

NWRT Final Report

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Project Title: South Baffin Composition Survey

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Summary:

Barren-ground caribou (*Rangifer tarandus groenlandicus*) occur across Baffin Island and are distributed roughly into north, south and central groupings across Baffin, and ancillary Islands. Local hunters, trappers, and community members began to suspect a decline in the Baffin Island caribou population in the mid to late 1990s. In February and March of 2014, the Government of Nunavut, Department of Environment (DOE), conducted aerial surveys on Baffin Island, Melville Peninsula and surrounding islands, to estimate the number of caribou on Baffin Island. The 2014 survey effort estimated 4,652 (95%CI=3,462-6,250; SE=702.79; CV=0.15) adult and yearling caribou across Baffin Island and ancillary islands. This finding confirmed a major decline of caribou on Baffin Island from the estimates of caribou in the 1990s based on Inuit Qaujimagatuqangit.

The 2014 survey results and community-based observations led to the establishment of an eight-month moratorium beginning on January 1, 2015. Following a round of intensive consultations with all Baffin Island communities, and a letter submitted for decision to the NWMB, recommending the establishment of a TAH of caribou be established on Baffin Island, a decision was reached to establish a Total Allowable Harvest (TAH) of 250 male caribou. In 2022 the Nunavut Wildlife Management Board (NWMB) implemented an increase to the TAH from 250 to 350 for the 2022-2023 harvest season and increases of 50 each year for the next year 8 years or until there new information available.

In the spring of 2022, we classified 2,641 caribou (bulls, cows, yearlings, and calves) in south Baffin Island, respectively. Calf:cow ratios for south Baffin varied from the lowest ratio of 49 calves:100 cows on Hall Peninsula to the highest ratio of 61 calves:100 cows on Loks Land, suggesting good productivity in south Baffin in the spring of 2022. All regions combined or separated, produced ratios within or above the suggested 30 calves per 100 cow baseline for taiga-wintering populations. However, there is risk associated with using baseline values from taiga-wintering populations to identify population trend in tundra-wintering caribou. A potential distributional shift was observed that has not been previously documented during these surveys. There appeared to be an eastward shift in distribution on the Meta Incognita Peninsula based on the presence of fresh tracks.

Project Objectives:

Since the 2014 survey the DOE has conducted fall and/or spring aerial composition surveys from 2015-2022, excluding spring of 2020, as a means to monitor productivity and relative densities of caribou across Baffin Island. The objectives of these monitoring indices were to:

- 1) Estimate the overall composition of the subpopulations, including the north Baffin grouping, south Baffin grouping, and central Baffin grouping (Figure 1); i.e. what proportion of the population are young bulls, old bulls, cows, yearlings, and calves.
- 2) Estimate the trajectory of abundance 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 the current population trend through demographic modeling, utilizing all demographic composition data to project a trend from the 2014 population estimate.
- 5) Provide information for discussions regarding management actions (including TAH) and monitoring plans and intensity.

Materials and Methods:

Surveys were conducted in the spring of 2022 (March 19-April 8) on Baffin Island, Nunavut. Weather and logistical constraints limited the extent of surveying to key areas where a greater chance of caribou encounters were suspected based on past telemetry studies, surveys, and IQ for the spring season (Figure 2). Surveys were conducted using a Eurocopter AS350 B2 rotary wing aircraft, and a survey crew consisting of a biologist, two observers, and a pilot. Study areas were selected based on previous aerial surveys and telemetry programs, and information gathered from hunters from each of the Baffin communities during consultations conducted in 2012, 2013, 2014, and 2015 (DOE 2013, 2014, 2015a, 2015b; Jenkins and Goorts 2013). Study areas were surveyed using two to three transects evenly spaced, bisecting appropriate habitat, or until tracks were observed. The method relied on tracking groups and/or individual caribou until they were sighted; however, visual sighting methods were used when tracking was either difficult or not possible. Once tracks were observed, they were followed until the group was located. Once a group was located and individuals identified, transects through the study area would be tightened up to 1 to 2 km apart to take advantage of clustering behaviour observed during previous survey and tracking studies where many caribou groups were observed in small geographic clusters during late winter and spring.

Once sighted, caribou would be classified into 5 categories; 1) Cow (based on the presence of a visible vulva patch), 2) Calf (based on body characteristics), 3) Yearling (based on body characteristics), 4) Mature Bull (based on absence of vulva patch, body characteristics and antler size) and 5) Young Bull (based on absence of vulva patch, body characteristics and antler size). When possible, image stabilizing binoculars were used to reduce approach distances as much as possible to limit disturbance to animals. In cases where groups could not be located due to fuel and/or weather-related issues, and where time allowed, tracking was resumed the following day or after refuelling, where possible.

Observations were recorded by hand and waypoints taken for each group using a Garmin 78S. Daily flight track logs were recorded using a Garmin 78s and a Garmin Montana 610 (as a backup). Priority was given to cow and calf observations; however, bulls were recorded when possible. Although preference was given to caribou observations, predators were documented when observed.

Results:

We flew a total of 67.6 hours in South Baffin from March 19-April 8, 2022 (Table 2). Substantial weather delays were encountered during the survey period which reduced the overall flyable hours due to cost implications of non-flying days. The crew consisted of John Ringrose (GN- Wildlife Biologist), Jason Aliqatuqtuq (GN-Director of Wildlife Operations) and an HTO selected observer. The aircraft used was an A-Star B2 helicopter piloted by Glen Sibbeston (March 19-21) or Francis Mathieu (March 29-April 8) of Panorama helicopters. Flights were focused in similar locations to previous spring and fall surveys (Figure 2).

Survey dates, flight hours and conditions

Table 2. Survey dates and general flight locations in South Baffin during spring composition surveys in 2022

Date	Location (general)	Flight Hours
<i>South Baffin</i>		
March 19, 2022	Markham Bay	7.4
March 20, 2022	Lower Mckeand River	7
March 21, 2022	Iqaluit local/ Hall Peninsula	3
March 29, 2022	Iqaluit local/Meta Incognita Peninsula	3.2
March 30, 2022	Weather Day	0
March 31, 2022	Weather Day	0
April 1, 2022	Weather Day	0
April 2, 2022	Iqaluit local/ Hall Peninsula	5.2
April 3, 2022	Iqaluit local/Meta Incognita Peninsula	3.2
April 4, 2022	Bond Inlet	8.6
April 5, 2022	Hall Peninsula	7.6
April 6, 2022	Upper McKeand River/ Amadjuak Lake	6.3
April 7, 2022	Meta Incognita Peninsula	9.1
April 8, 2022	Loks Land	7
<i>Total</i>		67.6

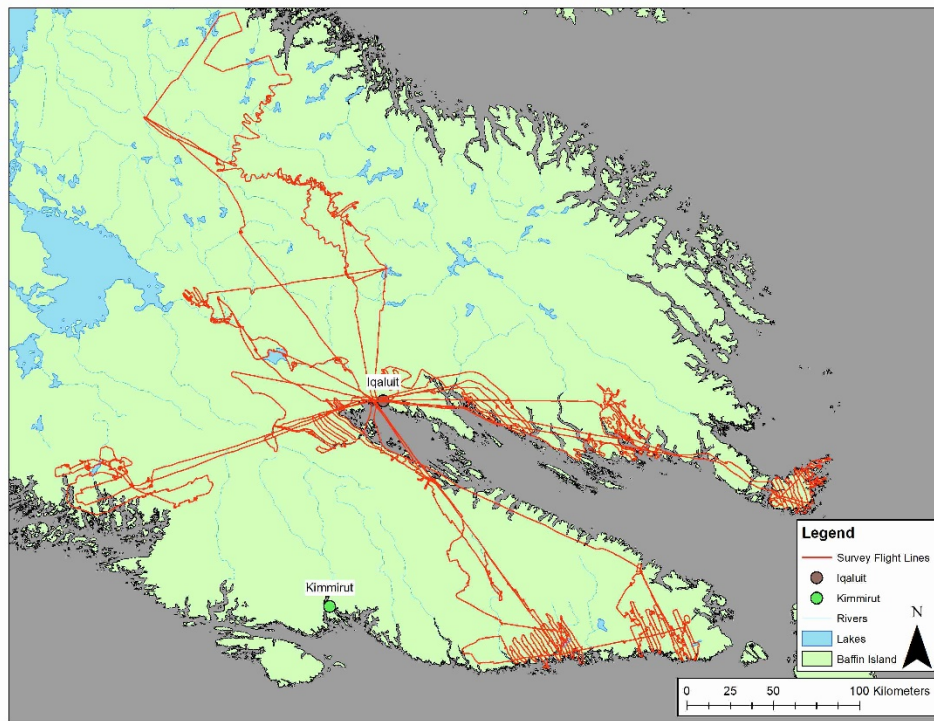


Figure 2. Composition survey flight lines in South Baffin in spring 2022.

Across the South Baffin survey area, we observed a total of 2,641 caribou (bulls, cows, yearlings and calves) (Table 3). The southern survey area was further divided into Lockland, Hall Peninsula and Meta Incognita Peninsula. The purpose of this further division was to identify regional variation in the demographics and total number of caribou observed in each area. Search effort was focused on locating cow and calf caribou and not maximizing the number of total individuals therefore the number of caribou observed is not representative of the overall population size. A conscious effort was made to leave a reasonable distance between observations from previous days to reduce the likelihood of double counts. No wolves or wolf tracks were observed.

Calf to Cow Ratio

In South Baffin, calf to cow ratios varied from 49 calves:100 cow in Hall Peninsula to 61 calves:100 cow in Loks Land. When all regions of south Baffin were combined the ratio was 54 calves:100 cow (Table 3).

Bull to cow Ratio

No bull to cow ratio was calculated for this survey due to preference given to locating calves and cows. Surveys completed in the fall are most effective in determining bull to cow ratios because of aggregation and mixing of the sexes at this time.

Table 1 Number of observed caribou by sex/age group during Baffin Island composition surveys in South and North Baffin 2022

Year	2022							
Season	Spring							
Location	North	Central	Prince Charles Island	Central Baffin + Prince Charles Island	South (Meta + Hall + Loks Land)	Meta Incognita Peninsula	Hall Peninsula	Loks Land
Calves Observed	not completed	not completed	not completed	not completed	618	376	133	242
Cows Observed					1137	686	271	451
Calves/100 Cows					54	55	49	54
Yearlings Observed					212	116	47	96
Bulls Observed					674	394	241	39
Bull + Cows					1811	1080	512	219
Adults + Yearlings Observed					2023	1196	559	268
Total Observed (Calves, Yearlings and Adults)					2641	1572	692	377
								1069

Discussion/Management Implications:

Calf to Cow Ratio

Calf ratios can be used to indicate the likely population trend and help ensure effective management actions are used during population increases or declines. Calf recruitment is an important factor in the rate and success of population growth (Boulanger and Adamczewski 2015). It is important to compare the observed calf ratios to baseline values to determine the population trajectory. There has been little research conducted on tundra wintering caribou and as a result there is no baseline value that exists for either calf:cow ratio or bull:cow ratio for this ecotype. However, we believe until a baseline is developed for Baffin Island caribou, it is reasonable to use the baselines for taiga wintering barren-ground caribou. It has been suggested that calf:cow ratios in barren-ground caribou in the Northwest Territories can be as high 70-90 at calving, 50-70 in the fall and 30-50 following winter when populations are stable or increasing (Adamczewski et al. 2009; Tobey 2001; Gunn et al 2005).

Ratios in South Baffin, whether combined or further separated by area, were above 30 calves:100 cow, with all regions except the Hall Peninsula being higher than 50 calves:100 cows which suggests a stable or increasing population. Since 2015 the calf:cow ratios in South Baffin have been

above the suggested ratio of 30 calves:100 cows including Hall Peninsula but Hall Peninsula consistently has the lowest ratios and even with increased effort we continually find similar numbers of caribou. It is unclear why the calf:cow ratio in Hall Peninsula is consistently the lowest. Although these ratios are commonly used to indicate population trend, there is an inherent amount of risk associated with using baseline values from different populations.

Calf:cow ratios can be extremely valuable to wildlife managers when combined with multiple additional sources of information such as survival rates, Cow:Calf ratios from different seasons, distribution, harvest rates and overall population change. For example, with this information the impacts of harvest and what amount of harvest a population can withstand without declining can be determined. Unfortunately, much of this information is currently unavailable for Baffin Island.

Limitations of the data

All types of wildlife surveys have limitations in their power to predict changes to abundance or long-term trends. Composition surveys are limited in their ability to predict short-term trends when multiple factors, such as increases in disease or overharvesting, are influencing the population structure. These same surveys, over the longer term can provide a useful index of population trend, offering a useful tool with which to determine the most effective timing of abundance estimates. Composition surveys on Baffin Island were separated by survey region (possible subpopulations), and without definitive delineations of subpopulations, it is higher risk to manage populations or base management decisions on trends at this scale. These types of long-term trends are more useful as an index to advise abundance survey frequency and timing. Identified trends must be taken with caution as sampling is completed within a relatively small geographic area. There are many factors that contribute to population growth and decline in addition to calf survival and demographics. Therefore, in order to accurately predict population growth or decline, it is important to use results from these surveys in conjunction with other sources of data, such as local knowledge, IQ and regular reconnaissance and abundance surveys. The impact of predation is expected to be low at this time due to the limited observations or reports of wolves from hunters.

One observation of particular interest is that in recent years, locating caribou the spring has been generally easier to find on Meta Incognita Peninsula than on Hall Peninsula. It is unclear if this reflects a distributional shift between these areas or an increase in abundance in one region and a decrease in the other. The impacts of shifts in distribution or changes in regional abundance can be identified using a combination of telemetry programs and abundance surveys.

During composition surveys this season a large-scale movement pattern was observed that has not been previously documented during these surveys. There appeared to be an eastward shift in distribution on the Meta Incognita Peninsula (Figure 3) based on the presence of fresh tracks. Three days had elapsed so it was unclear if caribou observed on April 7 originated in the Bond inlet area and were previously identified on April 4. Therefore, it is unclear whether this shift in distribution caused double counting of caribou which may ultimately cause inaccurate calf:cow ratios on the Peninsula. After this observation was made we flew to the west and back toward the Bond Inlet area and documented caribou still in this area but it was unclear what proportion if any had moved into the survey area for April 7. This type of random movement event highlights the importance of telemetry collar data and how without this data.

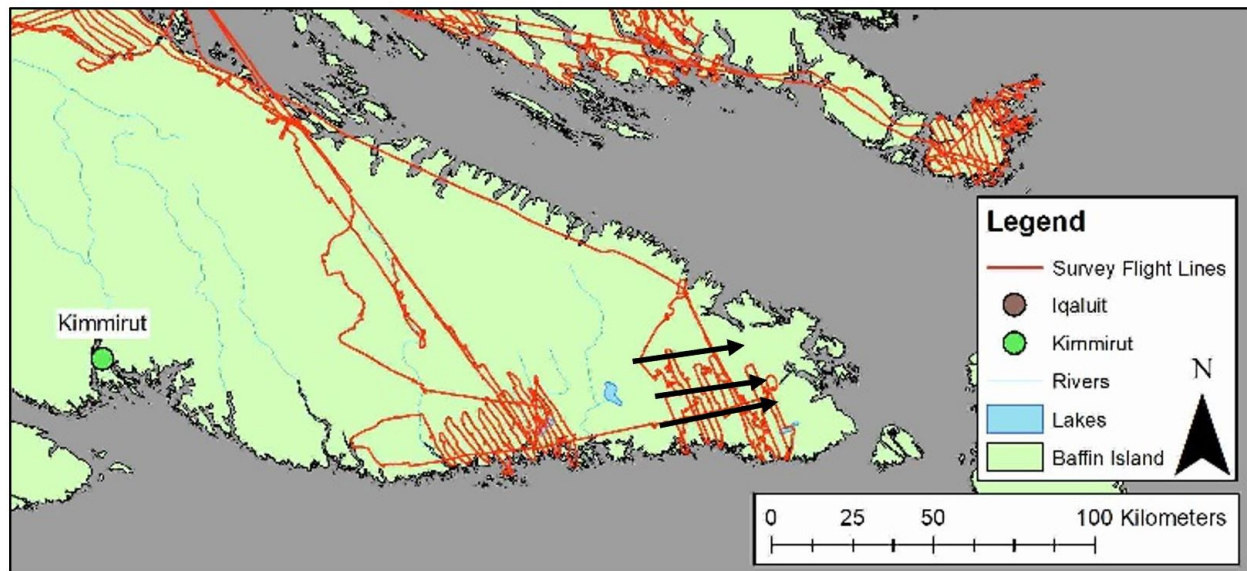


Figure 3. Composition survey flight lines in South Baffin in spring 2022. Black arrows show direction of movement determined by presence of fresh tracks.

Management implications and next steps

Long-term management of Baffin caribou relies on the active participation of all co-management partners. Current information gaps exist for Baffin caribou and are needed to ensure a quick and successful recovery. Although the GN has initiated a GPS collaring program on Baffin Island, there is a current lack of data available to identify changes in distribution. As previously mentioned, the adequacy of the observed calf:cow ratios to indicate population trend is unknown. However, the composition surveys and the information collected as a result is invaluable and adds to our knowledge of Baffin caribou. To assess the adequacy of Calf:cow ratios, results from composition surveys must be combined with the results of the next abundance survey. A second quantitative abundance estimate can be used to identify the change in abundance since the first estimate in 2014. Maintaining a consistent harvest and reporting regime between estimates and documenting calf:cow ratios will help identify the impact of harvest over this period.

Although composition survey results may indicate a stable or increasing population trend, it is important to use these results in combination with IQ, distribution data, and complete another abundance survey to validate the composition survey trends and ensure a successful population recovery is occurring. After a new abundance survey is completed an assessment can be made of the accuracy of the NWT baseline values as an indicator of calf productivity for Baffin Island. Once assessed the composition surveys may be a stronger tool that can be used for future management.

Reporting to communities/resource users:

Due to travel restrictions associated with the COVID-19 pandemic in 2020, 2021 and 2022 there were minimal in-person consultations conducted prior to this survey. In-person consultations were planned and attempted on 4 separate occasions during 2021 and early 2022 but were ultimately canceled due to logistical constraints and Covid-19 travel restrictions. We completed consultations by

teleconference and video conference prior to the spring survey and completed follow-up consultations throughout the summer of 2022.

Once finalized, this report will be provided to communities and in-person consultations are expected in the fall of 2022 and/or winter of 2023.

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