

Baffin Island Caribou Composition Summary Report 2015-2018

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Introduction

Caribou on Baffin Island are of the barren-ground subspecies, *Rangifer tarandus groenlandicus*. This subspecies is further divided into two separate groups; the taiga wintering and tundra wintering; Baffin Island caribou being the latter. As the name suggests, tundra wintering caribou differ in that they spend the entire within tundra habitats. Tundra wintering caribou generally occur in small groups and vary widely in their migratory behaviour. This can make surveying more difficult as the animals tend to be distributed unevenly across the landscape and in smaller groups than taiga ecotypes.

Due to the large size of the region, there has been limited scientific research conducted on Baffin Island caribou. However, there is a wealth of Inuit Qaujimatuaqangit (IQ) that depicts the long-term population and distributional trends for the region. Due to the lack of quantitative data available the exact number of caribou on the island historically is largely speculative. Recent telemetry studies (2008-2011) in North Baffin along with past survey findings and an Island-wide collaring program from the late 80's to early 90's have suggested potential sub-populations on the Island. However, further research will need to be conducted prior to delineating specific groupings and/or subpopulations across Baffin Island.

Local hunters, trappers, and community members began identifying a suspected decline in the caribou population on the island in the mid to late 1990s (Jenkins et al. 2012). In Feb/March 2014 the Government of Nunavut, Department of Environment (DOE) conducted aerial surveys across Baffin Island, Melville Peninsula and surrounding islands to estimate the abundance and general distribution of caribou Island wide (Campbell et al, 2015). Aerial surveys were conducted in February and March of 2014 using the double observer pair and distance sampling method. The survey identified the estimated number of caribou within different geographic locations including; North and South Baffin Island, Baffin Island as a whole, Baffin Island and its ancillary islands, and Baffin Island and northern Melville Peninsula. A total of 1,157 Caribou were observed during the survey, 50 caribou in 8 groups in North Baffin, 347 in 104 groups in South Baffin, 557 caribou in 164 groups on Prince Charles Island and 31 caribou in 7 groups on Melville Peninsula (Campbell et al. 2015). From these results it was estimated that 315 (95% CI=159-622; SE=109; CV=0.35) caribou were in North Baffin, 2,734 (95% CI=1,777-4,207; SE=607; CV=0.22) caribou in South Baffin, 1,603 (95% CI=1,158-2,220; SE=250; CV=0.16) caribou on Prince Charles Island and 220 (95% CI=88-551; SE=101; CV=0.46) caribou within northern Melville Peninsula yielding a total estimate of 4,872 (95% CI=3,462-6,484; SE=712.23; CV=0.15) caribou. Campbell et al. (2015) also re-analyzed results from surveys flown in North Baffin in April 2009 and South Baffin in 2012 and found no statistically significant change in abundance between these and the 2014 surveys.

As a result of the confirmed decline in abundance of caribou on Baffin Island, an eight-month moratorium was put in place on January 1 2015. Following this moratorium, a Total Allowable Harvest (TAH) and a non-quota bull only limitation (NQL) was put in place by the Nunavut Wildlife Management Board (NWMB) in 2015. The total number of bull-only tags allocated to the communities of Baffin Island was 170 in 2015/16 and 250 in 2016/17 and 2017/18 to present. However, allocations per community and region have differed yearly (Table 1).

Table 1 Bull-only tag allocation by community and number of individuals harvested from 2015/2016 to 2018/2019 on Baffin Island.

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

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

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

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

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

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

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

As a result of the non-quota limitation and TAH allocation due to the low caribou abundance on Baffin Island, the DOE has conducted fall and/or spring aerial composition surveys from 2015-2018 as a means to monitor productivity and relative densities of caribou across Baffin Island. The objectives of these surveys were:

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

Methods

Surveys were conducted in spring and/or fall from 2015 to 2018 on Baffin Island, Nunavut (Table 2). Weather and logistical constraints limited the extent of surveying to key areas where a greater chance of caribou encounters were suspected in North, Central and South Baffin for both the spring and fall seasons (Table 2, Figures 2-4). Surveys were conducted using rotary wing aircraft with 2 observers and a pilot (3 observers were used in in South Baffin in 2018). Cross sectional routes were flown through areas

of known caribou distribution. Study areas were selected based on previous aerial surveys and telemetry programs, and information gathered from hunters from each of the 12 Baffin communities during consultations conducted in 2012, 2013, 2014, and 2015 (DOE 2013, 2014, 2015a, 2015b; Jenkins and Goorts 2013). Refinement of survey locations was completed based on advice from the Hunters and Trappers Organization (HTO) observers prior to and during the survey flights. Caribou were generally located in the areas consistent with previous findings both scientifically and locally based (Figure 5). In order to reduce the inherent biases of a clumped distribution, the largest feasible area was surveyed. For logistical reasons Baffin Island was divided into three survey areas; North, Central and South (Figure 1).

When caribou were located, quick, low flights, using image stabilizing 14X binoculars to reduce approach distances were initiated to document the number of individuals in the group and their sex and age class. Caribou were classified into 5 categories; 1) Cow, 2) Calf, 3) Yearling, 4) Mature Bull and 5) Young Bull. Tracks were used as the primary indicator of caribou presence within a survey area. When tracks were encountered they were followed until the caribou were located and identified, with very few instances where caribou could not be located. 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.

Table 2 Yearly Baffin Island caribou composition survey flight dates by sample area.

Year	Season	Survey Dates			Total Survey Days
		North	Central	South	
2015	Fall	Sept. 17, 21 & 22	Oct. 4 - 7	Oct. 11,12,14 & 15	11
2016	Spring	Not completed	April 17-19 & 23	April 4, 5 & 8	7
2016	Fall	Sept. 18, 21 & 22	Not Completed	October 17-20, 22 & 23	9
2017	Spring	Apr. 15 - 16	Mar. 31, Apr. 4 - 6	Mar. 26 - 29	10
2017	Fall	Sept. 30, Oct. 1 & 4	Not Completed	Not Completed	3
2018	Spring	Apr. 26 - 27	Apr. 12 - 14	Mar. 30, Apr. 4, 5, 9, 10, 16, 19	12

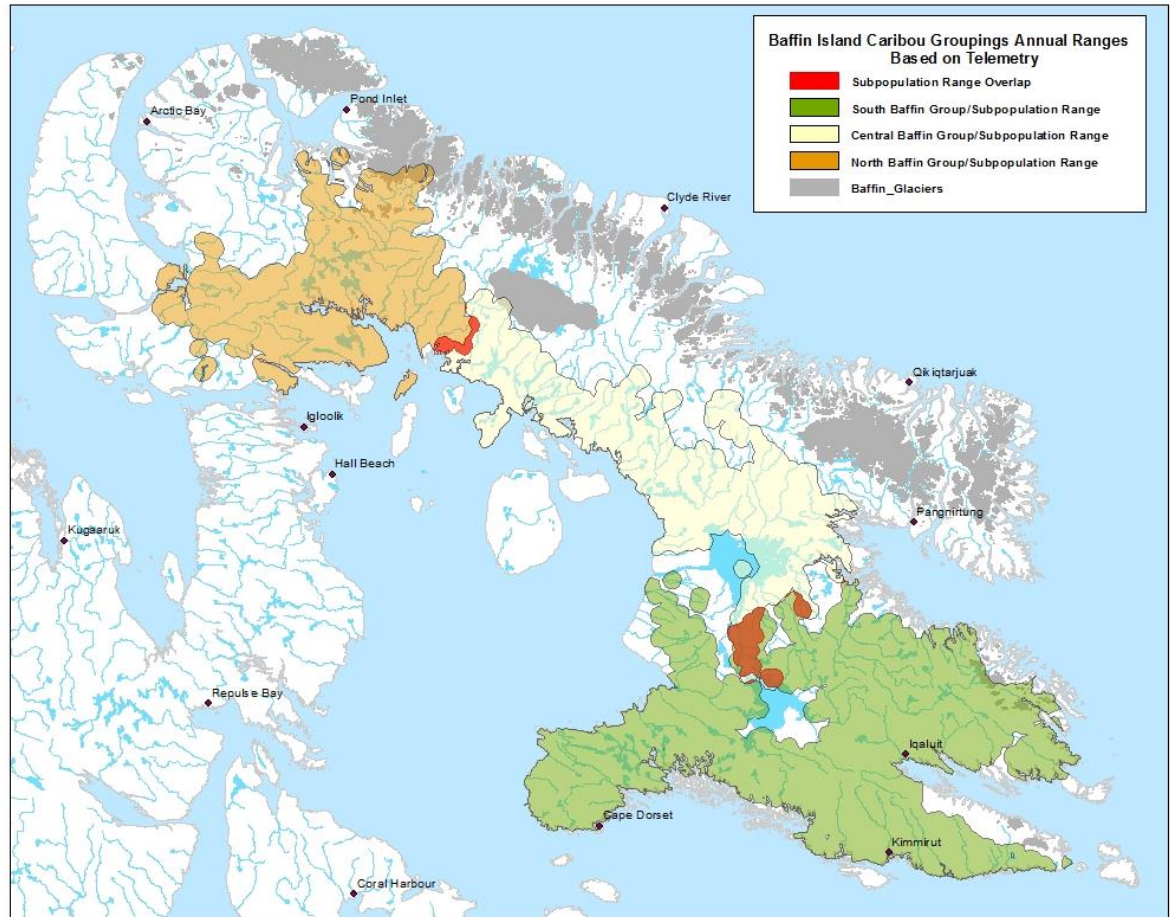


Figure 1. Caribou grouping annual range delineation based on telemetry studies from 1987 to 1994 (primarily South Baffin), and 2008 to 2011 (North Baffin). Polygons created utilizing a kernel analysis (See methods) of telemetry point data collected for 107 collars (North=35; Central = 17; South = 55). Excerpt from Campbell et al. 2015. Used to identify survey area during 2015-2018 composition studies.

Results

In the fall of 2015 we flew a total of 96.4 hours (28.6 hours in North Baffin, 38.5 hours in Central Baffin and 29.3 hours in South Baffin). In the spring of 2016 we flew a combined total of 86.3 hours in Central and South Baffin. In the fall of 2016 we flew a total of 67.4 hours (19.6 hours in North Baffin and 47.8 hours in South Baffin). In the spring of 2017 we flew a total of 104.6 hours (26.2 hours in North Baffin, 41.6 hours in Central Baffin and 36.8 hours in South Baffin). In the fall of 2017 we flew a total of 14.6 hours in North Baffin. In the spring of 2018 we flew a total of 102.5 hours (18.9 hours in North Baffin, 29.1 hours in Central Baffin and 54.5 hours in South Baffin) (Table 3).

Table 3 Survey Flight hours by survey region 2015-2018.

Year	Season	Survey Flight Hours		
		North Baffin	Central Baffin	South Baffin
2015	Fall	28.6	38.5	29.3
2016	Spring	Not completed	86.3**	86.3**
2016	Fall	19.6	Not completed	47.8
2017	Spring	26.2	41.6	36.8
2017	Fall	14.6	Not completed	Not completed
2018	Spring	18.9	29.1	54.5

** a combined total of 86.3 hours was flown for Central and South Baffin.

In the fall of 2015 we observed a total of 911 (646 adults) caribou (bulls, cows, yearlings, and calves). In the spring and fall of 2016 we observed 1,266 and 901 (1,112 and 512 adults) caribou respectively. In the spring and fall of 2017 we observed 1,514 and 316 (1,260 and 230 adults) caribou respectively, and in the spring of 2018 we observed 1,433 (1,208 adults) caribou bulls, cows, yearlings, and calves (Table 4).

Based on the 2014 population estimate of 4,652 on Baffin and ancillary islands (Campbell et al. 2015) we observed 14% of the island-wide population in fall of 2015, 24% in the spring and 11% in the fall of 2016, 27% in the spring and 5% in the fall of 2017, and 26% in the spring of 2018. As a result of only surveying North Baffin in fall of 2016 and 2017 (Figure 2) the percentage of individuals of the entire population was lower than other survey years and seasons due to North Baffin having disproportionately lower caribou densities than central or south Baffin. When comparing our observations to the 2014 estimate of 315 caribou on North Baffin (Campbell et al. 2015) we observed 47% in the fall of 2016 and 73% in the fall of 2017 of the caribou estimated in this area. Considering the high proportions of caribou observed within each of the north, central and south Baffin groupings, we suggest the number of caribou observed is sufficient to address our main objectives. With increased sample effort and spatial coverage, more individuals may have been observed, however the current method of high-grading areas with high encounter rate probability seems to be effective and we suggest continued use of the method.

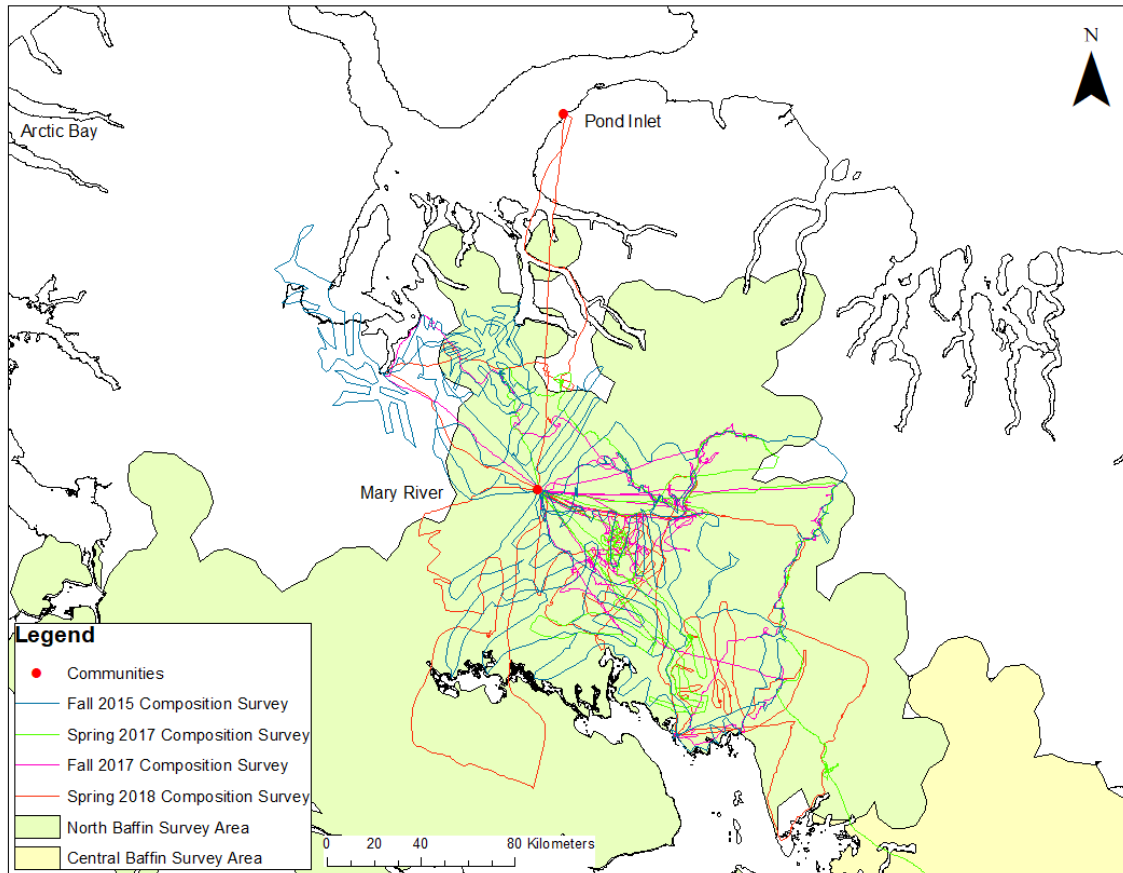


Figure 2 Baffin Island Composition Survey flight lines 2015-2018 in the North Baffin survey area. Search areas based on “high grading” historically and recently known areas with seasonally high to moderate densities of caribou.

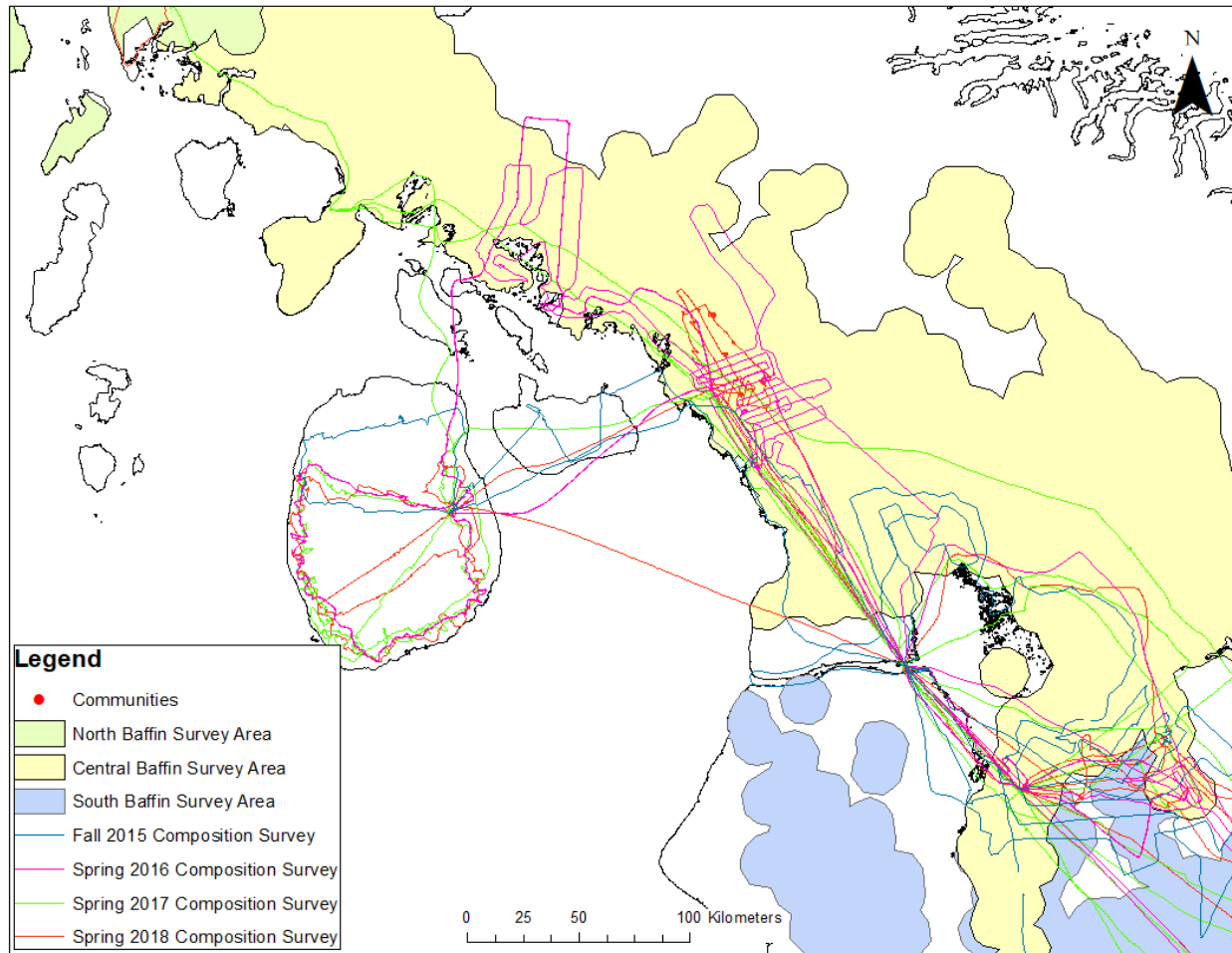


Figure 3 Baffin Island Composition Survey flight lines 2015-2018 in the Central Baffin survey area. Search areas based on “high grading” historically and recently known areas with seasonally high to moderate densities of caribou.

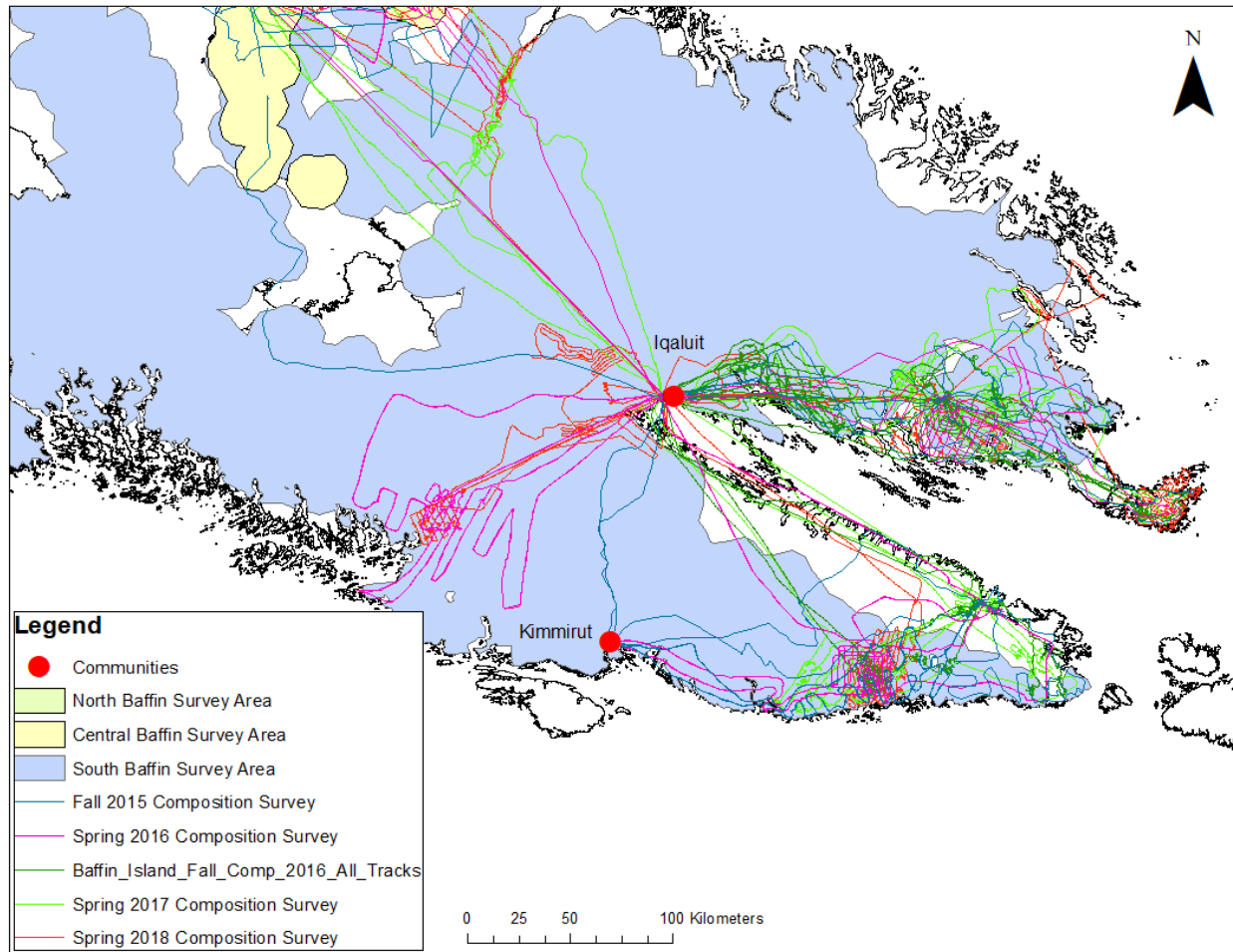


Figure 4 Baffin Island Composition Survey flight lines 2015-2018 in the South Baffin survey area. Search areas based on “high grading” historically and recently known areas with seasonally high to moderate densities of caribou.

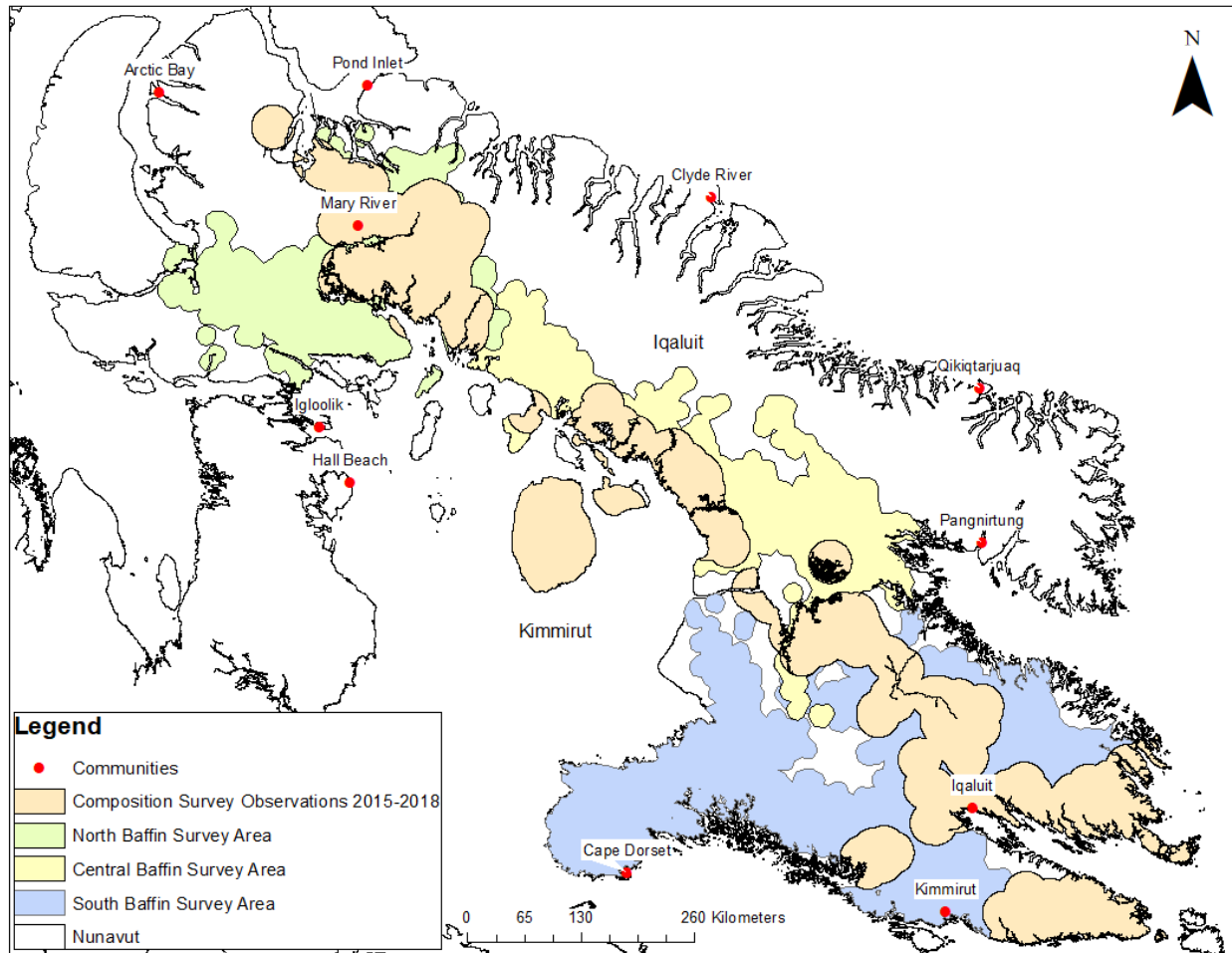


Figure 5 Baffin Island Composition Survey caribou observations 2015-2018, all years combined buffered by 25 km.

Fall composition surveys were conducted to determine bull ratios and calf productivity in an effort to insure the bull only NQL was not impacting productivity through the reduction of mature bulls, as well as to index the growth potential within the three study areas; North, Central and South Baffin Island. Spring composition surveys were completed with the main objective of determining over-winter calf survival (recruitment) as an index of population growth.

When populations are low there is an increased risk of local extirpation caused by severe winter weather events. Severe weather in the winter of 2015/2016 is the suspected cause of a spring die off of caribou found on Prince Charles Island, based on the initial discovery of 47 dead caribou in the vicinity of a remote landing strip. Samples taken from the caribou confirmed the animals had low fat reserves and likely died from starvation.

Calf to Cow Ratios

In North Baffin calf to cow ratios in the fall varied from 71 calves:100 cows in 2015, 57 calves:100 cows in 2016 and 62 calves:100 cows in 2017 (Table 4). The spring calf to cow ratio increased from 39 calves:100 cows in 2017 to 58 calves:100 cows in 2018. In Central Baffin the calf to cow ratio in the spring increased from 34 calves:100 cows in 2016 to 55 calves:100 cows in 2018 (Table 4). The observed ratio of 100 calves:100 cows in the spring of 2017 can be attributed to the low sample size of only 1 cow and 1 calf observed. Limited survey effort has been applied within Central Baffin, other than Prince Charles Island, over the past 4 years due to logistical constraints.

A decrease in fall calf ratio was observed in South Baffin between 2015 (77 calves:100 cows) and 2016 (41 calves:100 cows). Contrastingly, an increase in calf ratios was observed in spring from 2016 to 2018 (2016 - 22 calves:100 cows, 2017 - 37 calves:100 cows, 2018 - 39 calves:100 cows) suggesting varying impacts on productivity (such as weather, predation, disease, etc) had been in play between years making overall trend predictions difficult with the current 4 years of data (Table 4).

On Prince Charles Island the Spring calf ratio fluctuated from 25 calves:100 cows in 2016 to 32 calves:100 cows in 2017 and 19:100 cows in 2018 (Table 4). Additionally, caribou in very poor condition were observed as well as several dead individuals on Prince Charles Island in the spring of 2018 suggesting a population trajectory that differs from the study areas on Baffin Island itself. Only one survey was completed in the fall of 2015 and the observed ratio was 70 calves:100 cows.

Bull to Cow Ratios

To effectively determine bull:cow ratio only fall survey results should be evaluated. The reduced sightability of bulls in our survey areas in spring and summer, due to differences in bull and cow distribution, can lead to inaccurate results if large groups of bulls are missed or included.

The ratio of bulls to cows in North Baffin in the fall declined from 2015 to 2017 (2015- 99:100 cows, 2016 - 57:100 cows, 2017- 53:100 cows) (Table 4), which could be a result of increased harvest pressure on one sex. The ratio of bulls to cows in central Baffin in fall 2015 was 74:100 Cows. Only a single survey was conducted in central Baffin (Table 4). Therefore, no trend in bull ratios can be predicted in Central Baffin. The ratios should instead be considered a one-time evaluation based on the reduced spatial and temporal coverage. The ratio of Bulls to cows in South Baffin in fall declined from 72 bulls:100 cows in 2015 to 64 bulls:100 cows in 2016 (Table 4). A baseline ratio of 62 bulls:100 cows was observed on Prince Charles Island in the fall of 2015 (Table 4). Only one survey of the island was completed in the fall on Prince Charles Island so no trend can be identified.

Table 4 Number of observed caribou by demographic group during Baffin Island composition surveys 2015-2018.

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

Discussion

Calf to Cow Ratio

Calf ratios can be used to indicate 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 such 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). There is an inherent amount of risk associated with using baselines values from a different population and therefore these composition baselines, when used with Baffin Island caribou, should be used with caution.

The observed calf:cow ratios across Baffin Island in fall of 2015 are all within the suggested 50-70 percent baselines indicating a likely stable or increasing population. The calf:cow ratio in North Baffin in the fall from 2015-2017 suggests a stable or increasing population as these ratios are above the suggested 50 calves:100 cows baseline indicated for the more southern ecotypes. The calf:cow ratio in the spring in North Baffin in 2017 and 2018 also suggests a stable or increasing population. Over winter calf survival appears to have improved in 2018 (62 calves:100 cows in fall and 58 calves:100 cows in spring) compared to 2017 (57calves:100 cows in fall and 39:100 cows in spring). This suggests that the winter in 2017/2018 may have been relatively easy on calves in North Baffin and many calves survived. These findings could also be the result of a decreased sample size in 2018. Without an updated population estimate, accurate hunter harvest numbers, and confirmation of the spatial use of caribou in North Baffin, it is unwise to base management decisions on a single metric.

Surveys were not completed in Central or South Baffin in the fall of 2016 or 2017 and therefore estimating the overwinter survival compared to fall ratios is not possible. The calf ratio in 2015 in Central and South Baffin were lower than the suggested baseline of 30-50 calves in a stable or increasing population which suggested a decline in over winter calf survival in these regions. Spring calf ratios in 2017 and 2018 were within the suggested 30-50 percent baseline which may indicate either stable or increasing populations in Central Baffin. Relatively low sample effort was completed in Central Baffin and therefore it is unlikely that the observed ratios are accurate due to the small sample size.

Southern Baffin Island had the lowest ratio of calves in the spring of 2016 (22 calves:100 cows) following the highest fall ratio for any region surveyed over the 4-year period in the fall of 2015 (77 calves:100 cows). This reduced overwinter survival was worrisome as it suggested a substantial impact on productivity over the winter of 2015/2016 in South Baffin, the region with the largest population of caribou on Baffin Island. This low ratio of calves to cows in spring 2016 was followed by a ratio of 41 calves:100 cows in the fall of 2016, less than the suggested ratio for a stable or increasing population.

Many calves seemed to survive the 2016/2017 winter, however, and calf ratios of 37 calves:100 cows were observed in the spring of 2017, within the suggested baseline ratio of 30-50 for a stable or increasing population. The highest spring calf ratio was observed in 2018 (39 calves:100 cows) supporting earlier trends of a stable or increasing population in South Baffin.

Although most calf ratios suggest a stable or increasing population on Prince Charles Island between 2015 and 2018, general observations on the island suggest that fairly substantial die-offs have occurred over the 2016/2017 and 2017/2018 winter. A total of 655 caribou were observed on the island in the spring of 2017 compared to a total of 302 in the spring of 2018 given near identical survey effort. Similar spatial coverage was achieved both in 2017 and 2018 with the majority of the island surveyed. Sightability of caribou on Prince Charles is very high due to the flat near 100% snow covered terrain. Little to no tracking is required as animals can generally be seen from greater than 2 km away. In addition to the reduced number of observed caribou in 2018, many caribou were observed in poor body condition, including some so weak they were unable to stand. In a few instances dead caribou were observed, even though fresh snow had fallen recently on the island just prior to the composition. This follows similar die-offs observed in the winter of 2015/2016 where 47 dead caribou were discovered. It is not uncommon for severe winter weather events to cause localized die-offs of caribou on smaller Islands. It is unclear if these suspected die-offs were localized to Prince Charles Island or if the reduced numbers are a combination of die-offs and migration off of the island to Baffin.

It is important that the calf:cow ratios not be taken out of context and applied to the population in its entirety until a second abundance survey helps verify the observed trends and the usefulness of the taiga baseline values. To limit seasonal and sampling variability, trend indices require long term data sets and therefore caution should be taken until more years of data have been collected.

Bull to cow Ratio

Since the current harvest regime on Baffin Island is sex-specific and targets bulls only, it is important to monitor the number of bulls within the population and the resulting trends in bull to cow ratio to ensure productivity is not impacted. The current use of a bull-only harvest regime on Baffin Island creates the possibility of a skewed sex ratio which may limit future population growth. This will need to be monitored in the future to ensure a sufficient number of mature bulls exist within the population to impregnate the cows. Ultimately, this ratio ensures that there are sufficient bulls within the population to impregnate all receptive females. Tag allocations have varied each year but generally are evenly allocated to all Baffin Island communities regardless of caribou grouping (Table 1). Bull to cow ratios will be inherently variable based on survey timing and seasonality. If surveys are completed too early in the fall, when mature bulls are either alone or in small groups, observability might be reduced and animals may be missed. At this time, larger groups of females and young bulls may be observed more easily which will result in a female dominated sex ratio. The ratio of 40 bulls:100 cows is suggested as a benchmark for the number of bulls required in a population to ensure all cows are bred successfully (Tobey 2001).

Although, all of the current bull:100 cow ratios within North Baffin are greater than the suggested minimum ratios of 40 bulls:100 cows, the trend in fall ratios suggests a slight decline. A reduction in the number of bulls was observed between the fall of 2016 and 2017 which suggests a possible impact on bulls within the North Baffin as a result of the bull only harvest allocation (although some illegal harvest of females has occurred). These ratios should be continually monitored to determine any longer term effects on the number of bulls in North Baffin that may result in a loss in productivity from continual harvest of bulls only (Table 1).

The bull ratio in the fall of 2015 in Central Baffin (74 bulls:100 cows) is greater than the suggested ratio of 40 bulls:100 cows, however, based on the relatively low sample size of 68 adults this ratio should not be taken out of context and likely reflects the ratio of a small geographic area and not Central Baffin in its entirety. Since the current tag allocation system does not dictate a specific management area within Baffin Island where tags must be used, it is likely that the majority of tags allocated to Central Baffin communities are harvested in Southern Baffin Island. Therefore, due to logistical constraints and reduced hunting pressure with Central Baffin, long-term trends in bull to cow ratios are likely less important than the other regions. The decrease in bull to cow ratio in the fall in South Baffin from 2015 to 2016 may be due to a low sample size in the fall of 2015 (110 caribou). Alternately, surveying in the fall of 2015 may have occurred too early when the majority of bulls were still migrating in small groups prior to the Rut. As mentioned above, this can be problematic as sightability of mature bulls at this time might be less than the larger groups of cows.

The population decline on Prince Charles Island between 2016 and 2018 was clearly evident. Observing the die-offs on Prince Charles Island in two consecutive seasons shows how relying on a single metric to diagnose population growth or decline can be problematic. Movement of caribou between Baffin Island and Prince Charles Island is currently unknown. Ice conditions are regarded by local hunters as unpredictable and dangerous suggesting little movement over the long-term. Understanding this dynamic will aid in the overall management of caribou on Baffin and ancillary islands.

Current literature suggests that when populations are low, percent harvest should be as low as 0 or 3% to allow a quick population recovery (Alaska Department of Fish and Game 2001; Porcupine Caribou Management Board 2010). Based on the 2014 population estimate of 4,652 caribou the current tag allocation of 250 bulls only represents a 5.4% harvest. In order to reduce the rapid decline of the Bluenose-West herd in 2006-2007 harvest levels of bulls only were reduced to 4% (Boulanger et al 2014) suggesting a higher percent hunt than this when populations are already low will limit recovery potential. There are many possible negative effects from overharvesting when populations are low including, slower population recovery, local depletion and/or extirpation events and further population decline. The effects of this harvest management method are unknown and will need to be verified by another population estimate. There is also the issue of illegal and undocumented harvest of caribou on Baffin Island. The current 5.4% harvest is based strictly on allocation and not necessarily the number of caribou that are actually being harvested annually. There has been indication that illegal harvest of both bulls and cows is occurring but the extent is currently unknown (Table 1). This additional undocumented harvest will undoubtedly further reduce the possibility of a timely recovery.

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 unwise to manage populations or base management decisions on trends at this scale. Instead, long-term trends should be used as an index to advise abundance survey frequency and timing. Trend assumptions 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.

Consultation progress

Community consultations are being planned for the fall of 2018 to inform on the results from the last 4 years of composition surveys on Baffin Island. These discussions will summarize the information provided in this report and include open discussions regarding future management and monitoring of caribou populations on Baffin Island. A final consultation report will be completed by the DOE summarizing discussions at the consultations.

Management Actions/Implications

Next Steps

There has been relatively limited research on Baffin Island caribou so there are many areas where additional information could be collected through IQ or scientific studies. One limitation to effective caribou management on Baffin Island is the spatial extent of the island. There has been some indication that Baffin Island caribou form distinct herds or subpopulations but this delineation has not been effectively verified. If in fact there are distinct caribou herds on Baffin, survey efforts could more efficiently focus on smaller spatial scales and herds of caribou that exhibit the greatest risk of population decline, ultimately increasing survey effectiveness and decreasing cost. The most effective method to delineate herds would be to utilize GPS tracking collars. This method would also allow us to identify seasonal movement patterns at the same time and aid in identifying key migration corridors, calving and post-calving areas, and fall rut locations. Disturbance during calving of cows and calves by development has been well documented (Wolfe et al 2000). Identification of specific key use areas such as calving or migration corridors will also identify risks associated with development activities. Continual monitoring of movement rates and locations prior to and during surveys will also increase the effectiveness of surveys and confidence in the results. For example, if the intent is to survey during calving, movement rates can be monitored to determine when peak calving is occurring, reducing the error associated with double counting or surveying too early or late.

Successful delineation of caribou groups on Baffin Island will also allow the use of different management techniques specific to the group/subpopulation being identified. If the suggested delineations are confirmed, harvesting pressure could be allocated proportionally with higher allocations to populations with greater abundance, providing groups with lower populations some relief from harvesting pressure. Shifting harvest pressure will allow faster recovery of groups with low abundance.

Calf productivity, recruitment (over-winter survival), and adult sex ratios can vary by season, and sampling region. Therefore continued Island wide sampling is essential to determine long-term trends and population trajectory. In the absence of a multiyear collaring program or second abundance estimate, continued composition surveys should be completed to determine the long term trends of Baffin caribou. Regular reconnaissance surveys should also be considered as a best practice; however, in the absence of a collaring program these surveys would be excessively expensive, and possibly ineffective.

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 year estimates of recruitment (over winter calf survival) , 3) Productivity and sex ratio trends for the different sampling areas, and 4) Overall health of caribou within the different survey regions. The results of the past 4 years of composition surveys have been extremely helpful in allowing us to begin to understand the basic population dynamics of the Baffin Island caribou groups, however much more needs to be done if we are to effectively steer harvest management into recovery.

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