The Effects of Predation on a Declining Population of Mainland Migratory Barren-Ground Caribou (*Rangifer tarandus groenlandicus*) in the Vicinity of Qamanirjuaq Lake, Nunavut

Interim report 2010 (2-10-01)



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Summary

Several hunters from different communities have indicated that barren-ground grizzly bear and wolf populations are increasing, and are concerned about the extent to which predators may be reducing caribou numbers. The causes of mortality among newborn calves on the calving grounds were investigated in June and July. In June, during calving, necropsies on 28 calves revealed that none of these deaths were attributed to predators. In July, in post calving areas, we found six dead carcasses. Among these, three were confirmed wolf kills (two calves and one adult male 3-4 years old), one yearling female was a suspected wolf kill, and two partially decomposed adult carcasses had an unknown cause of death.

Two wolves and three grizzly bears were observed in the southern and western portions of calving ground in low density strata. Seven wolves, two grizzly bears and one wolverine were observed in the post calving area.

Introduction

The mainland migratory barren-ground caribou of the Kivalliq, referred to as the Qamanirjuaq Caribou Herd (QCH), represents one of the largest herds in Nunavut. From 1993-2010, QCH ranged over an estimated 300,000 km^2 area that included parts of northeastern Saskatchewan, northern Manitoba, southeastern Northwest Territories and Nunavut. Most of the annual range (including the calving and post-calving grounds), as well as the migration (spring and fall) corridors, lie entirely within Nunavut. The estimated annual value to all aboriginal communities utilizing Qamanirjuaq caribou for subsistence is $15,078,873 per year (Inter-Group, 2008; Campbell et al. 2010). Calving commences in early June, peaks around June 8 to 10^{th} and ends by late-June.

Aerial and photographic surveys to estimate the number of breeding females have been conducted on the QCH calving grounds since the 1970s. The highest number of

animals (496,000 ± 105,400) being estimated was in 1994 (Heard 1981; Gates 1983; Russell 1990; Thomas 1996). Recent spring cow:calf classification surveys of Qamanirjuaq caribou herd in the Kivalliq region have indicated a population decline and low recruitment rates. This decline was validated in June 2008 when 348,000 Qamanirjuaq caribou were estimated (Campbell et al. 2010).

Spring classifications of cow: calf ratios (expressed as calves per 100 cows) have indicated that recruitment in the population has likely been declining since the mid-1990s. Campbell (2008) described a decline in cow: calf ratios from 60:100 in 1992, to 47:100 in 1996, to 30:100 in 1999, 26:100 in 2003 and finally 16:100 in 2006. Calf mortality is identified as an important factor in the population dynamics of many caribou herds on barren lands (Miller and Broughton 1974; Miller et al. 1983), and predation is suspected as the primary cause of mortality (Parker 1972; Miller et al. 1985; Miller et al. 1988). Several hunters from different communities have indicated that barren-ground grizzly bear and wolf populations are increasing, and are concerned about the extent to which predators may be reducing caribou numbers (NWMB Regional wildlife priorities). This recent decline in recruitment is of great concern to wildlife managers because recruitment replaces the loss of adults from predators, harvest and other factors and an imbalance between recruitment and mortality leads to decreases in population size.

Concern for the future of the QCH in the Kivalliq region in the shadow of the extensive declines observed across the Canadian north have lead investigators to recommend longer term analysis/monitoring of these disturbance/mortality effects on calving grounds. To this end the current program identifies long term studies and if possible the addition of the Beverly Herd to determine causes of death of new born calves. This report provides a summary of the research conducted on QCH calving and post calving grounds during the pilot year (2010) of the study. The objectives of the study were:

- to investigate the extent and causes of mortality among new-born caribou calves on the calving ground;

- to determine the spatial distribution and numbers of wolf and grizzly bears and when possible their dens in the QCH calving grounds;
- to use stomach contents/fecal and stable isotope analysis to examine the food habits of wolves in the region.

Methods

During the calving and post calving survey we used predetermined transects designed by Campbell et al. (2010) within the known extent of calving ground of the QCH. Based on satellite collar locations, we located calving groups of caribou, and surveyed transects systematically over the calving distribution to estimate relative densities of predators and breeding females (hard antlered cows or cow/calf pairs) to stratify the calving ground for the subsequent carcass searching. For this stratification survey, strip width and observers procedures followed Mitch et al. (2010). Two observers counted all caribou (>1 year old) and identified calves within a 400 m strip on each side of the aircraft. We surveyed transects at 152 m AGL using a Cessna Grand Caravan fixed with a radar altimeter with airspeeds between 140 -180 km/h. High, medium and low strata were delineated using the methods described by Mitch et al. (2010) for the calving period from June 7- 13 and for post calving, July 23rd.

During calving we flew 2,350 km, covering a total 235 stratification (recon) survey transects (length 10 km, width 800m). In July again from satellite collar locations we located and followed post calving caribou and flew 102 stratification (recon) survey transects to stratify the post calving distribution (Fig 1).

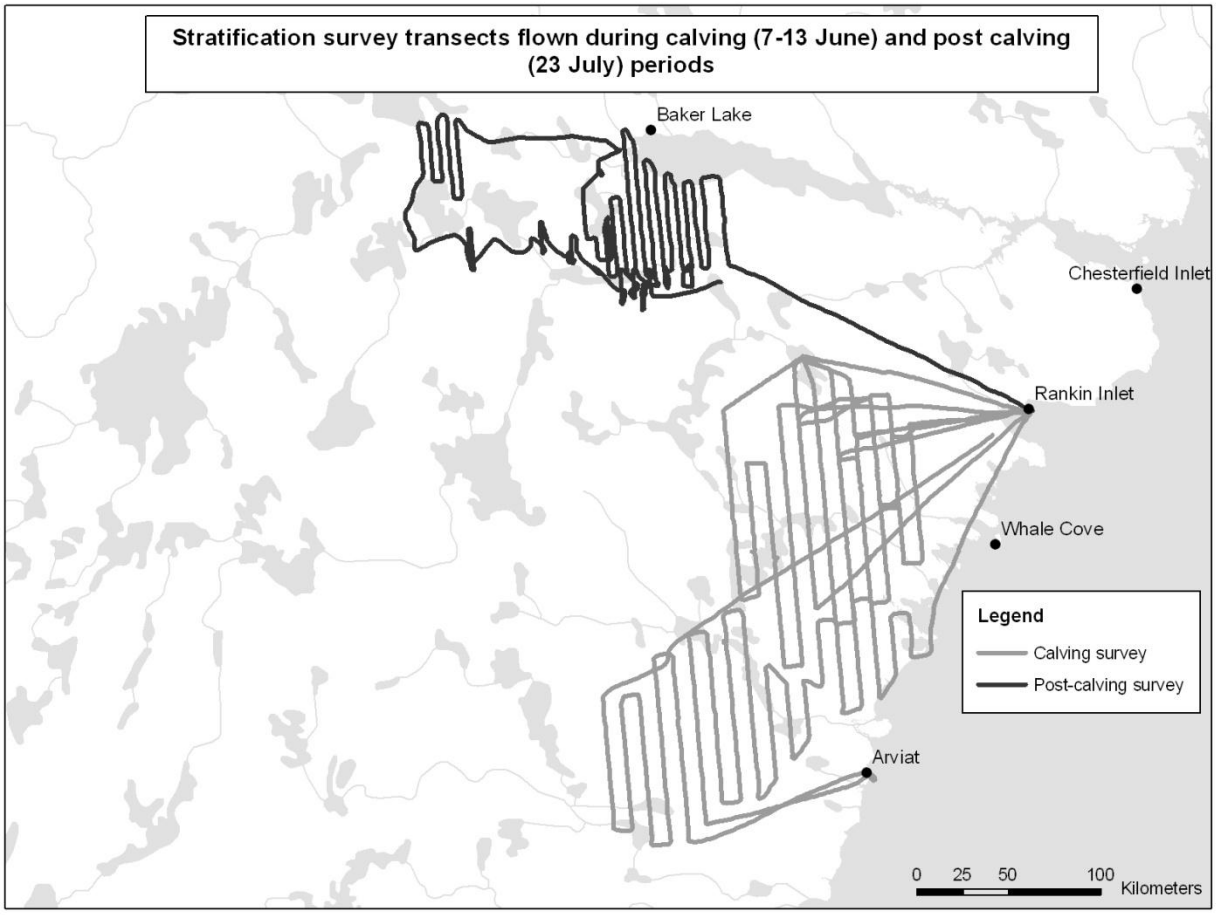

Figure 1: Stratification survey transects flown during calving (7-13 June) and post calving (23 July) periods.

From the recon transects (235 in June and 102 in July), we randomly selected within the high and medium density strata (as logistically possible), 29 transects (10 km) during the calving period and 23 transects during post calving period for the purposes of searching for calf carcasses and any sign of predation.

Following local Hunters and Trappers Associations (HTOs) recommendations, we first attempted to search for dead calves by foot on June 8th and 9th. The total area of the selected recon transect (10km x 800m) was divided into 4 strips of 10km x 200m which were each searched by a single observer following a transect centered in the strip and covering 100m on each side. After the completion of two such transect series, all

observers agreed that the presence of humans on foot was causing unacceptable disturbance and may have resulted in mother-calf separation and possible abandonment. A different technique was therefore used for the remaining of the study.

We used a Bell 206 Jet Ranger HC to search for carcasses from 35-55 m above the ground at approximately 90-120 km/h (Miller et al. 1988). During the first two flights on transect, observers were instructed to monitor the effects of the helicopter on cows and calves. Although observers found that the cow/calf pairs were disturbed, they also found that the duration of disturbance was short lived and appeared to pose no threat of separation. Following these initial observations, the survey technique was switched over to rotary wing and the intensive search for carcasses began. The configuration within the helicopter included one observer/data recorder in the front left seat with the pilot and two observers in the rear left and right seats. Although all crew members searched for predator sign and carcasses, the two rear seat observers were dedicated to that task. Observations were made within a 100 m strip on either side of the helicopter. To effectively search the original transect width of 800 m (previously flown during the recon phase), we flew 4 parallel transects by helicopter each located 200 m apart. We conducted these carcass search surveys from June 11 to 14 (calving) and from July 24 to 27 (post calving). The time gap between the fixed wing recon survey and the carcass searching varied between 1 to 5 days (Appendix 1). During calving, the high number of caribou present on the transects during the carcass searching suggests that most caribous observed during the recon survey had moved relatively little between the recon and carcass searching. However, during the post-calving period, most caribous that were observed during the recon survey had moved away from the area at the time of carcass searching.

When observers located a carcass, we landed, searched the immediate area for predator signs and took pictures of the carcass and surroundings. Field necropsies were either performed directly on the site or the carcasses were labelled and bagged to

be sampled/examined at the end of the day. Necropsies consisted of external and internal examination of the body and visceral organs for signs of predation or other non-predator mortality causes (e.g. malnutrition, physiological or pathological disorders). Age of calves was estimated from general body characteristics: weight, condition of pelage and umbilical cord, and degree of hoof wear following Miller et al. (1988). We collected lung, liver, kidney and spleen samples from each carcass, which were frozen and shipped for histopathology analysis. All data were recorded on a field data sheet.

To obtain further information on wolf's diet in the vicinity of the Qamanirjuaq calving grounds, a wolf sample collection program has initiated in Kivalliq communities. Stomach content as well as muscle, liver and hairs samples are being requested from local hunters in exchange of a 75$ subsidy. Through collaboration with Université du Québec à Rimouski, stomach content evaluation and stable isotope analysis will be conducted on the various tissues to determine the importance of caribou and temporal variation in the consumption of caribou by wolves.

Results and Discussion

Between June 11 and 14, we found carcasses of 34 calves and one adult female in the core calving area (Fig 2). Six calf carcasses were found floating in the lakes, yeilding 29 carcasses evaluated for cause of death. Necropsies revealed that none of these deaths were attributed to predators. The necropsy conducted on the adult female showed that the animal probably died of complication associated with parturition. Of the 28 dead calves examined in June, the number of males and females were similar (13 and 14, respectively; 1 unknown sex), showing no predisposition to death due to sex. Miller et al. (1988) suggested 4.0 kg as the threshold viable whole body weight of new born calves. Mean whole body weight of 20 calves < 7 days old (excluding 8 calves with missing viscera) in our study area was 4.8 kg (SD=1.3), and included four calves with

body weight < 4.0 kg. To identify primary cause of death (non predator) the tissue samples were submitted to the Canadian Cooperative Wildlife Health Centre (CCWH) lab for pathological analysis.

In June (calving period), we focused our searching efforts in the core calving area, and found no evidence of predators. Two wolves and three grizzly bears were observed in the southern and western portions of calving ground in low density strata. We also found three old grizzly bear dens in the core calving area (Fig 2).

Between July 23 and 27 in post calving areas, we found six dead carcasses (Fig 2). Among these, three were confirmed wolf kills (two calves and one adult male 3-4 years old), one yearling female was a suspected wolf kill, and two partially decomposed adult carcasses had an unknown cause of death. Seven wolves (five single and one pair), two grizzly bears, one wolverine and one temporary grizzly bear den were observed in the post calving area (Fig 2).

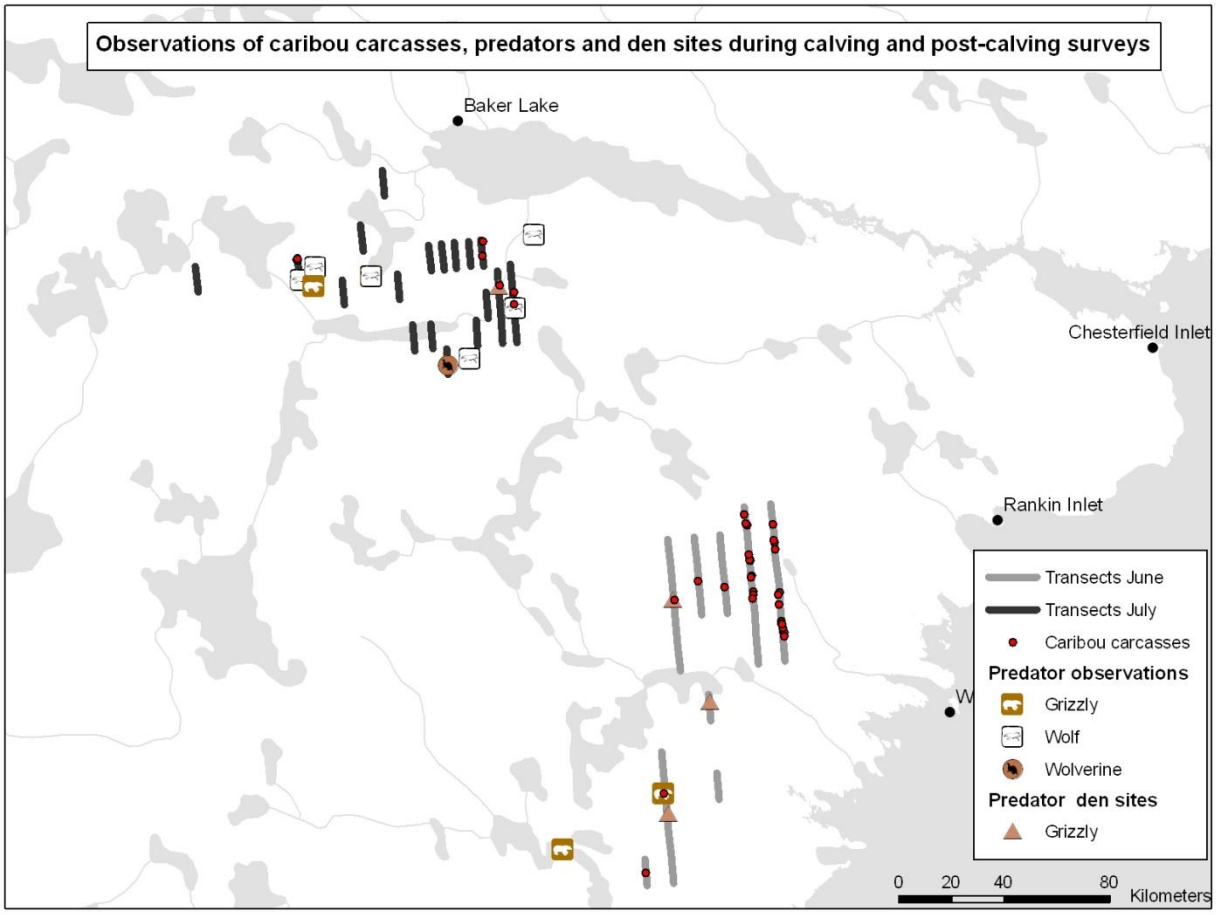

Figure 2: Observations of caribou carcasses, predators and den sites during calving and post-calving.

The pathological analysis of the samples submitted to CCWH lab is still in process and the results presented here are preliminary and based only on the first (pilot) year of data which prevent any solid interpretation at this stage. The preliminary findings indicate no predator activity in the core calving area. However, wolf and grizzly bear sightings in low density strata during this study and predator sightings during the June 2008 calving ground survey (Mitch et al. 2010) suggest that predation may be active at times in the annual concentrated calving ground of the QCH. Results from the survey conducted in late July indicate a higher abundance of predators close to caribou post calving aggregations as well as confirmed wolf predation but the number of predated carcasses remains low for this first pilot year.

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Appendix I: Transect ID with dates of high altitude flights for recon survey and low flying flights for carcass searching.

Transect ID	Date flown for recon survey	Date flown for carcass search	# of days gap
BC33-32	08/06/2010	11/06/2010	3
BD33-32	08/06/2010	11/06/2010	3
BD32-31	08/06/2010	11/06/2010	3
BD31-30	07/06/2010	11/06/2010	4
BD30-29	07/06/2010	11/06/2010	4
BC32-31	08/06/2010	12/06/2010	4
BC31-30	08/06/2010	13/06/2010	5
BC30-29	08/06/2010	13/06/2010	5
BC29-28	08/06/2010	13/06/2010	5
BC28-27	08/06/2010	13/06/2010	5
BE32-31	08/06/2010	12/06/2010	4
BE31-30	08/06/2010	12/06/2010	4
BE30-29	09/06/2010	12/06/2010	3
BF32-31	09/06/2010	12/06/2010	3
BF31-30	09/06/2010	12/06/2010	3
BF30-29	09/06/2010	12/06/2010	3
BF26-25	09/06/2010	12/06/2010	3
BF23-22	09/06/2010	13/06/2010	4
BG32-31	09/06/2010	12/06/2010	3
BG31-30	09/06/2010	12/06/2010	3
BG30-29	09/06/2010	12/06/2010	3
BG29-28	09/06/2010	12/06/2010	3
BG28-27	09/06/2010	12/06/2010	3
BH24-23	10/06/2010	13/06/2010	3
BH23-22	10/06/2010	13/06/2011	3
BH22-21	10/06/2010	13/06/2012	3
BH21-20	10/06/2010	13/06/2013	3
BH20-19	10/06/2010	13/06/2014	3
BI20-19	10/06/2010	14/06/2010	4
BL43-42	23/07/2010	25/07/2010	2
BL42-41	23/07/2010	25/07/2010	2
BL41-40	23/07/2010	25/07/2010	2
WBL43-42	23/07/2010	25/07/2010	2
WBL42-41	23/07/2010	25/07/2010	2
WBL41-40	23/07/2010	25/07/2010	2
BM44-43	23/07/2010	26/07/2010	3
BM-43-42	23/07/2010	26/07/2010	3
BM-42-41	23/07/2010	26/07/2010	3
WBM44-43	23/07/2010	25/07/2010	2

WBM41-40	23/07/2010	25/07/2010	2
BN44-43	23/07/2010	25/07/2010	2
WBN44-43	23/07/2010	26/07/2010	3
BO44-43	23/07/2010	26/07/2010	3
537-536	23/07/2010	26/07/2010	3
452-451	23/07/2010	26/07/2010	3
531-529	23/07/2010	26/07/2010	3
435-436	23/07/2010	26/07/2010	3
WBP47-46	23/07/2010	24/07/2010	1
WBQ45-44	23/07/2010	27/07/2010	4
450-449	23/07/2010	27/07/2010	4
BT44-43	23/07/2010	27/07/2010	4
445-446	23/07/2010	27/07/2010	4