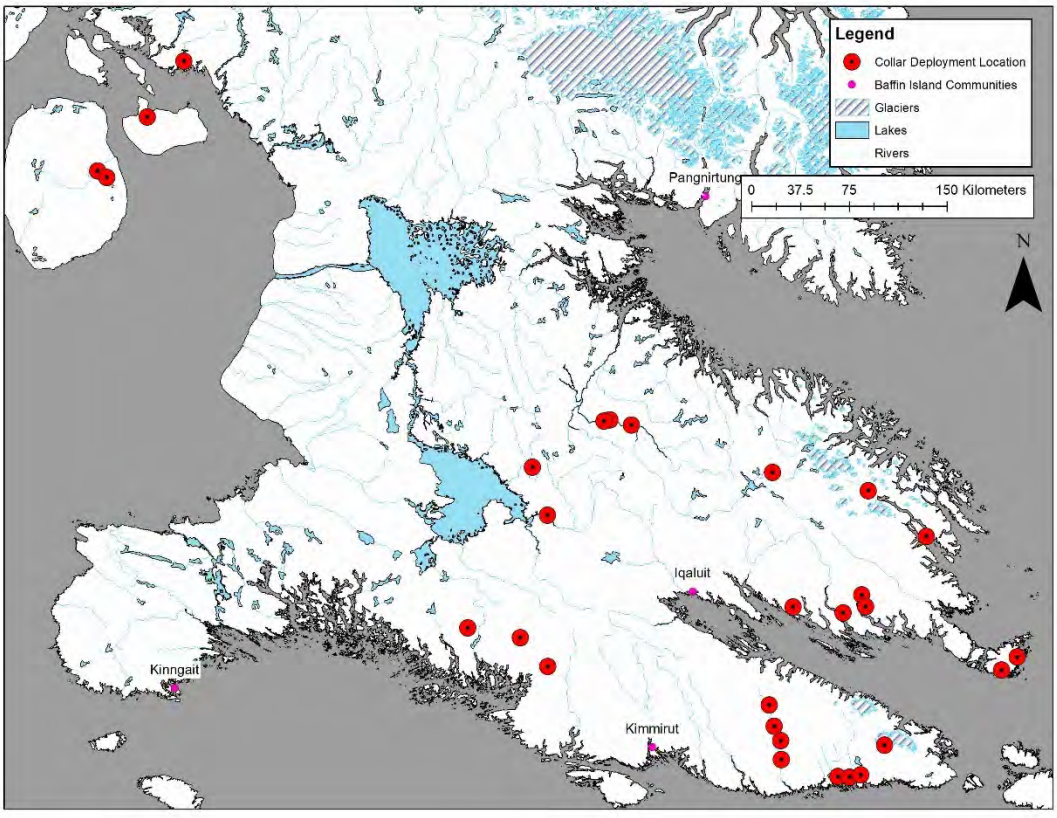


Figure 5.2. Collar deployment locations in South and Central Baffin Island in April 2023.

Baffin Island Harvest Management and TAH Changes

The 2014 island-wide caribou abundance survey results on Baffin Island revealed a population decline. Evidence of the decline combined with community-based observations and traditional knowledge (IQ), prompted the establishment of an eight-month harvest moratorium starting January 1, 2015. The moratorium was replaced in August 2015 with a TAH.

To allow some subsistence harvesting on Baffin Island (Table 5.3), the TAH was established at 250 male-only caribou, including mandatory reporting. To assess the impacts of the sex-specific harvest regime, sex ratios have been assessed through yearly composition surveys.

In July 2019, the TAH was adjusted to include the harvest of up to 25 females as part of the annual harvest.

In July 2022, the TAH was modified again to allow the harvest of 350 caribou with up to 75 being female. This decision also included additional harvest increases of 50 caribou a

year for the next 8 years with up to 20% of the harvest being female (e.g. TAH=400 in 2023/2024, TAH=450 in 2024/2025, etc).

Table 5.3. Seasonal harvest allocations and caribou harvested by season and region.

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	54	89	93	236	7
2019/20	250	63	89	98	58	75	118	251	18
2020/21	250	63	76	98	68	80	99	247***	21
2021/22	250	67	84	99	72	77	101	250	21
2022/23	350	105	101	144	119	86	143	348	43

* Females harvested are included in the "Total Caribou Harvested"
** 5 of the females harvested are suspected and not confirmed
*** not including 9 additional suspected harvests.
[1]North Baffin allocation divided between communities of Pond Inlet, Igloolik, Arctic Bay and Sanirajak (Hall Beach). Sanirajak had an allocation of zero for 2019-2021.
[2]Central Baffin allocation divided between communities of Clyde River, Pangnirtung and Qikiqtarjuaq.
[3]South Baffin allocation divided between communities of Iqaluit, Kimmirut and Kinngait (Cape Dorset).
[4]As of November 20, 2023

Baffin Island Caribou Management Plan

The draft Baffin Island Caribou Management Plan was initiated in 2013 with a series of co-management workshops and community consultations. Many of the identified information gaps were subsequently addressed through the 2014-2018 Baffin Island caribou survey efforts. The draft management plan was finalized and submitted to the NWMB for approval for their Regular Meeting in March 11, 2020 (RM001-2020). The Board opted not to exercise their decision-making authority to approve the proposed management plan. Upon consideration of their decision, it was concluded that revising the plan to satisfy the expectations of traditional knowledge (IQ, science and the goals and objectives of all co-management partners would likely be challenging. Consequently, the management plan is now utilized as an internal guiding document.

5.1.2 High Arctic Research and Management Initiatives

Peary Caribou and Muskoxen Surveys

Surveys of Peary caribou and muskoxen indicated notable declines on certain Arctic islands, largely attributed to severe weather events. In other populations, cycles of decline and subsequent recovery were evident, albeit with variations in magnitude and frequency among islands. Generally, foundational data on the distribution and abundance of many Peary caribou and muskoxen populations was infrequent or absent.

From 2013 to 2021, the GN conducted aerial surveys to estimate the densities and abundance of Peary caribou and muskoxen across the Bathurst Island Complex, Devon Island, southern and central Ellesmere Island, Lougheed Island, Prince of Wales Island, and Somerset Island.

The results from all surveys conducted between 2013 and 2018 were presented to local communities for their feedback and interpretation. In 2019 a combined survey of Peary caribou and muskox was conducted on Axel Heiberg Island (MX-02). The survey results did not identify any conservation concerns or lead to management recommendations for either species, primarily due to the island's remote location.

This survey will enhance our overall baseline information and guide future research. Results from the 2021 work will be shared with co-management partners upon completion. Insights gained from these studies aid in the formulation of management and monitoring plans grounded in both traditional knowledge and science. Additionally, they contribute to recovery planning as required under the 2011 addition of Peary caribou to Schedule 1 of the federal *Species at Risk Act*.

Results from these studies have been utilized to review harvest rates and capacity and inform recommendations for caribou and muskoxen conservation and management and support environmental impact assessments. Opportunistic sample collection also contributes to a broader genetic and dietary study across the region (refer to details below).

Peary Caribou Landscape Genetics

In partnership with other agencies, the Government of Nunavut has collaborated to enhance understanding of the population dynamics of Peary caribou through genetic analysis. Results align with traditional knowledge (IQ) and previous research indicating regular movements between many Peary caribou island groups, while also identifying isolated groups that have remained separate for generations. Additional sample

collections from areas such as southern Ellesmere Island and Melville Island would enhance our understanding of the relationships between these Peary caribou groups.

Ungulate Health Monitoring Programs

The overall decline in Peary caribou, combined with occasional die-offs of both Peary caribou and muskoxen, along with potential adverse effects of climate change, underscore the necessity for regular monitoring. Such monitoring will provide relevant information to scientists, wildlife managers, and stakeholders. Local harvesters maintain ongoing interaction with caribou and muskoxen and possess a deep connection with the environment.

This distinctive knowledge is captured through collaboration with Inuit hunters to gather samples and data from animals they already harvest, as well as their habitats. The goal is to establish baseline values for fundamental ecological and health-related metrics, prioritizing sustained monitoring to track changes over time. Through the creation of community-based monitoring programs, our aim is to address some of the unique challenges of conducting research in northern regions. This approach involves active participation from community members, wildlife managers, co-management partners, and scientists, fostering a collaborative endeavour that integrates resources and expertise.

Future Research Directions

Potential future research on Peary caribou may encompass health monitoring, habitat investigation, resource selection, and simulation modeling to assess impacts from harvest, climate change, and periodic icing events. Additionally, exploring less-invasive monitoring techniques and their potential applications to Peary caribou populations could also be explored.

Peary Caribou Management Planning

ENV collaborated with the communities of Resolute Bay, Arctic Bay, and Grise Fiord to develop a draft management plan for Peary caribou in 2014, integrating IQ and scientific data. The draft plan was also presented to Kugaaruk, Taloyoak, Gjoa Haven, and Cambridge Bay to incorporate input and concerns from Kitikmeot communities. After multiple revisions, the draft plan was last submitted to NWMB for their June 2018 regular meeting. Based on what we heard at the meeting, during the consultations and from co-management partners throughout the development, it became evident that the plan could not address all concerns raised. As a result, the plan is being utilized internally as a guiding document. Our current focus has shifted to supporting the federal government in the development of a national Recovery Strategy for Peary caribou. This recovery

strategy was accepted by the federal Minister in March 2022. Co-management partners will maintain their collaboration to exchange information, share responsibilities for implementing the recovery strategy, and engage in ongoing discussions regarding new information and potential management actions.

Muskox Management Planning

Building on the effective consensus-based Kivalliq muskox management plan, ENV collaborated with Arctic Bay, Grise Fiord, Resolute Bay, and NTI to develop a High Arctic Muskox Management Plan. Consultations took place in March 2012, and feedback was incorporated into the Plan, and all communities supported the final draft. Submitted to the NWMB in March 2013, the plan received approval on June 13, 2013.

This management plan outlined a community-based consensus approach, in which ground surveys, conducted on a rotating basis among island groups were required, and could impact management decisions or identify the necessity for more detailed information between aerial survey abundance estimates. Stakeholder meetings incorporated up-to-date local and scientific knowledge and were used to determine management objectives and direction and allow for rapid response to changes in populations. Ongoing collaboration with co-management partners focuses on High Arctic muskox management, addressing community concerns and government priorities.

5.2 Kitikmeot Region Research and Management Initiatives

In the Kitikmeot region, over half of the population depend significantly on hunting wildlife for sustenance and supplement their income through the sale of meat, fish, furs, and guiding for sport hunting. The predominant industries in the Kitikmeot region are mineral exploration and mining, which contribute to employment and economic prosperity. Effective land use, wildlife planning, and co-management are crucial to protect critical areas, including migratory corridors that extend onto sea-ice. All research initiatives and their results are regularly communicated to co-management partners through meetings with affected HTOs and RWOs.

The Kitikmeot Region, the westernmost of Nunavut's three regions, serves as a meeting point for Arctic and Boreal species in its southern reaches. It boasts a diverse array of wildlife, including caribou, muskox, moose, grizzly bear, polar bear, wolf, Arctic fox, red fox, and wolverine. Various caribou herds, such as the Peary caribou, Dolphin and Union caribou, and several barren-ground caribou herds ranges overlap with the Kitikmeot Region, which is renowned as a primary calving ground for many barren-ground caribou. For millennia, Inuit in this region have depended on hunting wildlife for sustenance and income, derived from the sale of meat, furs, traditional clothing, and crafts made from antlers and horns.

Effective co-management with partners is crucial to balancing land use and wildlife management through the implementation of monitoring projects. This effort can be enhanced by building capacity through collaborations with academia, other governments, and local communities.

Muskox Abundance and Management

Central Kitikmeot Group, MX-11

The Central Kitikmeot Group (MX-11) is one of several muskox management units in the Kitikmeot region (Appendix 2). The western Kitikmeot communities of Cambridge Bay, Kugluktuk, Umingmaktok (Bay Chimo), and Bathurst Inlet, harvest from this management unit. MX-11 is entirely within the Kitikmeot region and extends from the south at the Nunavut boundary with the NWT northwards to the coast of the Northwest Passage. This management unit is bounded on the west by the Coppermine River and the Perry River within the Queen Maud Gulf Migratory Bird Sanctuary to the east.

In 2013, a survey of the western portion of management unit MX-11 estimated 6,746 muskoxen, while the remaining area was estimated at 754 muskoxen, resulting in a total estimate of 7,500 muskoxen for MX-11. In March 2022, an aerial survey was conducted to monitor muskox abundance in MX-11, during which 130 muskox groups were observed. The highest densities were recorded in the western part of the management unit, with 24 muskoxen per 100 km², while lower densities were observed in other areas. Using mark-recapture distance sampling (MRDS) analysis, ENV estimated a total of 10,246 muskoxen (Figure 5.3). However, due to differences in survey area and methodology, we are unable to compare the estimates from 2022 to 2013 or assess population trend.

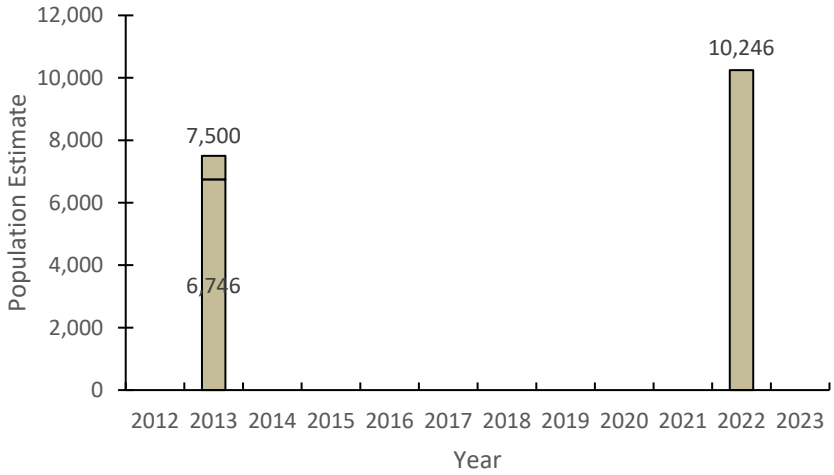


Figure 5.3: Muskox abundance in the Central Kitikmeot Group, MX-11, from 2013 to 2023.

Following the establishment of MX-11 in 2015, a TAH of 225 muskoxen was established at 225 with allocations designated for Kugluktuk, Cambridge Bay, Bathurst Inlet, and Umingmaktok. A submission to the NWMB in 2023, and further acceptance by the Minister of Environment, the TAH for MX-11 was increased from 225 muskoxen to 350 muskoxen beginning in 2023-2024. The current TAH for MX-11 provides additional harvesting opportunities as an alternative source of country food until neighbouring caribou herds recover.

Future Research Direction

While some muskox populations are increasing and recolonizing their historical range, others, such as MX-07, have sharply declined due to disease outbreaks. Inuit communities are concerned about the growth of muskox populations, fearing it may negatively impact caribou herds that share the same habitat. Despite both species inhabiting the Canadian Arctic, their ecological relationship remains relatively unstudied. Future research should investigate resource competition and assess whether population shifts correlate with environmental changes. Research focused on regional priorities may contribute valuable insights to support caribou recovery efforts.

Caribou Abundance and Management

Dolphin and Union Caribou

Dolphin and Union caribou have a relatively large distribution encompassing Victoria Island and parts of the northern Canadian mainland. These caribou, known for their lighter colouration and smaller size, exhibit distinctive behaviours, such as its characteristic migration across sea-ice. ENV's research efforts over the past five years have focused on estimating the population through aerial surveys conducted in 2018 and 2020. Additionally, satellite telemetry collars were deployed in spring 2018 (n=50) and 2021 (n=36), complemented by multiple spatial analyses to enhance our understanding of the habitat use of Dolphin and Union caribou within their annual range (**see Figure 5.4**)

Figure 5.4: Dolphin and Union Caribou Annual Range (yellow polygon), based on assessments of collar data from 1996-2020.

In fall 2018, a population survey was conducted using the coastal survey methodology initially employed in 1997, enhanced by data from satellite collars. Surveying during the rutting/breeding period provided an advantage, as both male and female caribou aggregate on the south shore of Victoria Island. During this period, daily movement rates

were less than 5 km/day, allowing for a reduction in survey area and effort compared to summer surveys, when caribou are dispersed across the entire island. The survey recorded 91 caribou groups and yielded a final estimate of 4,105 caribou. This marked a significant decline between 2015 and 2018 with a change of 62% or 38% herd decline each year (**Figure 5.5**).

There was concern that the 2018 survey did not capture an unexpected seasonal range shift identified by communities and telemetry data. Consequently, a follow-up survey was conducted in fall 2020. The survey area in 2020 was significantly expanded to include both the fall migration range and the rutting/breeding range. After accounting for all potential areas where caribou might have been present during the survey period, the population in 2020 was estimated at 3,815 caribou (**Figure 5.5**). This population estimate did not show a statistically significant difference between 2018 and 2020, and the distribution of Dolphin and Union caribou remained unchanged.

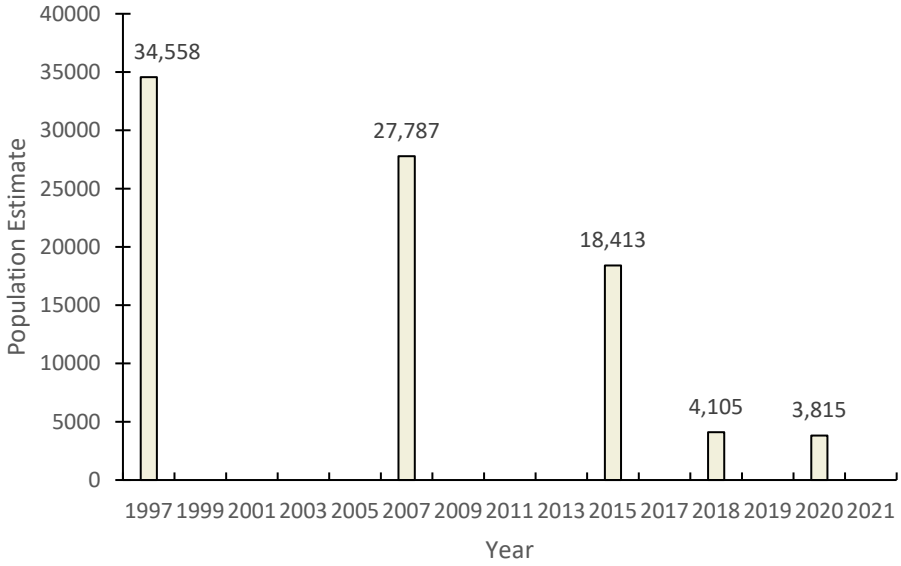


Figure 5.5: Dolphin and Union caribou herd population estimate from 1997 to 2020.

These two surveys confirmed a significant decline in the Dolphin and Union caribou herd from the 2015 population estimate of 18,413 caribou (**Figure 5.5**), prompting management actions. In August 2020, an interim TAH of 42 caribou was established as a conservation measure pending further consultations. A submission to the NWMB in December 2020 resulted in the Minister of Environment accepting the NWMB decision to increase the TAH to 105 caribou. A subsequent submission to NWMB in December 2021, using the 2020 population estimate, recommended maintaining the TAH at 105 caribou; the NWMB opted not to modify the TAH, thus it remained unchanged. The next population survey was conducted in November 2023 and is currently undergoing analysis.

In 2015, a satellite telemetry caribou collaring program was launched for the Dolphin and Union caribou herd. These programs provide important information including movement rates, survival rates, location during surveys, and year-round movement patterns. In 2021, an analysis of pregnancy rates was conducted for females collared in 2015, 2016, 2018, and 2021, revealing rates ranging from 86.8% to 93.6% during this period, indicating relatively robust reproductive health. Using collar data from 2018, four annual maps were produced to provide co-management partners with a general overview of caribou locations across different seasons. Following the 2021 collaring effort, map frequency increased to a bi-weekly schedule, increasing our information sharing with co-management partners (**Figure 5.6**). Additional analyses are currently underway to assess calving ground fidelity, wintering ground fidelity, habitat suitability during calving and wintering seasons, and the timing of sea-ice migrations, with expected completion by December 2023.

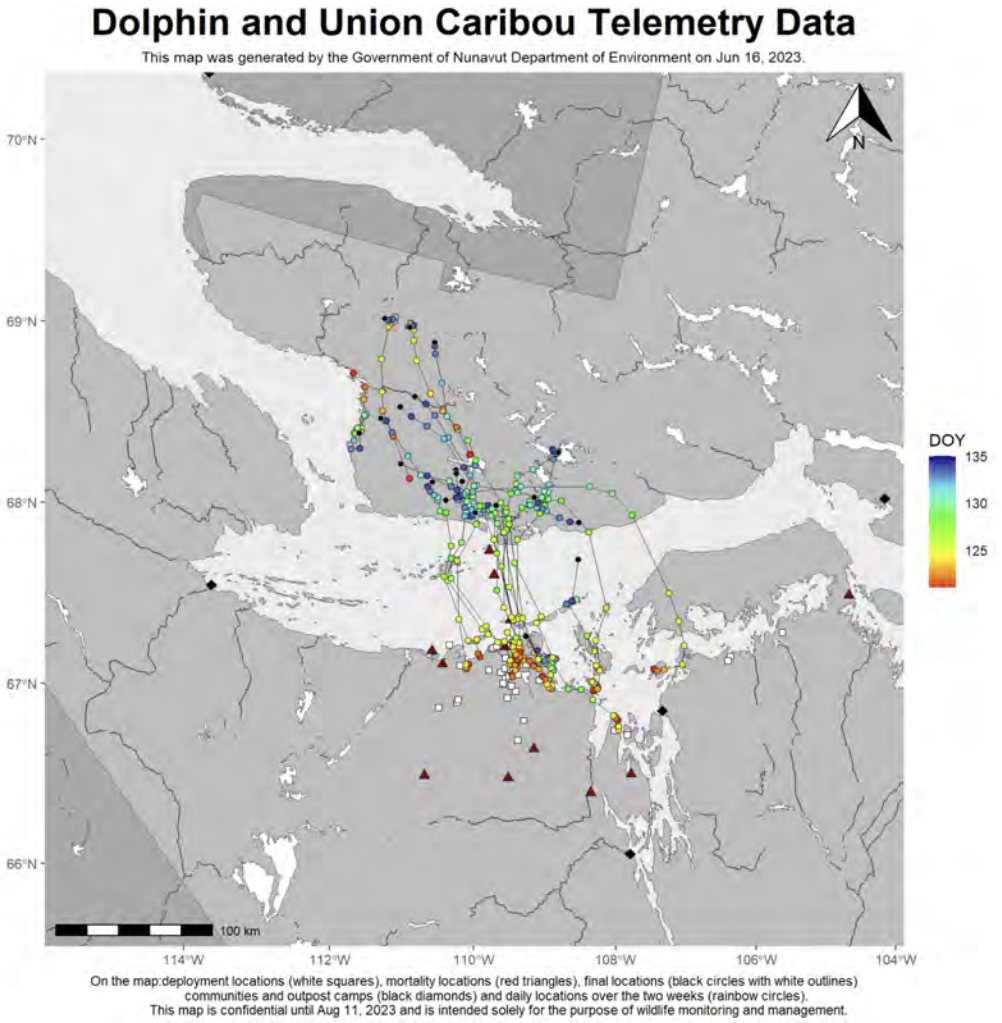


Figure 5.6: Example of a Dolphin and Union collar map showing the daily location (Day of the Year (DOY)) of collars for a two-week period.

Bathurst Caribou

The Bathurst caribou herd is harvested by hunters in the NWT and Nunavut (Kugluktuk, Cambridge Bay, Bathurst Inlet, and Umingmaktok (Bay Chimo)). Long-term monitoring has been on-going in collaboration with the GNWT and two aerial surveys have been completed in the last five years. In June 2021, the Bathurst caribou herd abundance was estimated to be 6,240 caribou (**Figure 5.7**). A second Bathurst caribou survey flown in June 2022 produced an abundance estimate of 6,850 caribou. No statistically significant change was detected in Bathurst caribou abundance between these two years. However, between 2018 and 2021 the herd estimates represented an annual rate of decline of about 8%.

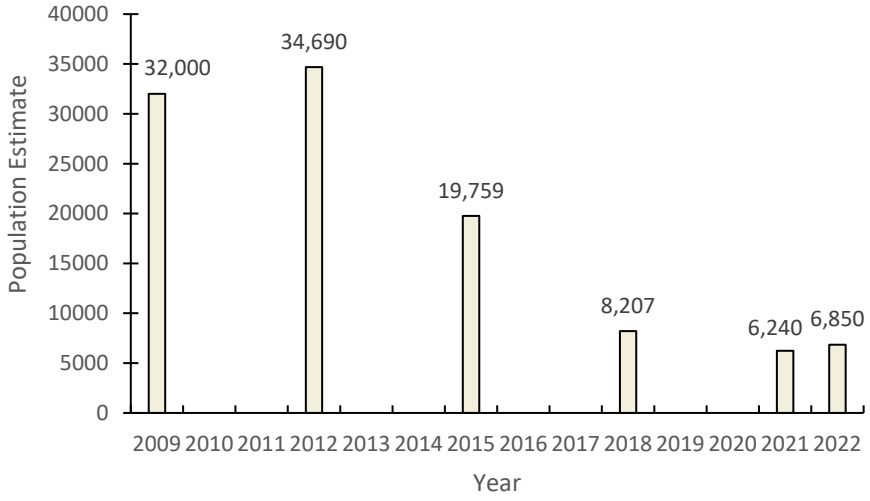


Figure 5.7: Estimated size of Bathurst herd from 2009-2022.

Here are the Bathurst herd population indicators:

- 73% collar-based cow survival in 2021
- 79.8% breeding females in June 2022
- 38.4 calves: 100 cows in October 2022
- 64.1 bulls: 100 cows in October 2020. Survey attempted in October 2022 but results questionable.
- 30.4 calves: 100 cows in March 2020. *Survey not possible in March 2022 due to herd mixing

In March 2020, the NWMB held a public hearing in Cambridge Bay regarding proposed reductions to the TAH established for 30 male-only caribou in 2017Minister rejected the initial decision and later in 2020 accepted the NWMB final decision to establish a TAH of 10 male-only caribou for the Bathurst caribou herd in Nunavut. Since 2017, ENV has actively coordinated, developed, and provided technical support for an inter-jurisdictional management plan for the Bathurst caribou herd. ENV also participated in the development of an action plan in 2022-2023.

Bluenose-East Caribou

The Bluenose-East (BNE) caribou herd is an inter-jurisdictional herd shared between Nunavut and the Northwest Territories, with Kugluktuk hunters being the main, and only Nunavut community, that harvests from this herd (36% total harvest allocation). The GNWT conducts abundance estimates on this herd. In 2021, GNWT led a survey of the calving grounds, resulting in an estimate of 23,202 caribou for the BNE herd. This estimate was not found to be statistically significant from the 2018 estimate of 19,294 animals, indicating stability over the survey periods (Figure 5.8). The increase in abundance was attributed

to a rise in the number of bulls, while the estimate for adult females remained consistent across both survey periods, with 13,988 estimated in 2018 and 13,991 in 2021.

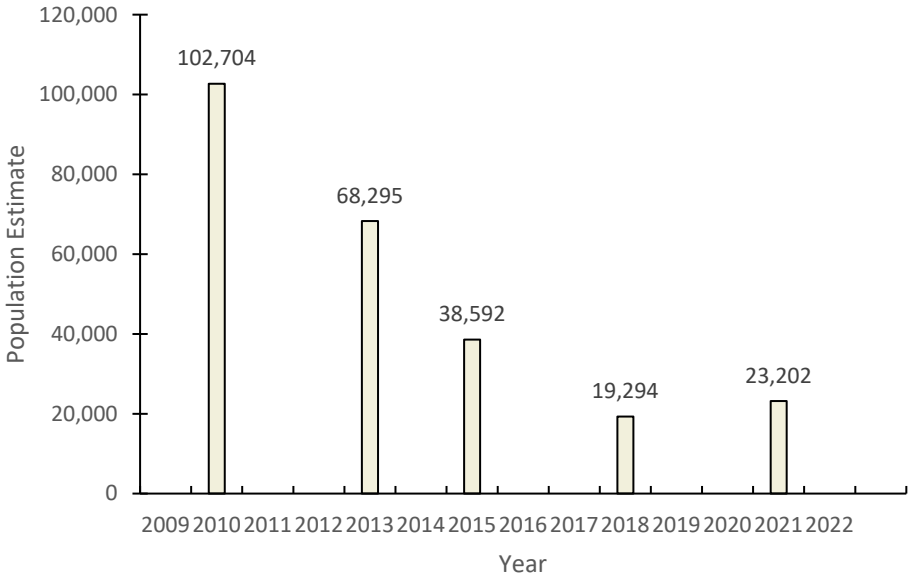


Figure 5.8: Estimated size of Bluenose-East herd from 2009-2022.Population indicators for the Bluenose-East (BNE) herd can be summarized as follows:

Population indicators for the BNE herd can be summarized as follows:

- Cow Survival: 86.6% for 2021, 89.0% for 2020 and average 2018-2021 of 85.1%
- Proportion of Breeding females: 86.2% June 2022, 91.9% June 2021, 87.5% in June 2019.
- Fall calf: cow ratios: 52.3 calves:100 cows in Oct. 2022, 49.6 calves:100 cows in Oct. 2021, 51.7 calves :100 cows in October 2020
- Fall sex ratios: 64.8 bulls:100 cows in October 2022 and 68.6 bulls:100 cow in October 2021, 63.3 bulls: 100 cows in October 2020.
- Winter calf: cow ratios: 46.9 calves:100 cows in March 2022, 46.7 calves:100 cows in March 2021, and 41.8 calves: 100 cows in March 2020.

In 2016, the Minister of Environment for the GN established a TAH of 340 caribou for the BNE herd and endorsed the development of a community management plan. The 2018 survey results were submitted to the NWMB in 2020, resulting in a revised TAH of 170 caribou for the 2020-2021 harvest season, with provisions allowing up to a 50% female harvest (up to 1:1 harvest sex ratio). The 2023 photographic survey of the BNE calving grounds has been completed, and results will be shared with affected communities and co-management partners and may lead to new harvest recommendations for this interjurisdictional herd.

Boothia Peninsula Research

The Boothia Peninsula is recognized by the community of Taloyoak as an important calving ground for potentially hosting more than one caribou subspecies; additional surveys and analysis are necessary to verify this. Previous caribou surveys of the Boothia Peninsula were conducted during the calving season from May to June and in July to August. In 1985 there were 4,831 caribou estimated and in 1995 there were an estimated 6,658 caribou for the entire Boothia Peninsula.

In 2022, a new research project was launched with the primary objective of evaluating the caribou population on the Boothia Peninsula. This project seeks to determine genetic distinctions among caribou present on the peninsula during the calving season, while also estimating the overall caribou abundance during this period, along with a separate estimate of breeding cows.

Fieldwork was conducted from June 12 to June 18, 2022. Caribou aggregations were identified during the initial reconnaissance survey, followed by subsequent visual and composition surveys. During the visual survey, 66 caribou in 30 groups were observed. Additionally, we observed cows with newborn calvesreinforcing IQ that caribou are indeed calving on the Boothia Peninsula, and we assessed pregnancy rates. Fecal samples were collected from the calving ground to determine herd identity. ENV distributed 150 sample kits to harvesters (100 in Taloyoak, 25 in Gjoa Haven, and 25 in Kugaaruk), with 97 kits returned. These samples were sent for genetic analysis to enhance our understanding of caribou ranges beyond the calving season and to identify the specific caribou herds or species present on the Boothia Peninsula. This study is ongoing pending genetic results, with a final report expected in fiscal year 2023-2024.

Future Research Direction

As part of the Kitikmeot research program, the Bluenose-East, Bathurst, and Dolphin and Union caribou herds are displaying indications of population decline. These herds are currently at vulnerable population levels, posing potential negative impacts on Inuit culture. ENV will persist in monitoring population trends and endeavour to identify critical habitat necessary for herd recovery and climate change adaptation planning.

With a milder Arctic climate expected, it is predicted that southern species will expand their home ranges northward. While moose currently provide an alternative source of country food compared to caribou, their role in the Arctic ecosystem remains largely unexplored. Future studies should focus on establishing a baseline, addressing knowledge gaps through abundance surveys, health monitoring, and gaining a deeper understanding of their tundra habitat.

Ungulate Health Monitoring Program

Since 2013, a muskox and caribou health monitoring program has been ongoing in the region through collaboration with the University of Calgary (UCalgary). This program was jointly developed with HTOs, GN ENV, and UCalgary to address community needs, specific research questions, sampling areas, sampling intensity, and components. Kitikmeot HTOs play a direct role in this program and are valued collaborators. When potentially positive samples are identified, the Canadian Wildlife Health Cooperative (CWHC) and the Government of Nunavut Environmental Health Officer are informed, and samples are sent to the Canadian Food Inspection Agency (CFIA) for confirmation.

CFIA then informs GN Health regarding any potential human health concerns. Graduate students engage with ungulate samples as part of their academic curriculum. Research findings are disseminated through the "UCalgary-Kutz Research Group" Facebook page, monthly newsletters, HTO meetings, specialized health workshops, conferences, in additional to peer-review publications, and theses.

This program identified the presence of Brucella in muskoxen on Victoria Island and concluded that approximately one-third of adult muskoxen harvested near Ulukhaktok, NWT, tested positive for Brucella during the sampling period. Cases have now emerged on the mainland, specifically on the Kent Peninsula. Brucella poses a significant threat to muskox populations, as younger animals exposed to the disease were observed to have lower pregnancy rates, potentially impacting population growth and contributing to the decline of muskoxen on the western side of Victoria Island. Surveys are planned for 2023 to provide updated population estimates for Victoria Island, MX-07, and ongoing health monitoring to track the disease's spread to neighbouring muskox management units. Programs like these play a crucial role in understanding population trends, facilitating survey planning, and ensuring sustainable harvests from healthy food sources.

(Photo from Umingmak Productions Inc.)

5.3 Kivalliq Region Research and Management Initiatives

Ungulate Monitoring

Caribou are vital to the people of the Kivalliq region, playing a crucial role in traditional practices, poverty reduction, and contributing an estimated annual food replacement value exceeding 20 million dollars. Monitoring caribou populations, developing management and action plans, the protection of the harvest are essential to ensure a sustainable supply of healthy caribou for subsistence harvesters. Significant threats to the long-term health of Kivalliq caribou herds include impacts from industrial development and the fragmentation of seasonal ranges. Of particular concern are roads and associated traffic, which contribute to habitat modification and create zones of influence that disturb caribou through visual, physical, auditory, and olfactory disturbances. Additionally, environmental contaminants pose long-term risks to caribou populations.

Additional concerns involve online sales of caribou meat leading to increased harvesting, predator impacts within modified and fragmented environments, and cumulative human impacts. While muskoxen are not as abundant or as heavily relied upon for food as caribou, they are increasingly valued as an alternative source of country food due to declining populations in many Kivalliq caribou herds. Table 5.4 summarizes the status of Kivalliq caribou and muskox herds and subpopulations, offering an evaluation of current trends.

Understanding the impact of human activities on caribou herds is challenging due to their migratory nature and the influence of seasonal and vegetative changes across their annual range. Caribou abundance fluctuates over time due to various factors, primarily stress induced by habitat alterations and behavioral disturbances, both natural and human induced.

Ongoing is a comprehensive analysis of telemetry data collected over several years from collared caribou cows, aimed at tracking changes over time and investigating underlying mechanisms driving these changes. The Kivalliq caribou telemetry program, launched in 1996, initially aimed to validate data on caribou seasonal range use and migratory patterns and corridors gathered from various sources. Following the identification of significant adverse effects on caribou spring and fall migration behaviour due to a mining road, the telemetry program evolved into an effective tool for monitoring the impacts of industrial activities on caribou movements, alongside its original objectives. These studies are key to understanding and mitigating these impacts, although some effects remain challenging to mitigate. The findings from these studies align with and complement local knowledge, as indigenous caribou experts possess valuable insights into observing and explaining changes in herd movements, distribution, and health, which are often noted but not well understood by scientists.

The telemetry study results from ENV, used to map annual and seasonal caribou ranges, migratory corridors, and the impacts of industrial activities, garnered strong endorsement from RWOs and HTOs. The seasonal range maps generated by the study are widely acknowledged as the most comprehensive and well-supported depiction of barren-ground caribou herd distributions on the Nunavut mainland (Appendix 3). Furthermore, consensus was achieved through both scientific data and Indigenous knowledge (IQ) regarding the locations and boundaries of critical annual calving areas and migratory corridors, among other vital seasonal ranges. This information is crucial for conducting environmental impact assessments, safeguarding important seasonal habitats from industrial development and other disruptive land uses, and coordinating survey efforts to protect critical caribou habitats that require conservation from disruptive activities and developments (**Figure 5.9).**

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

Species	Subpopulation Identification	Previous Abundance Survey (year)	Estimate	Coefficient of Variation (%)	Most Recent Abundance Survey (year)	Estimate	Coefficient of Variation (%)	Statistically Verified Trend
Barren-ground Caribou	Ahiak	2011	71,340	5.4	2021	39,131	7.8	Declining
	Beverly	2011	136,608	4.8	2018	103,372	4.9	Declining
	Coats Island	2010	4,089	14.0	2013	1,304	21.0	Declining
	Lorillard	None	None	None	2021	33,454	19.2	Unknown
	Qamanirjuaq	2017	288,244	7.8	2022	252,892	13.9	Declining
	Southampton Island	2015	12,368	8.1	2019	12,255	9.7	Stable
	Wager Bay	None	None	None	2021	45,005	7.3	Unknown
Muskox	Central Kivalliq Muskox*	2010	4,506	11.0	2016	4,437	11.6	Stable
	Northern Kivalliq Muskox*	2012	2,341	11.7	2017	3,239	16.0	Increasing

*Boundaries and name changes occurred in 2015 when new regulations were introduced.

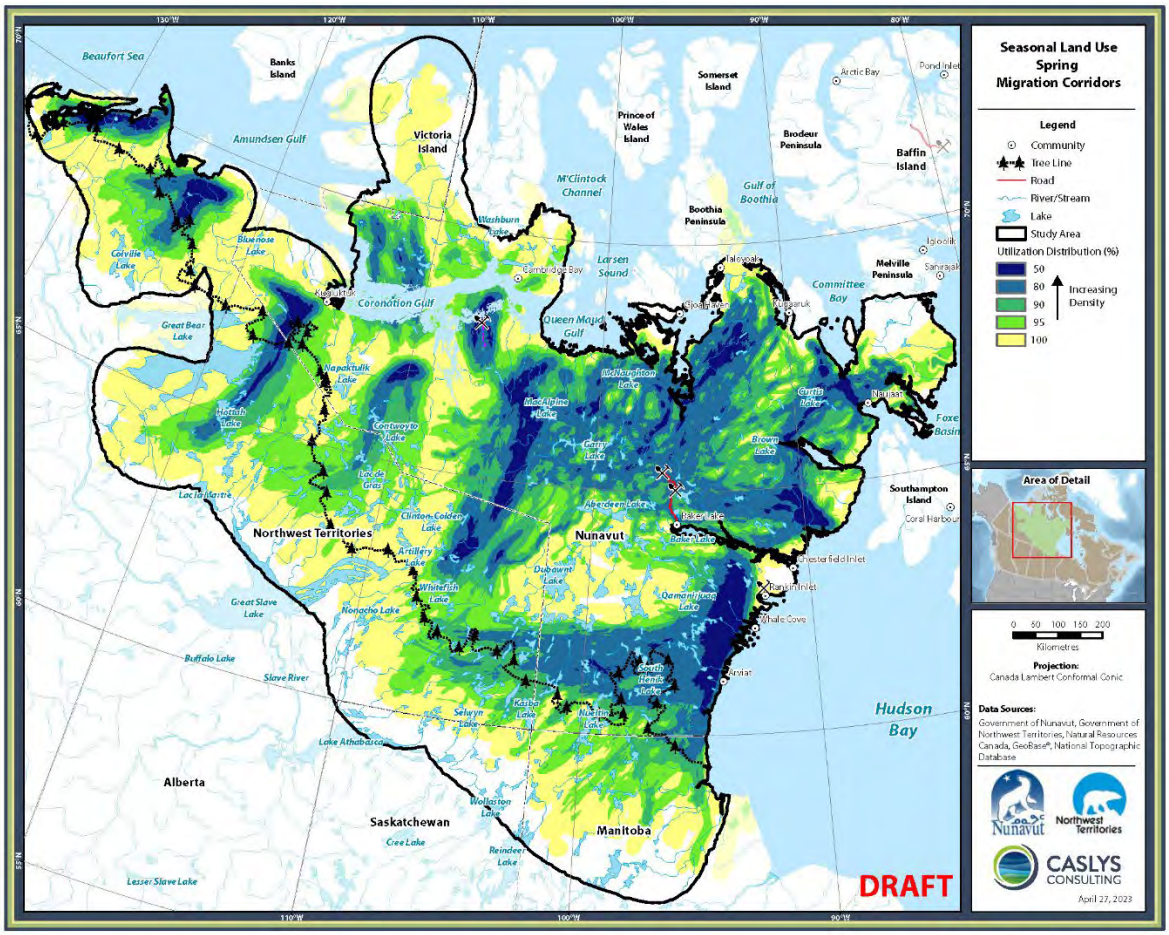


Figure 5.9. Barren-ground caribou spring migratory corridors across Nunavut.

Qamanirjuaq Caribou Surveys

The Qamanirjuaq Caribou Monitoring Program includes spring classification and satellite telemetry studies (**Figure 5.10**), and abundance surveys. These investigations have and continue to be undertaken with input and support from Regional HTOs and the RWO, including many partners in Nunavut and NWT.

Understanding the whereabouts of caribou is crucial for developing effective research initiatives and making informed land-use management decisions. Approximately 50 Qamanirjuaq caribou cows are collared over a two-to-four-year span in their spring range (**Figure 5.11**). The primary goals of this project include monitoring distribution and seasonal range utilization and establishing a comprehensive habitat database for the Qamanirjuaq caribou herd. Ideally, this database would encompass seasonal data on location and behaviour, preferences for habitat and vegetation, hydrological and topographical preferences, as well as responses to disturbances and avoidance behaviours. Additionally, telemetry data can furnish resource users, RWOs, territorial

authorities, and inter-jurisdictional management boards with valuable information for making informed decisions regarding appropriate land-use activities.

Another critical objective of telemetry studies is to locate seasonal aggregations of caribou across their annual range, with particular focus on spring and fall periods when assessments of overwinter calf survival and herd sex ratios are typically conducted. These ongoing studies are instrumental in assessing herd productivity, which indicates whether the population is growing or declining, as well as help trigger expensive abundance surveys. Furthermore, ongoing monitoring of population health, especially in light of confirmed declines, is conducted through hunter observations and periodic collection of hunter kill samples for subsequent analysis.

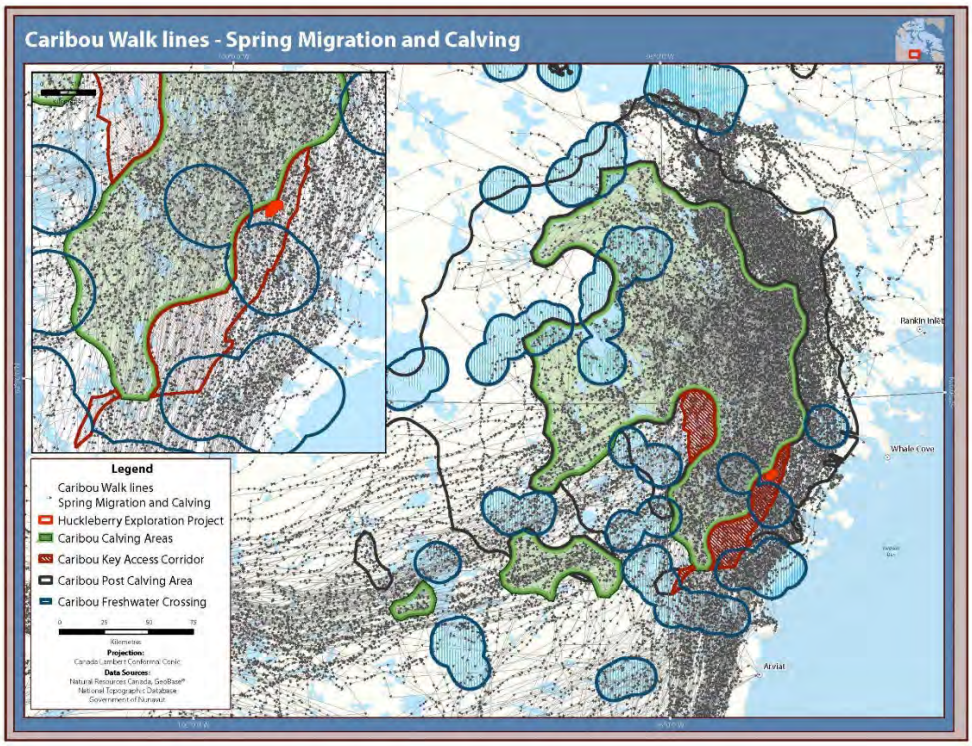


Figure 5.10. Telemetry data used to track the movements of Qamanirjuaq caribou onto and off of the core calving grounds and key access corridors. In this example, collars are being used to assess risk of proposed developments within the key access corridor and calving areas.

Figure 5.11. A collared female Qamanirjuaq caribou.

Studies examining trends in calf survival from the Qamanirjuaq caribou herd between 1994 and 2022 provide an index of productivity. These studies, when analyzed longitudinally, offer insights into herd trends and their magnitude. Thus far, all indices of overwinter calf survival indicate a mean declining trend in calf production, indicating a downward trend (**Figure 5.12**). Annual composition studies on the Qamanirjuaq caribou herd are proposed to continue.

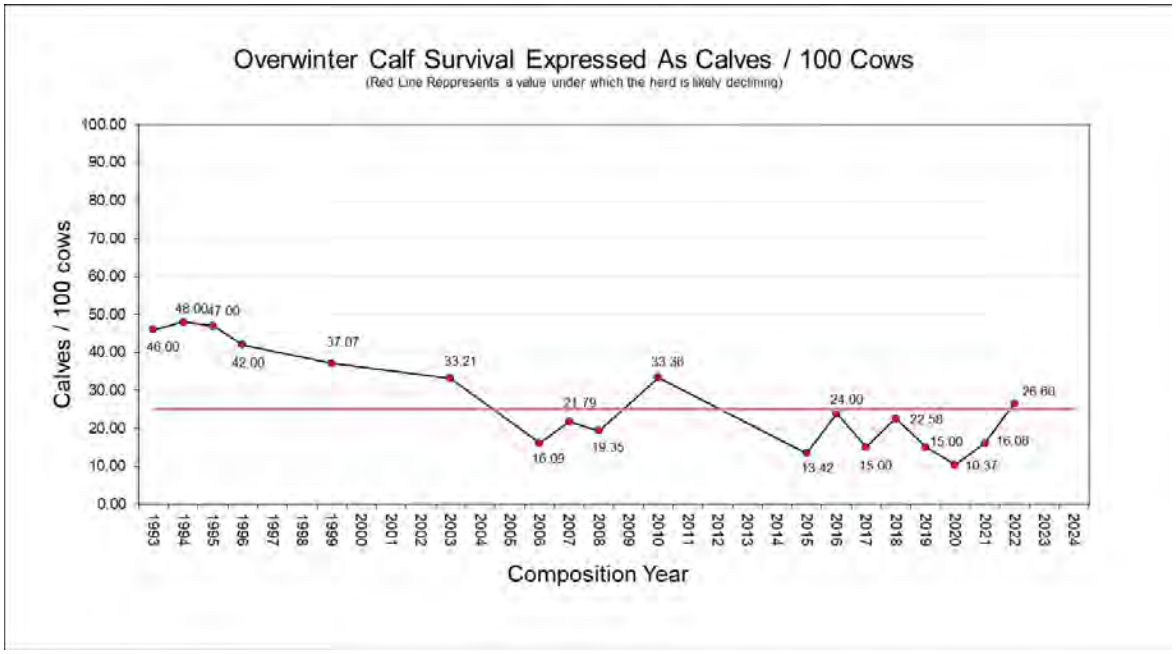


Figure 5.12. Spring composition studies showing overwinter calf survival. Red line approximates calf to cow ratios that are consistent with herd population stability.

The Qamanirjuaq monitoring program, in the absence of abundance surveys, aims to include calving ground reconnaissance surveys every 24 months to determine trends in abundance during declining phases of population decline. More detailed calving ground photo surveys will be implemented when overwinter calf survival indices and trend analyses from reconnaissance surveys indicate a sustained decline. Ideally, once a declining phase is identified, surveys (reconnaissance or abundance) are proposed to continue every two years until trends indicate sustained growth.

Since the June 2008 full abundance calving ground photo survey, the Qamanirjuaq calving ground has been surveyed at the reconnaissance level five times including 2010, 2012, 2014, 2017, and 2022, while full abundance (photo surveys) surveys have been flown in 2014, 2017 and 2022 (**Figure 5.13**). During calving-ground photo abundance surveys, females were directly estimated with whole herd estimates being extrapolated using fall (a time when all sexes gather together for the rut) composition results to determine sex ratio. Initial information collected following the most recent June 2022 estimate suggests the Qamanirjuaq caribou herd has continued declining in numbers (**Figure 5.14**).

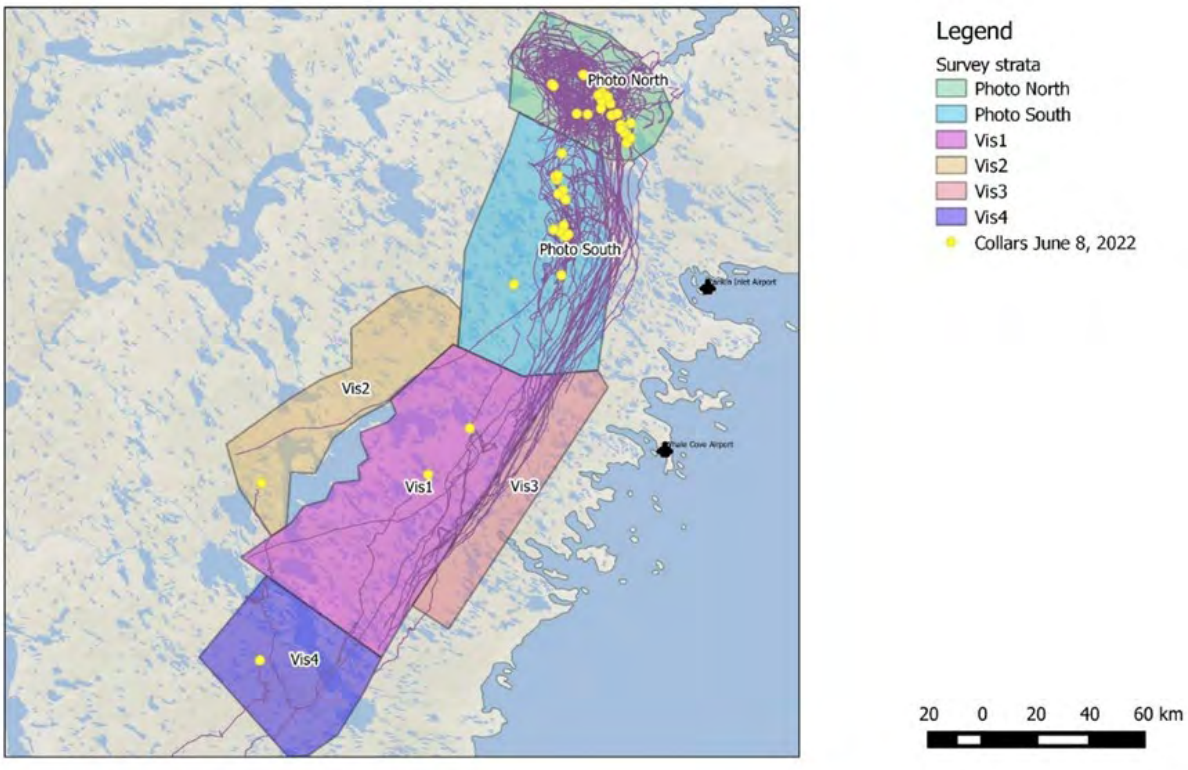


Figure 5.13. The Qamanirjuaq caribou herd June 2022 survey area, strata and collared caribou movements.

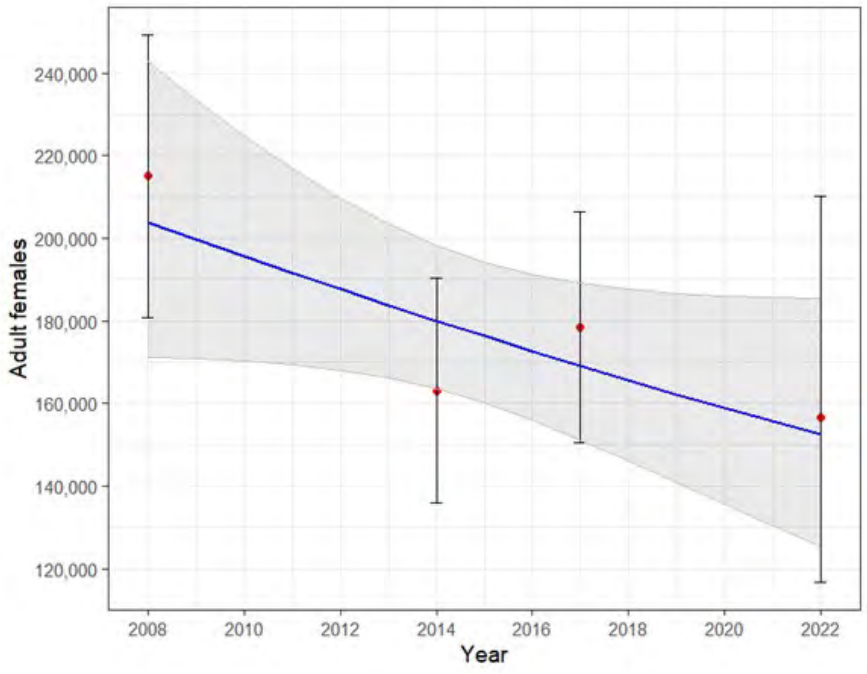


Figure 5.14. Qamanirjuaq herd trend based on 4 abundance level surveys 2008-2022.

Qamanirjuaq Caribou Management

An advisory level 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 and Beverly Monitoring Programs, which include abundance survey results, to make recommendations to all jurisdictions over which the Qamanirjuaq and Beverly annual range lie. Study results have been used to review and manage harvest rates, coordinate exploratory aerial and ground research and operations, monitor compliance and licencing requirements through the provision of monitoring results to 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

Whenever feasible, a component of the Qamanirjuaq Caribou Monitoring Program conducts investigations into diseases and overall health conditions. These studies occur twice a year, with local harvesters gathering blood and tissue samples for analysis. Blood

samples undergo screening to assess reproductive status and to detect diseases such as Brucellosis, a reproductive ailment, along with other known reproductive diseases. Additionally, teeth, muscle tissue, and a rumen sample are collected for detailed analysis. Based on the sampling conducted over the past five years, Brucellosis has not exhibited a high prevalence within the Qamanirjuaq caribou herd.

Continued disease monitoring identified multiple cases of hoof rot during the spring and fall of 2011, confirmed by the CWHC. Initial findings indicated that this disease affected thousands of caribou shortly before their fall migration. The area with the highest sightings and confirmed cases encompassed a corridor extending from Rankin Inlet west to Peter Lake and south to Whale Cove. Evidence of limping caribou markedly decreased south of Whale Cove near Sandy Point and north of Arviat on the west coast of Hudson Bay. From 2011 to 2017, a significant prevalence of hoof rot was not observed; however, hunters sporadically reported observing hoof rot with lower prevalence in most years up to 2022. Other disease indicators such as sepsis, roundworm infections, Besnoitia, and various tapeworm cysts appear to be common based on hunter kill samples, although aside from isolated instances, their prevalence has not been unusually high.

Beverly and Ahiak Caribou Surveys

The Beverly Caribou Monitoring Program responsibilities are shared with the GNWT. Generally, the GNWT maintains the telemetry program, spring and fall composition studies, and disease and condition monitoring for the Beverly population, while Nunavut has managed the reconnaissance and abundance survey component of the program. These research initiatives have also been carried out in partnership with local HTOs, RWOs, the NWMB, NTI, BQCMB, and Environment and Climate Change Canada (ECCC).

Currently, the GN employs reconnaissance and abundance surveys as the primary methods for monitoring this herd. In 2011, ENV conducted a comprehensive assessment of the entire calving area inhabited by both the Beverly and Ahiak caribou populations. The study aimed to determine the current numbers of breeding females in the Beverly herd, which consists of taiga-wintering mainland migratory caribou, and the Ahiak herd, known for tundra-wintering caribou. These figures were then extrapolated to estimate the total herd size, utilizing fall sex ratio estimates for the Beverly herd provided by the GNWT.

The Beverly herd's estimated size, calculated from the proportion of females determined in fall composition studies, increased from 105,995 (SE = 5,199.0; CV = 0.049) to 136,608 (SE = 6,603.3; CV = 0.048) with the inclusion of observations from the Adelaide Peninsula. The decision to incorporate Adelaide Peninsula data was based on subsequent evaluations of collar data from the Northeast Mainland (NEM) and Beverly, revealing greater use of this calving area by the Beverly herd than previously known in

2011. Using this spatial information, in June 2018, we estimated there were 103,372 (SE = 5,109.3; CV = 0.049) caribou within the Beverly Herd (**Figure 5.15**). T-tests were conducted to assess the significance of the observed decline between June 2011 and June 2018. The decline in females, considered the most precise indicator of change based on our survey methodology, was found to be statistically significant.

Initial findings confirmed a significant ongoing decline in the Beverly herd, which now numbers fewer than half the 1994 estimate of 276,000 animals. Since June 2011, reconnaissance surveys have been conducted over the Beverly calving areas in June 2013 and 2016, with the most recent abundance survey flown in June 2018 (**Figure 5.16**). Trend analysis of the 2011, 2013, and 2016 Beverly reconnaissance surveys for Beverly indicated a declining population trend, coupled with a shift eastward in calving distribution (**Figure 5.17**). These reconnaissance trend results informed the decision to conduct the latest survey in June 2018.

The assessment of the Ahiak herd after the 2011 survey was the first of its kind, making trend analysis following that effort impossible. Information on trends and estimates from the June 2021 NEM survey effort is detailed in the section titled "Northeast Mainland Caribou Surveys" later in this report.

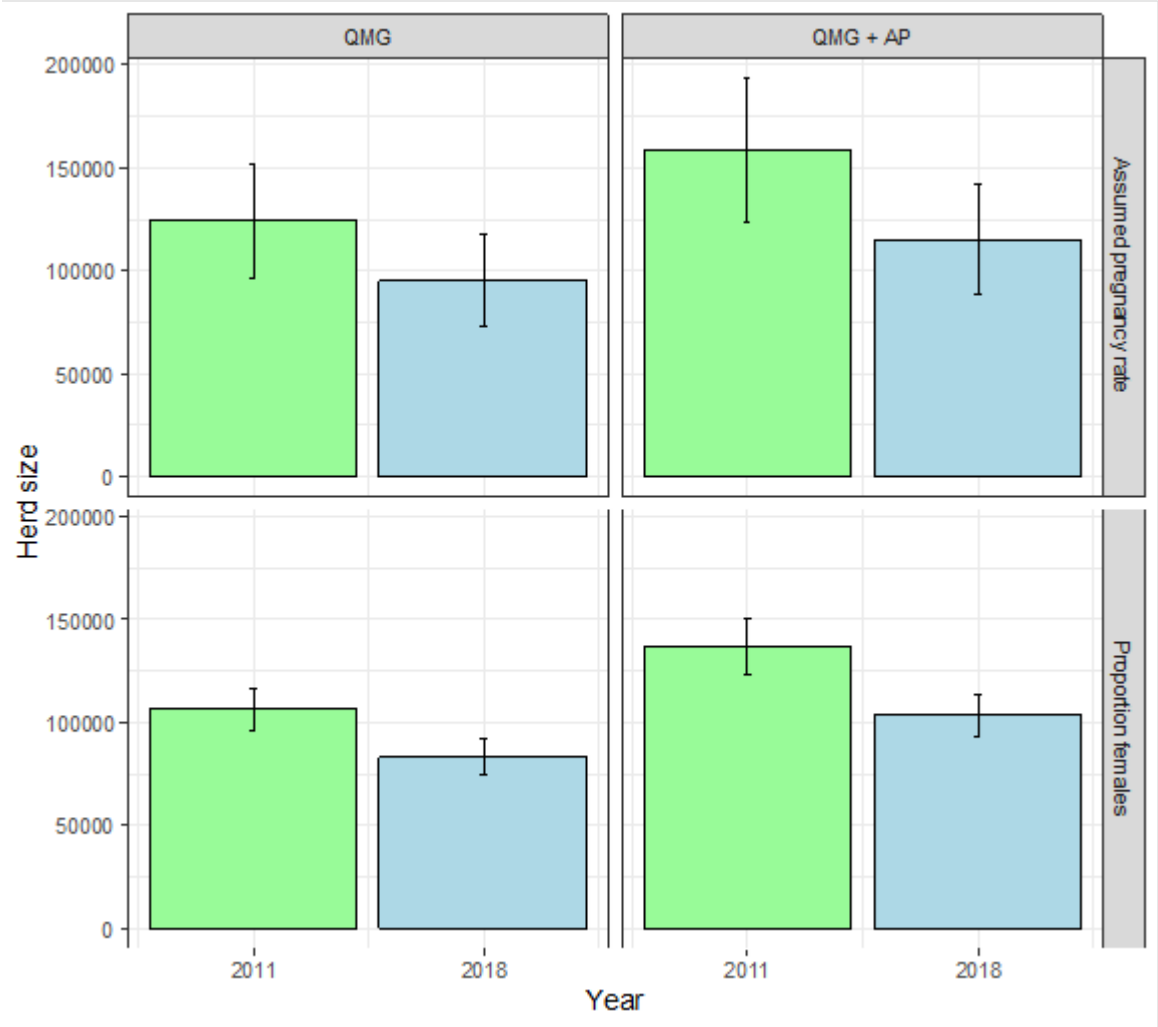


Figure 5.15 Comparison of extrapolated herd size estimates from surveys conducted in June 2011 and 2018 for the Beverly mainland migratory barren-ground caribou subpopulation. The estimates derived from the Queen Maud Gulf (QMG, left) and combined Queen Maud Gulf and Adelaide Peninsula (QMG + AP, right), extrapolated based on the number of breeding females calculated from an assumed pregnancy rates (top) and total number of breeding females (bottom).

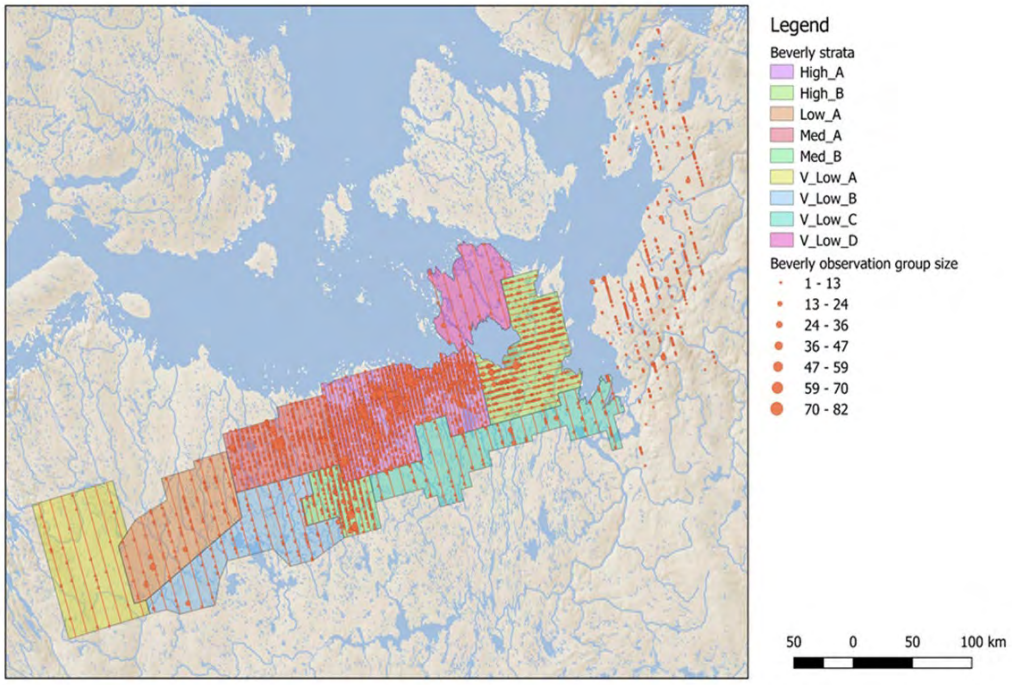


Figure 5.16. The June 2018 Beverly Herd survey area and abundance observations.

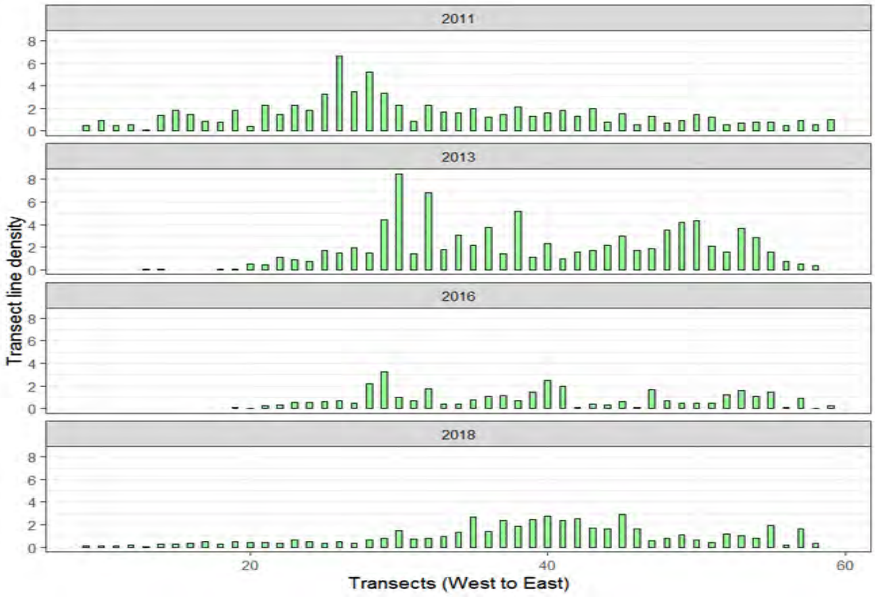


Figure 5.17. Reconnaissance survey transect observations from 2011 to 2018. Noted are the declining relative transect densities and the gradual shift east.

Beverly and Ahiak Caribou Management

Like the Qamanirjuaq caribou herd, an interjurisdictional advisory management plan was developed by the BQCMB. The results from the collaborative Beverly Caribou Monitoring Program conducted jointly by the GNWT and GN are utilized to formulate management recommendations to all jurisdictions that share the Beverly caribou range and harvest. These results have also been instrumental in evaluating harvest rates, coordinating exploratory aerial and ground research and operations, inform Nunavut Impact Review Board (NIRB), KIA and CIRNAC caribou protection measures, and contributing to environmental impact assessments.

The plan assesses the sustainability of current harvest practices and provides management recommendations to all jurisdictions that harvest from the Beverly caribou herd. The BQCMB coordinates herd management, serving as the single forum for management decisions and is authorized to pursue partnerships for herd conservation efforts. Monitoring herd size is an integral part within the BQCMB's management recommend “enhanced management actions during periods of decline. Further management actions are required if herd size cannot meet subsistence needs levels.

As of now, no management plan has been developed for the Ahiak caribou herd. Challenges related to understanding herd status and distribution have hindered progress, despite available information on distribution and abundance from 2011. Development of an Ahiak caribou herd management plan could proceed following the next comprehensive population assessment of the Northeast Mainland caribou herds.

Northeast Mainland Caribou Surveys

The NEM caribou herds, encompass the Ahiak, Wager Bay, and Lorillard herds of tundra-wintering barren-ground caribou. Communities reliant on these NEM caribou herds, such as Chesterfield Inlet, Rankin Inlet, Naujaat, Gjoa Haven, Taloyoak, Baker Lake, Sanirajak, Igloolik, and Kugaaruk, have expressed widespread concerns about the health and numbers of these herds. Many communities emphasize the importance of ongoing abundance monitoring and advocate for telemetry research to support sustainable co-management and mitigate the impacts of human disturbances on the herds. Stakeholders have highlighted various significant issues, including the effects of industrial development, online sale of caribou meat, rising disease rates, and predation. Due to limited data on caribou population sizes, seasonal range utilization, and habitat requirements in the NEM region, managers have faced challenges in addressing community concerns until recently.

Surveys conducted between 1976 and 1987 identified three distinct densities and associated calving grounds in the NEM region during June, known then as the Melville,

Wager, and Lorillard Herds. A VHF collaring program implemented in the 1980s within the Wager and Lorillard ranges confirmed the presence of at least three additional aggregations of caribou displaying calving ground fidelity. Additional research to verify these aggregations included several aerial surveys, with a comprehensive survey in 1983 estimating the NEM caribou population at approximately 119,800 +/- 13,900 animals. This survey also identified a fourth area with high caribou densities south of the Queen Maud Gulf. Subsequent surveys in 1986 identified a discrete calving ground utilized by approximately 40,000 animals, which was later designated as the Ahiak herd.

The next population estimate for Northeastern mainland caribou was conducted in May 1995, indicating a significant decline from 1983, with numbers decreasing to 73,994 +/- 11,670 caribou. However, the survey effort was limited in terms of area coverage, resembling more of a reconnaissance-level survey. This sparse coverage raised concerns that smaller aggregations of calving caribou, typical in certain years, may have been overlooked despite statistical confidence.

By March 2014, assessments on northern Melville Peninsula indicated that caribou populations had nearly disappeared, with significant declines also noted north of Wager Bay. The reasons for this potential 84% decline in caribou numbers remain unclear, as do the specific populations involved. By the early 2000s, consensus among communities, wildlife biologists, and managers generally recognized the main herds of the NEM as including the Ahiak, Wager Bay, and Lorillard herds.

The latest survey aimed to estimate the abundance of the three recognized herds within Nunavut's Northeast Mainland. These herds comprise the Ahiak, Wager Bay, and Lorillard herds of barren-ground caribou. Among these, only the Ahiak herd had been previously surveyed in June 2011 using aerial transects and double observer visual methods. The survey commenced on June 4, 2021, at the Ahiak calving grounds and concluded on June 15, 2021, at the Lorillard calving grounds Figure 5.18). In total, we covered 259,746 km² across the three herds and flew 30,625 km on transects. The estimates revealed 39,131 (95% CI = 33,385-45,867, CV=7.8%) Ahiak caribou (excluding yearlings), 45,005 (95% CI = 38,735-52,293, CV=7.3%) Wager Bay caribou, and 33,454 (95% CI = 22,503-49,735, CV=19.2%) Lorillard caribou, amounting to an estimated total of 117,590 caribou within Nunavut’s Northeast Mainland.

Of the three NEM herds only the Ahiak had been previously surveyed for abundance in June 2011. We observed a significant statistical decline ($p<0.0001$) in the Ahiak herd's population, including estimates from the Adelaide Peninsula, from 58,090 caribou (1+ year old) (95% CI = 51,458-65,577, CV = 6.1%) in June 2011 to 30,369 caribou (95% CI = 26,515-34,784, CV = 6.7%) in June 2021. This represents an estimated decline of 52%, equivalent to 5.2% per year.

An overview of movements pooled across all years suggests a notable level of fidelity to the Beverly (0.86), Wager Bay (0.69), and Lorillard (0.85) calving grounds, with lower fidelity observed for the Ahiak calving ground (0.44). However, caution is advised in interpreting these findings due to relatively small sample sizes for collar data, with 40 collars for Wager Bay and 37 collars for Ahiak.

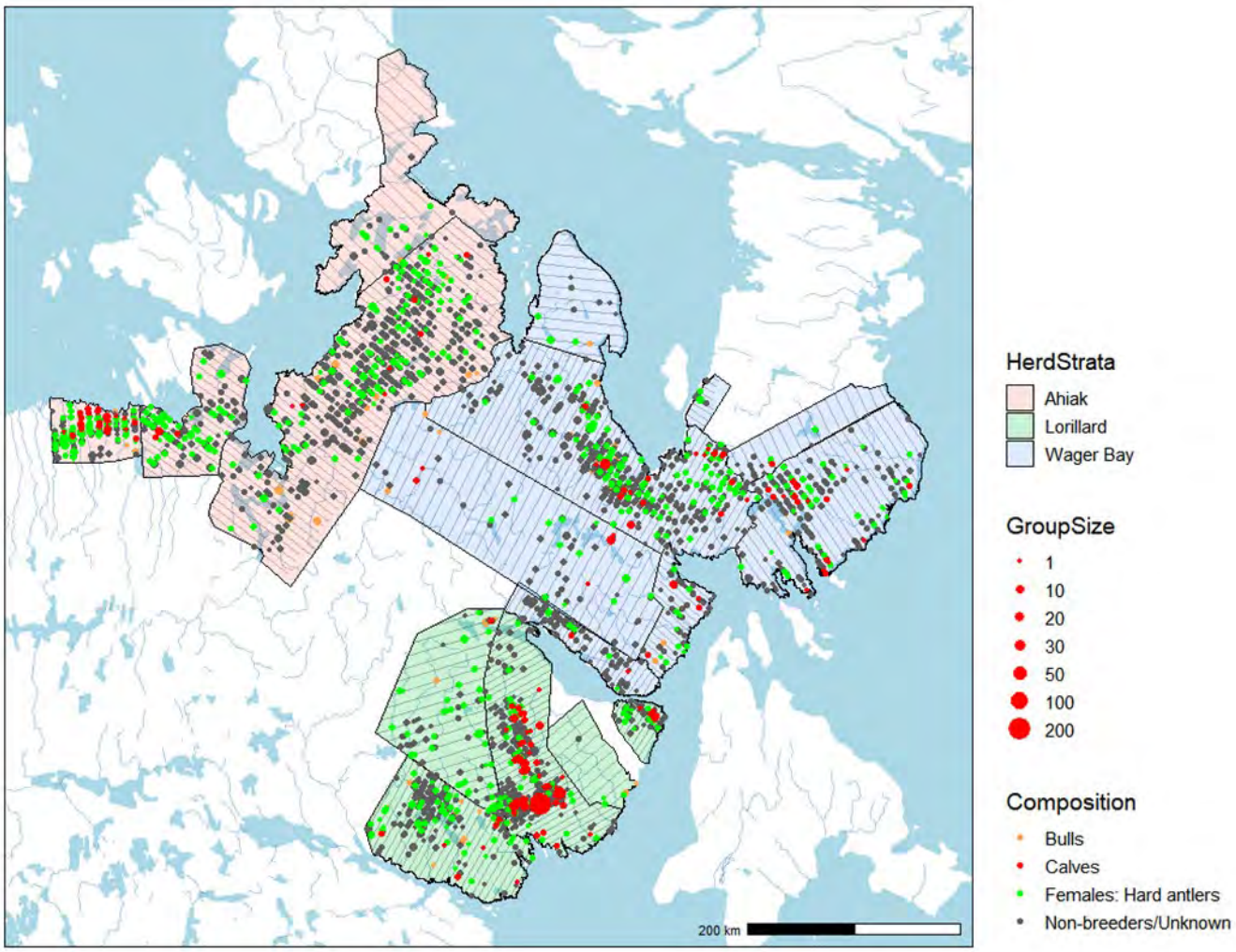


Figure 5.18 illustrates caribou observations within the June survey strata of the NEM calving grounds (Red = Ahiak Herd; Blue = Wager Bay Herd; Green = Lorillard Herd), with transects and composition noted.

Research on Northeast Mainland Caribou utilizing satellite telemetry and periodic calving grounds commenced on April 15, 1999. The selection of collaring study areas was based on historical survey data and local Inuit knowledge. Between mid and late April 1999, and again in April 2000, a total of twenty satellite collars were systematically deployed on barren-ground caribou cows. The collaring operations spanned from the north shore of

Chesterfield Inlet to the south shore of Wager Bay (Lorillard Herd) in the first year, and from the north shore of Wager Bay to the northern tip of Naujaat (Wager Bay Herd) in the subsequent year.

Calving ground delineations were then flown, using locations of satellite collars, guiding survey efforts within each designated study area. From 1999 to 2004, aerial reconnaissance-level surveys were conducted each June as part of this program, focusing on identifying crucial seasonal ranges for the Lorillard and Wager Bay Herds, with particular attention to delineating the core extents of their calving grounds.

After a 5-year hiatus, monitoring programs focusing on the NEM herds were reinstated in response to concerns voiced by communities and biologists regarding industrial development in the region. In spring 2010 and again in 2012, a total of 15 collars were deployed on Ahiak caribou cows near Baker Lake. In 2014, a mixed deployment of 15 collars, including 11 on Lorillard and 4 on Ahiak caribou cows, was completed (**Figure 5.19**).

Since 2014, deploying collars on Ahiak caribou cows has been challenging due to spring concentrations of Lorillard caribou encountering difficulties crossing the Meadowbank all-weather mining road, which has saturated the Ahiak collaring study areas. The Wager Bay subpopulation was minimally collared between 2006 and 2022. Although plans were made to collar Wager Bay caribou in spring 2019, the Covid-19 global pandemic led to the cancellation of all collaring programs until spring 2022 and 2023.

During these two field seasons, the GN collaborated with local HTOs and received support from the KWB to successfully deploy 30 collars on adult cows from the Ahiak, Lorillard, and Wager Bay herds, effectively reactivating the NEM telemetry program.

The NEM collaring program has played a crucial role in developing assessments of seasonal ranges and identifying significant migratory delays along an all-weather mining road north of Baker Lake. Furthermore, the locations of collared NEM caribou cows have been and continue to be utilized for assessing seasonally important caribou ranges. They are also integral to designing and implementing abundance surveys to monitor herd abundance and trends.

Information gathered from the collaring program is currently used to update seasonal range maps continuously and study the effects of the Meadowbank all-weather road on caribou movements and distribution. Additionally, collar locations guide efforts in conducting aerial surveys and composition surveys, as well as determining herd affiliations by focusing on reproductive seasonal range extents and overlaps (**Figure 5.20**).

Figure 5.19. Caribou calving ground aggregations as seen from the survey aircraft.

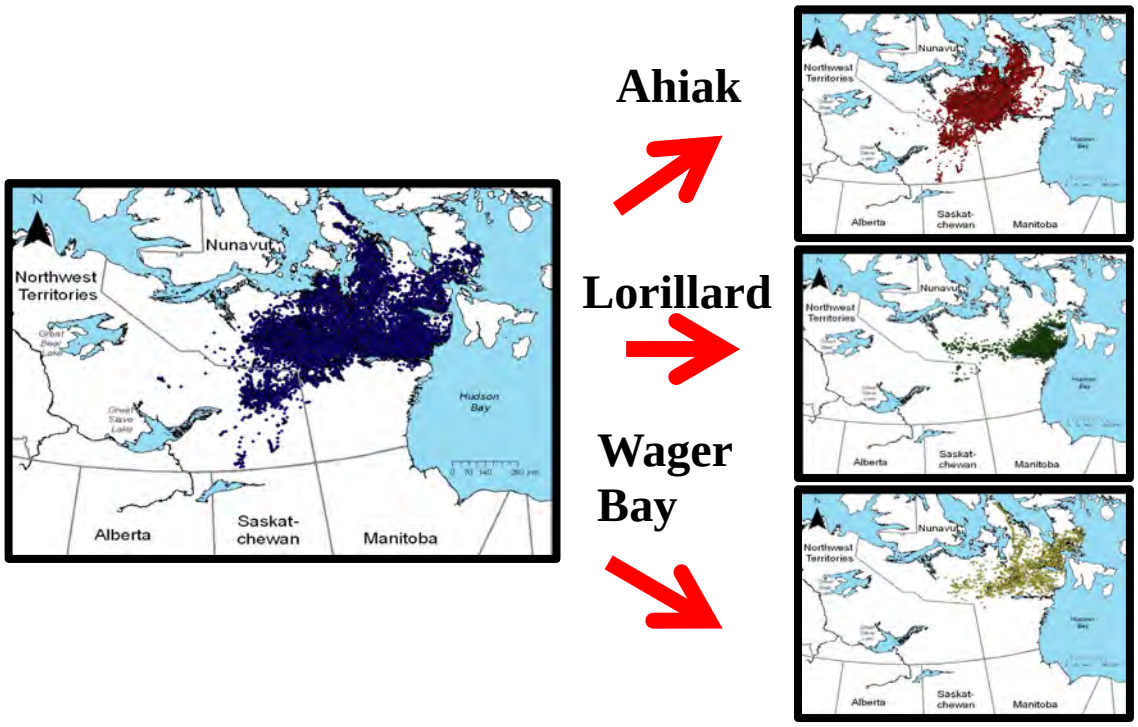


Figure 5.20. An analysis of herd affiliations of the Northeast Mainland barren-ground caribou herds using telemetry data.

Southampton Island Caribou Surveys

The SHI Caribou Monitoring Program operates in collaboration with the Coral Harbour HTO, the KWB, ENV, and the NWMB. The program's objectives are aimed at managing the herd for both commercial and subsistence harvesting. The primary goal is to assess the status and trends of the Southampton Island caribou population, which has been affected by a high prevalence of Brucellosis and decades of commercial and subsistence

harvesting. The study has focused on evaluating the herd's health and dynamics up to 2019, examining potential correlations with range conditions, availability, and habitat. Demographic studies were conducted every two years, but multiple program cancellations occurred in 2019 due to the global pandemic.

Since their extirpation in the 1950s and subsequent reintroduction in 1967, the SHI caribou herd has supported a subsistence harvest since 1978 and a large-scale commercial harvest beginning in 1993. Advances in analytical methods have prompted the recalculation of historical survey estimates to ensure the most accurate and precise estimation of reported herd abundance. The GN ENV is committed to providing users and management organizations with the highest quality results. While differences in methodological results are not deemed statistically significant, the estimates presented below may differ from previously reported estimates that utilized an earlier version of a similar statistical analytical package.

Following nearly three decades of growth, the herd's abundance declined from an estimated 29,425 in June 1997 to 7,287 in May 2013. By May 2015, the population had rebounded to 12,370. However, by 2017, the population had declined to 9,200. During this decline, caribou distribution gradually concentrated into a core area within the south-central portion of the island near the Kirchoffer River. In 2019, the herd size was estimated at 12,054 (95% CI = 10,354-14,032, CV = 0.075), like the 2015 estimate, indicating a stable population trend.

From 2003 to 2019, the Southampton Island caribou herd has been surveyed every two years to estimate its population size (**Figure 5.21**). Additional surveys were conducted in 2012 and 2013 specifically to verify a significant decline below sustainable harvesting levels. Surveys conducted between May 2013 and 2015 indicated an increase in abundance, followed by a slight decline in 2017, and then stability in May 2019 (**Figure 5.22**). The initial increase between May 2013 and 2015 was confirmed through IQ and genetic analyses to result from an immigration event from the mainland to Southampton Island.

While hunters currently report healthier caribou and increased calf numbers, they also note a decrease in overall caribou numbers on the island. These concerns prompted the planning of an abundance survey for May 2023. The most recent demographic study of the Southampton Island caribou herd was completed in May 2023, and results are currently under analysis. They will be shared with affected stakeholders once finalized.

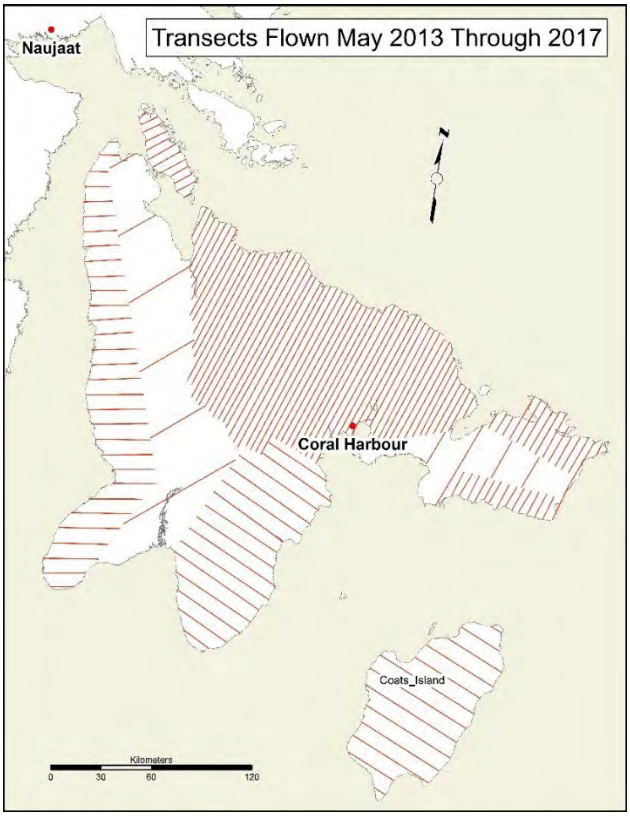


Figure 5.21 Survey study area, strata, and flight transects for Southampton Island caribou survey from 2013 and 2017. Both the 2019 and 2023 surveys employed identical study areas and flight transects.

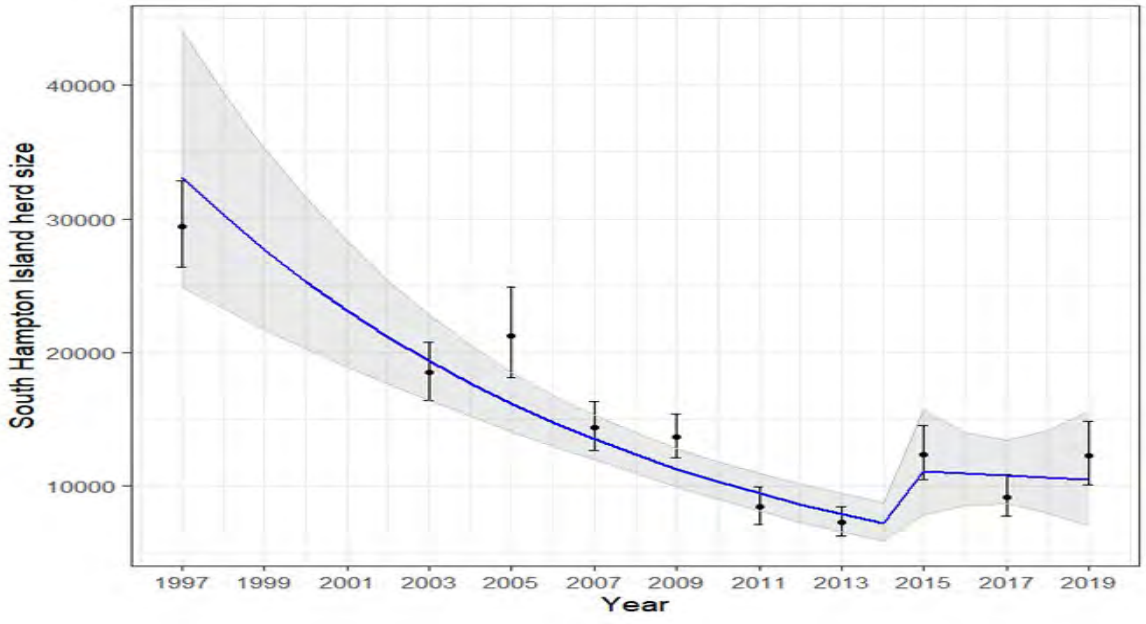


Figure 5.22. A history of abundance of the Southampton Island tundra wintering barren-ground caribou population.

The initial declines observed during the 2003 survey are believed to have resulted from reduced pregnancy rates caused by the reproductive disease brucellosis. Subsequent declines starting in 2011 are thought to be partially attributable to a large-scale local harvest aimed at selling caribou meat primarily to Baffin communities, which were experiencing severe declines in their own caribou herds, prompting the establishment of a TAH.

Annual disease and condition studies were conducted from 2007 to 2011. In a meeting with the Coral Harbour HTO in 2011, it was decided that ongoing harvesting for monitoring herd condition might contribute to the herd's decline, leading to a cessation of harvesting 100 caribou for study until evidence of recovery. In its place, a harvester-sampling program was developed and launched in 2012 and 2013 to monitor disease levels, overall condition, and pregnancy rates. The limited success of this program prompted its replacement with a voluntary reporting system on caribou condition and reproductive status. However, this voluntary program has also encountered challenges. Currently, discussions are underway in Coral Harbour regarding a paid sample collection and reporting program.

Since 2013, hunters have generally reported healthier caribou with fewer signs of disease.

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 reintroduction, the herd has grown from its original 48 animals to a peak of approximately 30,000 animals by 1997. The herd has been harvested extensively both commercially and domestically since the late 1980s and early 1990s, following its reintroduction. Commercial harvesting for the sale of caribou meat ceased in 2009.

Due to the "founder effect" resulting from the small initial population of 48 individuals that founded the current caribou herd, Southampton Island caribou exhibit relatively low genetic diversity. This reduced genetic diversity can increase susceptibility to diseases and parasites, which may have contributed to the widespread occurrence of brucellosis first detected in the Southampton herd in 2000/2001. The prevalence of brucellosis rose to 58.8% by 2011 and played a role in the decline in pregnancy rates since 2000. Most of the decline in the herd occurred between 2009 and 2013.

By 2011, the Coral Harbour HTO had recommended the cessation of all commercial harvesting activities. Despite the continued decline in the SHI caribou population and

recommendations from both the Coral Harbour HTO and ENV to limit harvesting to subsistence levels only, the sale of Southampton Island caribou meat to Baffin Island communities accelerated due to internet use and subsidized country food shipping programs. This export of meat led to an estimated (though unverified) 30% increase in the overall harvest. With significantly reduced herd numbers, this additional harvest threatened to push the herd well below sustainable levels for domestic subsistence harvesting.

In response, the Coral Harbour HTO and ENV collaboratively developed a management plan for the Southampton Island caribou herd in January 2012. This plan emphasized the importance of meaningful consultation, traditional Indigenous knowledge (IQ), and timely scientific research results in guiding management actions. The plan was ratified by the Coral Harbour HTO, KWB, and ENV.

Harvest Management

During the 1988 harvesting year, concerns regarding the accidental harvesting of females prompted the removal of the female quota and an increase in the male quota to 300 animals at some point during that year. Regulations explicitly restricted hunting zone J/2 (Southampton Island) to 300 male caribou during this period. In 1989, recommendations were made to increase the TAH to 400 caribou, allowing for the harvest of up to 100 females. The hunting seasons under this new quota were proposed to run from October 1 to October 31 for males and from April 1 to May 31 for females.

By 1993, and in response to rapid population growth reported in 1991, the TAH was removed (Table 5.5). From 1993 until the 2012 harvesting season, subsistence harvesting was not consistently monitored. In Nunavut, monitoring of caribou harvests is not mandatory in the absence of a TAH. Although the 1991 NWMB Harvest Study attempted to assess wildlife harvests through hunter interviews, it is generally acknowledged that the final estimates are rough approximations and may be inaccurate in some cases.

However, for SHI, comprehensive records of harvest numbers and sex ratios (for most harvests) were maintained during the commercial harvesting seasons spanning from 1992 through 2007, including 2009.

The first commercial quotas were established in 1992, initially set at 250 animals (gender breakdown unknown). Despite the establishment of commercial allocation 1992, the first five caribou harvested for commercial purposes were not reported until 1993, following the herd's reintroduction from Coats to Southampton Island. Commercial quotas steadily increased to 1,000 animals in 1993, 5,000 in 1994, and reached 6,000 by 1997. Annual

commercial harvests have occurred since 1993 up to and including the 2011 harvesting season.

In 1994, a non-sex-selective subsistence quota of 1,000 animals was reinstated in response to the commercial quota increase from 1,000 to 5,000 during the same period. By 1997, concerns arose due to survey results indicating rapid population growth to 29,425 animals, surpassing the hypothesized carrying capacity of 15,000 caribou for the island. In response to these concerns, wildlife regulations were amended again to allow for an unlimited subsistence harvest and a non-sex-selective commercial quota of 6,000 caribou.

Overall, the commercial harvest effectively reduced the population to the estimated carrying capacity of the island, approximately 15,000 caribou. Concerns arose that sustained high harvest rates, exceeding 6,500 caribou during the 2006 and 2007 seasons, could drive the population too low to sustainably support the estimated subsistence harvest rate of 1,500 to 2,000 caribou annually. Additionally, rising Brucella prevalence and its impact on the reproductive potential of the SHI herd were observed concerns.

The decline of the SHI caribou population following the 2003 survey estimate intensified these concerns. By 2007, as the population continued to decrease, discussions began on discontinuing the commercial harvest. However, the commercial harvest provided employment for many people, and there was strong desire to continue it. Despite these pressures, the Coral Harbour HTO cancelled the harvest in 2008, with only a small harvest of 843 caribou undertaken in March 2009.

Between 1978 and 2009, an estimated total of 27,400 caribou were harvested for subsistence purposes and 42,000 for commercial purposes, totaling 69,400 caribou harvested, of which 61% were taken for commercial purposes. Results from the 2009 aerial abundance estimate indicated no significant change between survey periods, suggesting that the cessation of the harvest was effectively slowing or stabilizing the population decline. However, during this period, ongoing condition and disease monitoring showed a steady increase in Brucellosis prevalence and a corresponding decline in reproductive productivity.

The stabilization was short-lived, as by June 2011, population estimates further declined to 8,442 adult and yearling caribou. Despite the cessation of commercial harvesting and a relatively stable subsistence harvest estimated at 1,500 to 2,000 caribou annually, the rapid decline was now attributed to the high prevalence of Brucellosis. By March 2011, Brucellosis prevalence had reached a concerning 58.8%, and spring pregnancy rates had dropped to 37%.

In addition to disease concerns, a new method of selling country foods gained popularity despite the commercial harvest ban. There was an increasing demand for SHI caribou meat on social media, particularly from Baffin Island communities also facing declining caribou populations. This new harvest pressure emerged due to the sale of caribou meat through online platforms. Within the first 8 months of these sales, approximately 24,764 kilograms of caribou meat were sold and shipped from SHI, equating to an estimated 710 caribou. Unfortunately, data from airlines was unavailable from January 2012 onward, preventing assessment of internet sales and harvest totals during peak harvest months (March, April, and May).

Meetings held during the summer and fall of 2011 between ENV and the Coral Harbour HTO, along with subsequent gatherings involving all stakeholders in Winter 2012, resulted in a formal request from the Coral Harbour HTO to the GN and NWMB to implement a TAH of 4 caribou per household (1,000 caribou total) aimed at stabilizing the population decline through better harvest management. Additionally, the annual harvest of 100 animals, used for assessing Brucellosis prevalence, pregnancy rates, and overall health indicators, was discontinued to focus all harvesting opportunities on local Inuit communities.

Another outcome of these meetings was the development of the Southampton Island Barren-ground Caribou Population Management Plan (2012), which was submitted to the NWMB for decision in March 2012. The plan proposed establishing a TAH of 1,000 caribou and implementing a Non-Quota Limitation (NQL) to protect cow/calf pairs. It also emphasized ongoing harvester-supported monitoring, and the continued assessment of SHI caribou population abundance every two years. Given the urgency of the situation, the NWMB supported a community-requested Ministerial Management Initiative through the Nunavut *Wildlife Act* to implement a temporary TAH.

By May 2013, the herd had further declined to an estimated 7,287 adult and yearling caribou, prompting the GN to recommend a reduction to 800 caribou, with 100 reserved for discretionary use by the HTO. The community endorsed this recommendation and requested a reassessment of the TAH following the May 2015 population estimate. Their decision was based on hunters' observations of reduced signs of Brucellosis and a general perception that herd health and pregnancy rates were improving and this reduction in TAH would be only temporary.

Continued reports of healthy caribou, diminished signs of disease, anecdotal evidence of possible migrations onto the island during the winters of 2014 and 2015, and a noticeable increase in calves in June 2014 preceded the May 2015 abundance survey. Reflecting community reports, the 2015 survey noted a significant rise in adult and yearling caribou. Over two years, the population had increased by 5,081 animals to 12,368 caribou, an estimate that exceeded expectations for natural reproduction alone.

The community of Coral Harbour was unsurprised by these findings, attributing the increase to what they believe was the movement of a substantial group of caribou from the mainland onto the island's north end. To validate these claims, the GN conducted genetic analyses using tissue samples provided by SHI hunters from 2014, comparing them with SHI samples from 2004 and samples collected on the mainland near Naujaat.

The observed increase documented in 2015 led to an increase in the TAH to 1,600 caribou with a NQL protecting cow/calf pairs (Table 5.5). This increased TAH persisted through the 2016 and 2017 harvesting seasons. However, the 2017 survey results revealed a notable decline in population abundance, the TAH for SHI was reduced back to 1,000 caribou per year, a level that has remained unchanged to the present day.

Table 5.5. Evolution of the Southampton Island harvest allocations for commercial and subsistence quotas (Total Allowable Harvest, TAH) from 1992 to the present (subsistence harvest estimated using government reports, HTO correspondence, and personal communications with wildlife staff)

YEAR	Regulated Quotas (TAH)						Total Allowable Harvest (TAH)
	Subsistence				Commercial		
	Female (#)	Male (#)	No Sex Selection (#)	Total (#)	No Sex Selection (#)	Total	
1992	0	400	0	400	250	250	650
1993	no limit	no limit	no limit	no limit	1,000	1000	no limit
1994	NA	NA	1,000	1,000	5,000	5,000	6,000
1995	NA	NA	1,000	1,000	5,000	5,000	6,000
1996	NA	NA	1,000	1,000	5,000	5,000	6,000
1997	no limit	no limit	no limit	no limit	6,000	6000	no limit
1998	no limit	no limit	no limit	no limit	6,000	6000	no limit
1999	no limit	no limit	no limit	no limit	6,000	6000	no limit
2000	no limit	no limit	no limit	no limit	6,000	6000	no limit
2001	no limit	no limit	no limit	no limit	6,000	6000	no limit
2002	no limit	no limit	no limit	no limit	6,000	6000	no limit
2003	no limit	no limit	no limit	no limit	6,000	6000	no limit
2004	no limit	no limit	no limit	no limit	6,000	6000	no limit
2005	no limit	no limit	no limit	no limit	6,000	6000	no limit
2006	no limit	no limit	no limit	no limit	6,000	6000	no limit
2007	no limit	no limit	no limit	no limit	6,000	6000	no limit

2008	no limit	no limit	no limit	no limit	6,000	6000	no limit
2009	no limit	no limit	no limit	no limit	6,000	6000	no limit
2010	no limit	no limit	no limit	no limit	6,000	6000	no limit
2011	no limit	no limit	no limit	no limit	6,000	6000	no limit
2012	NA	NA	1,000	1,000	0	0	1,000
2013	NA	NA	1,000	1,000	0	0	1,000
2014	NA	NA	800	800	0	0	800
2015	NA	NA	800	800	0	0	800
2016	NA	NA	1,600	1,600	0	0	1,600
2017	NA	NA	1,600	1,600	0	0	1,600
2018	NA	NA	1,000	1,000	0	0	1,000
2019	NA	NA	1,000	1,000	0	0	1,000
2020	NA	NA	1,000	1,000	0	0	1,000
2021	NA	NA	1,000	1,000	0	0	1,000
2022	NA	NA	1,000	1,000	0	0	1,000
2023	NA	NA	1,000	1,000	0	0	1,000

Coats Island Caribou Surveys

There are currently no plans for a monitoring program for the Coats Island caribou herd due to the highly variable nature of caribou abundance on the island and the relatively low harvest rates. However, whenever time and budget allow during surveys of Southampton Island, Coats Island is also assessed for caribou abundance. While there is no fixed schedule for these surveys, visual assessments were conducted in September 2010 (during a polar bear visual survey), May 2013, May 2015, and May 2017 in conjunction with the Southampton Island survey efforts. These surveys have revealed evidence of a dramatic die-off during the winter of 2010, which was confirmed in 2013 with a marked reduction in caribou numbers. This downward trend has persisted through May 2017.

Disease and condition studies on Coats Island have been initiated with varying degrees of success. Blood serum screening has shown no indications of brucellosis. Local Hunters and Trappers Organizations (HTOs) can assist in gathering this data as part of future health monitoring initiatives. The Coral Harbour HTO has expressed interest in establishing a management program for the Coats Island caribou herd in response to increased harvesting pressures from Coral Harbour (stemming from the decline of the Southampton Island herd), Baffin communities (due to declines in Baffin caribou), and northern Quebec (due to significant caribou declines in eastern Quebec).

Kivalliq Muskox

The Kivalliq muskox population was nearly hunted to extinction in the early 1900s. Protection measures were implemented in 1917, but sightings remained scarce until the late 1970s and 1980s. In the early 1980s, management efforts began to extend their range back into their historic range across the entire Kivalliq mainland. The management goal continues to ensure healthy populations accessible to all Kivalliq communities, a goal widely supported in principle. However, challenges such as shorter growing seasons and thicker snow cover in the eastern Arctic, now considered typical, along with declines in barren-ground caribou and shifts in predator target species focus, may complicate muskoxen expansion if harvest levels are set too high.

Since the 1996 harvest season, Kivalliq hunters have observed muskoxen venturing closer to their communities and beyond established management boundaries. Persistent reports of this expansion have prompted increased efforts in abundance surveys to adjust TAHs, NQLs and create new harvesting opportunities that reflect increasing muskox numbers and associated range expansion.

The Central and Northern Kivalliq muskox sub-populations (now MX-13 and MX-10 respectively) are an important part of the Kivalliq muskox management plan (2009)), aimed at maintaining healthy and accessible populations for local harvesters (Appendix 2). Incorporating IQ and scientific knowledge is integral to keeping this management plan current. Aerial surveys and IQ are primarily used for determining muskox trends, abundance, distributional changes, and potential range expansions. These surveys also record predator numbers, calf abundance indices, and general muskox health and range conditions. This approach complements proposed muskox surveys in the Kitikmeot region and the Thelon Game Sanctuary. Results of these IQ and scientific studies continue to inform sustainable harvest quotas, assess range, discuss NQLs and TAHs, and support the reestablishment of muskoxen into their historical ranges.

Since 1996, periodic reassessments of the Central and Northern Muskox management units have utilized IQ and local knowledge from HTOs to define survey areas and general trends. These surveys provide training opportunities for new observers. The MX-13 population was reassessed in July 2010 and again in July 2016, building on the ongoing collaboration among the NWMB, ENV, and the communities of the Kivalliq region for the co-management of muskoxen.

Aerial abundance estimates for the MX-13 (Central Kivalliq Muskox Group) Muskox Management zone have shown consistent growth, from 1,203 muskoxen (95% CI=919-1,487; CV=0.13) in July 1991 to 2,143 (95% CI=1,747-2,539; CV=0.09) in July 2000, and further to 4,506 (95% CI=3,558-5,455; CV=0.11) in July 2010. The most recent survey in July 2020 estimated 4,437 muskoxen (95% CI=3,383-5,491; CV=0.12), indicating stability compared to the previous survey period (**Figure 5.23**).

Since July 1999, when 1,522 muskoxen (95% CI=843-2,365; CV=0.22) were estimated, the Northern Kivalliq muskox subpopulation (southern third of the MX-10 management zone) has steadily increased to 2,341 muskoxen (95% CI=1,796-2,886; CV=0.12) in July 2012, and most recently to 3,239 muskoxen (95% CI=2,228-4,249; CV=0.16) in July 2017 (Figure 5.24). However, it's important to note that the survey boundaries for the Northern Kivalliq Muskox cover only the southern third of the MX-10 Management zone, thus not fully capturing muskox abundance across the entire MX-10 zone. Future survey efforts should aim to assess the entire MX-10 muskox Management zone to ensure representative trends in muskox abundance **(Figure 5.25)**.

Recently, there has been an increase in the range of muskoxen in both sub-populations, primarily towards the east and also south for the MX-13 sub-population **(Figure 5.26)**. This expansion is believed to have enabled a concurrent range expansion of barren-ground grizzly bears, although this phenomenon has not been fully assessed.

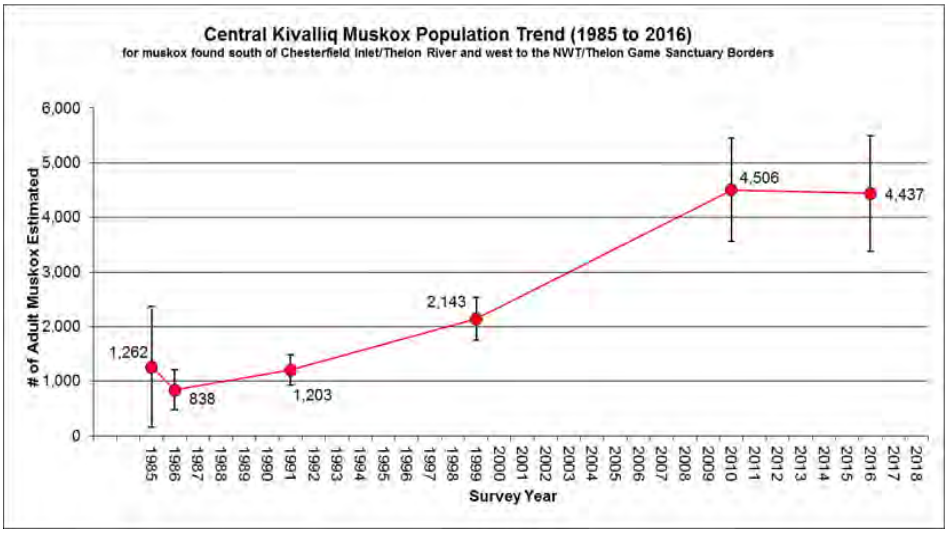


Figure 5.23. The trend of the central Kivalliq Muskox Population (MX-13) from 1985 through July 2016.

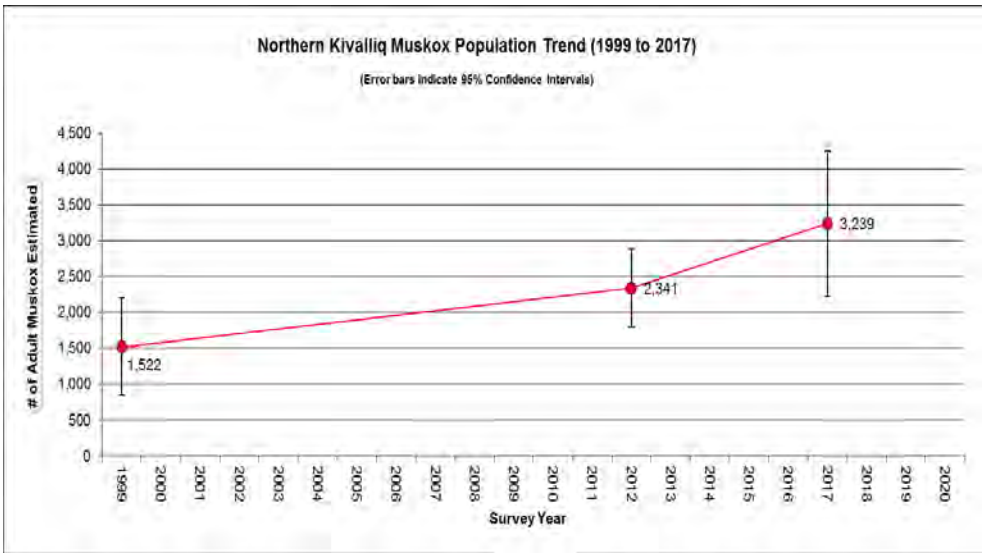


Figure 5.24. Abundance trends in the northern Kivalliq Muskox Population (July 1999 to July 2017).

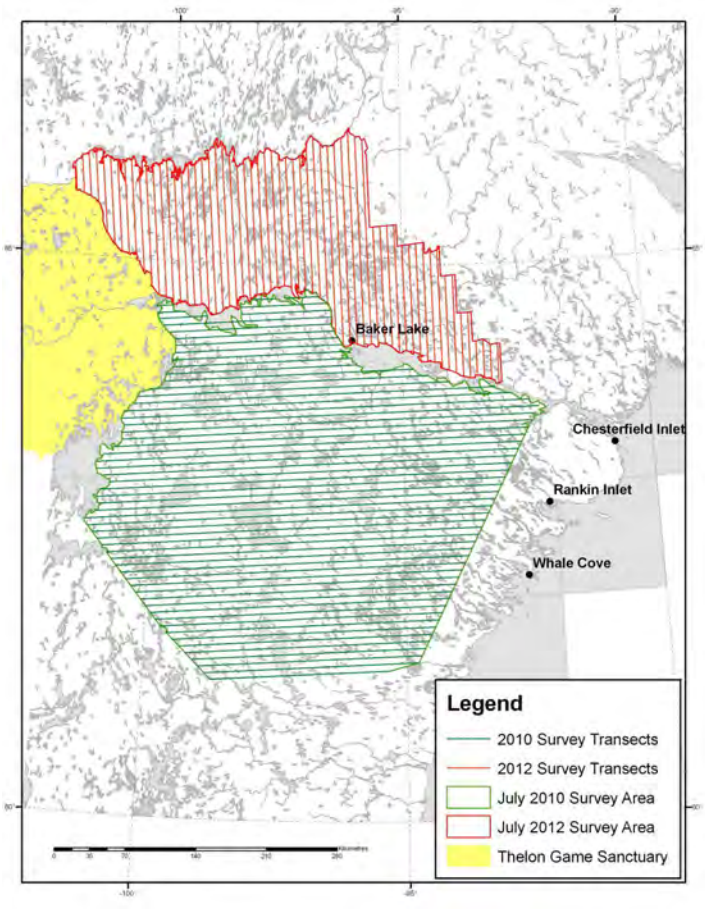


Figure 5.25. Study area and transects for the central and northern Kivalliq region muskox surveys. Note that the northern Kivalliq study area ends at regional boundaries and does not cover all of MX-10.

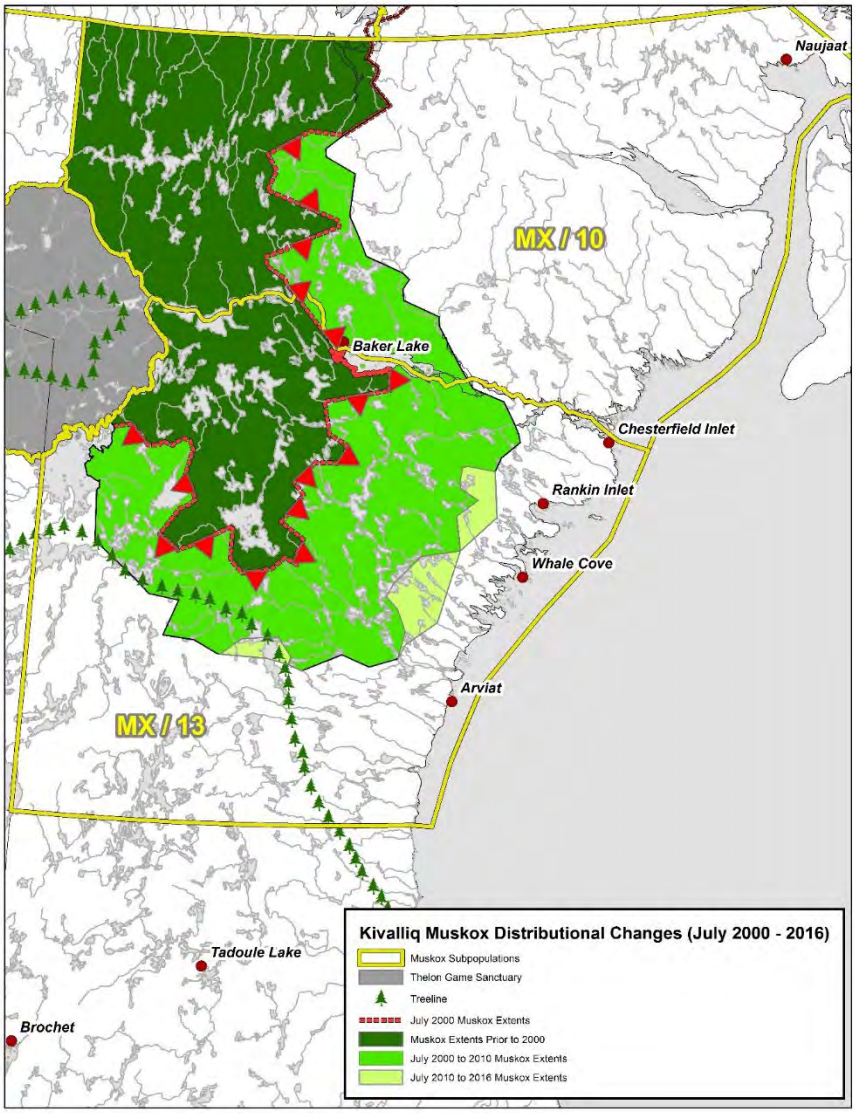


Figure 5.26. Range expansion and/or distributional shifts in muskox range through time.

Kivalliq Muskox Management

Since Nunavut's establishment as a territory in 1999, the boundaries of its muskox management groups have periodically been adjusted, with the most recent and significant changes occurring in 2015, as outlined in Appendix 2. The Kivalliq Muskox Management Plan is a collaborative effort involving KWB, ENV, NWMB, and NTI to enhance monitoring and management of muskox abundance and distribution in the Kivalliq region. Local communities including Arviat, Whale Cove, Rankin Inlet, Chesterfield Inlet, Baker Lake, Naujaat, and Coral Harbour harvest muskox from the MX-10 and MX-13 management units, and their HTO chairs represent them on the KWB. IQ and community consultations have guided the development of this management plan to help define the direction of muskox

harvesting practices in the region. The goals of the management plan are to protect, conserve, and manage the Kivalliq muskox population sustainably. Key priorities include advocating for permanent Wildlife Act Regulations adjustments to reflect boundary changes, eliminating seasonal restrictions, establishing TAH quotas, and adjusting NQLs as necessary and agreed upon by all stakeholders. The KWB maintains the role of distribution assigned TAHs amongst the communities of Arviat, Baker Lake, Chesterfield Inlet, Coral Harbour, Naujaat, Rankin Inlet, and Whale Cove for MX-13, and maintains the role of negotiating the shared MX-10 muskox management zone assigned TAH with the KRWB, then assign its portion of the MX-10 TAH by allocating to the Kivalliq communities of Baker Lake, Chesterfield Inlet, Coral Harbour, Naujaat, and Rankin Inlet **(Appendix 2.1).**

An action plan was formulated to address the current requirements of the KWB. The board plans to review this plan annually or as needed in response to updated information. Ongoing consultations between the KWB and its partners will continue to focus on the Kivalliq muskox populations, which are presently not categorized as a species at risk or a conservation concern at this time.

Southern Mainland Kivalliq Group MX-13

Since their near extirpation in the early 20th century, muskoxen have been steadily reclaiming much of their former range. Over the past three to four decades, they have continued to expand northeast, east, southeast, south, and southwest. Alongside this range expansion, MX-13 and MX-10 muskox abundance has also been increasing. By 2008 recorded increases in both range expansion and abundance prompted the removal of seasonal NQL, and adjustments in harvest rates increased from 3% of the most recent abundance survey to 5%. Following the 2016 MX-13 muskox abundance estimate which indicated stability between survey periods, the NWMB reviewed the GN's proposal during their December 2019 Regular Meeting to maintain the TAH at 182 muskoxen, as initially set after the July 2012 estimate. The decision was accepted by the ENV Minister on January 6, 2020.

Northeast Mainland Group MX-10

Muskoxen have also been expanding their abundance and range within the southern extents of the MX-10 muskox management zone, whereas previous expansions were primarily toward the east and northeast. With no recent aerial surveys conducted in the northern areas of MX-10, the GN has relied on available Indigenous Knowledge (IQ) to gather information on relative abundance and range expansion. As noted earlier, the TAH within MX-10 underwent similar adjustments in 2008 as the MX-13 muskox management

zone. The NWMB reviewed the GN's request to increase the TAH from 190 to 240 muskoxen within the MX-10 muskox management at their September 8, 2021 meeting and again at their December 10, 2021 In-camera Meeting. On January 18, 2022, the NWMB provided its decision to the ENV Minister to increase the MX-10 TAH from 190 to 250 muskoxen which would further be divided between the Regions as follows:

i. A Kitikmeot regional TAH of 140 muskoxen (56% of the total).
ii. A Kivalliq regional TAH of 90 muskoxen (36% of the total).
iii. A Qikiqtaaluk regional TAH of 20 muskoxen (8% of the total).

The ENV Minister accepted the NWMB's decision on February 17, 2022.

Barren-ground Caribou Seasonal Range Analysis

The seasonal range maps developed for this project concentrate on the mainland migratory and tundra wintering barren-ground caribou herds in the NWT and Nunavut (**Figure 5.27**). These maps are the culmination of over twenty years of telemetry studies and employ the most recent and sophisticated spatial analytical methods available, resulting in the most precise spatial depiction 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 data will guide decisions on how human activities may impact the sustainability of abundant and healthy caribou populations. Understanding the year-round locations of caribou is crucial for several reasons:

1. To mitigate seasonal land-use activities and regulate industrial development either permanently or seasonally within areas known to be important annually and/or seasonally for barren-ground caribou.
1. To regulate harvesting activities, which are herd specific, during periods of decline or to prevent local depletion.
2. To monitor spatial changes and herd affiliations over time, ensuring wildlife managers have current information.
3. To optimize demographic monitoring studies by focusing efforts where caribou are known or expected to be present.

While this initiative marks a significant advance in understanding the spatial and temporal behaviours of mainland barren-ground caribou herds, ongoing updates to the map atlas are encouraged to ensure effective management and identify unnecessary restrictions through co-management actions. Currently, ENV is reassessing all seasonal range polygons using telemetry data up to December 2023.

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. Factors such as road design, alignment with migratory routes, usage levels, and increasing access to caribou habitat all play a role in the ultimate impacts of roads on the movement and long-term viability. Our understanding of the negative impacts of roads on caribou is still in its early stages, and more comprehensive research is necessary for managers to develop strategies to mitigate these effects. This includes adopting appropriate road construction practices, strategic placement, usage regulations, and where necessary, prohibiting roads in areas where mitigation efforts may not suffice and could potentially harm Inuit harvesting rights protected by the *Nunavut Agreement*. Any mitigation efforts must adhere to scientific principles and focused consultations with HTOs and RWOs to ensure the protection of these rights. This study marks an intensified effort to assess disturbance effects at a time when caribou herds are declining across northern North America and concurring dramatic increases in resource development interests on critical caribou habitat.

Wildlife-road interactions are complex and involve effects at various scales, influencing individual movement patterns and seasonal distributions. Utilizing data from the Kivalliq Caribou Monitoring Program telemetry database, three methodologies were employed 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. During the fall, regression analysis identified higher tortuosity (increased meandering or non-linear movements) as caribou approached closer to the road. This increased tortuosity indicates greater milling behaviour (clustered movement) and avoidance movements (deflections to the north and south) by caribou within a 36 km radius of the road **(Figure 5.28)**. The observed slowed movement and avoidance behaviors provide statistically significant evidence that the road functions as a semi-permeable barrier to caribou 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 analyses has reinforced the statistically significant impacts to caribou movement and behaviour along mining and road infrastructure on caribou movement patterns. However, comprehensive analysis is ongoing to fully elucidate the extent of this ongoing problem.

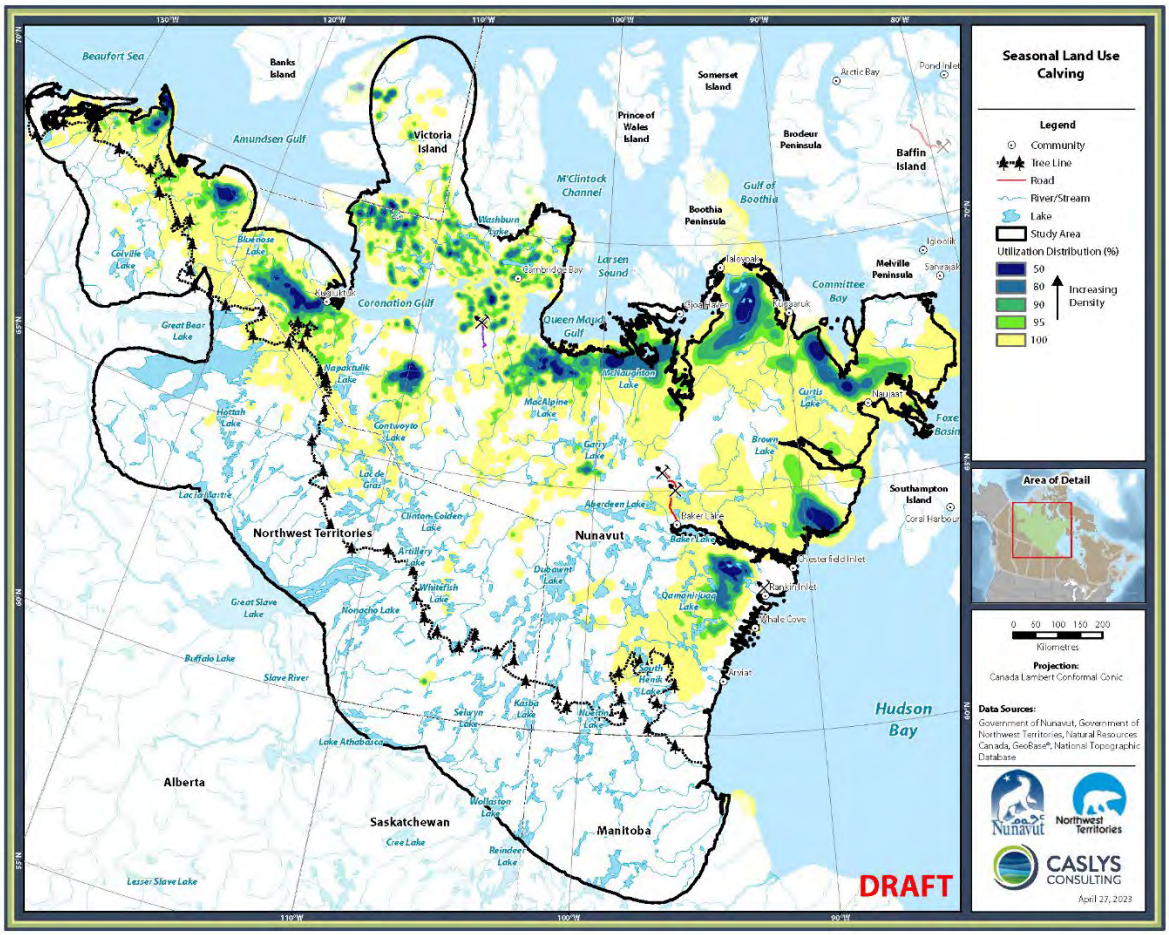


Figure 5.27. Core calving extents of Nunavut's mainland migratory barren-ground caribou herds based on multi-year telemetry studies. Kivalliq Herds including the Qamanirjuaq, Lorillard, Ahiak, and Wager Bay caribou herds show all years (25 years +) of data current to 2023, while the remaining herds to the west are current to 2014 and include 25 years + of data as well, for some herds. Darker areas indicated more concentrated migratory behaviour.

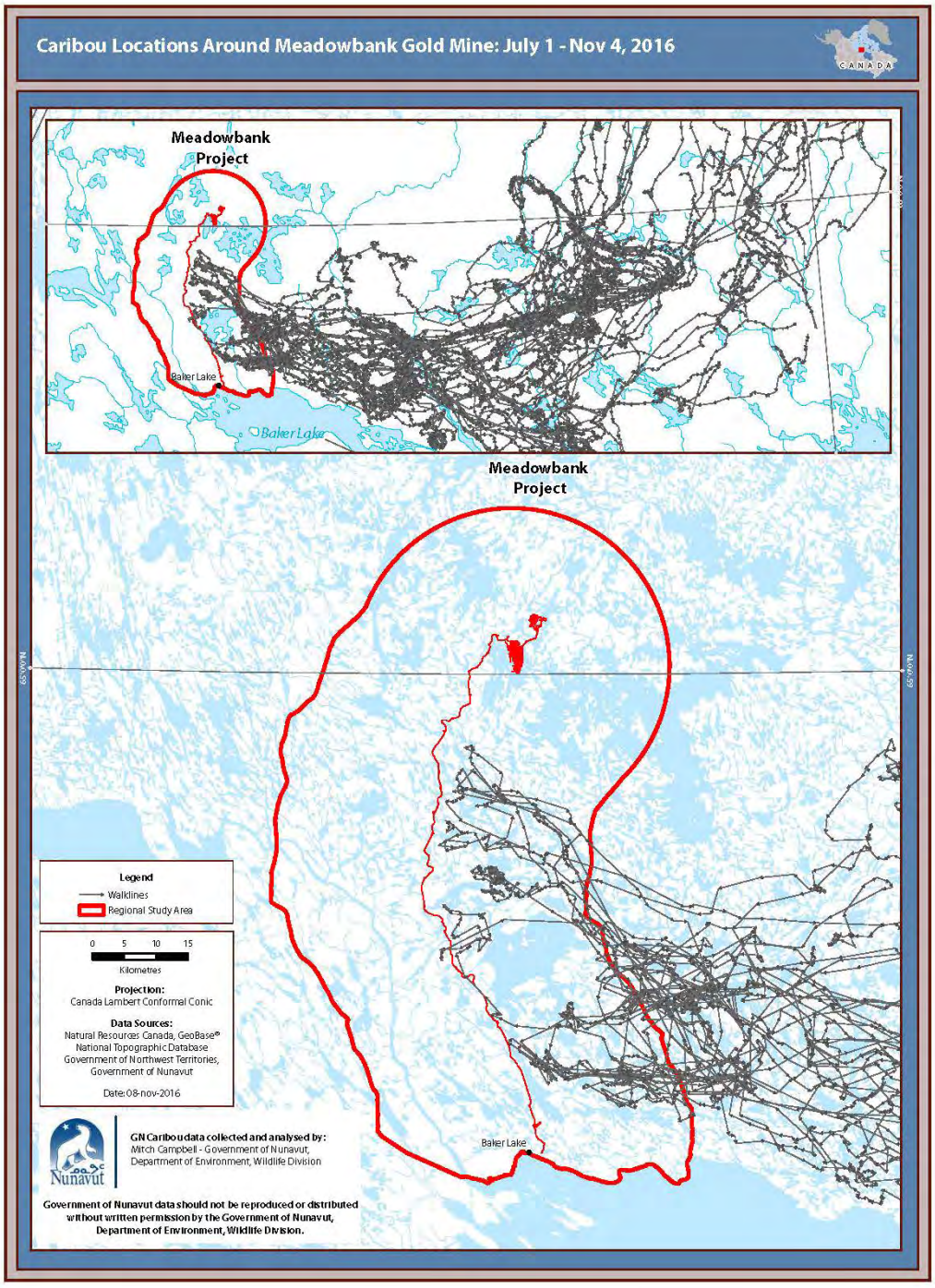


Figure 5.28. The deflection of barren-ground caribou from the Meadowbank all weather road.

5.4 Carnivore Research and Management Initiatives

Currently, Nunavut's carnivore research program is concentrated on grizzly bears, wolverines, and wolves.

Carnivore Harvest Monitoring

The three large terrestrial carnivore species (wolverine, wolf and grizzly bear) are classified as both a furbearer and a big game animal under the *Nunavut Agreement*. Inuit communities traditionally depend on wildlife harvests for food, clothing, and trade. In Nunavut, furbearer harvesting for clothing and income is a seasonal and traditional practice, especially in regions where alternative employment opportunities are limited. the *Nunavut Agreement*, furbearer harvest rights are held by Inuit beneficiaries, non-Inuit who harvested furbearers legally in Nunavut settlement area prior to 1981, and harvesting privileges to non-Inuit whose application has been approved and recommended by local HTOs. Unlike in other provinces, hunters and trappers in Nunavut do not have registered or traditionally exclusive family trap lines or hunting areas, so furbearers are generally harvested opportunistically wherever people travel or harvested while hunting other game.

Wolverine Harvest

The wolverine was assessed as Special Concern across the Canadian range by COSEWIC in 2014, followed by listing under the federal SARA in 2018. Inuit observations and recent harvest reports suggest that wolverine numbers in Nunavut are stable or possibly increasing, with indications of eastward and northward range expansion. Currently, there are no harvest limits for wolverine by Inuit hunters in Nunavut, and the territory contributes significantly to the national harvest total. Understanding the demographic structure of the harvested population is crucial for effective management recommendations, particularly for a species vulnerable to over-harvesting and habitat loss from industrial development.

Preliminary findings from the harvest monitoring program indicate concentrated harvesting efforts and success near communities. Meanwhile, remote areas with minimal or no harvest, are producing animals that disperse and replenish harvested animals near communities. The harvest pattern, which includes a higher proportion of young animals and a low number of adult females, suggests a healthy population that is likely not being overexploited**.**

Grizzly Bear Harvest

Grizzly bears are listed as a species of Special Concern in Canada under *SARA* and play a vital role in Inuit subsistence hunting for economic, social, and cultural purposes. Inuit harvest grizzly bears primarily for subsistence use and to address 'problem' animals (defense of life and property kills), and by sport hunters. Harvest monitoring 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.

From 2010 to 2022, annual grizzly bear harvests in the Kitikmeot region have ranged from 4 to 33 bears per year, averaging 15 bears annually. There have been no significant changes in the sex ratio or mean age of harvested bears during this period. In contrast, the Kivalliq region has seen a substantial increase in grizzly bear harvests, rising from an average of 6 bears per year between 2000 and 2007 to 20 bears per year between 2010 and 2022.

Harvests in both regions are predominantly male, influenced by protective practices around family groups, avoidance of taking family groups by traditional hunters, preference for larger individuals (especially by sport hunters), and behavioral traits that make male bears more susceptible to being targeted or categorized as problem bears. The number of grizzly bears harvested in sport hunts has consistently been below the allocated tags and is skewed towards males. Presently, Baffin Island and the Arctic Islands (excluding Victoria Island) do not support any known populations of grizzly bears.

Wolf Harvest

Enhanced management actions for wolves (*Canis lupus*) are frequently employed to aid in the recovery of declining caribou herds. Most migratory tundra caribou herds (*Rangifer tarandus groenlandicus*) in Nunavut and neighboring NWT are either experiencing declines or are at historically low population levels. Beginning in 2018-2019 in the Kitikmeot region and expanding to all of Nunavut in 2019-2020, the GN ENV offered compensation through the Support for Active Harvesters program to local hunters to harvest wolves and provide sample and location data.

We analyzed data from the harvest of 1,500 wolves by hunters in Nunavut between 2018-2019 and 2020-2021 to examine the spatial and temporal patterns of wolf harvesting in relation to caribou densities, particularly focusing on collared individuals. Our study investigated the age and sex distribution of harvested wolves, as well as the spatial and temporal clustering of the harvest—assessing whether hunting effectively targets entire packs. Additionally, we provided preliminary estimates of the number of wolves

associated with the Qamanirjuaq caribou herd and the proportion of these wolves harvested by Nunavut hunters.

During the 2018-2019 harvest year, hunters in the Kitikmeot region reported harvesting 146 wolves, involving 52 hunters primarily from Kugluktuk. Harvest numbers peaked between December and February, with a significant portion occurring from October to December comprising juveniles. As the season advanced, a wider distribution of ages were harvested.

In 2019-2020, 658 wolf harvests were reported across Nunavut, with 64% of the harvest attributed to hunters from Arviat, Baker Lake, and Kugluktuk. Harvest peaked in November and from March to May. In the following year, 2020-2021, 699 wolf harvests were reported, with 68% from the same communities. In both years, the proportion of juveniles in the harvest decreased over time, and a relatively small number of hunters contributed significantly to the overall harvest. Almost all (99%) of the wolves were shot, and the remainder were trapped.

While patterns varied among communities, wolves were typically harvested closer to communities before Christmas (generally within 75 km), moving farther away later in the winter, with peak distances in April and May (up to 500 km). Despite requiring camping over day trips, hunters were effective in harvesting a larger number of wolves. In 2019-2020, Arviat hunters harvested wolves over a wide distance later in the winter, including areas over 450 km from the hamlet, but the distribution of harvest was higher closer to areas with higher caribou densities. The distribution of high densities of Qamanirjuaq caribou and hence the wolf harvest varied between years. The proportion of packs harvested varied among communities, generally decreasing as pack size increased and increasing as the season progressed.

Further efforts are needed to refine estimates of wolf populations associated with migratory herds, particularly the Qamanirjuaq herd, during winter and spring. However, the substantial harvest of wolves south and southwest of Arviat from March to May suggests a significant reduction in wolf numbers and predation on caribou as the herd migrates to their calving grounds west of Hudson Bay. This likely results in fewer wolves and reduced predation pressure on the calving and early post-calving areas.

Wolf harvesting is a traditional part of the culture of Nunavut hunters and serves as a seasonal income source. Significant annual harvests are reported from Arviat, Baker Lake, and Kugluktuk. In some regions, wolf harvesting during the spring migration period may lead to lower wolf populations and reduced predation on calving and post-calving grounds.

Wolverine Density Estimates

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. A long-term DNA sampling initiative was initiated in collaboration with local HTOs in the Kivalliq and Kitikmeot regions from 2013 to 2019.

The study employed two primary methodologies. Initially, biologists conducted interviews with wolverine hunters and elders from Arviat, Baker Lake, and Kugluktuk to identify wolverine habitat and distribution and hunter harvest patterns, as well as caribou and muskox distribution. Second, the study considered future mineral resource developments, potential linear developments, infrastructure projects, and historical trends in wolverine harvesting across the region.

Genetic analysis techniques were employed to determine the sex and individual identities of wolverines using hair samples collected through a scientifically driven, non-invasive approach facilitated by local hunters. Hair snagging posts were strategically positioned in a grid formation within the study area and baited to attract wolverines attempting to retrieve bait placed on the top of the post. Regular visits were made to these posts to collect hair samples. Density estimates and the size of the study area are detailed in Table 5.6.

Table 5.6. Estimates of wolverine population density from capture–recapture studies. Methods Spatially explicit capture–recapture (SECR).

Locality	Year	Density (per 1000km^2)	Proportion females	Method	Source
Nunavut					
Aberdeen Lake, Kivalliq Region	2013	2.36 (2.09–3.33)	0.57	SECR	Awan & Boulanger 2016
	2014	1.66 (1.12–2.53)	0.61		
Henik Lake, Kivalliq Region	2015	4.42 (3.29–5.93)	0.43	SECR	Awan et al. 2018
	2016	3.38 (2.89–3.96)	0.49		
Napaktulik Lake, Kitikmeot Region	2018	3.10 (2.00–4.78)	0.51[1]	SECR	Awan et al. 2020
	2019	4.14 (2.78–6.18)	0.51[1]		

1. Proportion female assumed constant across years

Grizzly Bear Density Estimate Surveys

Grizzly bears are an important part of subsistence hunting by Inuit for economic, social and cultural purposes. Habitat fragmentation and loss due to development and anthropogenic mortality were considered the primary threats during the *SARA* listing process (COSEWIC 2012). While this is true for most parts of the species' Canadian range, the range fragmentation and habitat loss issues that affect southern or western grizzly bear populations may have limited application to barren-ground grizzly bear in Nunavut. Comparatively, barren-ground grizzly bears occupying central Arctic tundra roam over larger areas and experience relatively little contact with humans. Local knowledge, harvest records and research indicate an increase in numbers and range expansion eastward and northward. There are limited baseline data on grizzly bear distribution and density within Nunavut, in part because of the cost and challenge of surveying bears at low densities in remote areas.

Hair Snagging Method

ENV conducted a survey of grizzly bears in Nunavut in collaboration with HTOs using DNA hair snagging techniques. Genetic analysis was employed to determine the sex and individual identities of grizzly bears from hair samples collected. Simulation modeling was utilized to optimize the sampling design, employing a sub-grid approach for sampling within a single year. Wooden tripods equipped with barbed wire were deployed in sub-grid formations and monitored three times at approximately two-week intervals via helicopter flights in July and August.

Each tripod consisted of six 2″ x 4″ pieces of rough lumber measuring 5′ 3″ (160 cm) in length, secured at the corners with 3/16th inch (0.47 cm) aircraft cable. The upright legs of the tripods were wrapped with double-stranded 15-gauge high-tensile 5″ (13 cm) barb-spacing barbed wire spaced at 5 inches (13 cm) to capture grizzly bear hairs during interactions. In preparation for deployment, materials for the tripods were readied in spring in the community (Arviat, Baker Lake, and Kugluktuk), involving tasks like barbed wire wrapping, cutting aircraft cable, and preparing felt. The tripods were transported to the sampling grids by hunters via snowmobile and assembled within grid cells using a Bell 206B-LR helicopter for transport (**Figure 5.29**). A video was developed to illustrate the methodology:

Inuktitut https://www.youtube.com/watch?v=LkKlXMQZrFs

English https://www.youtube.com/watch?v=uZ5FEFVrMas

French https://www.youtube.com/watch?v=AwczX6A8DPw

Inuinnaqtun https://www.youtube.com/watch?v=2UIYWvI_0Ww

Figure 5.29. Deployment and monitoring of hair snagging tripods in sub-grid areas.

We affixed non-reward commercial trapping lures (Long Distance Call and Beaver Castor; O'Gorman Lures, Montana, USA) on a piece of felt placed atop each tripod and applied approximately 200 ml of commercial fish oil (Forsyth Lures, Alix, AB) to attract bears. The GPS coordinates of each tripod were recorded. During sampling, we used forceps to collect all visible hairs from both the tripod and the surrounding ground. The barbed wire was cleaned with a propane torch to remove any remaining hair, and the tripod was relocated about 10 metres to avoid cross-contamination between sessions. A fresh set of lures was installed after each check.

Kitikmeot Grizzly Bear Study

We divided the western mainland portion of the Kitikmeot region into three approximately equal-sized sectors for our grizzly bear sampling design, with surveys planned for 2021, 2022, and 2023. The 2021 study covered the 54,275 km² western sector, where intensive DNA hair sampling had been conducted in 2008–2009 using a nearly uniform grid of posts. This earlier effort estimated a grizzly bear density of 5.6 bears per 1,000 km² (95% CI = 4.5–7.0 bears/1,000 km²). To assess population trends since 2008–2009 more precisely and collaborate with the Kugluktuk Angoniatit Association, we implemented a revised sampling strategy in 2021 using clustered sampling stations for hair snagging, testing its efficacy in reducing sampling effort while maintaining accuracy.

The 2021 survey area covered the late spring and summer range of the Bluenose-East barren-ground caribou herd. The overall grizzly bear population density in 2021 (6.6 bears/1,000 km²) showed a non-significant increase compared to 2008–2009 (5.6 bears/1,000 km²), with overlapping confidence intervals (CI). The sex ratio appeared more female-biased in 2021 (61% females vs 54% in 2008–2009). Estimates for the target management area indicated 219 females (CI = 161–299) and 141 males (CI = 98–200) in 2021. Female estimates increased from 163 (CI = 114–234) in 2008–2009, while male estimates remained similar (143, CI = 88–231) between the two periods. These differences were not statistically significant. The 2021 sub-grid design, with three sampling sessions conducted in a single year, proved effective in providing more precise density estimates compared to the combined two sessions conducted in each of the 2008 and 2009 surveys.

In July/August 2022, we sampled three sub-grids (**Figure 5.30**) to estimate grizzly bear density across the larger regional study area, including the calving and post-calving grounds of the Bluenose-East and Bathurst caribou herds. A total of 905 hair samples were collected and genetically tested to identify individual grizzly bears. The eastern sector of the mainland Kitikmeot region (Figure 5.30), covering the calving through summer ranges of the Bathurst caribou herd, is planned for sampling in July-August 2023.

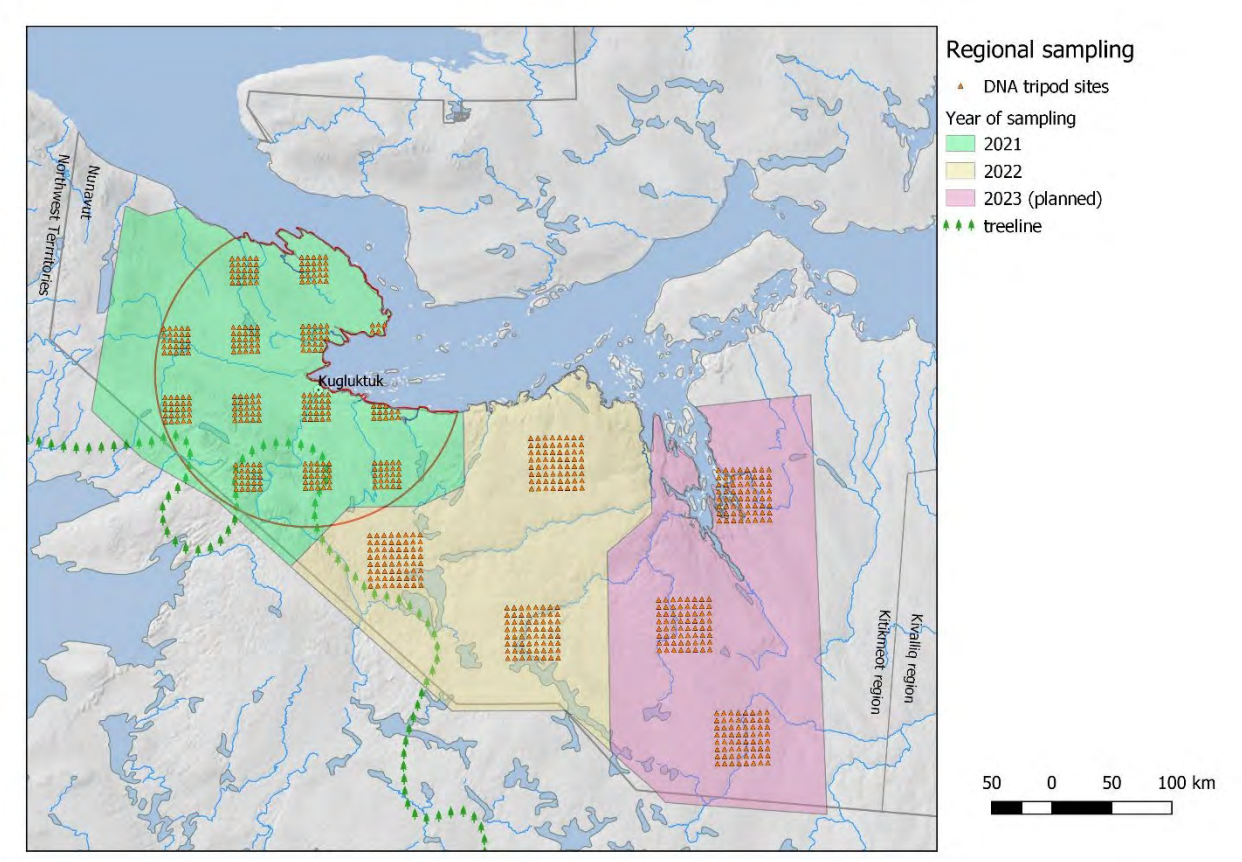


Figure 5.30 Division of Kitikmeot Region into sectors sampled for grizzly bears in 2021 (western; 54,200 km²), 2022 (central; 51,500 km²), with planned sampling in 2023 (eastern; 50,800 km²). The red crosses indicate current or proposed locations of hair snag stations (tripods). The western and southern boundaries align with the NWT/Nunavut border.

Grizzly Bear Management

ENV collaborated closely with relevant HTOs, RWOs, communities, and other stakeholders to gather input for the Nunavut Grizzly Bear Co-Management Plan. Initial consultations with HTOs focused on identifying management priorities and goals. The draft plan was formulated based on the feedback received during these consultations and subsequently presented to communities and HTOs for final review and input. The NWMB approved the Nunavut Grizzly Bear Co-Management Plan in 2017. This plan was designed to provide guidance and direction to co-management partners, aiding in decision-making processes and to identify goals and objectives for grizzly bear population management in Nunavut. Continuous communication among co-management partners, Inuit engagement, and collaboration are crucial for the plan's success. Key actions outlined in the plan, which were supported voluntarily by users, include protecting family groups and bears in dens, harvest monitoring, and reduction of human-bear conflict. Implementation of this co-management plan remains ongoing.

Arctic and Red Fox

The Arctic fox and red fox are significant furbearers within Nunavut's cultural and traditional economy. Harvest levels fluctuate annually based on prey abundance, accessibility, and pelt value. ENV employs various methods to monitor harvest sizes, including tracking fur sales and issuing export permits. Initial findings from harvest monitoring indicate robust fox populations in Nunavut. Moreover, these species appear more adaptable to human developments compared to other furbearers. While Arctic and red foxes are prized for their fur, they are also carriers of the rabies virus, which poses a potential threat to mammals, including humans.

5.5 Polar Bear Program (PBP) Research Initiatives and Management

Approximately 50-60% of the world's polar bears occur in Nunavut. Canada accounts for about 80% of the global polar bear harvest. mainly undertaken by Inuit but also by sport hunters. Of the 13 polar bear subpopulations in Canada (Appendix 1), all but one are located within or shared with Nunavut, totaling approximately 14,000 – 15,000 bears. Consequently, Nunavut is therefore responsible for the majority of polar bear conservation, research, and management globally.

The PBP focuses its research efforts on population descriptions, recommending and implementing TAH decisions, population modelling, and genetics (Table 5.7). Research also covers foraging and habitat ecology, contaminants, harvest monitoring/reporting, and behavioural ecology for Nunavut's polar bear populations, conducted through collaborative efforts with academic institutions.

IQ studies have been conducted for numerous polar bear subpopulations, capturing valuable information not typically captured by Western scientific information and surveys. IQ and scientific data are collaboratively used by decision-makers to establish sustainable harvesting quotas for polar bears. Cooperative management with various co-management organizations and u jurisdictions helps meet the extensive research and monitoring demands for polar bears, ensuring ongoing program support and resources.

Table 5.7. Polar Bear subpopulation statuses and trends in Nunavut.

Baffin Bay	**Davis Strait**
Annual Removal (2021-2022): 65 Historical Annual Removal (5 year mean): 69 Most Recent Abundance Estimate: 2826 Recent Trend: Likely Stable TEK Assessment: Stable Year of Estimate: 2012-13 Year of Next Estimate: TBD	Annual Removal (2021-2022): 33 Historical Annual Removal (5 year mean): 39 Most Recent Abundance Estimate: 2015 Recent Trend: Likely Declined TEK Assessment: Increased Year of Estimate: 2017-2018 Year of Next Estimate: TBD
Foxe Basin	**Gulf of Boothia**
Annual Removal (2021-2022): 109 Historical Annual Removal (5 year mean): 108 Most Recent Abundance Estimate: 2585 Recent Trend: Stable TEK Assessment: Increased Year of Estimate: 2009-2010 Year of Next Estimate: 2024	Annual Removal (2021-2022): 66 Historical Annual Removal (5 year mean): 66 Most Recent Abundance Estimate: 1525 Recent Trend: Stable TEK Assessment: Increased Year of Estimate: 2015-17 Year of Next Estimate: TBD
Kane Basin	**Lancaster Sound**
Annual Removal (2021-2022): 0 Historical Annual Removal (5 year mean): 0 Most Recent Abundance Estimate: 357 Recent Trend: Increased TEK Assessment: Increased Year of Estimate: 2013-14 Year of Next Estimate: TBD	Annual Removal (2021-2022): 73 Historical Annual Removal (5 year mean): 69 Most Recent Abundance Estimate: 2541 Recent Trend: Uncertain TEK Assessment: Increased Year of Estimate: 1995-1997 Year of Next Estimate: 2023
M'Clintock Channel	**Northern Beaufort Sea**
Annual Removal (2021-2022): 13 Historical Annual Removal (5 year mean): 10 Most Recent Abundance Estimate: 716 Recent Trend: Increased TEK Assessment: Stable Year of Estimate: 2014-16 Year of Next Estimate: TBD	Annual Removal (2021-2022): 0 Historical Annual Removal (5 year mean): 0 Most Recent Abundance Estimate: 1291 Recent Trend: Likely Stable TEK Assessment: Stable Year of Estimate: 2006 Year of Next Estimate: 2023
Norwegian Bay	**Southern Hudson Bay**
Annual Removal (2021-2022): 4 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	Annual Removal (2021-2022): 31 Historical Annual Removal (5 year mean): 30 Most Recent Abundance Estimate: 1003 Recent Trend: Likely Stable TEK Assessment: Stable to increased Year of Estimate: 2021 Year of Next Estimate: TBD
Viscount Melville (Managed by GNWT)	**Western Hudson Bay**
Annual Removal (2021-2022): 0 Historical Annual Removal (5 year mean): 1	Annual Removal (2021-2022): 33 Historical Annual Removal (5 year mean): 32

Most Recent Abundance Estimate: 252 Recent Trend: Likely Increased TEK Assessment: Increased Year of Estimate: 2012-2014 Year of Next Estimate: TBD	Most Recent Abundance Estimate: 618 Recent Trend: Likely Declined TEK Assessment: Increased Year of Estimate: 2021 Year of Next Estimate: TBD

Alternative Techniques to Traditional CMR

Since 2007, to reflect Inuit societal beliefs and values, the PBP has developed less and non-invasive alternatives to the traditional CMR studies to estimate population abundance. One such method is DNA biopsy sampling, which involves using a small dart to collect a small skin sample from polar bears. This approach allows for individual identification without harming the bear **(see Figure 5.31)**. It has been implemented on a larger scale during population reassessments in Baffin Bay, Kane Basin, M'Clintock Channel, Gulf of Boothia, and Davis Strait.

Figure 5.31. 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 method employed is the use of aerial surveys, a technique that was previously limited until recently. Through collaboration with the University of Minnesota, ENV applied this technique to estimate polar bear population abundance in Foxe Basin (2009 and 2010), Western Hudson Bay, and Southern Hudson Bay (2011, 2016, and 2021), as well as Lancaster Sound (2023). The results clearly demonstrated the

effectiveness of aerial surveys in assessing polar bear numbers in specific regions, particularly in seasonally ice-free areas with minimal relief. While aerial surveys offer a snapshot of population status at a specific time and location, repeated surveys can establish trends in population abundance and help measure and assess the efficacy of management efforts over time.

Davis Strait Population Inventory and IQ Study

In Canada, the Davis Strait (DS) polar bear subpopulation is shared by Nunavut, Québec (Nunavik), and Newfoundland and Labrador (Nunatsiavut). Initially inventoried in the 1970s, the subpopulation abundance was likely underestimated due to limited aerial coverage. A comprehensive population study conducted from 2005 to 2007 estimated the abundance to be approximately 2,158 bears and indicated a future decline in both productivity and population size. This reduced productivity may be linked to high bear densities during a period of population growth from the 1970s to 2007. Additionally, observed declines in sea ice, resulting in longer open water periods, have raised concerns about reduced seal access for polar bears, further impacting productivity and population numbers. Recently, Inuit communities have expressed safety concerns due to high bear numbers, particularly affecting people going out on the land. Inuit observations suggest polar bears are also impacting other wildlife by preying heavily on young seals and bird colony eggs. To address these concerns, the TAH was increased from 46 to 61 bears annually in 2012/2013 to slightly reduce the DS subpopulation.

A two-year genetic-mark-recapture (biopsy) study was conducted in 2017 and 2018 involving all of the DS management jurisdictions and Boards. The study design was like the 2005-2007 study in terms of coverage and timing, allowing for direct comparison with previous data. This similarity in design and methods facilitated a reanalysis of the 2005-2007 study alongside the 2017-2018 data to enhance the accuracy of abundance estimates. The analysis integrated live-capture data from 2005-2007, harvest recovery data spanning 2005 to 2018, and genetic samples collected in 2017 and 2018. Based on this dataset, the DS abundance was re-estimated at 2,250 bears [95% Credible Interval (CRI) 1,989 - 2,512] for the period of 2005-2007, which falls within the confidence interval of the original estimate. For the 2017-2018 period, the estimated abundance was 2,015 bears [95% CRI 1,603 - 2,588]. The geometric mean subpopulation growth between 2006 and 2018 was 0.989 [95% CRI 0.974 – 1.010], indicating a 0.896 probability of subpopulation decline during this period, consistent with the management objective for a slight population decline. The mean annual reported harvest across all jurisdictions increased from 64.1 ± 10.1 (SD) bears/year between 1999 and 2008 to 86.8 ± 23.6 between 2009 and 2019, potentially contributing to the lower abundance estimate in 2017-2018. However, bears during the 2017-18 study period were less likely to be in poor body condition compared to the 2005-07 study period. Cub-of-the-year (COY) recruitment averaged from 0.23 to

0.45, and yearling recruitment averaged from 0.23 to 0.41 over the two study periods, suggesting sufficient levels to sustain the subpopulation. Inter-annual variations in survival did not appear linked to assessed environmental variables, including sea ice parameters.

Nunavut currently maintains a quota of 61 bears, while Greenland's quota is 3 and Nunatsiavut's is 12; Nunavik currently does not have a set quota. Since the increase in TAH to 61 bears, the average annual removal in Nunavut has remained consistent. From the period of 2012/2013 to 2021/2022, the average harvest has been 42.8 bears per year. Concurrently with the 2017-2018 scientific study, IQ studies were conducted in Nunavut, Nunavik, and Nunatsiavut. In Nunavut, a collaborative research project with Inuit hunters took place in Pangnirtung and Kimmirut in 2019. This study focused on various aspects including the cultural significance of polar bears to Inuit, their use, health, abundance trends from the 1940s to the 2010s, demography, distribution, ecology, and habitat. In Pangnirtung and Kimmirut, all Inuit respondents reported an increase in polar bear abundance since the 1940s to the 2010s. Many also noted a rise since the 1980s, although a few respondents from Kimmirut mentioned observing a recent decline since the 2000s. Consultations on both the population inventory and the IQ report were held with affected stakeholders in May 2023. The consultation report and management recommendations were submitted to the NWMB for decision at their August 2023 meeting. NWMB forwarded its decision to increase the TAH to 64 bears annually; the Minister accepted this decision on October 12, 2023, to be implemented for the 2024-2025 harvest season.

Western Hudson Bay (WH) Population Inventory/Aerial Survey

The CWS, in collaboration with the Manitoba government, routinely surveys a portion of the polar bear population in Western Hudson Bay (WH). Various surveys conducted since 1999 have indicated a decline in this subpopulation due to reduced survival rates, reproduction, and body condition, attributed to earlier sea-ice breakup caused by climate change. In response, the GN conducted an aerial survey in 2011, which revealed that bear numbers and condition were better than anticipated, though births were low, prompting a call for increased monitoring. It also suggested a potential shift in distribution, which may have previously underestimated abundance estimates.

A follow-up aerial survey was conducted in 2016 to assess population trends and status. Data collection involved mark-recapture and distance sampling using an independent double-observer pair platform. The mean abundance estimate in 2016 was 842 bears, which was 11% lower than the comparable estimate from 2011 (949 bears), indicating a non-significant decline. Reproductive parameters, such as the proportion of cubs-of-the-year (COY) and yearlings, remained like those recorded in 2011 (COY: 11.5%, yearlings:

2.9%). Analysis of age-sex groups post-stratified data suggested a decline in the segment of the population comprising adult females with offspring compared to adult males.

Given the rapid environmental changes, management agencies are expected to respond swiftly. In 2017, the Minister accepted an increase in the TAH from 28 bears to 34 bears. Subsequently, following a public hearing by the NWMB held in Rankin Inlet in January 2018, the Minister accepted an NWMB decision to further increase the TAH from 34 bears to 38 bears. NWMB's rationale for both increases was to address concerns over public safety in communities around Western Hudson Bay where residents expressed worries about interactions between bears and humans. Efforts are ongoing to maintain the established bear monitoring and relocation/diversion program.

In 2021, ENV partnered with the Government of Manitoba, supported by the Government of Ontario and Environment and Climate Change Canada, to resurvey the polar bear subpopulation. The aerial survey in 2021 estimated an abundance of 618 bears (SE=119.3, CI=385-852). Comparisons with aerial survey estimates from 2011 and 2016 suggest a decline in the WH subpopulation, with reductions of 40% and 27% from 2011 and 2016, respectively. Furthermore, post-stratification of the 2021 survey results by sex and age classes revealed significant declines in the abundance of both adult females and subadult bears between 2011 and 2021. The exact reasons for the observed decline in WH over the past decade, particularly among adult females and subadults, remain unclear and could be attributed to reduced survival and recruitment, movement of bears into neighbouring subpopulations (emigration), harvest pressures, or a combination of these factors.

Conversely, the 2021 aerial survey estimate for the Southern Hudson Bay subpopulation showed an increase. It is uncertain whether there is movement between these two subpopulations, and it is possible that the decline observed in Western Hudson Bay is partly due to emigration. Consultations with affected stakeholders are proposed for 2023, and additional studies are underway to better understand the dynamics of movement between subpopulations.

Southern Hudson Bay (SH) Population Inventory/Aerial Survey

In previous inventories, ENV allocated funding to the Ontario Government to conduct surveys in SH. Although the population size has remained stable since an estimate in the 1980s, documented declines in body condition, survival rates, and sea-ice coverage suggest potential future population decline, as observed in other polar bear populations. In response, the GN initiated an aerial survey in 2012, resulting in a population estimate of 943 bears. A subsequent survey in 2016 estimated the population at 780 bears, indicating a decline from 2012. The 2021 aerial survey produced an abundance estimate of 1,003 bears.

Concurrently, the 2021 aerial survey of Western Hudson Bay polar bears indicated a decrease in that subpopulation's estimate. Movement between these two subpopulations is uncertain, and the observed increase in Southern Hudson Bay may be influenced in part by immigration. Other factors possibly contributing to this increase include enhanced birth rates and improved survival.

The SH population is shared between three jurisdictions (Nunavut, Québec, and Ontario) and falls under four land claim agreements (Nunavut, Nunavik, Eeyou Istchee, and James Bay Cree). Within Nunavut, the community of Sanikiluaq is involved in Southern Hudson Bay polar bear research and harvest management. User-to-user meetings were convened in 2011, 2014, and 2020, bringing together harvesters from affected communities, government representatives, wildlife management boards, and land claims organizations responsible for co-management. These meetings facilitated collaborative discussions on harvest management.

In Nunavut, Inuit knowledge (IQ) shared by community members from Sanikiluaq during the November 2018 NWMB public hearing on the Nunavut Polar Bear Co-Management Plan emphasized that the polar bear population is experiencing growth rather than decline, particularly in the vicinity of Sanikiluaq. Participants also asserted that climate change will not lead to the extinction of polar bears, noting that fluctuations in population size are a natural occurrence.

A harvest risk assessment was completed to help identify a management objective and harvest level, based on the last population survey results. The Technical Working Group engaged a consultant to perform the analysis, which was published in September 2019 alongside a status report on the subpopulation. Although the report was shared with the NWMB, there have been no adjustments to the TAH for Southern Hudson Bay since the initial population estimate of 943 bears in 2012. The TAH for Sanikiluaq remains unchanged at 25 bears per year.

M’Clintock Channel (MC) Population Re-assessment & IQ Report

M’Clintock Channel (MC) is a smaller polar bear subpopulation managed by Nunavut. It is currently harvested by residents of Gjoa Haven, Taloyoak, and Cambridge Bay, with an annual TAH of 12 bears. Unsustainable past harvest levels, reaching 34 bears per year from 1979 to 1999, led to a moratorium from 2001/2002 to 2003/2004, followed by a reduction in the TAH. Management efforts have focused on recovery, supported by local traditional knowledge indicating increased bear sightings in recent years.

Historically, a physical mark-recapture study conducted from 1998 to 2000 estimated the MC population at 284 bears, highlighting its vulnerable status at low abundance levels. Community reports of increased bear sightings prompted interest in raising the TAH. In

response, ENV initiated a new 3-year genetic mark-recapture study from 2014 to 2016 to reassess the size and status of the subpopulation. Fieldwork was completed in 2016, but data analysis posed challenges due to small sample sizes, low bear densities, and the presence of migrants. Efforts to locate and genotype older samples from the previous study period were successful.

The updated abundance estimate from the 2014-2016 study is 716 bears, indicating an increase from the 2000 estimate of 284 bears. The subpopulation is currently deemed healthy based on estimates of reproduction and body condition. Improved marine productivity, likely influenced by spatial changes in sea ice conditions, has benefited the bears. However, caution is warranted in interpreting the size and trend of the subpopulation, as the genetic mark-recapture study did not include movement data (e.g., radio collars), and the abundance estimate represents the "superpopulation," encompassing all bears using the MC management area, including those moving into other subpopulations.

ENV commissioned a consultant to undertake an IQ study facilitated by communities harvesting polar bears from the MC subpopulation. Remote interviews were conducted with hunters and elders from Cambridge Bay, Gjoa Haven, and Taloyoak during May and June 2020. The study aimed to document their knowledge of polar bear ecology, changes in population dynamics (including human-animal interactions), and management perspectives and recommendations.

Interviewees expressed concerns about evolving human-bear dynamics leading to increased bear aggression and rising bear numbers in M’Clintock Channel. They highlighted insufficient hunting tags as a safety threat to humans. Additionally, there was criticism that Inuit perspectives and traditions have not been adequately integrated into research and management practices to date. Decision-makers and researchers were urged to enhance their understanding of Inuit knowledge from an Inuit perspective in order to better incorporate IQ into polar bear research and management. These efforts are crucial for fostering balanced, culturally appropriate, and sustainable management approaches that garner community support.

Following a submission to the NWMB, the Minister of Environment approved an increase in the TAH from 12 to 21 bears per year for the MC subpopulation in 2021.

Gulf of Boothia (GB) Population Re-assessment & IQ Report

The GB subpopulation is exclusively found within Nunavut. The last subpopulation inventory conducted in 2000 estimated the population at 1592 bears. Current data suggests the population is stable or likely increasing, attributed to robust recruitment and survival rates. However, caution is advised regarding long-term trends, especially in light of observed

environmental changes affecting other polar bear subpopulations such as Foxe Basin, Baffin Bay, Davis Strait, and Western Hudson Bay.

Currently, the GB subpopulation sustains an annual TAH of 74 bears, with an average harvest of 61 bears recorded between 2005/06 and 2010/2011. While a previous genetic study did not find genetic similarities between the MC and GB subpopulations, recent genetic analyses have raised questions among Inuit hunters about the distinction between these subpopulations. These analyses suggest significant interchange between them.

In line with obligations set forth in the 2005 Polar Bear MOU for GB, a new three-year study (2015-2017) utilizing genetic mark-recapture techniques was conducted to reassess the size and status of the GB polar bear subpopulation. The Gulf of Boothia's abundance estimate of 1,525 bears from the 2015-2017 study indicates that the subpopulation has remained stable since the last assessment in 1998-2000. Based on estimated reproduction and body condition, the subpopulation is deemed healthy.

Additionally, ENV commissioned a consultant to conduct an IQ study led by communities that harvest polar bears from GB. From May to August 2020, hunters and elders from Gjoa Haven, Taloyoak, Kugaaruk, Naujaat, Igloolik, and Sanirajak were interviewed remotely to document their knowledge of polar bear ecology, population dynamics (including interactions with humans), and perspectives on management considerations. Interviewees reported an increase in bear numbers, particularly females and young bears, as well as more frequent bear encounters. Concerns were raised regarding harvest regulations that do not adequately account for the rising bear population and the cultural perspective.

Improved incorporation of IQ perspectives in bear management is essential to ensure that decision-making considers both the animals and the livelihoods of the communities that coexist with them. Following a submission to the NWMB, the Minister of Environment approved an increase in the TAH from 74 to 84 bears per year for the GB subpopulation in 2022.

Lancaster Sound (LS) Population Re-assessment

The Lancaster Sound (LS) polar bear subpopulation, one of Nunavut’s largest, is entirely situated within the territory. The most recent assessment of LS utilized data from 1989 to 1997. As such, there are no current trends available.

A three-year study (2021-2023) was proposed to reassess the size and status of the LS polar bear subpopulation using genetic biopsy mark-recapture techniques. This approach differs from the 1994-1997 study in LS, which involved chemical immobilization of all bears for capture and marking. Instead of capturing bears, DNA is extracted from tissue

samples collected via biopsy darts to uniquely identify individuals. Despite the trade-off in the amount and type of data obtainable, this less-invasive method was supported by co-management partners and project leaders.

The project was cancelled for 2021 following a helicopter accident that claimed the lives of all on board. The project's lead biologist, Markus Dyck, pilot Steven Page, and helicopter engineer Benton Davie lost their lives on April 25, 2021.

Due to the tragic circumstances of the 2021 season, the Government of Nunavut extended the project through 2024 to complete the study. In response, alternative methods to monitor the abundance and distribution of polar bears within the Lancaster Sound subpopulation were sought. An aerial abundance survey with a reduced biopsy mark-recapture component was proposed as an alternative and was completed in March 2023. Results are anticipated in 2024.

Polar Bear Harvest Program (PBHP)

The polar bear harvest program plays a crucial role within the broader PBP framework. It involves the collection of harvest data for every human-killed polar bear within Nunavut, alongside approximately 2,000 research samples annually (Figure 5.32). Harvesters are compensated through the PBHP, which allocates quotas to communities based on previous harvest data and established subpopulation TAHs. This flexible quota system maximizes harvesting opportunities.

Each year, a harvest report is generated, and recommendations for annual quotas are presented to both the NWMB and the national Polar Bear Technical Committee (PBTC). The program also manages the handling, storage, and distribution of collected samples, contributing to a substantial research database. Continuous maintenance and updating of this database ensure its relevance for ongoing and future polar bear research initiatives.

Trends in Polar Bear Harvest

Polar bears from the 12 subpopulations, which are either shared or entirely within Nunavut, are hunted by all 25 communities. All human-caused mortalities (including regular hunts, sport hunts, defense of life and property kills, accidental kills, and illegal kills) are recorded for each subpopulation. The total harvest is managed through a sex-selective quota system of up to 1:1, which maximizes harvesting opportunities while achieving identified co-management objectives. It includes mechanisms to adjust quotas downwards following over-harvesting to maintain sustainable levels.

Polar bear harvesting holds significant cultural importance for Inuit communities and serves as a potential source of income. The demand for polar bears includes the use of

meat and other parts for subsistence within Inuit communities, the sale of hides domestically and internationally, and sport hunts, which provide substantial income in some areas.

The TAH for each of Nunavut's 12 polar bear subpopulations is set to ensure the long-term conservation of polar bears, enabling sustainable harvesting for current and future generations of Nunavummiut. Since detailed harvest records began several decades ago, community harvest levels have consistently approached the TAH limits **(Figure 5.32).**

The average annual removal of polar bears in Nunavut from all subpopulations over the past five years is 429. 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. A harvest risk assessment for Southern Hudson Bay was completed in 2019 and shared with NWMB, while work on a similar assessment for Western Hudson Bay is ongoing.

There has been 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), which would remove them from the international market but could contribute to illegal hunting. In 2013, Nunavut and Inuit successfully defended their sustainable polar bear harvest against a proposal by the United States to up-list polar bears under CITES, marking the second successful defense. The GN collaborated effectively with the Government of Canada and Inuit organizations to oppose the proposal. Substantial information provided to CITES led the Animals Committee to conclude in 2015 that polar bears do not meet the criteria for listing under Appendix I due to trade not posing a significant threat.

Since 2015, there have been no further submissions to CITES to up-list polar bears to Appendix I. The *Review and Analysis of Canadian Trade in Polar Bears from 2012-2021* report reaffirmed that *"...trade does not currently constitute a significant driver of harvest in Canada and appears to be a low threat to the conservation of polar bears.*" The GN and its co-management partners will continue efforts to educate audiences outside Nunavut, including animal rights groups and environmental activists, about the sustainable management practices applied to polar bear populations.

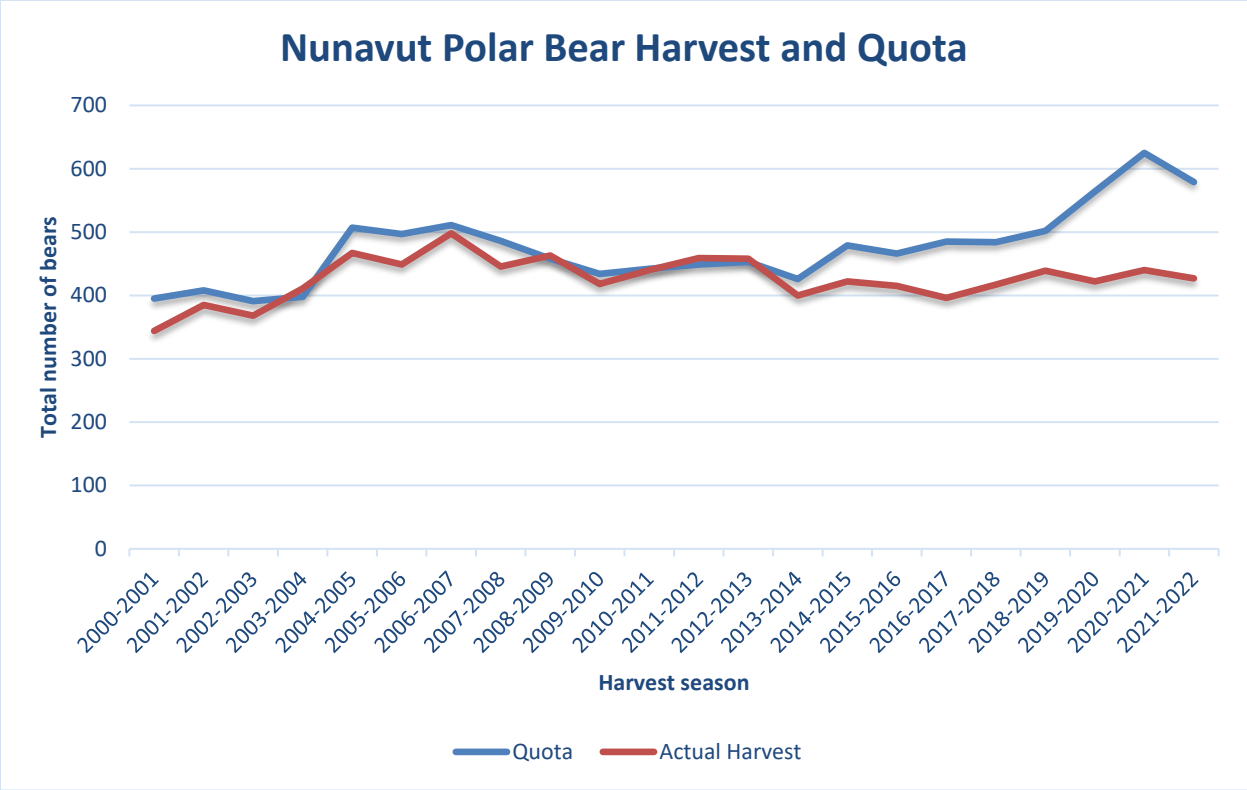


Figure 5.32. Overview of the Nunavut polar bear quota and harvest between 2000 and 2022. The total harvest generally remained within the Total Allowable Harvest limits, with occasional adjustments made for overharvest reductions or credit applications.

Other Research/Collaborations

The department collaborates with various government organizations, university departments, and environmental interest groups like the World Wildlife Fund. These government organizations can be international (e.g., Greenland), federal (e.g., Environment and Climate Change Canada), or provincial/territorial (e.g., Québec, Manitoba, Northwest Territories). Depending on the project, the department may lead the research project and in other cases the GN plays a supporting role.

Population Inventory Cycle

The main responsibility of the PBP is to determine sustainable harvest levels for polar bears in Nunavut and set a TAH for each subpopulation. This involves conducting population inventories, analyzing birth and death rates, assessing IQ on population trends, and evaluating animal health. HTOs and RWOs are consulted, and recommendations are made to the NWMB. Once approved, RWOs allocate the TAH among communities within their jurisdiction, and local HTOs and RWOs administer the harvest within their respective regions.

The PBP conducts inventories of all 12 polar bear subpopulations in Nunavut, whether they are entirely within Nunavut's borders or shared with other jurisdictions, on a rotating basis (see Table 5.8). These inventories include mapping the subpopulation's geographic extent, determining age and sex demographics, and estimating population size. The inventory cycle typically spans 10-15 years, with some subpopulations requiring more frequent assessments depending on past research methods and changes in population abundance that need management attention. Collaborative efforts with ENV often occur for subpopulations shared with other jurisdictions.

Prior to commencing research, local HTOs are consulted to obtain and incorporate the most up to date IQ into the survey results. HTO and community members participate in field operations during the study period. Once the study concludes, the PBP consults with HTOs and RWOs to report on the results and determine appropriate TAH levels and management actions.

Table 5.8. Schedule of polar bear inventories in Nunavut.

Population	Last inventory completed	Next inventory scheduled to begin [a)]
Davis Strait	2018	TBD
Baffin Bay	2013	2025
Kane Basin	2014	TBD
Norwegian Bay	1998	TBD
Lancaster Sound	2023	TBD
Foxe Basin	2011	2024
Southern Hudson Bay	2021	TBD
Western Hudson Bay	2021	TBD
Gulf of Boothia	2020	TBD
M’Clintock Channel	2020	TBD
Viscount Melville	1992	TBD
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 are managed under the Nunavut Polar Bear Co-Management Plan, which entails MOUs between the GN and each HTO for every polar bear subpopulation. When polar bears were designated as a Species of Special Concern under the SARA in 2011, it triggered the requirement for a national management plan within three years. In 2013, the ENV convened a focus group composed of representatives from RWOs, NTI, and the NWMB to guide the development and implementation of the management plan for Nunavut.

Consultations were conducted in spring 2014 across all Nunavut communities to gather input on the plan's content and direction. After an initial draft was prepared, the draft plan underwent review involving RWOs and other stakeholders. The resulting co-management plan incorporated community and local concerns, crafted by and for Nunavummiut. A finalized draft of the Nunavut Polar Bear Co-Management Plan was submitted to the NWMB for decision in June 2015.

A written public hearing was held by the NWMB in October 2015, during which constructive feedback was provided and subsequently addressed in the plan after the hearing adjourned. The revised draft of the Nunavut Polar Bear Co-Management Plan was submitted again to the NWMB for decision in January 2017, followed by an in-person public hearing in November 2018.

The NWMB approved the Nunavut Polar Bear Co-Management Plan in September 2019, with changes including the implementation of a revised harvest sex ratio effective from the 2019/2020 harvest year. The new ratio allows for harvesting up to half of the TAH in female bears, ensuring that communities do not exceed this limit, compared to the previous practice of using the entire TAH for male bears if desired. The proposed harvest management system was initially approved by the NWMB on a 1-year interim basis in 2019.

Development and refinement of the Harvest Administration and Credit Calculation System (HACCS) commenced in autumn 2019. Over the course of fall 2021, the GN actively sought and incorporated feedback from co-management partners, specifically RWOs and HTOs, regarding the HACCS.

In their regular meeting held in December 2021, the GN presented the finalized HACCS to the NWMB for consideration. Subsequently, in February 2022, the NWMB and the Minister of Environment approved and accepted the HACCS. Following these decisions, the HACCS was implemented and utilized to compile the harvest data for the 2021/2022 season. Additionally, it was employed to calculate quotas and credits for the subsequent 2022/2023 polar bear harvest season.

5.6 Other Species – Programs and Activities

The GN holds responsibility for various species including all raptors, Arctic hare, Arctic ground squirrel, voles, lemmings, and resident birds such as ptarmigan and ravens. Currently, ENV conducts direct research on raptors, while research on other species is limited. Harvest levels for most of these species are low.

In the Kivalliq region, a long-term ecological monitoring project began in 2012. However, due to staff turnover and shifting priorities, there were intermittent gaps in data collection, particularly affecting monitoring efforts. The project focused on the calving grounds of the Qamanirjuaq caribou herd. With climate change identified as a significant threat to declining caribou populations, continuous ecosystem-level monitoring aims to identify how changes in habitat features influence population dynamics over time.

Recognizing the importance of sustained monitoring, ENV established a collaborative research relationship with the University of Alberta in 2017 to revitalize and maintain the long-term ecological research project. This initiative assesses various ecological aspects including vegetation, birds, insects, small mammals, temperatures, precipitation, and other environmental features. Collaborating with universities helps address capacity challenges within the Wildlife Research division.

In addition to maintaining a database of raptor nests across Nunavut, ENV supports a long-term study of peregrine falcons breeding near Rankin Inlet (Figure 5.33). This research has contributed valuable insights into the ecology and detection of contaminants in these birds. It represents one of the longest continuous studies of Arctic breeding raptors globally. Studies have examined occupancy rates, reproductive performance, and pesticide levels in breeding peregrines. Occupancy rates remained stable from 1980 to 2010, but variability in annual egg production and declining chick hatch and survival rates have been observed. Climate-related factors, such as increased precipitation, are considered potential contributors to these trends.

Following a reassessment by COSEWIC in November 2017, the peregrine falcon was classified as "Not at Risk". Subsequently, the SARA delisting process, based on the new COSEWIC assessment, was completed in 2023.

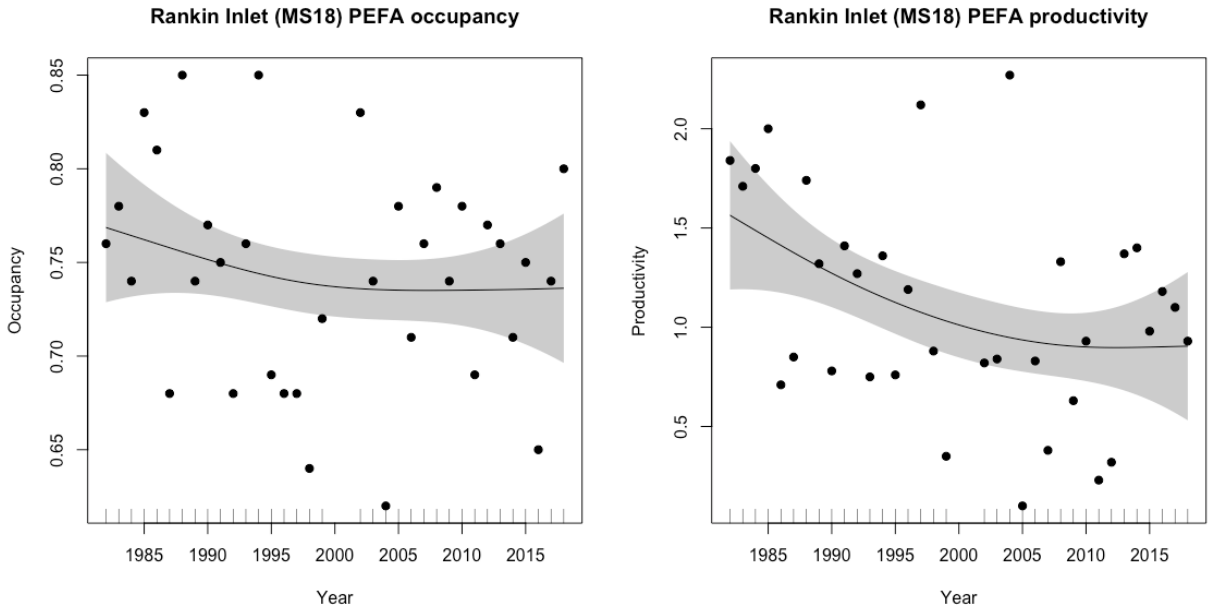


Figure 5.33. General additive results for occupancy and productivity for peregrine falcons (PEFA) monitored near Rankin Inlet, Nunavut from 1982-2017. Model results indicated that occupancy has remained stable throughout the monitoring period.

6. CAPABILITY OF NUNAVUT WILDLIFE RESOURCES TO MEET ANTICIPATED DEMANDS

Nunavut is home to 12 caribou herds, 1 reindeer herd, 12 subpopulations of polar bears, and 13 subpopulations of muskoxen, many of which are shared with neighbouring jurisdictions. Systematic monitoring of most species in Nunavut occurs at scheduled intervals but is limited due to the vast size and remoteness of populations, the costs associated with survey work, and the human capacity of the research staff within the division. Given recent declines in most caribou herds, there is a need to consider increasing the frequency of population assessments, disease monitoring, and other factors that could impact recovery negatively.

There is a national/international inventory schedule and a general commitment by the GN to a 15-year inventory cycle for polar bears, as outlined in the memoranda of understanding for harvest from each polar bear subpopulation. These memoranda were followed until the finalization and implementation of the Nunavut Polar Bear Co-Management Plan. According to the 2021 Canadian Census, the human population in Nunavut has increased by 2.5% since the previous national census conducted in 2016. With this population increase, there has also been a rise in demand for country food. Resource development activities in Nunavut have been increasing, and their impacts on wildlife populations are not yet well understood but could potentially have negative effects.

The following tables provide a general estimate of the current and future ability of some Nunavut wildlife populations to meet the demand for these resources. These tables focus on major big game species harvested by Nunavummiut and managed by the ENV. Estimates are based on general population trends, harvest data, anecdotal evidence, and expert opinions from professional biologists. As harvest reporting for most game species in Nunavut is not mandatory, quantifying levels of demand and capacity is challenging. Therefore, qualitative assessments using traditional knowledge, observational data, and population trends are used to evaluate 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	Likely 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	Medium	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	Likely 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	Decreasing to increasing	Muskox are being harvested as an alternative food source to caribou. While some populations are stable to increasing, muskox in decreasing populations are proving to be more challenging to locate for harvesters.

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	Low	Due to the significant decline in this population of caribou, a TAH has been implemented. Capacity will likely remain 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 "*Endangered".*
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	Medium to high	This subpopulation is stable and supports harvest from multiple jurisdictions. Medium demand from NU harvesters due to lower hide prices.
Foxe Basin	123	High	Medium to high	This subpopulation is likely stable or slightly increasing.
Gulf of Boothia	84	High	Medium to high	This subpopulation is stable and can support the higher harvest.
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	The population trend is uncertain. Recent survey results are still in the analysis stage.
M'Clintock Channel	21	High	Medium to high	This subpopulation is stable and can support the higher harvest.
Northern Beaufort	6	Low	Uncertain	The population trend is uncertain. This subpopulation is managed by the Government of the Northwest Territories.
Norwegian Bay	4	Medium	Uncertain	The population trend is uncertain.
Southern Hudson Bay	25	High	Low to medium	This subpopulation is likely stable and supports harvest from multiple jurisdictions.
Western Hudson Bay	38	High	Low	This subpopulation is likely declining. Communities who harvest from this subpopulation experience higher levels of human-bear conflict.
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 potentially impacting biodiversity in Nunavut include rapid human population growth, exceeding rates seen in most of Canada, leading to heightened economic demands in areas such as resource extraction and tourism, coupled with the effects of climate change. To fulfill its stewardship responsibilities, ENV has conducted a general status assessment of all wildlife in Nunavut, encompassing animals, plants, fish, and insects. Since the initial assessment in 2000, subsequent reports have been published every five years, with the latest in 2020. Each update revises previously assessed species and expands the scope to include additional species. These reports are accessible at www.wildspecies.ca.

The 2020 assessment now includes the general status ranks of 50,534 wild species across Canada, encompassing 3,560 species in Nunavut alone. This comprehensive review spans 46 different taxonomic groups, ranging from mammals and fishes to beetles, slime molds, and leeches.

Flora and fauna documented or suspected to inhabit Nunavut include:

- Vascular plants: 671 species documented in Nunavut out of the 5,324 known across Canada.
- Freshwater and marine bivalves: 15 species documented in Nunavut out of the 416 species known in Canada.
- Insects (including bees, mosquitoes, and beetles): 923 species documented in Nunavut out of approximately 55,000 species found in Canada. The Transverse Lady Beetle (*Coccinella transversoguttata*), listed as Special Concern under the federal Species at Risk Act, is suspected but lacks confirmed specimens from Nunavut to date.
- Spiders: 105 species documented in Nunavut out of the 1,439 known in Canada.
- Moths and Butterflies: 143 species documented in Nunavut out of the 5,430 species recorded in Canada.
- Amphibians (including frogs, toads, newts, and salamanders): 4 species documented in Nunavut out of the 47 species found in Canada.
- Reptiles: Only the Common Gartersnake potentially inhabits some islands in James Bay in Nunavut, although confirmation is lacking. There are 49 reptile species documented in Canada.
- Terrestrial Mammals: 32 species documented in Nunavut out of the 172 terrestrial mammals in Canada. Notable species under the federal Species at Risk Act include Peary Caribou (Threatened), Barren-ground caribou-Dolphin and Union

Population (Special Concern), Grizzly Bear (Special Concern), Polar Bear (Special Concern), and Wolverine (Special Concern).

- Birds: 278 species documented in Nunavut out of the 696 bird species in Canada; 46% are classified as “accidental,” meaning they do not regularly occur in Nunavut, and breeding has not been confirmed. Fourteen bird species in Nunavut are listed under the federal Species at Risk Act, including the Barn Swallow (Threatened), Buff-breasted Sandpiper (Special Concern), Common Nighthawk (Special Concern), Eskimo Curlew (Endangered), Harlequin Duck (Special Concern), Harris’s Sparrow (Special Concern), Horned Grebe (Special Concern), Ivory Gull (Endangered), Olive-sided Flycatcher (Special Concern), , Red Knot islandica subspecies (Special Concern), Red Knot rufa subspecies (Endangered), Red-necked Phalarope (Special Concern), Ross’s Gull (Threatened), Rusty Blackbird (Special Concern), and Short-eared Owl (Special Concern);.
- Bryophytes (mosses): 417 species documented in Nunavut out of the 1,406 moss species known in Canada. Porsild’s Bryum (Threatened) is listed under the federal Species at Risk Act.
- Lichens: 758 species documented in Nunavut out of the 2,677 species known in Canada.
- Macrofungi: 144 species documented in Nunavut out of the 6,951 known in Canada.
- Slime Moulds: 1 species documented from Nunavut out of the 290 known in Canada

Species at Risk and COSEWIC

In 2003, the federal SARA was enacted to protect wildlife species at risk in Canada. Under the Act, COSEWIC was established as an independent panel of experts tasked with 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)	Threatened (2023)
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)	Removed from List (2023)
Short-eared Owl	Special Concern (2008)	Special Concern (2012)
Grizzly Bear	Special Concern (2012)	Special Concern (2018)

In Nunavut, the *Wildlife Act* includes provisions for listing species, conducting community consultations, and providing protection for listed species. These involve the Nunavut Species at Risk Committee, which assesses species and oversees recovery processes. Despite being passed into law, these provisions have not yet 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. WILDLIFE OPERATIONS DIVISION AND ENFORCEMENT

Overview

The Department of Environment maintains a Wildlife Office in each community throughout Nunavut. Conservation Officers (COs) and Wildlife Guardians (WGs) act as liaisons for ENV within their communities, providing a broad range of services. These include ensuring compliance with legislative and regulatory requirements, investigating alleged violations of laws or regulations, issuing licences and permits, performing wildlife deterrence and assisting Nunavummiut in accessing ENV harvester support programs. They regularly participate in local wildlife research initiatives and support ENV biologists by regularly collecting biological samples. Collaborating with co-management partners, they are dedicated to conserving Nunavut's wildlife species.

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

- Wildlife Damage Prevention Program
- Wildlife Damage Compensation Program
- Disaster Compensation Program
- Fur Purchasing Program

The Department of Environment carries out GN obligations under various territorial legislation, including the Wildlife Act, Environmental Protection Act, Territorial Parks Act, Forest Management Act, Forest Protection Act, and Herd and Fencing Act. Additionally, the division enforces certain federal conservation legislation through agreements with the GN, including the *Migratory Birds Convention Act, Fisheries Act*, and *Wild Animal and Plant Protection and Regulation of International and Inter-provincial Trade Act* (WAPPRIITA).

Compliance and Enforcement

One of the main responsibilities of the Wildlife Operations Division is to ensure compliance with federal and territorial legislation. Compliance involves three primary components: education, prevention, and enforcement.

Nunavut Conservation Officers promote conservation education by conducting school presentations, organizing community workshops, airing radio announcements, and displaying posters in the communities they serve. They also participate in job and career fairs to raise awareness about conservation careers and recruit for related positions.

Additionally, they contribute to the Nunavut Hunter Education Program and provide educational materials at Wildlife Offices, addressing inquiries regarding the legislation they enforce.

Prevention efforts primarily involve Conservation Officer patrols, where officers engage with people on the land, fostering visibility and communication with resource users. The presence of officers often acts as a deterrent to illegal activities.

When education and prevention measures are insufficient, enforcement actions become necessary. Nunavut Conservation Officers have several enforcement options at their disposal, including verbal warnings, written warnings, disciplining of members of the HTO, issuing misdemeanor SOTIs, and filing long-form informations for court proceedings. HTOs may also decide to discipline their own members for contraventions.

Table 8.1. Summary of Enforcement Actions 2018-2023 (based on best available data at time of report)

Occurrences	**2,569**
Investigations	**196**
Enforcement Action Used	
Unresolved	32
No Offence Committed	413
Verbal Warning	70
Written Warning	42
HTO Resolved	26
Summary Offence Ticket Information	38
Long-Form Information	0

Table 8.2. Investigation Overview 2018-2023 (based on best available data at time of report)

Type of Investigation	Number of Instances
Defence of Life or Property	85
Wastage	72
Export Without a Permit	43
Harvest Without Allocation	23

Dangerous Harvesting	10
Wildlife Harassment	8
Illegal Possession	8
Harvesting without a Licence	7
Harvest of a Family Group	6

Conservation Officer and Wildlife Guardian Development

Wildlife Operations Division has continued to make progress in improving the training and resources available to its Conservation Officers and Wildlife Guardians.

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

- Introduction to Law Enforcement and Compliance;
- Personal Defensive Tactics Training;
- Conflict Intervention and De-escalation Training;
- Firearms Proficiency Training;
- Small Vessels Operators Proficiency; and
- Spill Response Course.

For many years, the Wildlife Operations Division relied on bringing enforcement instructors to Nunavut from southern jurisdictions to train Conservation Officers, as there was no local training capacity. Training provided by external instructors is often specific to southern jurisdictions and do not adequately address the unique environmental and cultural considerations of Nunavut.

The Wildlife Operations Division has since developed its own in-house training programs and instructors. This approach ensures that training is specific and relevant to Nunavut and is delivered primarily by instructors who live and work in the territory. This shift has significantly improved the competence and confidence of Conservation Officers in their roles. Currently, a comprehensive review of the division's training programs is underway to ensure they meet current needs, particularly in light of staff turnover which necessitates training a new cohort of instructors in the coming year.

During the COVID-19 pandemic, in-person training was severely impacted by travel restrictions, disrupting regular training sessions.

Communities without a Conservation Officer are supported by Wildlife Guardians, who perform most duties except enforcement activities. These locally hired positions do not include housing and often lack the educational qualifications and relevant experience

required for full-time Conservation Officer roles. To address this gap, the division is developing a Wildlife Guardian training program. This program aims to qualify Wildlife Guardians for Conservation Officer positions through Departmental work experience and on-the-job training, providing an equivalency to the Environmental Technology Program offered by Nunavut Arctic College. This initiative aims to increase opportunities for Nunavut beneficiaries to secure meaningful employment as Conservation Officers.

The Wildlife Operations Division maintains a close partnership with the Environmental Technology Program, a primary source for recruiting new Conservation Officers. Since 2017, division staff have actively contributed to delivering enforcement-related courses at the program, allowing students to gain valuable experience and knowledge in enforcement before pursuing a career. This collaboration has successfully facilitated the recruitment of several Conservation Officers from the Environmental Technology Program.

Community Relations

Nunavut Conservation Officers foster positive relationships among hunters, co-management partners, and ENV. Joint patrols have been conducted in certain communities alongside other agencies such as DFO, Parks Canada, and RCMP. Additionally, some communities have successfully employed bear monitors to aid Conservation Officers in polar bear deterrence or to provide bear deterrence in the absence of a local Conservation Officer.

Conservation Officers actively engage in after-school and in-school programs within their communities, which include outdoor school trips, archery programs, and teaching GPS use. They also assist community members in setting up GPS units, SPOT units, and similar technologies to enhance safety during land travel.

Conservation Officers contribute to wildlife research initiatives by managing logistics, coordinating local participation with HTOs, and directly participating in fieldwork. They also support search and rescue efforts as needed.

Future Plans for Wildlife Operations

The Wildlife Operations Division is nearing the launch of an electronic Enforcement and Licencing Database. This program has been in development for several years and is now nearing readiness for implementation. It aims to enhance the efficiency of Conservation Officers in completing and submitting their required monthly paperwork. With this system, officers can digitally input all enforcement activities, which can be accessed from any computer. This eliminates the need for officers to manually send these records to other divisional staff, enabling seamless access for all concerned. The

Wildlife Operations Division remains committed to enhancing its efficiency through the adoption of new technological methods.

9. WILDLIFE DETERRENCE PROGRAM

The Wildlife Deterrence Program aims to reduce human-wildlife conflicts in Nunavut. These conflicts can adversely affect society and the economy. Ensuring human safety and preserving life are the program's foremost concerns, guiding resource allocation to support Nunavummiut in maintaining their traditional lifestyles.

Program updates

Community-based plans to mitigate bear-human conflicts encourage collaboration among key stakeholders within communities to develop tailored mitigation strategies. Extensive consultations at the community level have defined roles and responsibilities, fostering agreements on mitigation efforts. Enhanced data collection and analysis have improved predictive capabilities and readiness.

The WDCP provides direct compensation to Nunavummiut whose property suffers wildlife-related damage. From 2018 to 2023, a total of $48,843.75 was awarded **(Figure 9.1)**, distributed among 37 individual applications. Polar bear damage to cabins accounted for many claims, with an average compensation of $1320 per applicant. Commonly damaged items include plywood, windows, and various camp equipment, for which compensation is granted. Applicants are encouraged to adopt preventive measures such as using deterrents and passive conflict reduction equipment, securing cabin areas from attractants, and reinforcing structures. Awareness efforts about available programs for Nunavummiut are actively being developed.

The Wildlife Damage Prevention Program (WDPP) offers financial support to individuals and non-profit organizations seeking to prevent wildlife-related property damage. Interest in the program has steadily grown since 2018 **(Figure 9.1)**. Between 2018 and 2023, a total of $109,607 was allocated to 43 applicants, with an average contribution of $2549. The most requested items include bear-resistant food storage bins, cabin reinforcement, pyrotechnic deterrents, and electric fences. Initiatives are underway to enhance awareness and utilization of WDPP funding.

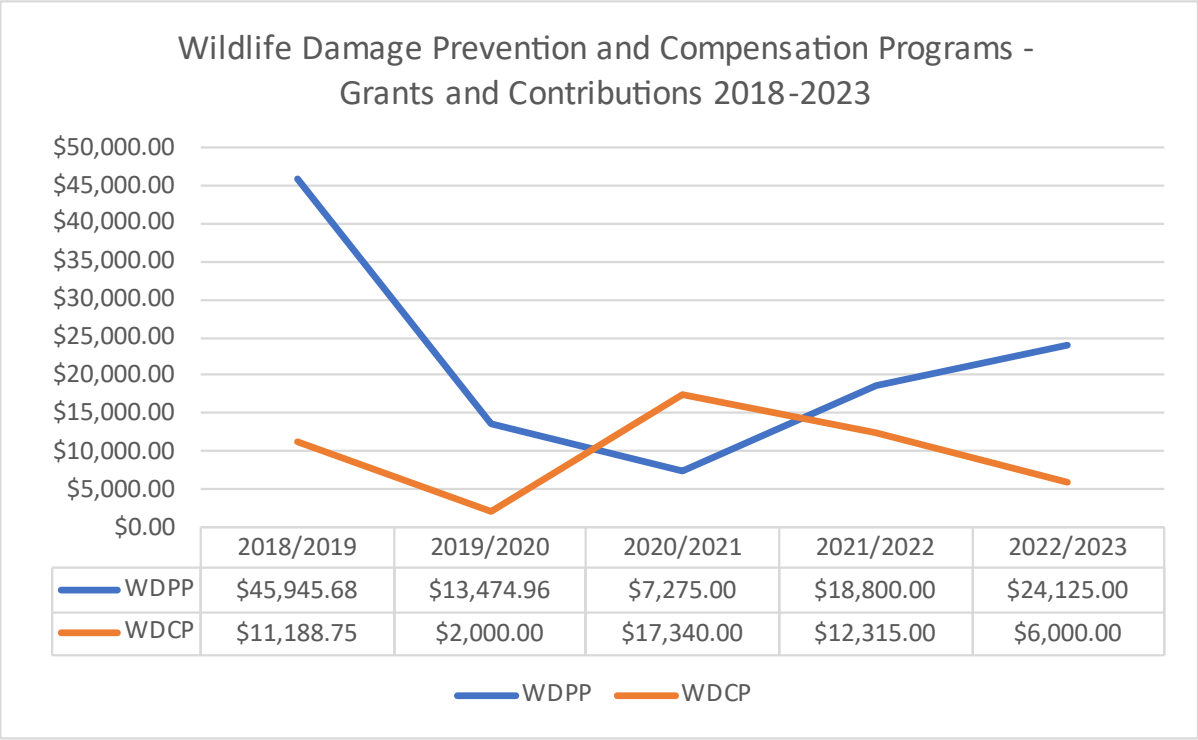


Figure 9.1. Wildlife Damage Prevention (WDPP) and Compensation Programs (WDCP)– Grants and Contributions 2018-2023.

As part of an enhanced data collection initiative, the Wildlife Deterrence Program is collaborating closely with the enforcement section to develop and implement a centralized database. This database will allow the operations division to gather more detailed information on incidents and provide regular reports to managers. Implementation is slated for summer 2024.

Experimental projects and techniques for mitigating wildlife conflicts are also being explored. Significant data has been accumulated on initiatives such as live trapping/relocating and large-scale electric fencing projects. Live trapping is currently practiced in Arviat by conservation officers and has proven effective as a passive method for preventing human-bear conflicts. Interest from other communities has prompted the Department of Environment to consider expanding this practice. Meanwhile, successful large-scale electric fencing projects at community meat caching sites in Igloolik have prompted the department to evaluate similar projects in several other communities.

Defence of Life and Property Kills (polar bears)

Between July 1, 2018, and June 30, 2023, Nunavummiut have reported 210 incidents of Defence of Life and Property Kills (DLPK) involving polar bears **(Figure 9.2)**. The average of 42 kills per year over this five-year period is consistent with the 22-year average of 42.8 kills per year. The North Baffin region recorded the highest number of DLPK incidents over the past five harvest seasons (91), followed by Kivalliq, South Baffin, and the Kitikmeot region with 69, 39, and 11 incidents respectively **(Figure 9.3)**.

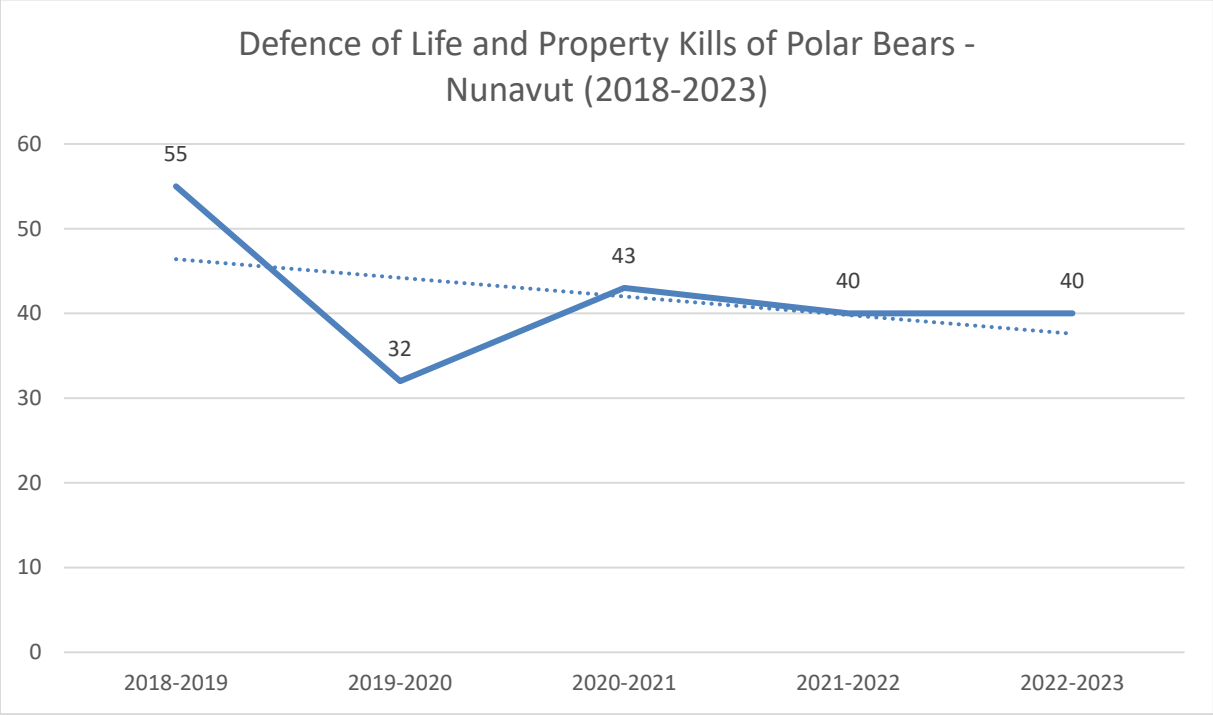


Figure 9.2. Trends in Defence of Life and Property Kills (DLPK) of Polar Bears in Nunavut from 2018 to 2023.

Figure 9.3. Trends in Defence of Life and Property Kills (DLPK) of Polar bears by region in Nunavut from 2018 to 2023.

Human Injury and Fatalities

During the summer of 2018, two fatalities resulted from human-polar bear conflicts. The first incident occurred on July 4, 2018, near the community of Arviat. The second incident occurred on the land outside of Naujaat, resulting in one fatality and one serious injury. In 2021, three individuals were attacked by a polar bear near Sanirajak, sustaining serious injuries but surviving.

The wildlife deterrence program advises individuals travelling and camping on the land to carry personal deterrents and utilize early warning and detection devices when camping in high-risk areas. Equipment can be obtained through contribution programs available to Nunavummiut. The wildlife deterrence program continues to promote these programs and address individual needs through targeted applications.

10. WILDLIFE CONSERVATION

This report from the ENV Wildlife Division provides both a current snapshot and a historical overview of wildlife co-management and stewardship in Nunavut. The environment is dynamic, with wildlife populations influenced by natural events beyond human control. Therefore, wildlife management remains an ongoing challenge, requiring continual adaptation.

As communities grow and hunting techniques become more efficient, coupled with increasing environmental pressures such as climate change, environmental contamination, invasion by exotic species, and development, there is potential for diminishing wildlife productivity over time. It is crucial to manage and ideally mitigate these impacts to ensure that basic needs levels for wildlife can be met in the short term and the long term.

The Department of Environment is dedicated to collaborating with all Nunavummiut to ensure the retention of wildlife resources in the territory. This commitment aims not only to sustain these resources for food and health benefits but also to uphold Inuit cultural identity and support the local economy.

Polar Bear Harvests

The growing global interest in polar bear conservation places significant demands on Nunavut, which is home to most of the world's polar bear population. Essential to building upon past achievements in sustainable polar bear management is the collaborative development of the Nunavut Polar Bear Co-Management Plan. This plan integrates Inuit traditional knowledge and scientific knowledge to ensure the long-term viability of this crucial species in a rapidly changing environment, while also prioritizing human safety.

Grizzly Bear Harvests

To ensure a sustainable harvest of grizzly bears for Inuit within Nunavut, ENV made recommendations to the NWMB to establish a limit on sport hunting of grizzly bear in both the Kitikmeot and Kivalliq regions. Initially, these limits were based on historical practices from the GNWT era predating Nunavut's establishment. As further scientific information and IQ is collected, these hunting limits can be reviewed to optimize the balance between Inuit harvesting and sport hunting activities. Wildlife deterrence programs are also crucial in mitigating human-grizzly bear encounters and conflicts.

Monitoring Caribou and Muskox Populations for Best Conservation Practices

Caribou populations necessitate regular monitoring and a deeper understanding of herd fidelity, migration patterns, health, and predation dynamics throughout their demographic cycles. The preservation of specific calving grounds is particularly crucial to ensure herd persistence. Ongoing research on the abundance, genetics, and movements of caribou and muskox is essential to ensure that harvests are management sustainably because decisions affecting one herd may impact others. Harvest practices must be adaptable to fluctuations in herd abundance. These species are susceptible to brucellosis, and conservation concerns arise when populations are low in certain regions. Co-management partners are diligently establishing, monitoring, and adjusting harvest levels to maintain healthy and productive populations, critical for the sustenance of all Nunavummiut reliant on country food and subsistence harvesting.

Muskox in the High Arctic are vulnerable to sudden shifts in population size due to die-offs and occasionally reduced productivity caused by unpredictable severe weather events. Establishing and maintaining community-based and scientific monitoring programs are essential to assess population trends and adapt management actions accordingly.

Industrial Development, Land-Use Planning and ENV Research

With the escalation of industrial exploration and development, and the expansion of municipal infrastructure to accommodate growing communities, effective land-use planning must be informed by conservation insights derived from ENV research. Continuous monitoring of wildlife populations, detailed vegetation mapping, and identification of critical habitats are essential tools for wildlife managers and environmental assessment programs striving to evaluate potential impacts of land-use activities on wildlife. Collaboration among industry stakeholders, economic development agencies, and wildlife co-management partners is crucial to focus research efforts on addressing gaps in our understanding of the effects of development on wildlife and their habitats.

Climate Change Dynamics

Climate change in Nunavut presents challenges such as permafrost thawing, increased drainage of wetlands, and loss of soil and surficial sediment. Moreover, it leads to significant alterations in Nunavut's major ecosystems, affecting vegetation cover, biodiversity, and abundance of insects, as well as introducing invasive species. These ecosystem changes can bring benefits to some wildlife species while adversely affecting others. Importantly, these impacts vary across Nunavut; climate change may harm a species in one region while enhancing habitat conditions for the same species elsewhere

(e.g., southern Nunavut compared to the High Arctic region). One of the impacts of climate change under close scrutiny is its effect on sea-ice conditions and how this impacts polar bears and other wildlife that rely on the ice for seasonal migrations or food sources.

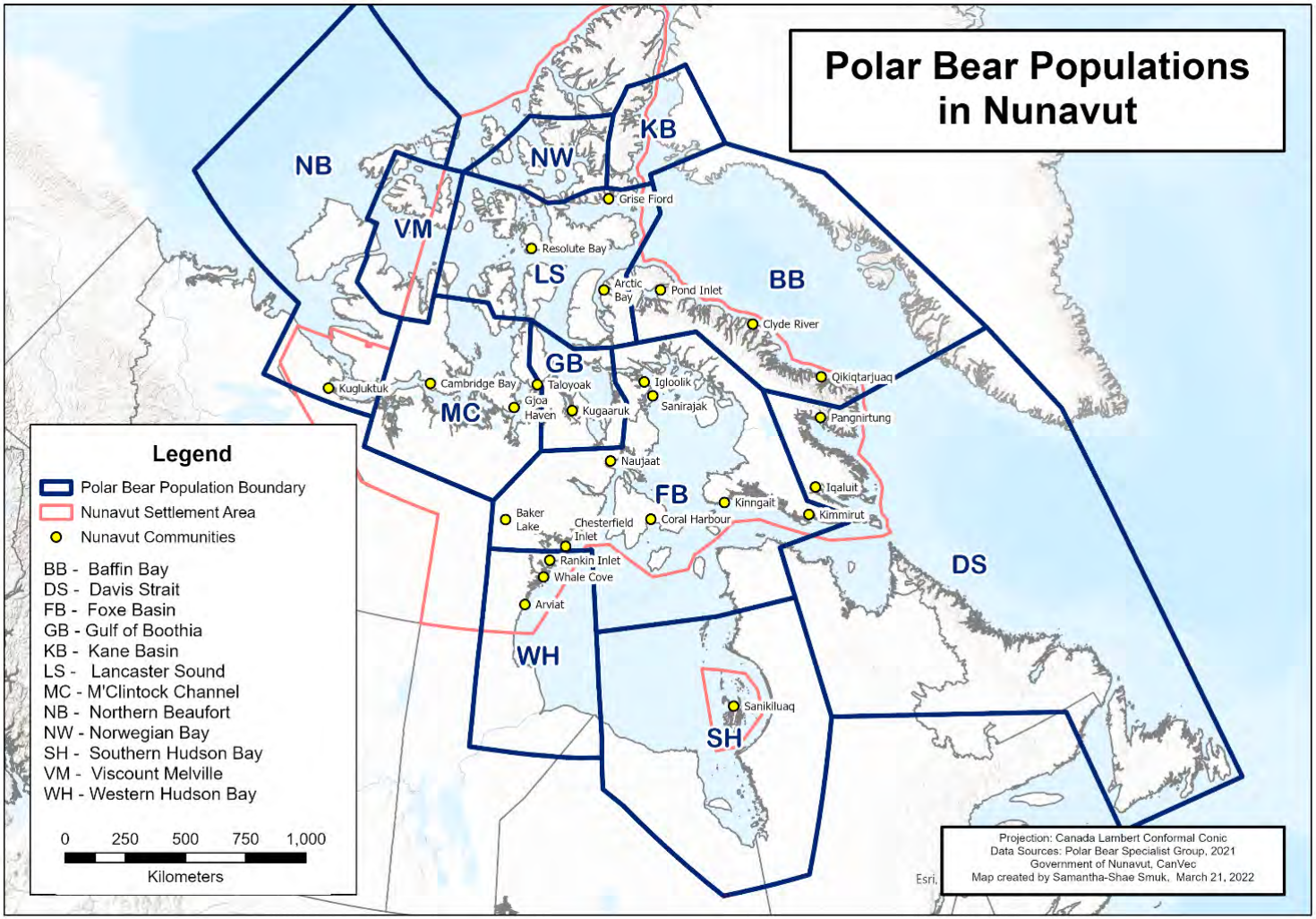
Future of Nunavut Wildlife Co-Management

Improved IQ and scientific knowledge of wildlife and their habitats in Nunavut, coupled with stewardship and management actions, pave the way for a future where wildlife populations thrive, are sustainable, and resilient. The Department will continue to play a pivotal role alongside its co-management partners in managing the intricate balance between public safety, environmental stewardship, wildlife conservation, and fostering economic growth.

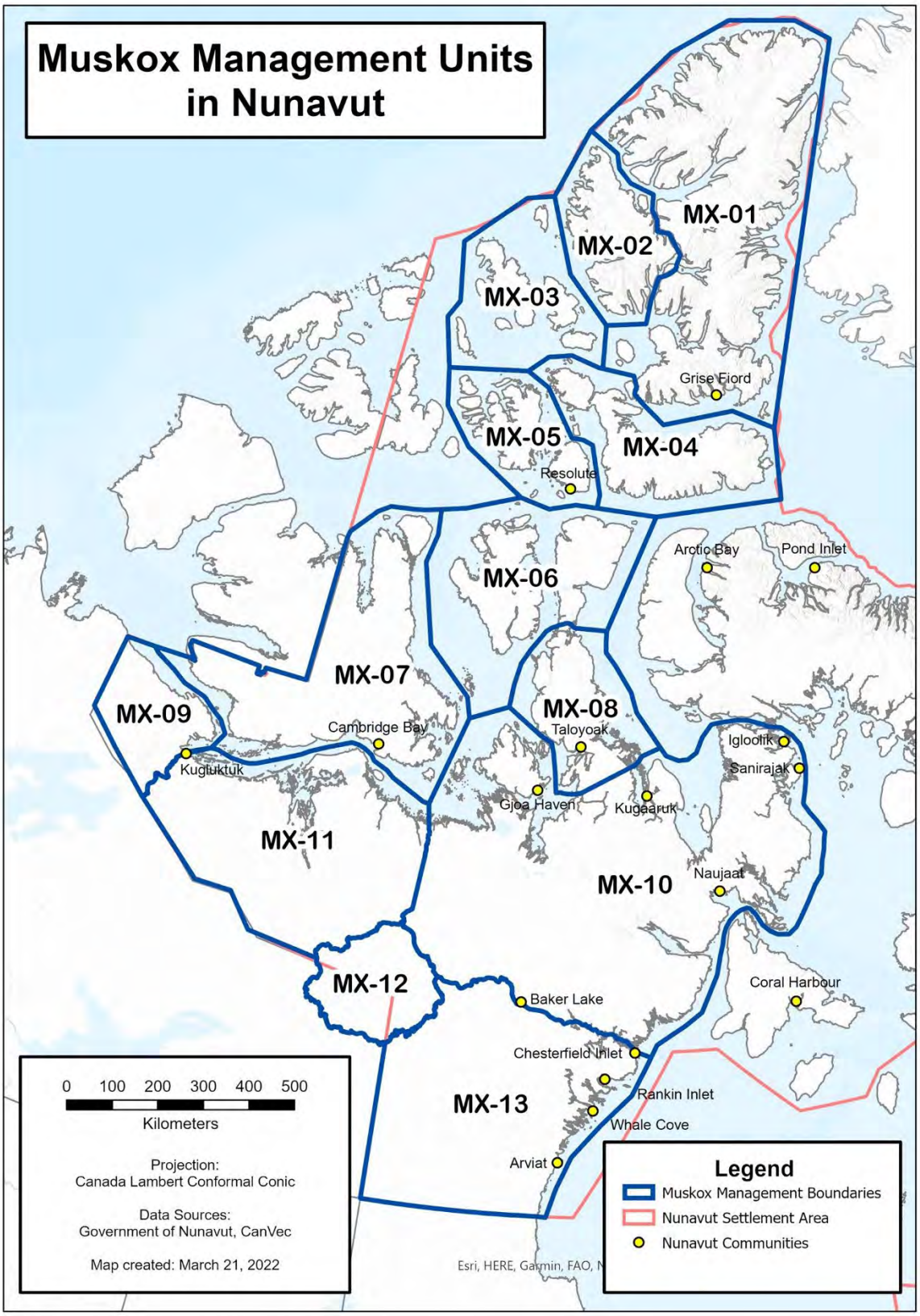
ACRONYMS USED IN REPORT

BQCMB	Beverly and Qamanirjuaq Caribou Management Board
CWHC	Canadian Wildlife Health Cooperative
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
ENV	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
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	*Wild Animal and Plant Protection and Regulation of International and Interprovincial Trade Act* (federal)

APPENDIX 1 Nunavut Polar Bear



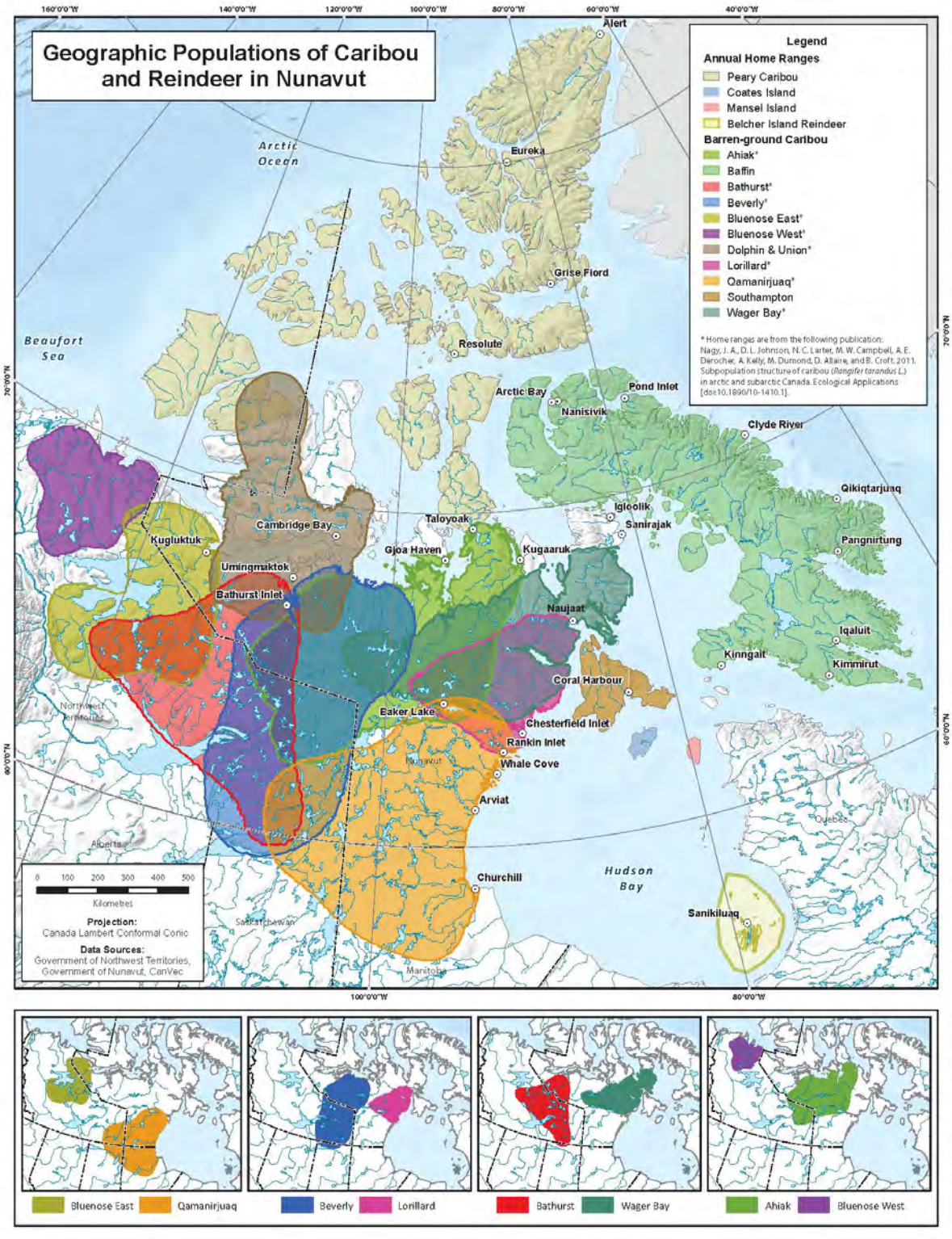
APPENDIX 2 Muskox management units in Nunavut



APPENDIX 2.1 Muskox Management. TAH as of December 2023

Muskox Management Zone	Abbreviation	TAH	Communities that harvest from MX
Ellesmere Group	MX-01	N/A	Grise Fiord
Axel Heiberg Group	MX-02	N/A	Grise Fiord
Ringnes Group	MX-03	N/A	Grise Fiord
Devon Group	MX-04	100	Grise Fiord Resolute Bay Arctic Bay Pond Inlet
Bathurst Group	MX-05	30	Resolute Bay
Prince of Wales/Somerset Group	MX-06	N/A	Resolute Bay
Victoria Island Group	MX-07	400	Kugluktuk Cambridge Bay
Boothia Peninsula Group	MX-08	275	Taloyoak
West of Kugluktuk Group	MX-09	20	Kugluktuk
Northeast Mainland Group	MX-10	250	Rankin Inlet Chesterfield Inlet Naujaat Coral Harbour Baker Lake Kugaaruk Gjoa Haven Baffin Region Sanirajak Igloolik
Central Kitikmeot Group	MX-11	225	Kugluktuk Cambridge Bay Omingmaktok Burnside
NWT/Kitikmeot/Kivalliq Group	MX-12	N/A	N/A
Southern Mainland Kivalliq Group	MX-13	182	Arviat Whale Cove Rankin Inlet Chesterfield Inlet Naujaat Coral Harbour Baker Lake

APPENDIX 3 Nunavut Geographic Populations of Caribou and Reindeer



APPENDIX 3.1 Nunavut Geographic Populations of Caribou and Reindeer

Caribou Herd Name	Population Estimate	Year of Last Population Survey	Total Allowable Harvest
Ahiak	39,131	2021	No TAH
Baffin Island	4,652	2014	350 (275 Male and up to 75 female)
Bathurst	6,243	2021	10 Male Only
Beverly	103,372	2018	No TAH
Bluenose-East	23,202	2021	170
Coates Island	1,304	2013	No TAH
Lorillard	33,454	2021	No TAH
Qamanirjuaq	288,244	2017	No TAH
Southampton Island	11,992	2019	1,000
Wager Bay	45,005	2021	No TAH
Dolphin and Union	3,851	2020	105
Peary Caribou	13,700 (range wide, ECCC)	2021 (Bathurst Island Complex only)	No TAH
Belcher Island Reindeer	No TAH. Managed by Sanikiluaq HTO.		