

*Brief Communication*

## Population survey of Peary caribou (*Rangifer tarandus pearyi*) and muskoxen (*Ovibus moschatus*) on Banks Island, Northwest Territories, July 2010

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**Abstract:** We conducted a systematic aerial transect survey of Peary caribou (*Rangifer tarandus pearyi*) and muskoxen (*Ovibus moschatus*) on Banks Island, Northwest Territories, in July 2010. The population estimate of adult Peary caribou was  $1097 \pm 343$  (95% Confidence Interval: CI), which is not significantly different from the 2005 estimate of  $929 \pm 289$  (95% CI;  $P < 0.05$ ). The current number, however, is a 4- to 9-fold decrease since the 1980s. The adult muskoxen population estimate was  $36\,676 \pm 4031$  (95% CI), which is significantly lower than the 2005 estimate of  $47\,209 \pm 3997$  (95% CI;  $P < 0.05$ ).

**Key words:** Banks Island; muskoxen; *Ovibus moschatus*; Peary caribou; population survey; *Rangifer tarandus pearyi*.

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### Introduction

Peary caribou (*Rangifer tarandus pearyi*) are endemic to Canada, occurring in the high Arctic islands of the Northwest Territories (NWT) and Nunavut. Peary caribou have declined across their entire range since the first surveys were done in the 1960s and 1970s, however, surveys of Peary caribou have been conducted infrequently, which makes determining trend of the overall Peary caribou population difficult. The Peary caribou of Banks Island, however, have a long term aerial strip-transect survey data set. Surveys were first conducted on Banks Island in 1973, and systematic island-wide surveys using fixed-wing aircraft have been done every 2 – 5 years since 1982. These have documented the number and population trend of Peary caribou and muskoxen on Banks Island.

Between 1982 and 1998, the Peary caribou population declined from about 9038 to 451 non-calf animals. The population estimate of adult Peary caribou in 2005 was  $929 \pm 289$  (95% CI). The adult muskoxen population estimate was  $47\,209 \pm 3997$  (95% CI) in 2005.

Peary caribou on Banks Island are harvested by aboriginal subsistence hunters from Sachs Harbour. A quota for Peary caribou has been in place since 1991 and is currently 72 animals (bulls only). Reported harvest of Banks Island Peary caribou for the period 2005 – 2010 has ranged from 1 to 12 caribou per year. Peary caribou was assessed by COSEWIC as endangered in Canada in May 2004 and legally listed under the Species at Risk Act in February 2011.

For muskoxen, there is both a commercial and aboriginal subsistence harvest. Although the total annual allowable harvest of muskoxen is 10 000, reported harvests have ranged from 60 to 987 muskoxen per year for the period 2005 – 2010. Here we present the 2010 population estimates for Peary caribou and muskoxen on Banks Island in relation to past estimates.

### Study area

Banks Island covers an area of 70 579 km<sup>2</sup>, making it the 4th largest island in the Canadian Arctic Archipelago. Located in the Inuvialuit Settlement Region (ISR), Banks Island is home to both Peary caribou and muskoxen. Wildlife on Banks Island is co-operatively managed by the Wildlife Management Advisory Council (WMAC [NWT]), made up of members appointed by the Inuvialuit, Government of the NWT, and the Government of Canada and whose mandate includes advising appropriate Ministers on all matters relating to wildlife management within the ISR.

### Methods

Survey lines, spaced 5 km apart, were flown over the entire island. The survey was conducted with two aircraft (Helio Courier and a Cessna 206) and each crew consisted of a pilot, two rear seat observers, and a front seat recorder/navigator. The island was divided into 11 blocks for survey purposes (A – K). This ensured that survey lines could be flown in less than 30 minutes to reduce observer fatigue. Transects were run perpendicular to drainages. The survey was flown at an average speed of approximately 160 km/hr, 120 m above ground level and markers were placed on the aircraft struts or windows to delineate a strip width of 500 m on each side of the aircraft. The pilot maintained altitude using an aircraft altimeter. No correction factor was used for missed or over-counted animals due to inability to maintain survey altitude due to steep terrain. This

type of terrain on Banks Island is minimal and occurs mostly in the northwest portion of the island. Past surveys also did not have a correction factor and covered the same terrain with similar methods so would have similar biases. Observations within 500 m were considered 'on' transect. Muskoxen and caribou, on or off transect, were classified as adults ( $\geq$  1-year old) or calves based on body size as calves are noticeably smaller than adult animals. Further, all caribou observed were classified as mature bulls, cows/young bulls, or calves. Mature bulls were identified by their antlers, and cows and young bulls were grouped as distinguishing between them from the aircraft is more difficult. Animals directly under the aircraft, and not visible from the side window, were considered 'off transect' as transect widths were measured using the area visible to the observer from the side of the aircraft. Sightings of other wildlife were also recorded.

Population estimates for adult caribou and muskoxen were calculated using a ratio method for unequal-sized units sampled without replacement (Krebs, 1999; Ecological Methodology, Version 7.0). Population estimates are calculated for the adults because of the high variability of caribou calf production year-to-year and higher mortality rate in their first year (Larter & Nagy, 1999b). This is also consistent with historic population estimates. A two-tailed t-test was used to determine if the population estimates of adult muskoxen and Peary caribou were significantly different than the 2005 estimates (Gasaway *et al.*, 1986; Nagy *et al.*, 2009a).

### Results & Discussion

The survey was conducted between July 17 and 26, 2010. One survey crew flew blocks A, B, C, H, I, J, and K in 9 days, with one weather day (19th July). The other survey crew flew blocks D, E, F, and G in 7 days with no weather days once the survey started. All planned survey lines

were flown except a short segment on the north shore of the island, which was obscured by fog (Fig. 1). There were 229 transects totaling 13 826.8 km in length flown on survey. With a transect width of 1 km this results in a coverage of 19.59% of the island.

A total of 285 Peary caribou (215 adults, 70 calves) were seen on transect, and a further 75 caribou (63 adults, 12 calves) were seen off transect (Fig. 1). On transect observations resulted in a population estimate of  $1097 \pm 343$  (95% Confidence Interval, [CI]; CV = 0.313) adult Peary caribou on Banks Island. The proportion of calves among all caribou observed (on and off transect as all observations of caribou were classified) was 22.8%. The proportion of calves varies by survey, reported in 2005, 2001, and 1992 as 19.4%, 26.3% and 28.8%, respectively (Nagy *et al.*, 2006; 2009a; b). Eighty-one mature bulls were observed (on and off transect), which was 22.5% of all caribou observed. The proportion of mature bulls varies by survey, reported in 2005 and 2001 as 29% and 19%, respectively (Nagy *et al.*, 2006; 2009a). Distribution was concentrated in the northwest, northeast, and central portions of Banks Island (Fig. 1). The average group size for Peary caribou observed on transect was 4.2 with the largest group being 37 and smallest being one. The 2010 population estimate of Peary caribou was not significantly different from the 2005 estimate of  $929 \pm 289$  (95% CI) ( $t = 0.74$ ,  $P < 0.05$ ,  $df = 45$ ). Peary

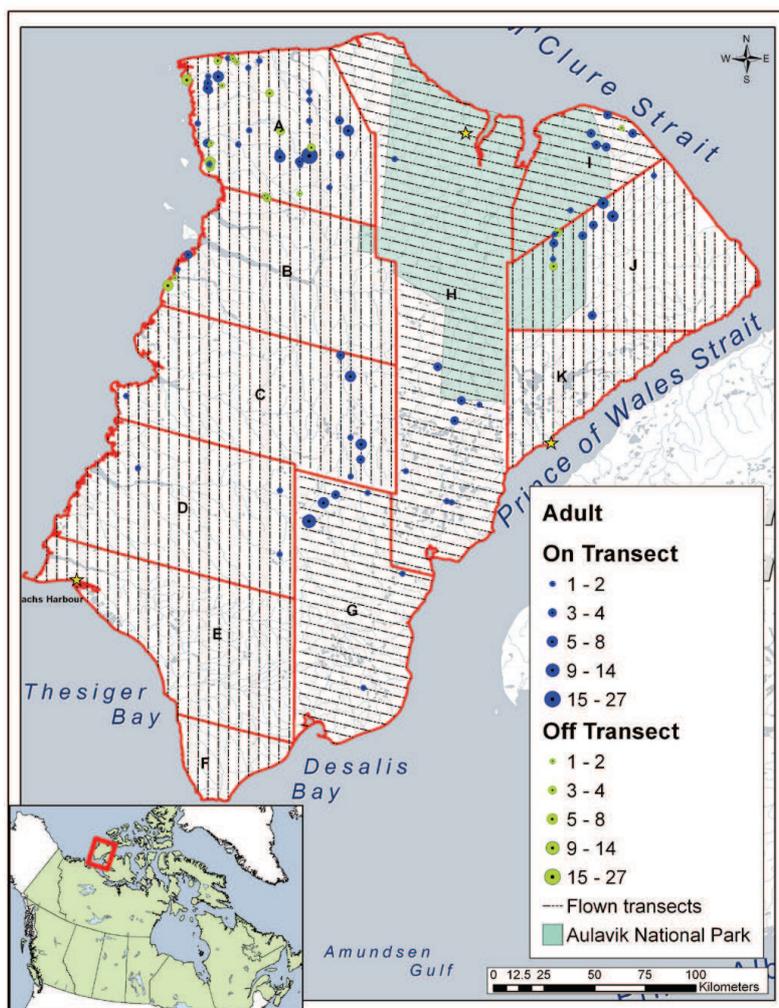


Fig. 1. Distribution of adult Peary caribou observed both on and of transect during an aerial survey flown from July 17 – 26, 2010, on Banks Island, NWT.

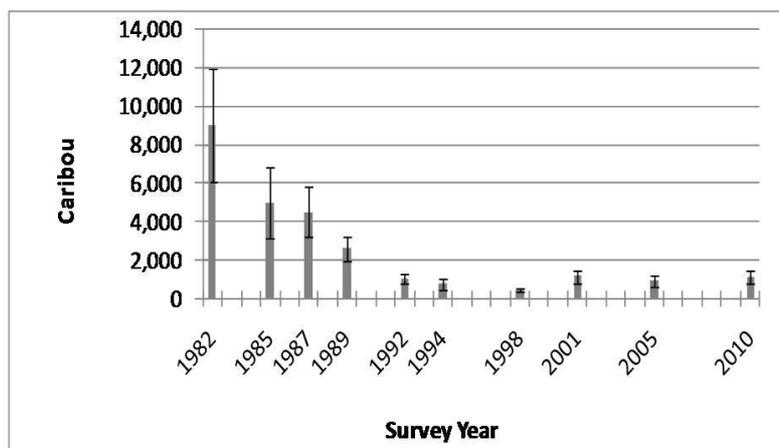


Fig. 2. Transects flown during the 2010 survey and distribution of adult caribou found 'on' and 'off' transect on northwest Banks Island, NWT.

caribou numbers on Banks Island have decreased 9-fold since 1982; however, the current low abundance appears to have been stable for the past decade (Fig. 2). At small numbers populations become more vulnerable (Lacy, 2000) and at low numbers Peary caribou populations are particularly influenced by severe weather and changes in their environment (Gunn *et al.*, 1980).

The average group size for muskoxen observed on transect was 8.5 with the largest group being 38 and smallest being one. There were a total of 8054 muskoxen (7185 adults, 869 calves) observed on transect, resulting in a population estimate of  $36\,676 \pm 4031$  (95% CI; CV=10.99) adult muskoxen on Banks Island and a calf percentage of 10.7%. Muskoxen were spread throughout Banks Island, with concentrations in the southwest and north-central areas (Fig. 3). The 2010 population estimate of adult muskoxen was significantly lower ( $t = 3.699$ ,  $P < 0.05$ ,  $df = 90$ ) than the 2005 estimate of  $47\,209 \pm 3997$ . Muskoxen abundance on Banks Island from 1982 to 2010 has fluctuated, and since 2001 has exhibited a decline (Fig. 4).

The reasons for the decline are not clear. In 1996 a die-off of muskoxen on Banks Island was attributed to disease (Larter & Nagy, 1999a). During

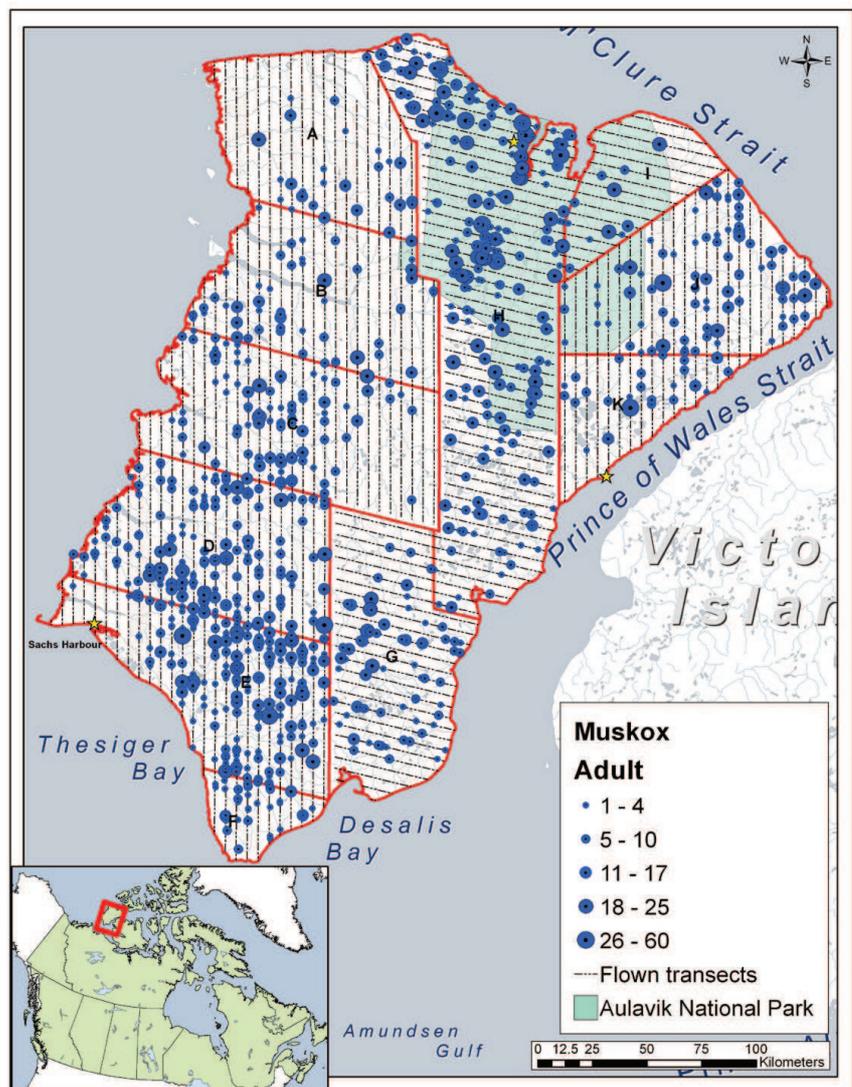


Fig. 3: Population counts of adult Minto Inlet Peary caribou and Dolphin-Union caribou on northwest Banks Island, NWT with 95% confidence intervals around the population estimates.

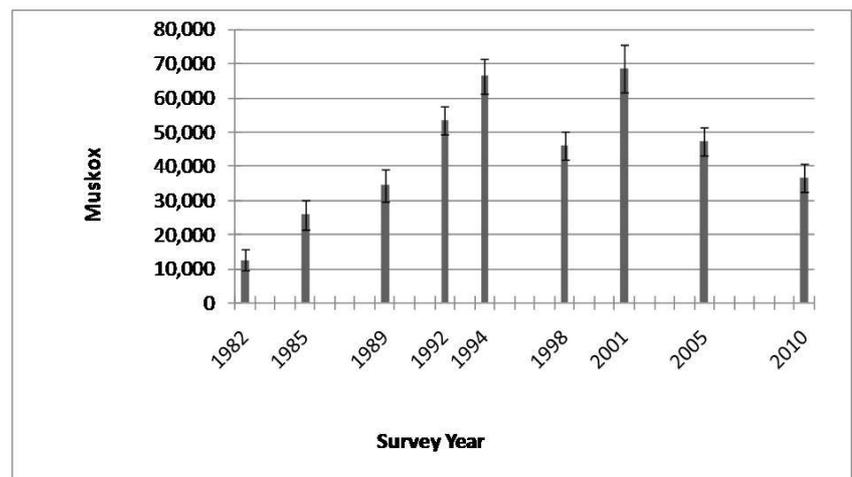


Fig. 4. Transects flown during the 2010 survey and distribution of adult muskoxen found 'on' transect on northwest Banks Island, NWT.

the July 2004 survey a large number of muskoxen carcasses were observed and calves made up only 4% of total muskoxen observed during the survey. This was assumed due to severe icing events in the 2003/2004 winter (Nagy & Gunn, 2009). Our 2010 survey observed only four carcasses, and 10.7% calves is similar to the recovered productivity of 12.6% observed in 2006 (Gunn & Williams, unpublished data, Government of the NWT July 2006). As designed, the surveys provided abundance estimates and trends, while explanations behind trends must be sought elsewhere.

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