

Project #: 2-16-14

South Baffin Caribou Fall Composition/Demographic Surveys

Interim Report to the Nunavut Wildlife Management Board

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Introduction/Summary:

Based on an extensive survey of the entire Baffin Island complex in 2014 the Department of Environment estimated there were between 159 and 622 tundra wintering Barren-Ground caribou in North Baffin and between 1,777 and 4,207 in South and Central Baffin (As defined by 2014 survey- not suggesting population boundaries). Inuit Qaujimagatuqangit suggests there are currently less caribou on Baffin Island than there has been in more than 50 years. Caribou are culturally significant to Inuit and provide an important source of food and thus their persistence and recovery is vital to traditional life and food security on Baffin Island. We sought to determine ongoing fall calf recruitment as an indication of whether the caribou population is productive or unproductive. Initial findings in fall 2015 suggested high productivity with calf/100 cow ratios reaching 77 in south Baffin and 71 in central Baffin. Spring 2016 composition studies found that many calves did not make it through the 2015/16 winter season showing a drop to 22 calves/100 cows in the south Baffin and a drop to 27 calves/100 cows in the central Baffin. South Baffin calf:cow ratios between fall (October) 2015 and Oct 2016 dropped from 77 calves/100 cows to 41 calves/100 cows suggesting an overall drop in productivity over the period. This followed a TAH of 250 bulls on Baffin Island caribou which came in to effect in September 2015, though the full quota was not harvested. It is important to note that overwinter calf survival values will have to be assessed before trend indices can be hypothesized. We will require a measure of overwinter calf survival to be sure overwinter mortality is not circumventing population growth.

Objectives:

The primary objective of the 2016 fall composition study was to monitor trends in fall productivity of Baffin Island caribou to:

- 1) Determine the vigor of the population based on demographic composition; i.e. what proportion of the population are young bulls, old bulls, cows, and calves.
- 2) Determine the trajectory of productivity of the population based on the demographic composition; and with spring composition results, determine if the population is increasing or decreasing based on calf recruitment.
- 3) Build a database with which to estimate the current population trend through demographic modeling, utilizing all demographic composition data to project trend from the 2014 population estimate.
- 4) Inform on management discussions regarding current TAH levels.

Study Area:

The Baffin Island complex, incorporating all of Baffin Island and proximal islands including Prince Charles Island and excluding the areas of glaciers and ice fields, covers an estimated 543,746 square kilometers. Baffin Island is the largest Island in Canada and fifth largest Island in the world. Relief varies from expansive lowlands near sea level exemplified by the great plain of the Koukdjuak, to the mountains of the North and South Baffin reaching elevations of 1,963 meters and 2,147 meters above sea level respectively. The northeastern fifth of Baffin Island is within the Arctic Cordillera ecozone while the remainder of the Baffin Island complex is wholly within the northern arctic ecozone (**Figure 1**).

In October 2016 we surveyed two study areas on the Meta Incognita Peninsula and Hall Peninsula corresponding to the Northern Arctic ecozone (Wiken 1986) (**Figure 2**). These study areas were selected based on caribou location data from previous aerial surveys (Campbell et al. 2015; Jenkins et al. 2012), and information gathered from hunters during community and HTO consultations (DOE 2013, 2014, 2015a, 2015b; Jenkins and Goorts 2013). The final survey location was fine-tuned through meetings with HTO Board members immediately before the survey as well as with continuous input from HTO Observers during the surveys. In an effort to sample a cross section of the available caribou population as wide of a survey extent as resources allowed was sampled.

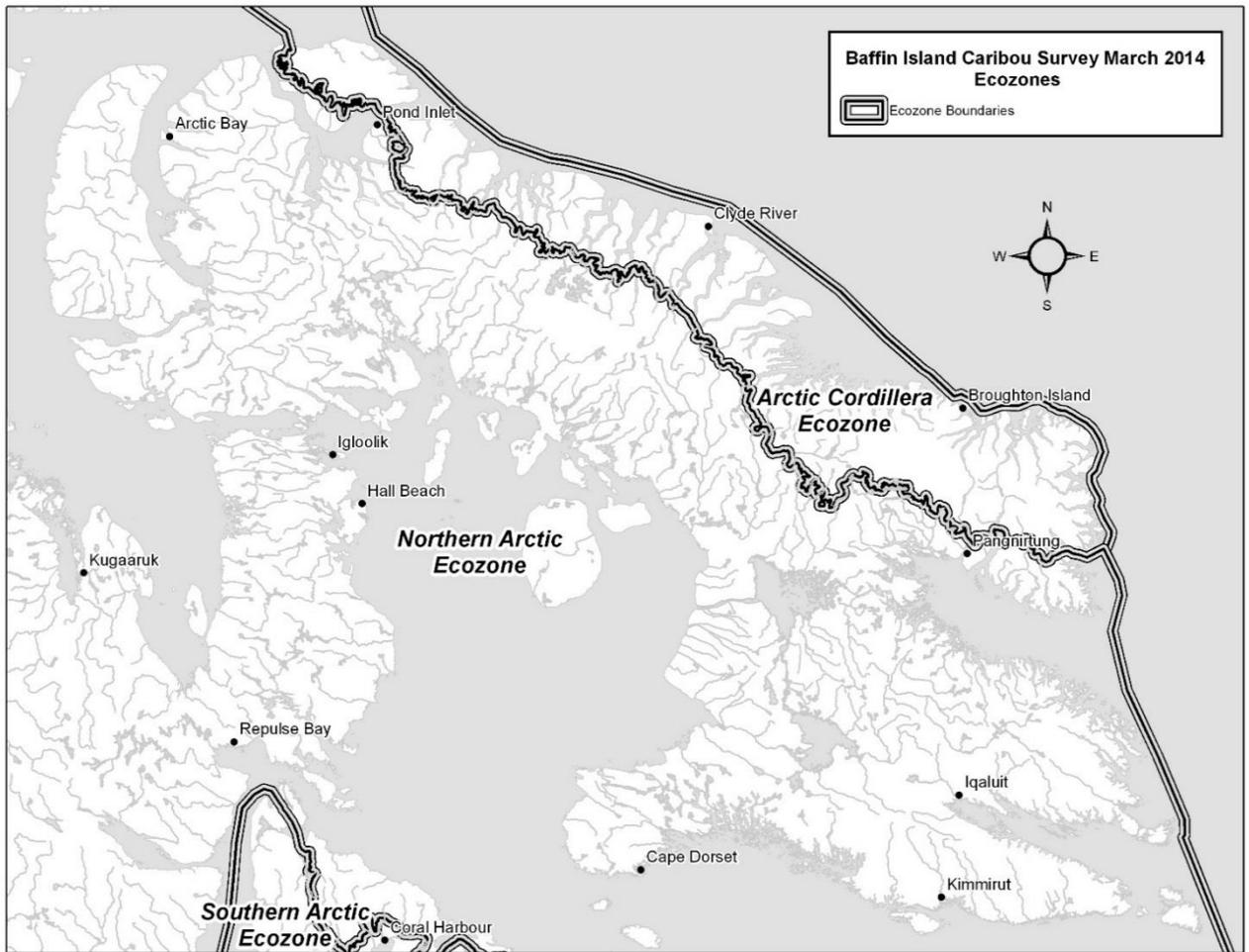


Figure 1. Ecozones of Baffin Island and proximal islands, and northern Melville Peninsula, Nunavut (after Environment Canada, 1995).

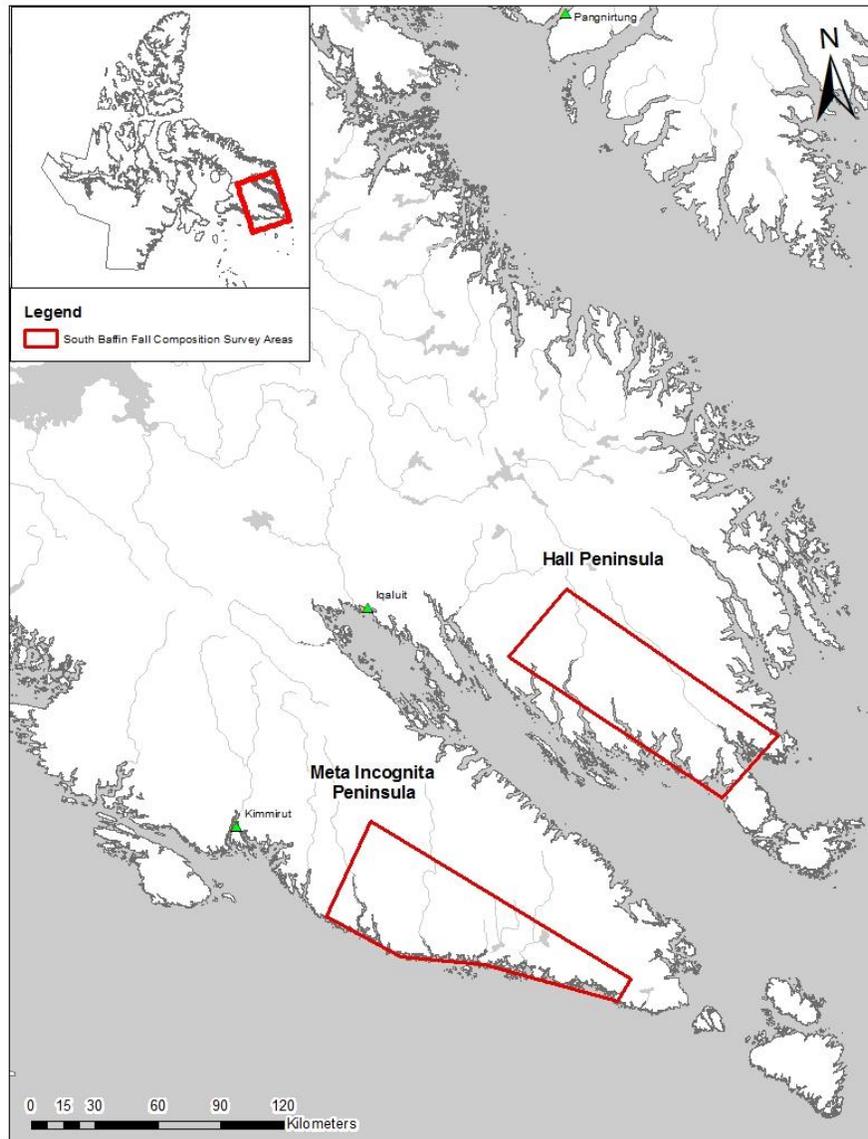


Figure 2. Target study area for fall 2015 caribou composition survey.

Methods:

In October 2016 we surveyed two study areas on the Meta Incognita Peninsula and Hall Peninsula corresponding to the Northern Arctic ecozone (Wiken 1986). These study areas were selected based on caribou location data from previous aerial surveys (Campbell et al. 2015; Jenkins et al. 2012), and information gathered from hunters during community and HTO consultations (DOE 2013, 2014, 2015a, 2015b; Jenkins and Goorts 2013). The final survey location was fine-tuned through meetings with HTO Board members immediately before the survey as well as with continuous input from HTO Observers during the surveys. In an effort to sample a cross section of the available caribou population as wide of a survey extent as resources allowed was sampled.

Using a rotary winged aircraft we flew serpentine route, high grading areas where caribou are known to occur (Gunn and Russel 2008, DOE 2016). When tracks were encountered we followed them until we found caribou with the exception of a few cases where weather or fuel shortages did not allow. When caribou were encountered we conducted a rapid low level pass of caribou groups recording caribou sex and age. Caribou were classified based on physical characteristics. Caribou were divided into 5 demographic classes including 1) cow, 2) calf, 3) yearling 4) mature bull, and 5) immature bull. Caribou locations and survey tracks were recorded using GPS.

Project Schedule:

Activity	Start Date	Completion	Status
Fall Composition	October 2016	October 2016	Complete
Report Current Status	February, 2017	February, 2017	Complete
Consultations	March 2017	Sept. 2017	On Going
Final Report	June 2017	November 2017	On Going

Preliminary Results and Discussion:

We flew a total of 73.8 hours, 47.8 of which were survey hours in the south Baffin study area (Figure 1). We covered the desired core areas of each of these study areas with approximately 10-20km between survey tracks selecting for the best habitat en-route. We observed 364 caribou during this survey in the proportions indicated in Table 1. We calculated 41 calves per 100 cows for our south Baffin study areas.

Demographic Group	South Baffin
Cows	196
Calves	81
Calves/ 100 Cows	41
Total Yearlings	42
Total Bulls	126
Bulls/100 Cows	65
Total	364

Demographic data gained through these surveys is indicative of population level health/productivity of the herd. Recruitment data indicates whether the caribou population is replenishing itself from losses due to natural and harvest mortality. Bull ratios indicate whether or not sufficient bulls are present to ensure cows are impregnated.

We sought to determine ongoing fall calf recruitment as an indication of whether the caribou population is productive or unproductive. Initial findings in fall 2015 suggested high productivity with calf/100 cow ratios reaching 77 in south Baffin and 71 in central Baffin. Spring 2016 composition studies found that many calves did not make it through the 2015/16 winter season showing a drop to 22 calves/100 cows in the south Baffin and a drop to 27 calves/100 cows in the central Baffin. South Baffin calf:cow ratios between fall (October) 2015 and Oct 2016 dropped from 77 calves/100 cows to 41 calves/100 cows, suggesting an overall drop in productivity over the period. It is important to note that overwinter calf survival values will have to be assessed before trend indices can be hypothesized; we will require a measure of overwinter calf survival to be sure overwinter mortality is not circumventing population growth.

The observed fall calf:cow ratio of 41 is below those observed for other herds (Adamczewski et al. 2009; Tobey 2001; Gunn et al. 2005). For example, for taiga wintering Barren-ground caribou herds in NWT, calf cow ratios at parturition can be 70-90 but decrease to 50-70 by fall and 30-50 in spring when herds are stable to increasing (Adamczewski et al. 2009; Tobey 2001; Gunn et al. 2005). Calf recruitment is implicated as an important factor in population recovery (Boulanger and Adamczewski 2015). The observed ratio suggests below expected productivity and that the population may be decreasing or stable. There are a few assumptions that are implicit in this conclusion that may or may not be correct.

Corresponding spring composition surveys for the next two years would be important for ongoing recruitment monitoring of this important Barren-ground caribou population. This is needed in order to give confidence to any indexed trends in abundance.

The observed fall bull to cow ratio of 65 is high relative to populations where there is a selective bull harvest, for example Bathurst in 2004 37 bull: 100 cows and 52 bull:100 cows (Gunn et al. 2005; Dau 2002). There needs to be at least 40 bulls per 100 cows to ensure all cows are bred, assuming caribou are distributed evenly over the range (Tobey 2001). Bull ratios in south Baffin are therefore sufficient to ensure that all breeding females will be bred. Generally one can expect the proportion of bulls to increase when calf survival is high during a population increase (Gunn et al 2005).

We are not currently able to conduct demographic modelling of this population due to the limited amount of composition data we have collected thus far. Many unknowns still exist including several missing critical pieces of information: 1) total harvest between the 2014 population estimate survey and the 2015 fall composition survey 2) multiple estimates of overwinter cow survival 3) multiple estimates of overwinter calf survival and 3) average recruitment over several years. These parameters are essential to determine the trajectory of caribou herds with confidence (Gunn and Russel 2008; Boulanger et al. 2011; Boulanger and Adamczewski 2015). With mandatory reporting through a TAH, multiple composition surveys and a collaring program we can generate the missing metrics and conduct demographic modeling. These models can then be utilized to predict the effects of a particular harvest regime on the population trajectory.

Surveying the core caribou use areas provided a cross section of caribou demographics on south Baffin while minimizing logistical challenges and survey costs. We observed more than 22% of the estimated *circa* 2014 population of the study area. This success of this program can be attributed to good location information available from the 2014 survey, a capable and reliable crew and pilot and substantial luck with weather. The survey was planned for fall rut when animals are aggregated for rut and sexual segregation is minimized, thus allowing for a measure of adult sex ratio (Gunn and Russel 2008; Gunn et al. 2005).

The results of this project are crucial to the management of Baffin Island caribou. However, this is but one piece of information that is required to sustainably manage Baffin caribou. This survey should be repeated yearly for at least two more years and then periodically afterward. Ultimately Baffin caribou cannot be managed with confidence until this survey is coupled to spring composition surveys and a multi-year caribou collaring program across Baffin to examine and build on our information base regarding spatial affiliations and biological divisions among caribou groups on Baffin Island.

Community consultation / Reporting

A field summary report will be prepared and sent to NWMB and HTOs by February 2017. A comprehensive file report summarizing the results of this survey and corresponding Central and North Baffin caribou composition surveys will be written and submitted to the NWMB, Baffin HTOs, QWB and NTI by June 2018 following multiple composition assessments. This project will be discussed during future HTO consultations to gather advice from local hunters and elders, help identify high-grade areas to fly during aerial population assessments, and to discuss the implications of the results and how they can inform management decisions and the setting of a TAH.

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Budget:

Budget Variance:

Air Charter costs exceeded proposed estimates as the caribou were distributed further away from fuel caches increasing flying hours. Travel and Accommodation was below expected as local observers were used on all phases of the study. Fuel drum retrieval was deferred to spring 2017 as spring composition fuel caching will also recover empty drums.

Section 9 - Budget (2016/2017)			
Item	Proposed (\$K)	Actual (\$K)	Difference (+/- \$)
Travel and Accommodation	\$24,500.00	\$8,296.99	+\$16,203.01
Field supplies disposable (Food, fuel for remote camp)	\$2,000.00	\$1,581.59	+\$418.41
Fuel Purchase and Caching	\$45,000.00	\$47,099.75	-\$209.75
Fuel Drum Retrieval	\$8,000.00	0.0 (deferred)	\$0.00
Rotary Wing Charter + Positioning	\$72,000.00	\$92,244.10	-\$20,244.10
Casual Wages	\$3,000.00	\$2,400.00	+\$600.00
	TOTAL	\$154,500.00	151,622.43
			\$2,877.57

Contributions:

<i>Kivalliq Caribou Monitoring Program</i>			
AGENCY	CONTRIBUTION		
	Confirmed contributions	Actual Costs 2016/2017	Actual Contributions
DoE	\$79,500.00	\$76,622.00	\$76,622.00
NWMB	\$75,000.00	\$75,000.00	\$75,000.00
TOTALS	\$154,500.00	\$151,622.43	