

GOVERNMENT OF NUNAVUT: DEPARTMENT OF ENVIRONMENT

Baffin Island Caribou Management Plan

Working together to ensure Baffin Island caribou
harvest is sustainable

GN DOE

July 2018

Summary

The purpose of the Baffin Island Caribou Management Plan is to provide guidance and recommendations to decision makers regarding the harvest management and monitoring of caribou inhabiting Baffin Island based on the best available Inuit Qaujimajatuqangit and science. The main body of this management plan is a guiding document that will be reviewed on a ten year term with co-management partners. The appended *Action Plan*, which will be reviewed annually by the Department of Environment, recommends management more specifically for the next 5 years, 2019-2024. Barren-ground caribou, such as those inhabiting Baffin Island, are known to undergo large cyclical fluctuations in abundance over a 50-90 year period, transitioning from periods of low abundance to high abundance, with phases of increasing and decreasing between. Each of these periods is represented by a corresponding management phase: Red (low), Yellow (increasing), Green (high), and Orange (decreasing). Baffin caribou are currently in the Red Phase, which means they are extremely vulnerable to overharvesting which could cause extirpation or prevent recovery. This plan advises harvest management and recommends continuous systematic monitoring of this population.

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Baffin Island Caribou Management Plan

1.0 Objectives

The primary objective of the Baffin Island Caribou Management Plan (BICMP) is to be an adaptive guide to harvest and monitoring of the Baffin Island caribou population (hereafter *Baffin caribou*). Management recommendations within the plan are intended to allow the caribou population to increase once range conditions improve. The rate of the caribou increase is dependent on the number of caribou harvested, recruitment, habitat availability, range condition, disease, predation and extreme weather events such as icing. Increasing from low to high abundance may take from several years to several decades to occur. This cyclical fluctuation can be delayed or interrupted by stress related to the above factors and overharvest. By minimizing risks related to harvest we can improve the likelihood that the population will increase and fluctuate naturally. In order to manage the harvest successfully we require current and accurate information on the status of the caribou, the productivity of their habitat, and the status of the harvest. The BICMP summarizes the components of a comprehensive harvest management and monitoring program and provides broad recommendations for the next ten years. The appended Action Plan makes more specific monitoring and research recommendations for the next five years, and will be subject to Department of Environment (DOE) review on an annual basis and amended as-needed (Appendix 1). The BICMP is not intended to be an overview of Baffin Island caribou consultations, research or ecology, all of which can be found in other publications cited herein. The legislative context of the plan and how it relates to the Nunavut Land Claims Agreement (NLCA) can be found in Appendix 2. The spatial area covered by this plan is shown in Figure 1.

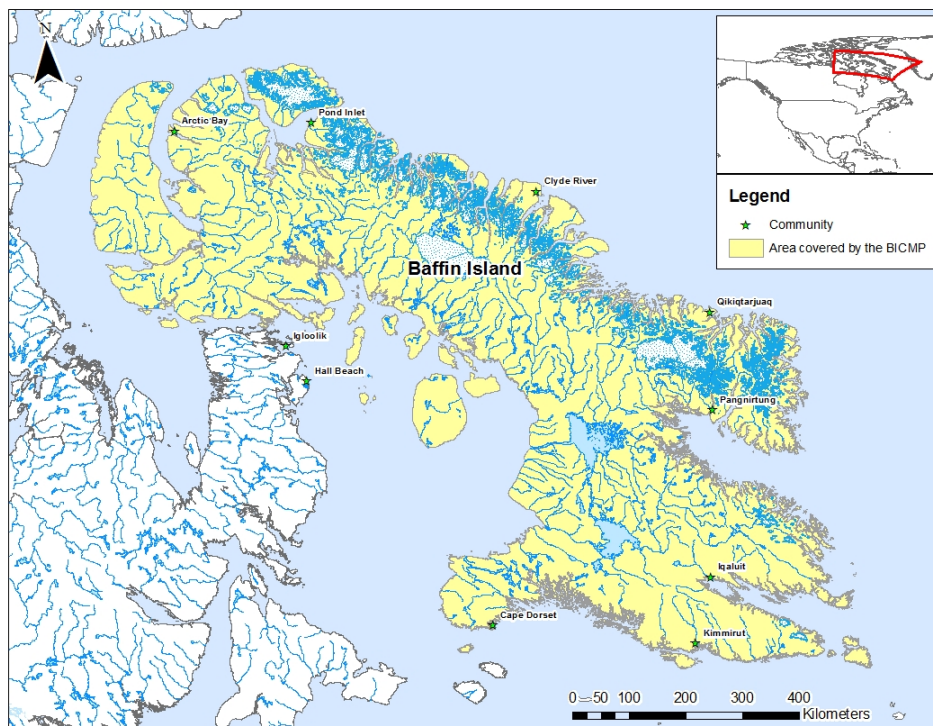


Figure 1. Area covered by the BICMP. All animals within this area are considered Baffin caribou and all harvest management and monitoring recommended herein is defined within these boundaries.

2.0 Participants

The BICMP affects all Nunavummiut; however, Inuit hunters from the ten communities which harvest caribou on Baffin Island (Iqaluit, Kimmirut, Cape Dorset, Pangnirtung, Qikiqtarjuaq, Clyde River, Pond Inlet, Arctic Bay, Igloolik and Hall Beach) will experience the greatest impacts. Co-management organizations that will contribute to the ongoing development and implementation of the BICMP include the Government of Nunavut Department of Environment, Baffin Hunters and Trappers Organizations (HTOs), Qikiqtaaluk Wildlife Board (QWB), Nunavut Tunngavik Incorporated (NTI), Nunavut Wildlife Management Board (NWMB), and Parks Canada (PC). Management of Baffin caribou will be most successful if co-management partners work collaboratively to ensure the sustainability of Baffin caribou.

In Nunavut, the Nunavut Wildlife Management Board is the main instrument of caribou management, subject to the ultimate authority of the Minister of Environment. The NWMB is an Institution of Public Government that includes representatives appointed by the Designated Inuit Organizations (DIO) and relevant government departments. The NWMB holds public hearings to garner input and makes decisions regarding caribou management based on information provided by DOE, HTOs, QWB, NTI and PC. These decisions then require the approval of the Minister of Environment to be enacted.

The Department of Environment has the legislated mandate to manage caribou in Nunavut. This includes the collection of scientific research and Inuit Qaujimajatuqangit (IQ), the development of caribou management plans, and ensuring legislative and regulatory compliance of harvest restrictions through education and enforcement. DOE provides background information on terrestrial wildlife species in Nunavut and provides recommendations to the NWMB, which then makes management decisions.

Hunters and Trappers Organizations represent hunters of each community on Baffin and provide conservation and management input directly through the QWB and NWMB public hearings.

The Qikiqtaaluk Wildlife Board works with the HTOs on harvesting practices and restrictions and allocates harvest within the Baffin region. The QWB also provides IQ input to the NWMB for making caribou management decisions.

Nunavut Tunngavik Incorporated ensures that all processes adhere to the Nunavut Land Claims Agreement (NLCA). Inuit harvesting rights are set out in the NLCA and beneficiaries retain last harvesting rights until conservation restrictions become necessary to ensure long term sustainable harvest.

Parks Canada is responsible for managing caribou within lands designated as National Parks. This includes Sirmilik and Auyuittuq National Parks for the purpose of the BICMP.

DOE consults with HTOs, QWB, NTI and communities when proposing research activities or management actions.

3.0 Review/Timelines

The BICMP Action Plan (Appendix 1) will be reviewed by the DOE whenever there is new information that informs caribou management. This includes new Inuit Qaujimajatuqangit as well as scientific data regarding the status of Baffin caribou, population delineation, caribou range/habitat and/or harvest. The overarching BICMP will be revisited by all affected parties once every 10 years. The 10 year review will include input from all affected parties and will include community and agency consultations. Once completed or revised, the BICMP will be submitted to the NWMB for consideration. Once the NWMB approves the plan it can be implemented, subject to final approval by the Minister of Environment.

4.0 Baffin Caribou

4.1 Abundance

Inuit Qaujimagatuqangit and archeological excavations of Thule sites suggest Baffin caribou have experienced large changes in abundance for at least the last 1000 years (Ferguson 1998; Stenton 1991). Fluctuations in caribou abundance seem to be cyclical, occurring over a period of 50-90 years. At its peak, the population is at least ten times larger than it is when caribou are scarce and numbers are at a minimum (Campbell et al. 2015; Ferguson 1998; Stenton 1991). These large scale fluctuations have been observed in many other caribou populations throughout the Arctic (Ferguson 1997; Gunn 2001; Morneau and Payette 2000). These cycles are believed to be natural and result from the interaction of caribou, vegetation, predation, and disease. On Baffin Island there are few predator species that persist at low densities, and it is believed much of the fluctuations in Baffin caribou abundance are driven by the interaction of caribou and their habitat. Caribou numbers increase until they surpass the carrying capacity of the environment. Eventually, large numbers of caribou degrade their range and the population declines quickly to low numbers until the range conditions improve and the cycle begins again (DOE 2015; Ferguson 1997; Ferguson and Messier 2000; Ferguson et al. 2001).

We divide the caribou cycle into 4 phases for the sake of caribou management. The duration of these phases are estimated from IQ and scientific observations during the previous caribou cycle (Ferguson et al. 1998):

Red Phase:

Caribou abundance is at a minimum (<10% of peak) during this *low* phase. During this phase, extirpation caused by overharvesting is possible for some or all of Baffin Island. Near the end of this phase caribou range will begin to recover and the population will increase in number and distribution. The rate of population increase is dependent on many factors but it can be slowed as a result of harvesting. We are currently in the Red Phase (2018). The last Red Phase spanned 25-30 years between about 1935-1965 (Ferguson 2005).

Yellow Phase:

Caribou abundance and range expand during this increasing phase. During the latter part of this phase the rate of increase can become quite high. Heavy harvest during the Yellow Phase could actually slow this rate of increase and prolong this stage. The last Yellow Phase spanned 25-30 years between about 1965-1990 (Ferguson 2005).

Green Phase:

Caribou abundance peaks and then begins to decline during this high phase. The last Green Phase spanned about 10 years between about 1990 and 2000 (Campbell et al. 2015; Ferguson 2005). During this phase the population far exceeds the ability of the environment to support it. The higher the number of caribou and the longer these numbers persist, the longer the recovery will be when the range recovers after the next Red Phase. During this phase, heavy harvest pressure could reduce the period to the next *increasing* and *high* phase.

Orange Phase:

Caribou abundance declines rapidly during this declining phase. Calf production and adult survival decline. The last Orange Phase spanned 10-15 years from about 2000-2010. Harvest in the early part of this phase will hasten the decline and could extirpate animals from certain areas as the population again enters the Red Phase.

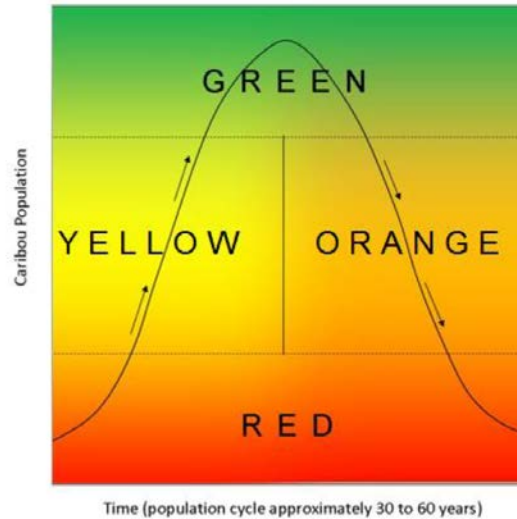


Figure 2. Population dynamics of Barren-ground caribou herds identifying *low/red, increasing/yellow, high/green* and *declining/orange* population phases (ACCWM 2014).

We collected demographic information through composition surveys from 2015-2018, that can be used to determine whether the caribou population is increasing, stable or decreasing. However, trends identified using composition survey data should be verified with additional abundance information prior to committing to specific management actions. We also lack the necessary historical data to determine what population sizes would constitute transitions between phases or to set thresholds, as has been done with other caribou herds across the Arctic (Advisory Committee for Cooperation on Wildlife Management (ACCWM) 2014, Beverly and Qamanirjuaq Caribou Management Board (BQCMB) 2005, Porcupine Caribou Management Board (PCMP) 2010). It is the intention of this plan to outline what research needs to occur for this data to be available in the future.

4.2 Distribution

Caribou are not evenly distributed across the landscape (Figure 3; Campbell et al. 2015). Barren-ground caribou tend to form distinct groups called herds, which utilize unique geographic areas that include calving grounds and migration routes and may have unique morphometric traits (Geist 1998). IQ and scientific analyses utilizing limited data suggest there may be several distinct subpopulations of caribou on Baffin Island. Available IQ and limited scientific information suggest there may be three to perhaps five distinct herds of caribou inhabiting Baffin Island. Inuit harvesters have suggested that caribou from different areas of Baffin have very different physical characteristics, and taste. Size, coloration, and eyelash length have all been cited as examples where caribou differ from one part of Baffin to another. Currently there is insufficient scientific data to delineate these populations with confidence (Campbell et al. 2015).

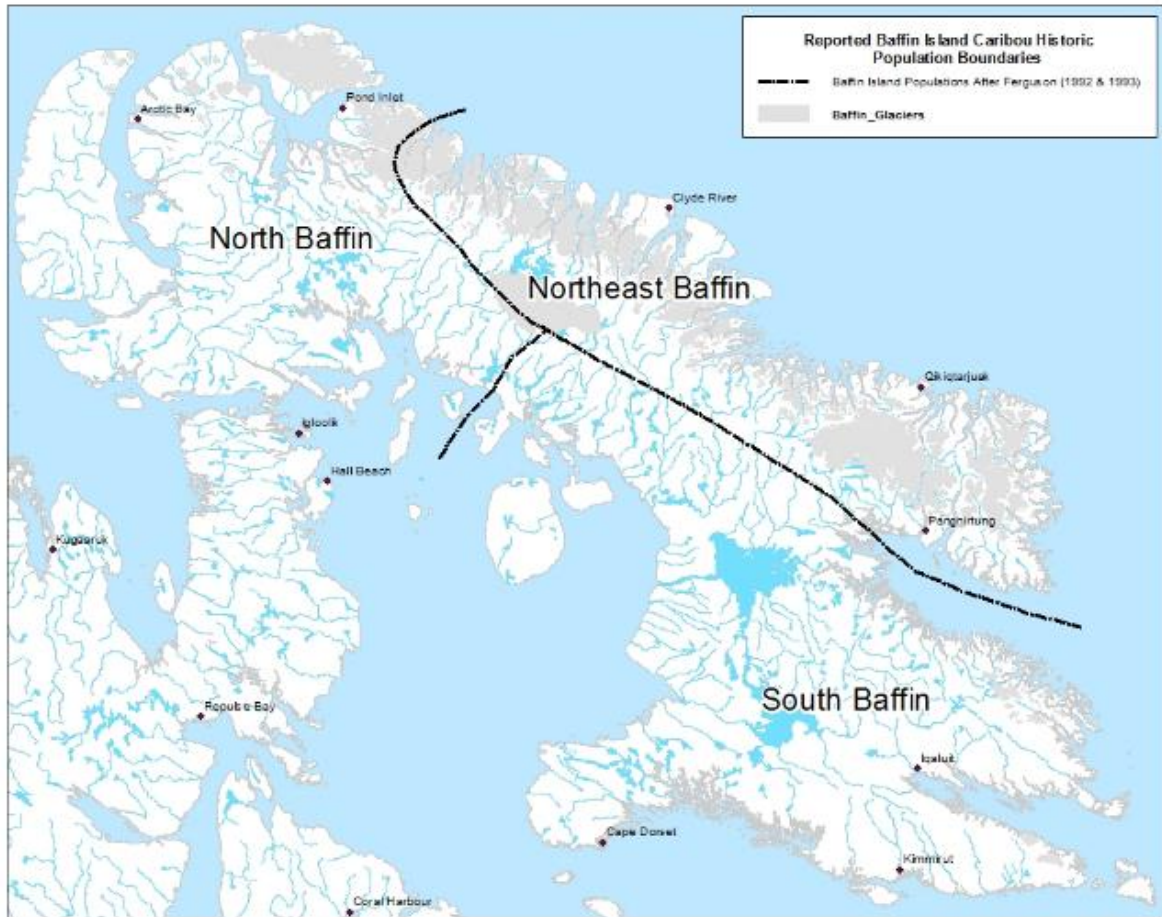


Figure 3. IQ studies with Inuit of Baffin Island in the early 1990s by Ferguson (1993) provided three regional caribou groupings or geographic areas.

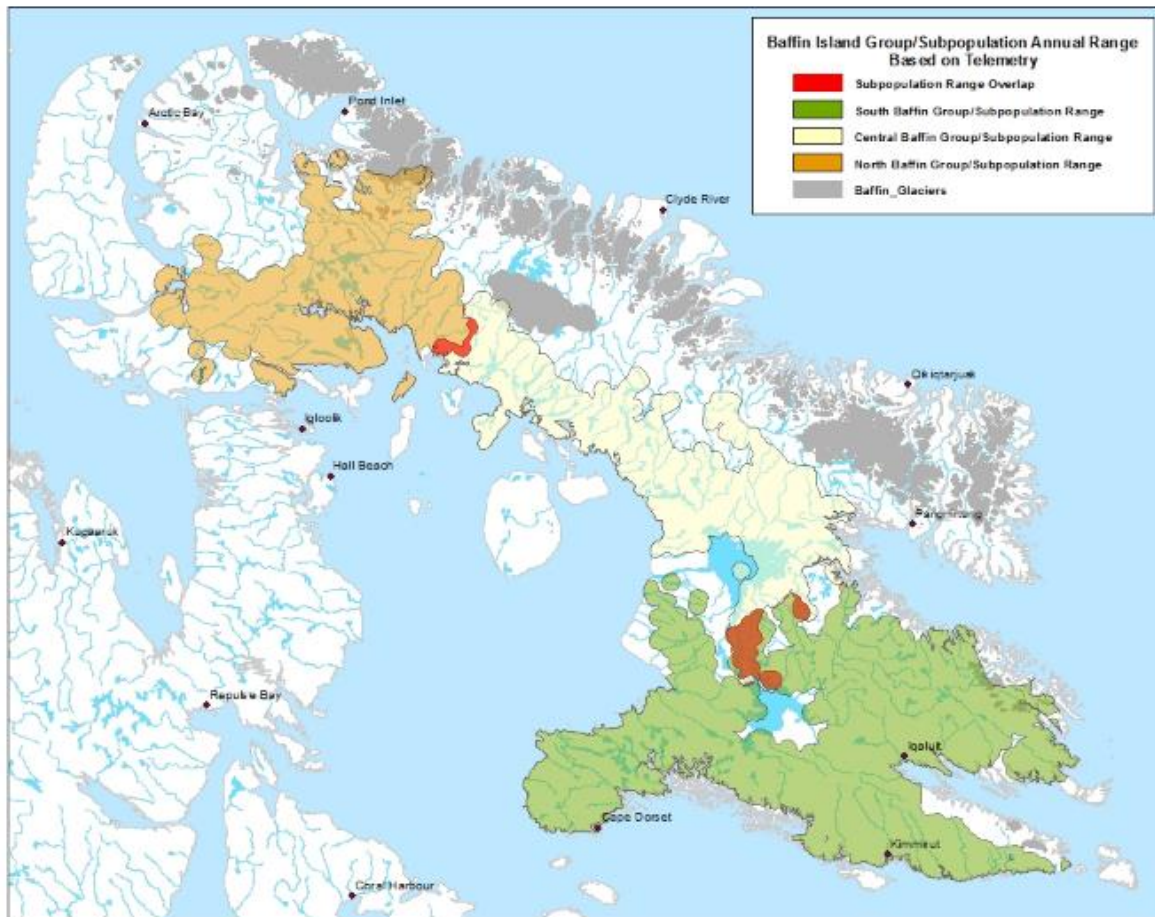


Figure 4. Caribou Group/Subpopulation annual range delineation based on telemetry studies from 1987 to 1994 (primarily South Baffin), and 2008 to 2011 (North Baffin) (Campbell et al. 2015). For a detailed description of methods used to produce this preliminary separation of Baffin caribou see Campbell et al. (2015).

4.3 Current Status

Baffin caribou are currently in the Red Phase (2018). In the early 2000's, IQ gathered from hunters across Baffin suggested the caribou had suffered a severe decline from the 1990's. Due to the apparent decline reported by hunters across Baffin, a study was designed incorporating IQ and the first population estimate of the whole of Baffin caribou range was completed in February and March 2014. As of March 2014 there were 4,652 (3,462 to 6,250; 95% CI) caribou on Baffin Island, including the nearby Prince Charles Island in Foxe Basin. Most of these caribou are concentrated in south Baffin and Prince Charles Island (Table 1; Figure 5; Campbell et al. 2015). This corresponds to a population decline of more than 95% based on the 1991 qualitative estimate derived from IQ (Ferguson 1998). As of March 2014 there were 159 - 622 (95% CI) caribou in North Baffin (Table 1; Figure 4). Caribou in this region are particularly vulnerable to extirpation.

Table 1. Estimates of caribou abundance by survey area (*Figure 5*) from the February and March 2014 Baffin Island survey.

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

Although there is widespread agreement amongst Inuit hunters and scientists that there are much fewer caribou on Baffin now than in the 1990s, what happened to them remains a matter of debate. Many Inuit that were consulted during the 2013 DOE Baffin caribou IQ research study (hunter-elder survey) and community public opinion poll, and the 2012-2015 community and HTO consultations believe that caribou numbers have not actually declined as scientists believe. Instead, they believe that the caribou have moved somewhere else, either far away or into the mountains (DOE 2015, Kotierk 2015a, Kotierk 2015b). Most believe that the bulk of the reduction in caribou numbers was caused by a mass migration onto the mainland via the Melville Peninsula. For this reason the Melville Peninsula was included in the 2014 Baffin caribou aerial survey (Figure 5). The most recent data suggests that caribou numbers have also declined on the mainland, though to a lesser extent than on Baffin. Recent genetic analyses suggest Melville caribou are genetically separated from Baffin caribou which are genetically uniform. Whether the caribou moved or have declined, what happens to the ones that remain is the focus of the BICMP.

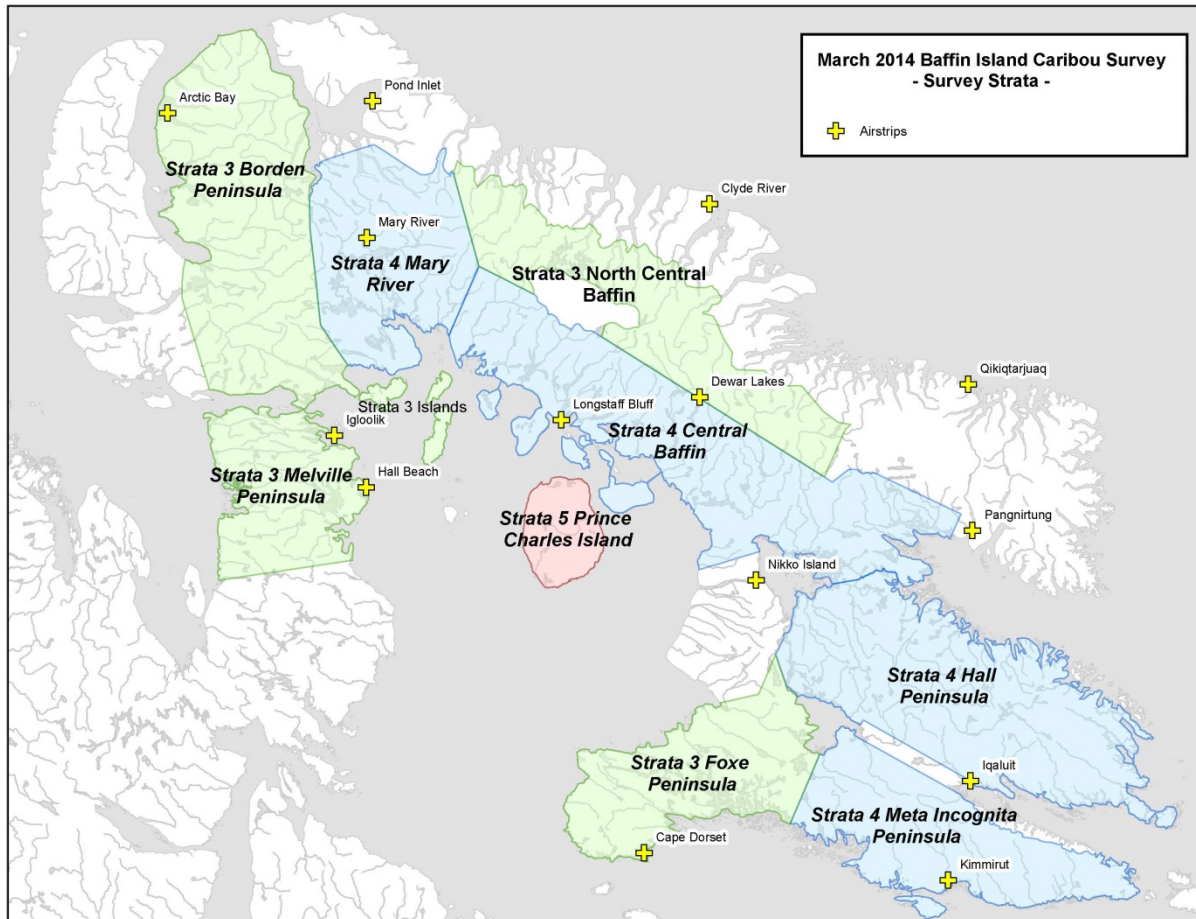


Figure 5. Survey Areas for the Baffin Island Caribou Survey – March 2014 corresponding to population and sustainable harvest estimates.

5.0 Harvest

5.1 Harvest Management

Caribou are important for cultural use and subsistence in Nunavut and have been harvested by Inuit for the last 1000 years (Stenton 1991). Ten Qikiqtaaluk communities and roughly half of all Nunavummiut rely on Baffin caribou as a source of food and traditional clothing. Human harvest could impact Baffin Island caribou populations, especially with increasing access and modern hunting techniques. If harvest, along with other forms of mortality such as predation and natural causes, surpasses calf recruitment, then population decline will result. Harvest management involves ensuring that the number of caribou hunted does not negatively affect the ability of people to harvest animals in the future, thus ensuring that Inuit can harvest caribou for the next 1000 years and beyond.

The potential impact of harvest is greater at times or in geographic areas where there are few animals. Furthermore, overharvesting in localized areas could lead to population fragmentation and added susceptibility to extreme weather events, which greatly increase the risk of extirpation. The extirpation of caribou by overharvesting has occurred previously on Southampton Island (Coral Harbour Hunters and Trappers Organization and Nunavut Department of Environment 2011; MacPherson and Manning,

1967). Consideration should be given to distributing harvest in proportion to available caribou, ideally for each distinct herd as herds become further delineated with ongoing research.

Harvest can occur and can even be encouraged at a sustainable level depending on what phase of the caribou population cycle is occurring. Harvest rates are set to ensure that harvest does not cause a decline in Baffin caribou and does not inhibit repopulation out of the current low phase. Harvest management could include management tools such as: Total Allowable Harvest (TAH), moratoriums, harvest management units (MUs), Non Quota Limitations (NQLs), and seasonal restrictions. Implementing a TAH means restricting the number of caribou harvested, while NQLs restrict where and/or what kind of caribou (e.g. cows, bulls during the rut, etc.) can be harvested. The maximum sustainable harvest for Barren-ground caribou populations used in the BICMP match our current understanding of caribou ecology and is based on empirical data and demographic modeling for Barren-ground caribou herds (see for example: Alaska Department of Fish and Game 2001; Porcupine Caribou Management Board 2010). A sustainable harvest level for caribou populations is 0-3% (bulls only) depending on population trajectory (decreasing, stable, or increasing). Higher level harvests can be sustained if there is little to no predation and rapid population growth; however this would increase risk and require intensive monitoring to ensure sustainability. Each cow harvested in the population is equivalent to approximately 3 bulls; therefore, a sustainable mixed harvest would need to be proportionately lower. Harvest should be restricted in accordance with the Nunavut Land Claims Agreement (NLCA), giving preferential and last harvesting rights to Inuit Beneficiaries (NLCA 1993). Non-beneficiary harvesting will be residual to the achievement of Basic Needs Level harvest, as determined by NWMB in consultation with NTI, QWB, HTOs and DOE (article 5.1.3 (a) (i) and (ii), NLCA 1993).

Harvest equal to the population growth rate will prevent any population recovery. Any harvest that occurs during in the *Red* or *Yellow Phase* will mean it will take longer for the population to recover. Harvest can be unrestricted and even encouraged in the later *Yellow* and *Green Phases*.

5.2 Current Status

The cause for the recent *Orange Phase* caribou decline (2000-2010) is likely a combination of factors (described in 4.1 *Abundance*) and is not assumed to be the direct result of overharvest. However, overharvesting when there are so few animals may lead to further decline and possibly even extirpation of this population. At the very least, overharvest will restrict the capacity of the caribou population to increase as range conditions improve. The impact of harvest will be more or less significant depending on the population trajectory (decreasing, stable, and increasing). If calf recruitment and survival are high then a higher harvest level can be sustained. However, we do not know if Baffin caribou are currently increasing or decreasing because we do not have sufficient recent demographic data. Multiple years of demographic data are needed to establish what the trend is for this population.

Until recently there has been no mechanism by which DOE could collect reliable harvest information, and no reliable harvest statistics exist. However, effective in 2015, the Minister of Environment accepted a decision by the NWMB to allow a limited harvest of 250 bull caribou including mandatory reporting. Future harvest management decisions will be made through the NWMB and NLCA process, which includes opportunities for input by interested public, communities and co-management partners.

6.0 Monitoring

Sound management is not possible without information. Uninformed management will risk further decline, prevent recovery and possibly lead to the extirpation of caribou from Baffin Island. Successfully

managed caribou populations require a multitude of information, including harvest levels, caribou abundance, population trend and range status (Table 2). For the sake of brevity and clarity, monitoring methodologies are not explained in detail in the BICMP (methodological references can be found in GN project reports).

6.1 Community Involvement in Monitoring

All monitoring activities undertaken by DOE involve participation by community members and regional HTOs (*see for example* Campbell et al. 2015; Goorts 2014; Jenkins et al. 2012; Jenkins and Goorts 2012; Nunavut Department of Environment 2013). This includes a) scoping and design of surveys, b) consultation and consideration of the cultural and ethical appropriateness of study techniques and c) involvement in research activities through Inuit expertise and direct employment as per the guidelines in the NLCA (article 5.1.6, NLCA 1993).

6.2 Inuit Qaujimajatuqangit

Inuit Qaujimajatuqangit (IQ) is the system of values, beliefs and knowledge gained through living and hunting on the land over many generations. The Government of Nunavut DOE mandate is to collect and utilize IQ alongside scientific data. DOE conducted IQ research on Baffin caribou in 2013. This was comprised of hunter-elder traditional knowledge (TK) interviews and public opinion poll surveys in the various Baffin communities (Kotierk 2015a, Kotierk 2015b). DOE considers IQ and science together when making management recommendations (NLCA article 5). IQ is also collected during project consultations and has helped inform scientific study design on numerous occasions. IQ is an important component for designing studies, and observations made by local harvesters provides valuable information on the status, distribution and behaviour of Baffin caribou.

6.3 Harvest Reporting

Quantifying the number of animals being harvested is important in all management phases, but essential when the population is low. Our understanding of harvest is crucial to sound management. The sex and age of harvested animals is important, as mortality of cows and calves may have a significant role in herd dynamics. Not knowing harvest levels severely hampers modeling and management efforts. There are several ways that caribou harvest can be quantified, but the most reliable method is mandatory reporting through a tag system, which is recommended herein and elsewhere (Rettie 2010).

6.4 Herd Status

There are many methods to help us better understand the status of Baffin caribou. Some methods provide one piece of information while others can provide many different kinds of information. In order to prioritize these approaches it is necessary to balance the effort with the amount and type of information gained (Table 2). Overall, collaring is the single most effective research tool to study caribou (Table 2).

6.4.1 Population Size, Demographics, and Rate of Change

The primary pieces of information required to successfully manage caribou are the number of animals and the demographics within a population (Northwest Territories Department of Environment and Natural Resources 2011). With these values we can calculate the rate of increase of the population and predict the population size a few years into the future. Knowing

how many calves are recruited will allow us to make an assessment of the sustainable level of harvest. However to be certain, we also require periodic estimates of cow survival.

6.4.2 Herd Delineation

Most Barren-ground caribou are managed as socially distinct units or herds which share seasonal range distributions. We do not currently know if all Baffin caribou form distinct herds or how many herds of caribou occur on Baffin Island. Both available IQ and Scientific information suggest that separate herds exist on Baffin Island, however there is currently insufficient data to delineate them with confidence (Campbell et al. 2015). Recent genetic analyses indicate there is minimal gene flow between Melville Peninsula and Baffin Island suggesting that Baffin caribou are unique from the mainland herds. These results also indicate that there is no genetic difference between caribou in North and South Baffin. Delineating separate herds of caribou on Baffin Island is necessary for the long-term success of any harvest management program (Northwest Territories Department of Environment and Natural Resources 2011). Managing Baffin caribou as one herd, when there are in fact separate herds, risks extirpating unique herds.

6.4.3 Health

Health refers to the condition of the individual animals within the herd, which is indicative of range condition, disease prevalence and population age structure. The health and condition of caribou can affect productivity and survival of caribou. Knowledge of the health status of caribou on Baffin Island will add to our understanding of the mechanisms of population decline and other health related obstacles that may hinder recovery of the caribou population. Protocols for standardized health and body condition monitoring are available (CARMA 2008). Overall, it is important to identify the causes of decreased condition so that managers may predict the overall effects on the herd and manage appropriately.

6.5 Range

Caribou have minimum habitat requirements necessary in order for them to survive and ultimately, the status of this habitat greatly impacts whether a population increases or decreases. Key habitat areas vary by season and the specific requirements of different life history stages from calving to overwintering. Inuit Elders have referred to areas in which caribou remain when they are absent everywhere else during population lows as “Special Areas” (Ferguson 1998), and these can be more fully designated through the implementation of the BICMP’s research and monitoring (Table 3). While calving ranges are important for population recruitment winter ranges may be the limiting factor for these barren-ground caribou, a time of year when they are most energetically taxed and forage is less accessible and of lower quality (Ferguson et al. 2001). Understanding habitat selection is critical to assess the impacts of disturbance and to identify critical habitats that caribou take refuge in when range condition is highly degraded. Along with IQ, habitat selection requires good caribou use information from a satellite collaring program and accurate habitat maps (Table 2).

6.6 Human Disturbance

Resource exploration and development has been on the rise in recent years across Northern Canada. A number of these developments currently exist on Baffin Island. The potential for mining/industrial activities and infrastructure to negatively impact caribou is a concern amongst Baffin communities and wildlife managers. Impacts to caribou could include, but are not limited to: increased levels of stress and energy expenditures associated with sensory disturbances, physical barriers to movement or alterations to movement patterns, habitat destruction and degradation, abandonment or avoidance of certain areas, and increased levels of harvesting. Other human disturbances such as aircraft-over flights and recreational activities may also impact caribou. Overall these disturbances have the potential to negatively influence movement and habitat use, and could act cumulatively to impact caribou condition, recruitment and health. Understanding the effects and the threshold levels of disturbance to caribou will be important to evaluate the impacts of development. This will require a thorough research program to understand the baseline condition of Baffin caribou.

6.7 Predation

Predators have the ability to limit the growth of caribou populations, and various predator-prey relationships are possible. Wolves are the primary predators of caribou on Baffin Island and have probably had a modulating effect on the population through time. Studying the wolf population and monitoring wolf-caribou interactions would provide insight into what role wolves play in the cycling of caribou on Baffin. Although wolves eat several other species, including Arctic Hare and various seals, their primary prey are ungulates. There are no Muskox on Baffin and currently very few caribou so the wolf population is likely extremely low and subsequently difficult to study (none were seen on the 2014 survey). Incidental observations of wolves by hunters could provide an early warning system of increasing wolf numbers or activity which could then signal the need for further study.

Table 2. Scientific methods used to determine the status of caribou harvest, caribou habitat and caribou herds and the inferences we can make using data from these methods.

Monitoring Activity	Population Estimate	Population Trajectory	Sustainable Harvest Level	Migration	Population Delineation	Habitat Selection	Animal Health	Harvest Rate	Range condition
Satellite Collaring	X*	X*	X*	X	X	X*	X	X	
Composition Survey	X*	X	X						
Population Size Survey	X	X*	X						
Landscape Genetics Study					X*				
Health Monitoring							X		
Range Classification						X*			X
Harvest Study		X*	X*					X	

* Only in some cases or when coupled to other data or over multiple years

6.8 Current Status

A thorough review and reanalyses of historical research conducted on Baffin caribou can be found in Campbell et al. (2015). Early scientific surveys (1940-1970) failed to provide reliable population estimates due to limited coverage and unsophisticated survey methods. In 2012, DOE conducted a survey of Southern Baffin Island and generated an estimate of 1,555-3,093 (95% CI; Jenkins et al. 2012; *revised estimate from* Campbell et al. 2015). In February and March 2014, the first Baffin Island-wide caribou aerial survey was completed using multiple aircraft and the Distance-Double Observer Pair Platform technique (Boulanger et al. 2014). Local Hunters and Trappers Organizations (HTOs) were involved in the planning of the aerial survey and in its implementation. Data from this survey formed the basis of the first scientifically rigorous population estimate for Baffin Island caribou (Table 1; Campbell et al. 2015). Similar island-wide surveys will be necessary in the future to determine whether the population size has changed.

While scientific research continues, more information will be needed to sufficiently inform the BICMP on herd delineation, migration routes, calving grounds, and habitat affiliations. Collaring of caribou was conducted in North Baffin from 2008-2011 and in South Baffin from 1987-1994, with a total of 102 collars deployed. While this number may seem large, it is insufficient to determine with confidence the spatial affiliations of Baffin caribou, given the huge extent and timescale (Campbell et al. 2015). While data to determine herd delineation needs to be expanded, data from 2008-2011 and 1987-1994 collaring indicates some seasonal movements within North and South Baffin. A continuation of a multi-year collaring program during decadal periods of both high and low population regimes with collars deployed across Baffin will be required to accurately delineate caribou sub groups, determine habitat use, and seasonal distributions.

A caribou Health Monitoring program was conducted on Baffin Island between 2012 and 2014 (Goorts 2014). This program, based on CARMA protocols, involved hunters bringing in samples, which were then prepared and sent to labs for analyses. A program similar to this should be instituted whenever caribou harvest is permitted and sufficient capacity exists to process samples in order to provide information on disease and parasite prevalence.

Composition surveys were conducted on Baffin Island from in spring and/or fall from 2015 to 2018. There are many key pieces of information required to ensure the successful recovery of caribou on Baffin Island. These include; 1) The total harvest between the 2014 population estimate and the 2018 spring composition survey (legal and illegal), 2) Multiple concurrent estimates of overwinter survival, 3) Average recruitment for the different sampling areas, 4) Overall health of caribou. Baffin caribou cannot be confidently managed until the missing information is collected and the composition survey results and associated trends can be verified. This information is imperative to determine what level of harvest is sustainable for caribou on Baffin Island. Demographic composition surveys should be conducted on a yearly basis to monitor calf recruitment and also to model changes to the population size between island-wide population estimates. It is very important that we begin regular systematic monitoring of this herd in order to effectively manage Baffin Island Caribou for the future.

7.0 References

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Appendix 1: 2019-2024 Baffin Caribou Action Plan

2014/2015 Management Action

The March 2014 caribou survey confirmed that there are extremely low caribou numbers on Baffin Island necessitating immediate management action to prevent human harvest from causing further decline. In November 2014, the Department of Environment (DOE) recommended immediate management action to the Nunavut Wildlife Management Board (NWMB) in order to minimize the imminent risk to the caribou population due to low numbers and relatively high harvest. The NWMB started the co-management consultation process with a public hearing planned for March 2015 and suggested that the Minister of Environment take any action necessary in the interim to ensure that caribou are not extirpated from Baffin Island. In December 2014, by interim order of the Minister, a moratorium on all harvest of Baffin caribou was announced due to urgent and unusual circumstances. The order came into effect in January 2015. In March 2015, NWMB held a public hearing to garner input on Baffin caribou management and to consider recommendations by members of the public, as well as Baffin HTOs, QWB, NTI, DOE and PC. In June 2015, the NWMB decided to replace the moratorium with a harvest of 250 bull caribou, to be followed by a review upon receipt of the results of the first survey.

On August 21st, 2015, the Minister signed a Baffin Island Caribou Total Allowable Harvest Order thereby removing the harvest moratorium. A limited harvest of 250 male caribou was permitted on Baffin Island. By a decision of the QWB, the allowable harvest was allocated evenly among the eight Baffin Island communities (30 tags/community), with an additional 10 tags provided to Igloolik and no tags in the current year provided to Hall Beach.

Recommendations

Management Action Plan

Any managed harvest should correspond to the guidelines explained in section 5.1 *Harvest Management*. By conducting the research suggested in the BICMP the GN will be able to confidently recommend management actions, such as adjustments to percent harvest or tag allocation. The issue of harvest pressure can be addressed through various management actions such as TAH, non-quota limitations (e.g. bull only harvest), time and area closures and other restricted access measures when and where caribou are particularly vulnerable. Any allocation of harvest should be adjusted by the estimated harvest since the 2014, or more recent, caribou survey. Any harvest that is above the population growth rate will cause further decline. Harvest equal to the population growth rate will prevent any population recovery.

Monitoring Action Plan

Inuit Qaujimajatuqangit and science will be used together in decision making for Baffin caribou management. Inuit Qaujimajatuqangit research on Baffin caribou (DOE 2015a, 2015b; Kotierk 2015a, 2015b; Ferguson et al. 1998) has been considered in the BICMP. We cannot manage what we do not know, and relative to most Barren-ground caribou there is a need for more scientific information regarding Baffin Island caribou. There is similarly limited documentation of Inuit Qaujimajatuqangit in a usable format for management purposes. What information is available is largely anecdotal and was collected over a long time period, with varying caribou densities and habitat quality. If we monitor 1) harvest, 2) the status of Baffin caribou and 3) their range we will be more able to manage harvest appropriately. Overall, a thorough scientific monitoring program for Baffin caribou would include regular

population estimates, yearly demographic surveys and a continuous collaring program (Table A1). This would be coupled to an ongoing landscape genetics program and hunter harvest caribou health monitoring program (Table A1). A harvest monitoring program needs to be instituted for Baffin caribou for all harvest management regimes. Mandatory harvest reporting is by far the most effective and least complicated method available (Table A1).

Table A1. Proposed caribou monitoring activities and information gained for the next five years. All activities are subject to budget constraints and HTO/community review and input. Note population estimates are expensive and GN may not be able to commit to a five year (ten year with certainty) interval for budgetary reasons.

Activity	Implementation Schedule				
	2019/2020	2020/2021	2021/2022	2022/2023	2023/2024
Collaring program		X	X	X	X
Composition Survey	X	X	X	X	
Landscape Genetics	X	X			
Health Monitoring			X	X	X
Range Classification		X	X		
Population Estimate Survey					X
Harvest Study			X	X	X

Appendix 2: Legislative Background and Context

The Baffin Island Caribou Management Plan accords with and is supported by legislation as follows: the Canada Nunavut Act (CNA), the Nunavut Land Claims Agreement (NLCA), and the Nunavut Wildlife Act.

In Article 5 of the Nunavut Land Claims Agreement principles, objectives and values of Nunavut are outlined with respect to Inuit harvesting rights in concert with the conservation and management objectives of the NLCA for wildlife and the environment. For clarification, some important Article 5 excerpts relevant to the BICMP include:

Principles

- 5.1.1 a) “species” means any particular species or any distinct sub-group within a species such as a stock or population;
- 5.1.2 e) there is a need for an effective system of wildlife management that complements Inuit harvesting rights and priorities, and recognizes Inuit systems of wildlife management that contribute to the conservation of wildlife and protection of wildlife habitat
- 5.1.2 f) there is a need for systems of wildlife management and land management that provide optimum protection to the renewable resource economy
- 5.1.2 g) the wildlife management system and the exercise of Inuit harvesting rights are governed by and subject to the principles of conservation
- 5.1.2 i) Government retains the ultimate responsibility for wildlife management.

Conservation

- 5.1.5 The principles of conservation are:
 - c) the maintenance of vital, healthy, wildlife populations capable of sustaining harvesting needs as defined in this Article; and
 - d) the restoration and revitalization of depleted populations of wildlife and wildlife habitat.

Total Allowable Harvest

- 5.6.16 Subject to the terms of this Article, the NWMB shall have sole authority to establish, modify or remove, from time to time and as circumstances require, levels of total allowable harvest or harvesting in the Nunavut Settlement Area.
- 5.6.17 A total allowable harvest of a stock or population may be expressed in numbers...a) ...in terms of a community total allowable harvest, and...b) ...in terms of a regional total allowable harvest.
- 5.6.20 The basic needs level shall constitute the first demand on the total allowable harvest. Where the total allowable harvest is equal to or less than the basic needs level, Inuit shall have the right to the entire total allowable harvest.

With reference to the Wildlife Act, the BICMP incorporates the precautionary principle as applied to the conservation and management of Baffin caribou.

As a management plan under the purview of the Nunavut Wildlife Management Board (the main instrument for wildlife management in Nunavut (NLCA)), the BICMP also needs to conform to territorial, national and international obligations of Nunavut on biodiversity. This national and international obligation for Nunavut to conserve biodiversity at the herd, “stock”, “distinct sub-group” or “population” level arises from the Canada Nunavut Act and the federal responsibilities for conservation of biodiversity conveyed therein upon Nunavut. This includes the requirement for conformity of the

BICMP with the Canadian Biodiversity Strategy arising from Canada's signatory commitment to the United Nations Convention on Biodiversity.