AERIAL CLASSIFICATION SURVEYS OF PEARY CARIBOU ON BANKS, MELVILLE, AND NORTHWEST VICTORIA ISLANDS - JULY 1998 AND 1999

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ABSTRACT

Spaghetti transect surveys were conducted over Banks, Melville, and northwest Victoria Islands between 10 and 16 July, 1998, and over Banks and Melville Islands between 16 and 20 July, using a Bell 206L helicopter. All Peary caribou groups observed during flying were classified into calves, yearlings, 2 year and older females, and 2 year and older males. The latter male category was subdivided into young and mature adult males by antler size and shape. Large antlered males were considered mature adults. Surveys on Banks Island were conducted specifically in caribou calving and summering areas to the northwest (1998 and 1999), and east central (1998) parts of the Island. Surveys on Melville Island covered Dundas Peninsula and Bailey Point (1998 and 1999), and an area north of Barry Bay (1998). Northwest Victoria Island was surveyed only in 1998. The survey area covered the western part of Prince Albert Peninsula and the Minto Inlet area. One-hundred and forty-eight caribou in 22 groups were classified on Banks Island and 46 caribou in 4 groups were classified on Melville Island during 1998. In 1999, 174 caribou in 23 groups and 73 caribou in 14 groups were classified on Banks and Melville Islands, respectively. No caribou were observed during the survey of northwest Victoria Island. We estimated 76.5 calves and 23.5 yearlings per 100 adult females for Banks Island and 80.0 calves and 20 yearlings per 100 adult females for Melville Island in 1998. In 1999, we estimated 70.5 calves and 32.1 yearlings per 100 adult females and 44.8 calves and 31.0 yearlings per 100 adult females for Banks and Melville Islands, respectively. Calving occurs prior to these surveys, therefore neonatal mortality is a part of the estimate of calf production. We conservatively estimated 1998-99 overwinter survival of calves as 43.2% and 38.8% for Banks and Melville Islands, respectively.

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INTRODUCTION

Annual aerial classification surveys of Peary caribou on Banks Island were initiated in summer 1992 in response to local concerns about low caribou numbers (Larter and Nagy, 1999). These surveys were used to assess annual calf production and overwinter survival of calves. Population surveys have been conducted on Melville and northwest Victoria Islands previously (Miller, 1998; F. Miller, A. Gunn and J. Nishi , unpubl. data; J. Nagy and M. Branigan, unpubl data). These surveys provided an estimate of the percent calves in the population, however aerial classification survey data to more accurately assess production and survival were lacking. In July, 1998 aerial classification surveys of Peary caribou were conducted in conjunction with the population surveys of Peary caribou and muskox on Banks Island and northwest Victoria Island. Classification surveys were conducted on Banks, Melville and northwest Victoria Islands in 1998. In 1999 classification surveys were conducted on Banks and Melville Islands.

A secondary goal of the classification surveys was to collect cast caribou antlers for an ongoing study on the genetics of Peary caribou and mainland caribou found in the Inuvialuit Settlement Region. This report summarizes the results of the aerial classification surveys of Peary caribou conducted on Banks, Melville, and northwest Victoria Islands during July 1998 and 1999.

METHODS

Aerial classification surveys of Peary caribou were conducted in mid- July using a Bell 206L helicopter. When groups of animals were located, the helicopter landed in the vicinity of the group and the animals were viewed with a spotting scope and classified into calves, yearlings, 2 year and older females, and 2 year and older males. The latter male category was subdivided into young and mature adult males by antler size and shape. Large antlered males were considered mature adults. Sometimes small groups ($\leq$6 individuals) were classified from the air.

In 1998, the survey on Banks Island was conducted on 10 and 13 July in the calving/summering grounds to the northwest. This area is basically bounded by the ocean to the north and west and by 74° N and 122° W to the south and east. The population survey had just previously completed surveying this area with a fixed-wing aircraft, and the locations of observed caribou were plotted on maps. This allowed us to conduct a spaghetti survey throughout the area which had been recently frequented by caribou. On 10 July we flew an area bounded by 74° 10' to the N and 123° 30' to the W and on 13 July we surveyed the remaining area west of 123° 30 using a similar spaghetti flight design (Fig. 1.). During a flight over an area north of Jesse Bay and south of Johnson Point on 16 July, 1998, caribou groups were also encountered and classified into the same sex and age categories (Fig. 1). This area was historically used for calving area when the caribou population was larger (Urquhart, 1973).

Because of the success in finding and classifying a large number of animals in the calving/summering grounds, we conducted a similar spaghetti survey in the same area on 16 July, 1999 (Fig. 2).

In 1998, the survey on Melville Island was based upon opportunistic observations of caribou

made during flights between Bailey Point and Cape Providence and in search of caribou carcasses located during a 1997 survey on the SW of the island. Bad weather and limited fuel resources restricted the survey area and flying time. On 11 July an area of Dundas Peninsula bounded by 75° N and 110° 30' W and an area bounded by Barry and Bushman Bays to the west and east and 75° 35' N to the north was surveyed (Fig. 3.). On 12 July the western portion of Dundas Peninsula and the Bailey Point area were surveyed (Fig. 3). Freezing rains prevented surveying the Sabine Peninsula and around the Hecla and Griper Bay.

In 1999, after opportunistic observations of caribou during limited flights on 18 July indicated that caribou were again located on the Dundas Peninsula, we designed a more systematic survey which was conducted on 20 July. We flew 8 parallel line transects of 26 km length running in a north-south direction across the south centre of the Dundas Peninsula between 113° 40' W and 112° 23' W. The transects were spaced *ca.* 5.6km apart. We also flew the Bailey Point area (Fig. 4).

The survey on northwest Victoria Island (16 July, 1998) was also based upon opportunistic observations of caribou made during flying. The survey area covered Prince Albert Peninsula south of 72° 35' N and west of approximately 118° W, Minto Inlet, and an area north from Holman to Cape Wollaston (Fig. 5.).

The number of calves produced per 100 adult females was estimated by dividing the number of calves observed by the number of 2 year old and older females observed. Because calving occurs prior to the survey neonatal mortality is part of the calf production estimate. Similarly the number of yearlings per 100 adult females was estimated by dividing the number of yearlings observed by the number of 2 year and older females observed. A conservative estimate of 1998-99 overwinter

calf survival was estimated by dividing the number of yearlings per 100 adult females determined from any survey by the number of calves per 100 adult females estimated during the 1998 classification survey. This estimate is conservative because it assumes that overwinter survival of adult females is 100%. Observations of wolves were also recorded.

RESULTS

Banks Island

Three groups totaling 36 animals were classified during 2.0 hours of flying on 10 July, 1998 in the calving/summering grounds. A further 14 groups totaling 85 animals were classified during 2.5 hours of flying on 13 July, 1998 (Fig 1). Of the 121 animals, 56 were adult females, 42 were calves, and 12 were yearlings resulting in estimates of 75.0 calves and 21.4 yearlings per 100 adult females in this area (Table 1). Five groups totaling 27 animals were classified in an area north of Jesse Bay during 2.5 hours of flying between Johnson Point and Coyote Camp. Twelve animals were adult females, 10 were calves and 4 were yearlings resulting in estimates of 83.3 calves and 33.3 yearlings per 100 adult females in this area (Table 1). A total of 148 caribou were classified in both calving areas and grouped to provide an estimate of 76.5 calves and 23.5 yearlings per 100 adult females (Table 1). Two wolves were observed during these flights. The wolves were observed along the Thomsen River *ca.* 15 km south of Castel Bay.

Twenty-three groups totaling 174 animals were classified during 4.2 hours of flying on 16 July, 1999 (Fig. 2). We estimated 70.5 calves and 32.1 yearlings per 100 adult females (Table 1). No wolves were observed during the survey.

We estimated 1998-99 overwinter survival of calves at 43.2% (Table 2).

Melville Island

Four groups totaling 46 animals were classified during 5.0 hours of flying on Melville Island during July, 1998 (Fig. 3); 15 were adult females, 12 were calves and 3 were yearlings resulting in estimates of 80.0 calves and 20 yearlings per 100 adult females (Table 1). Four wolves were

observed attacking a group of 13 muskox south of Chevalier Bay. Another group of 4 wolves was observed at a den site with four pups in the Bailey Point area.

Two groups totaling 4 animals were classified during 1.0 hours of reconnaissance flying over Dundas Peninsula on 18 July, 1999. Twelve additional groups totaling 69 animals were classified during 4.4 hours of flying over the Dundas Peninsula and Bailey Point area (Fig. 4). We estimated 44.8 calves and 31.0 yearlings per 100 adult females (Table 1). No wolves were observed during the survey.

We estimated 1998-99 overwinter survival of calves at 38.8%.

Northwest Victoria Island

No caribou or wolves were observed in the areas flown during 5.0 hours of flying. A population survey flown over northwest Victoria Island during summer 1998 estimated 508 (SE 75) $\geq$ 1-year-old animals and 23.1 calves per 100 $\geq$ 1-year-old animals (J. Nagy and M. Branigan, unpubl. data).

DISCUSSION

Banks Island

The success in classifying such a large number of animals in surveys during 1998 and 1999 has only been matched once previously in August, 1992 when the caribou population was twice current levels (Nagy *et al.*, 1996; J. Nagy and M. Branigan, unpubl. data) and the number of calves per 100 adult females was somewhat lower at 68.2. The numbers of calves and yearlings per 100 adult females recorded in 1998 and 1999 were higher than any recorded previously in the 1990's being similar to those reported in the early 1980's when the caribou population was substantially higher (Table 2) (Nagy *et al.*, 1996). Larter and Nagy (1999) reported annual variation in calf production (range 33.3-74.3 calves per 100 adult females) and overwinter survival (range 23-86%) for Banks Island Peary caribou between 1982 and 1998. However overwinter survival estimates are conservative because they assume adult female survival to be 100%. Tyler (pers. comm.) estimated mean overwinter survival of adult female Svalbard reindeer was 93%. Unlike Peary caribou Svalbard reindeer inhabit areas without predators and overwinter mortality is almost exclusively a result of starvation. If we estimate overwinter survival of adult female Peary caribou on Banks Island at 93% (following N. Tyler, pers. comm.), then estimated overwinter survival of calves would range from 25-92% with *ca.* 50% overwinter survival for 1998-99. The results of these two surveys, previous classification and population surveys (see Banks Island Management Plan, 2000), and historical information (Urquhart, 1973) indicate a definite fidelity of female and young caribou to the northwest part of Banks Island during July (Fig. 6).

Melville Island

An aerial population survey of Melville Island in 1997 observed a fairly substantial number of both caribou and muskox carcasses on and off transect (A. Gunn and F. Miller, unpubl. data), therefore we did not anticipate observing many caribou given our limited survey time in 1998. The largest group of caribou classified during all surveys in 1998 was on Melville Island. Calf production was at a similarly high level to Banks Island in 1998. All animals appeared to be fat and healthy and were located in highland rolling habitats which appeared to be similar to those frequented by Banks Island caribou during the calving and summer periods. On Banks Island there was an extended green period in late-summer 1998 which provided an extended period of higher quality forage prior to winter (N. Larter, unpubl. data). Snow conditions (depth, density, and hardness) during winter 1997-98 were the least severe measured on Banks Island (Larter and Nagy, accepted; Larter and Nagy, in review). Possibly Melville Island experienced similar conditions to Banks Island; high quality forage prior to winter and winter snow conditions not adversely affecting forage availability, and this was expressed by high calf production on Melville Island in 1998.

Gunn *et al.* (1980) believed that post-calving caribou moved from the coastal areas of the Dundas Peninsula to the higher inland plateaus of Dundas Peninsula. Results of the 1999 survey and an additional 7.9 hours of flying the rest of the Dundas Peninsula, parts of the Sabine Peninsula, and the Hecla and Griper Bay areas indicate that during mid-July most caribou on the western half of Melville Island were indeed congregated on the south central portion of the Dundas Peninsula (Fig. 7). Therefore, future surveys should use similar areas to those we blocked off on Dundas Peninsula and to exclude the Bailey Point area in order to efficiently collect comparative classification information in the future.

Calf production was noticeably lower in 1999 than in 1998 (44.8 versus 80.0) and was substantially lower than on adjacent Banks Island (44.8 versus 70.5) (Table 1). However, calf production was well within the range reported for High Arctic Peary caribou populations (Larter and Nagy, 1999). Overwinter survival of calves was conservatively estimated at 38.8% which was also well within the range reported on Banks Island (Larter and Nagy, 1999) (Table 2). Incorporating Tyler's (pers. comm.) estimate of adult female survival for the Melville Island data would increase our estimate of overwinter survival of calves to *ca.* 42%.

Northwest Victoria Island

No caribou were observed during the classification survey in 1998 because the main distribution of the caribou was later discovered to be further to the north and east of the survey area (J. Nagy and M. Branigan, unpubl. data); no classification survey was conducted in 1999. The 1998 population survey estimated 23.1 calves/100 $\geq$ 1-year-old caribou for northwest Victoria Island, an estimate similar to the 25.8 calves/100 $\geq$ 1-year-old caribou estimated for the 1998 Banks Island population survey (J. Nagy and M. Branigan, unpubl. data). We estimated *ca.* 74 calves per 100 adult females for Banks Island at the same time as the population survey; it is quite likely that calf production on northwest Victoria Island in 1998 was similar to that on Banks Island.

The secondary goal of the 1998 classification survey was to collect cast caribou antlers, in the Minto Inlet area especially, as a source of DNA material for a genetic study of caribou. Apparently there was little overlap in the distribution of cast caribou antlers and the summer distribution of caribou. We found many cast antlers during the flight, but only a few were collected for the genetic study. Until caribou on northwest Victoria Island can be outfitted with satellite

collars providing seasonal locations, classification surveys on northwest Victoria Island may be very costly and provide limited data.

RECOMMENDATIONS

1) Classification surveys should be conducted annually on post-calving ranges on all three arctic islands during the summer/post calving season in order to monitor annual calf production and overwinter calf survival.

2) Classification surveys should target known post calving areas whenever possible. Therefore, surveys should continue to be conducted in the northwest of Banks Island and in the south central Dundas Peninsula on Melville Island.

3) Until there is better information on caribou distribution during the summer/post calving season on northwest Victoria Island classification surveys are not practical.

4) Whenever possible fecal samples should be collected in order to monitor diet and parasites during the summer/post calving season, especially on Melville and northwest Victoria Islands.

5) A data base of all observations of wolves and den sites on these High Arctic Islands should be maintained.

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PERSONAL COMMUNICATIONS

Dr. N.J.C. Tyler, Professor University of Tromsø, Norway

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Table 1. The number of adult females, calves, yearlings, adult males, young male, and total Peary caribou classified on Banks and Melville Islands during July classification surveys in 1998 and 1999. JB indicates the Jesse Bay area of Banks Island.

Date	Location	Ad. Fem.	Calves	Yrlngs	Ad. Mal.	Yng. Mal.	Total
July 10/98	Banks NW	16	13	5	0	2	36
July 13/98	Banks NW	40	29	7	6	3	85
July 16/98	Banks JB	12	10	4	1	0	27
	All Banks	68	52	16	7	5	148
July 11-12/98	Melville Is.	15	12	3	16	0	46
July 16/99	Banks NW	78	55	25	9	7	174
July 18+20/99	Melville Is.	29	13	9	14	8	73

Table 2. Estimates of the number of calves per 100 adult females, yearlings per 100 adult females in the following year, and calf overwinter survival for Banks Island.

Year	Survey Month	Calves/100 2+ yr cows	Survey Month	Yrlgs/100 2+ yr cows following year	% Calf Over-Winter Survival
1982-83	Nov 82	75.6	n/a	n/a	n/a
1990-91	Oct 90	52.6	n/a	n/a	n/a
1991-92	Sep/Nov 91	59.1	Jun 92	13.8	23
1992-93	Aug 92	68.2	May/Jun 93	42.6	62
1993-94	Oct/Nov 93	41.9	Jul 94	36.0	86
1994-95	Jul/Aug 94	23.3	n/a	n/a	n/a
1995-96	Jul/Aug 95	53.3	Jul 96	33.3	62
1996-97	Jul 96	66.7	Jul 97	26.7	40
1997-98	Jul/Aug 97	43.5	Jul 98	23.5	54
1998-99	Jul 98	74.3[1]	Jul 99	32.1	43
1999-00	Jul 99	70.5	n/a	n/a	n/a

[1] This value represents our best estimate for Banks Island and includes other observations in additional to those documented in this report. See Larter & Nagy, 1999, Manuscript Report 114.

Figure 1. Flight lines and locations of classified groups on Banks Island on 10, 13, and 16 July, 1998.

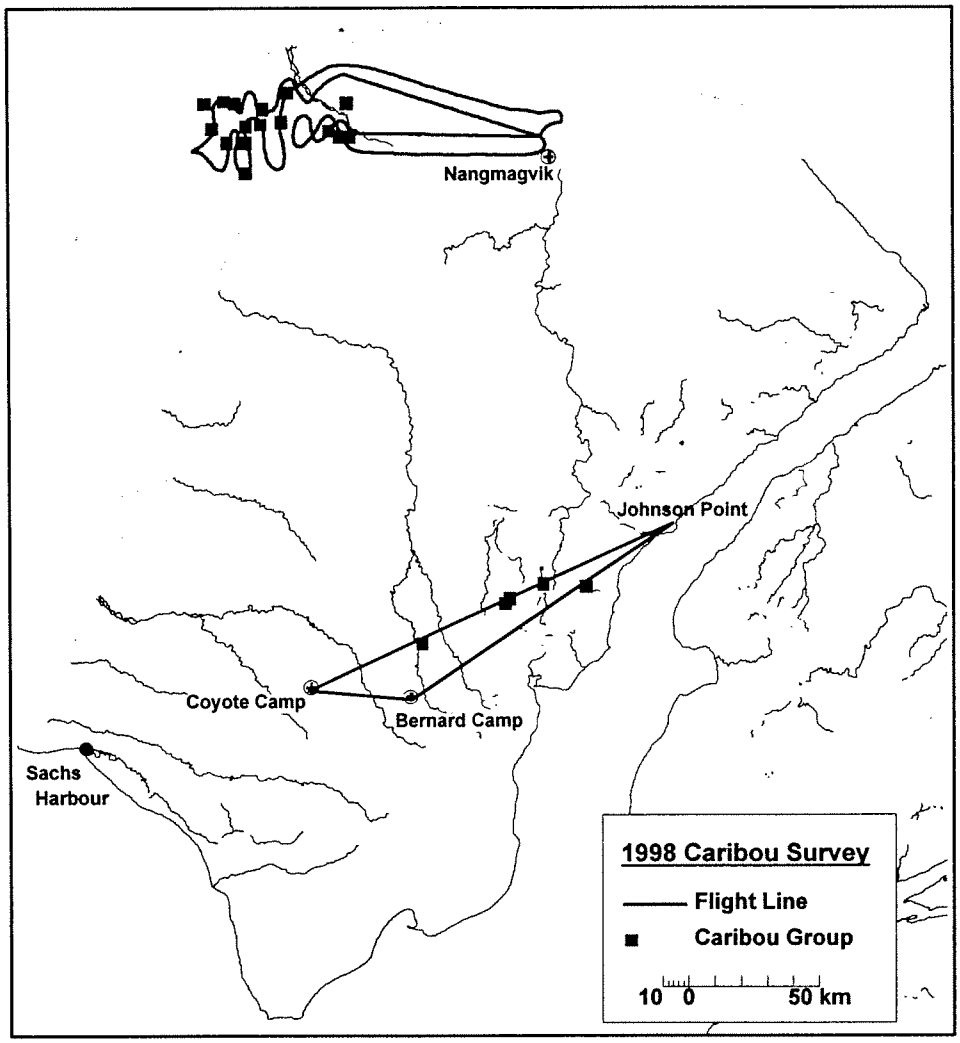


Figure 2. Flight lines and locations of classified groups on Banks Island on 16 July, 1999.

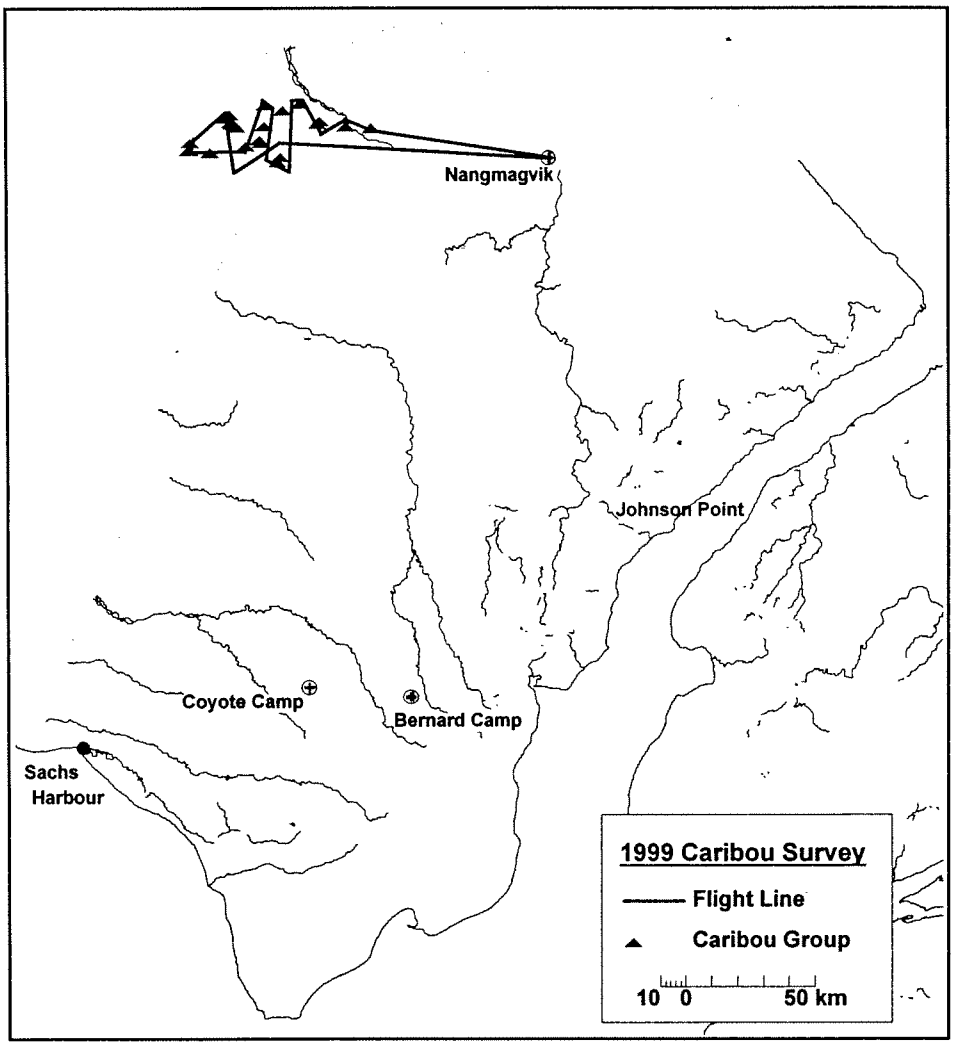


Figure 3. Flight lines and locations of classified groups on Melville Island on 11 and 12 July, 1998.

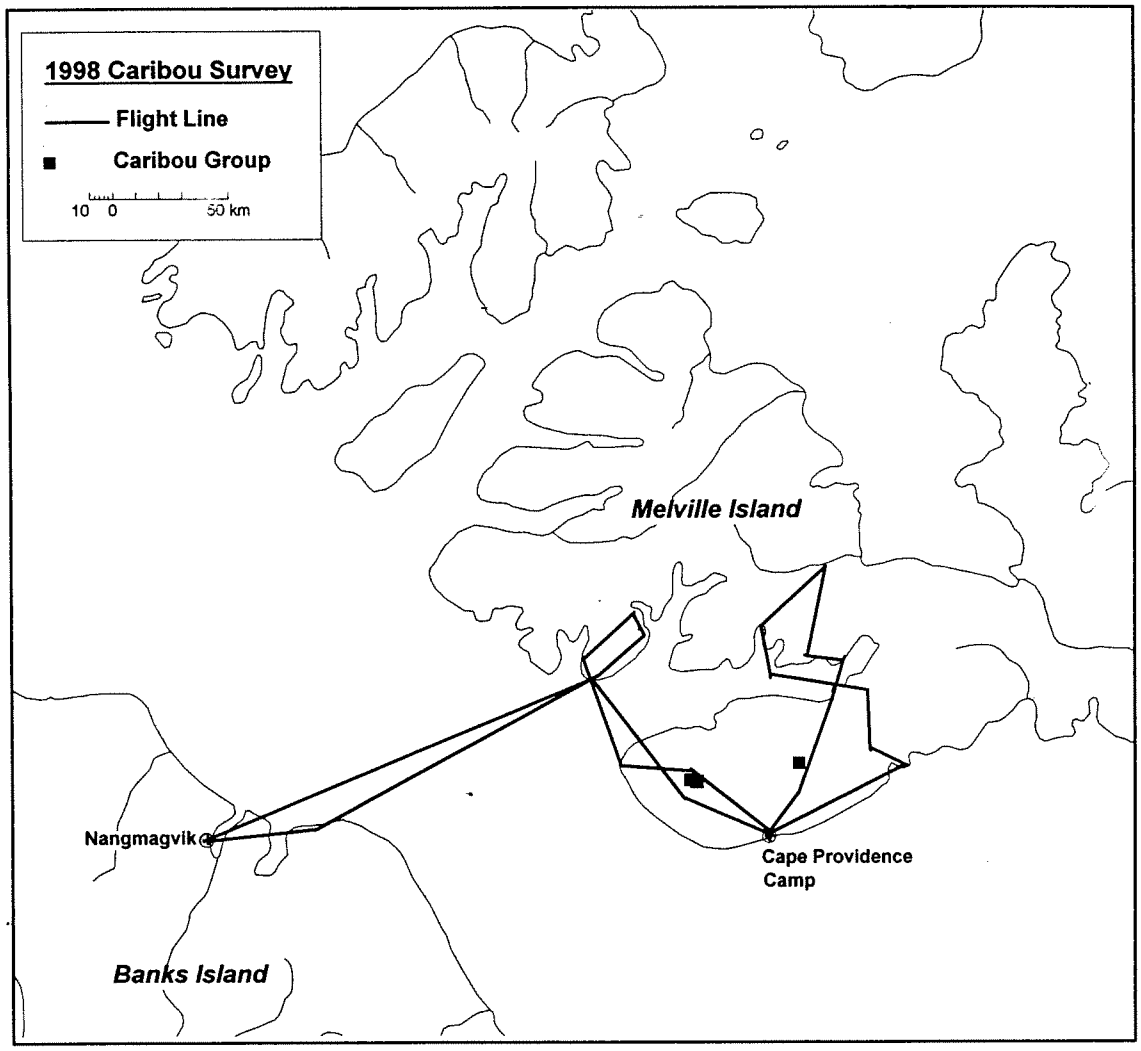


Figure 4. Flight lines and locations of classified groups on Melville Island on 18 and 20 July, 1999.

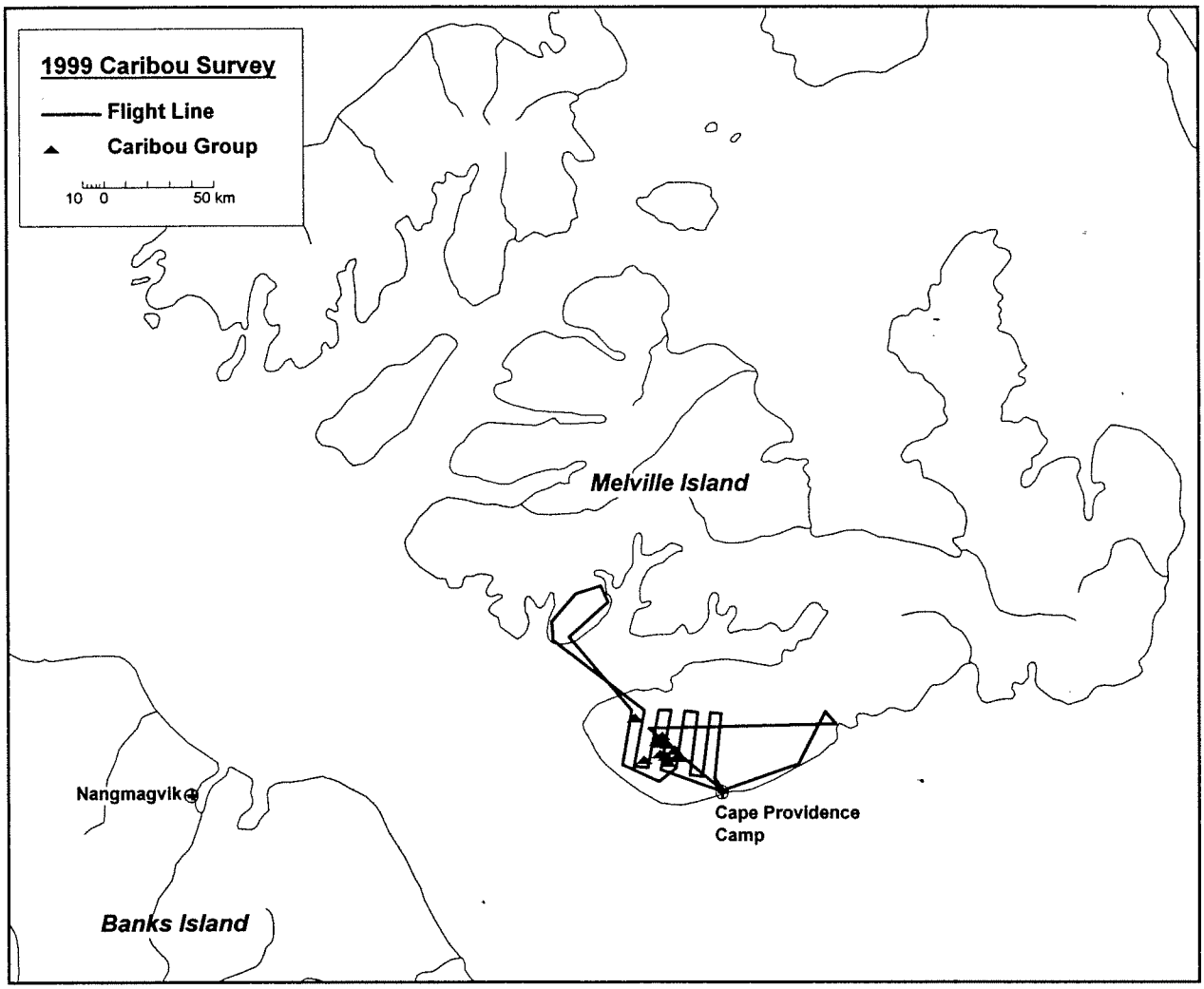


Figure 5. Flight lines over northwest Victoria Island on 16 July, 1998.

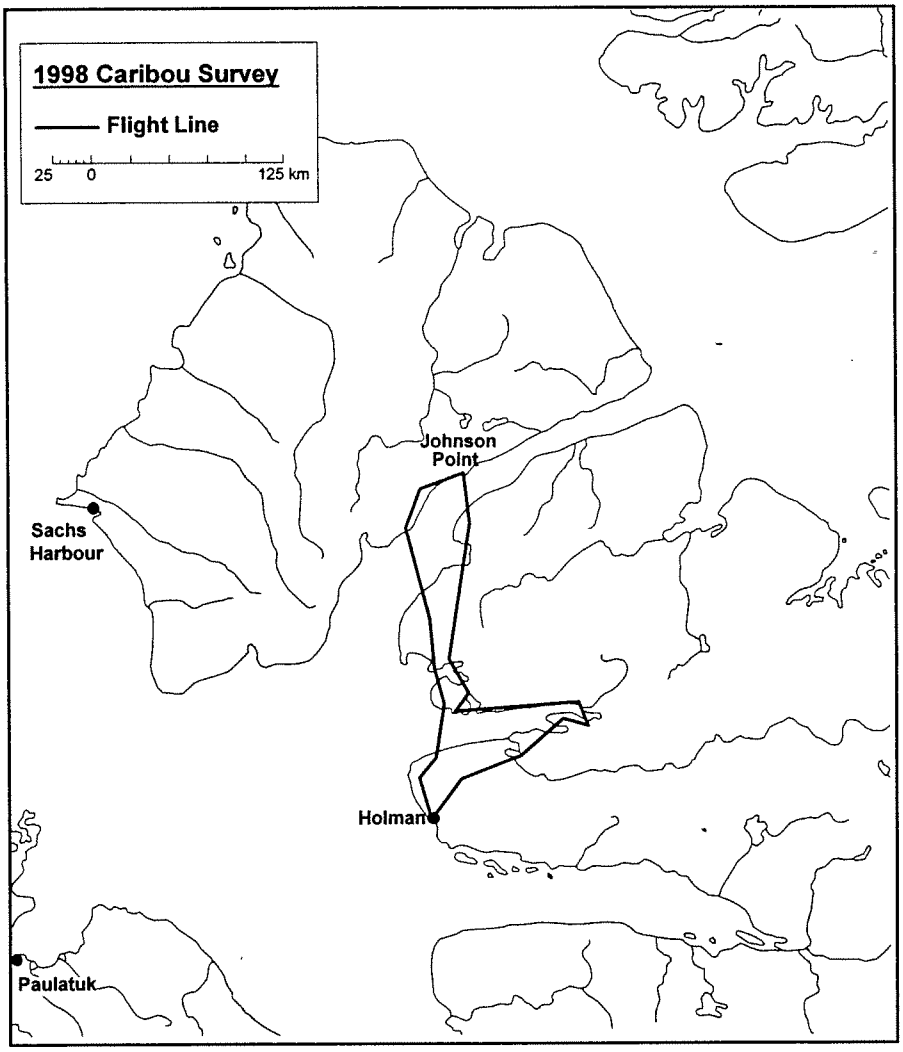


Figure 6. Locations of caribou groups on northwest Banks Island in July 1998 and July 1999.

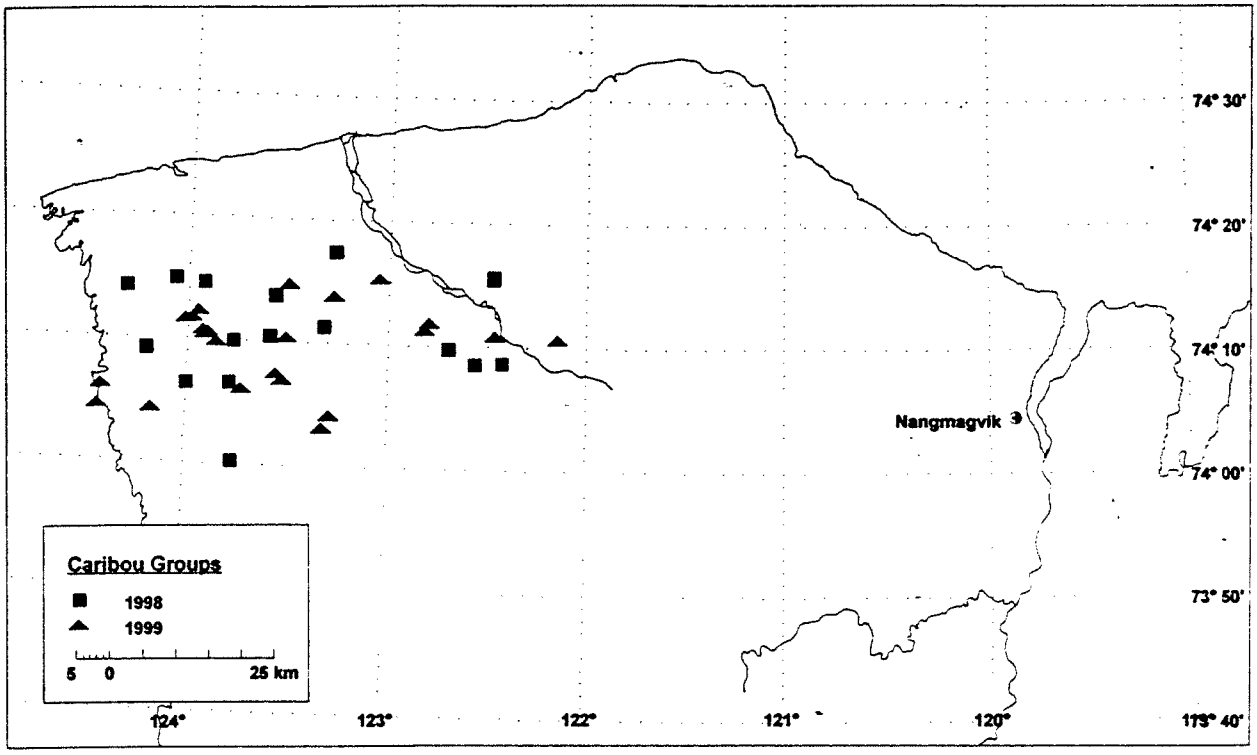
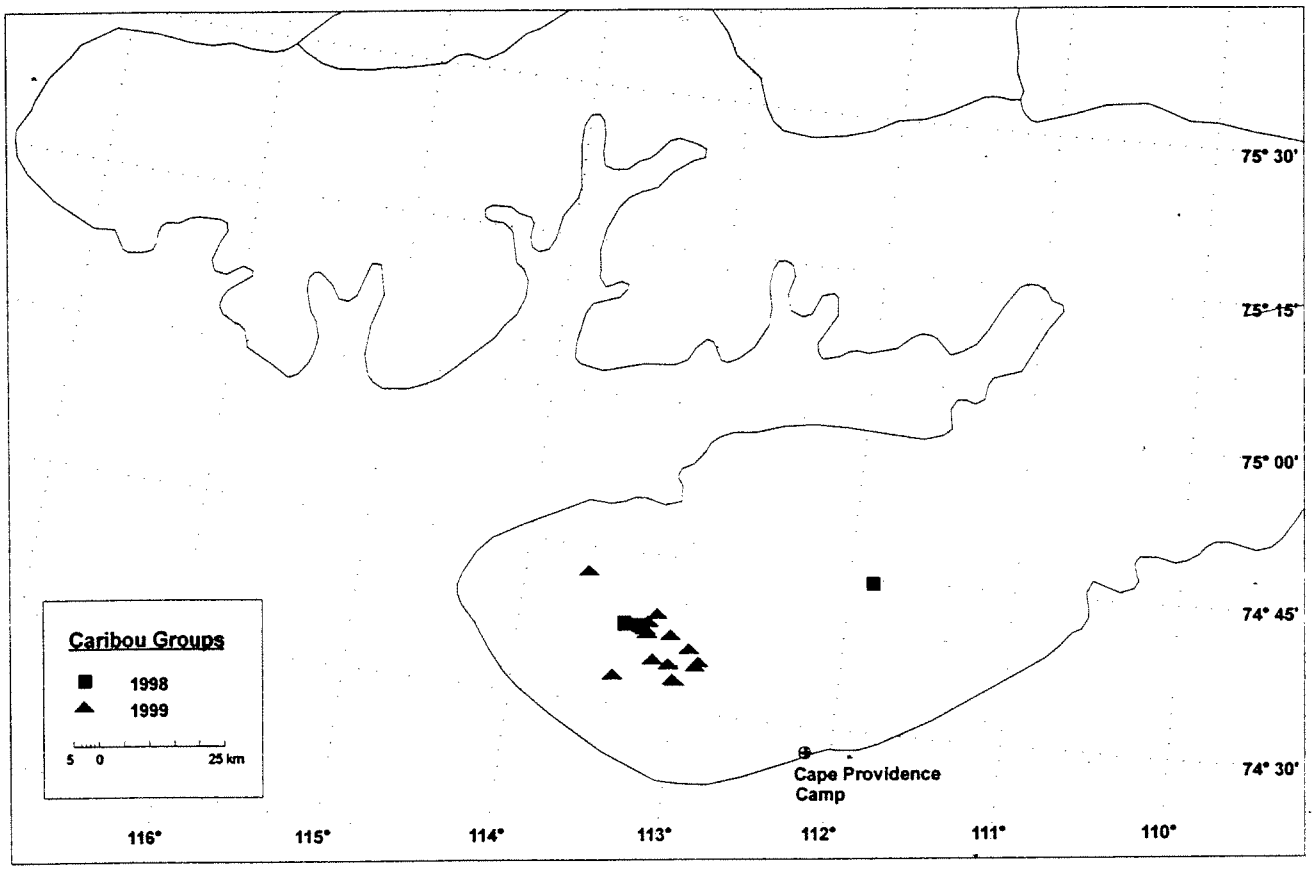


Figure 7. Locations of caribou groups on Melville Island in July 1998 and July 1999.



APPENDIX 1

Classification and location of all groups of Peary caribou classified on Banks and Melville Islands, July 1998.

Group	Adult Females	Adult Males	Young Males	Year-lings	Calves	Total Animals	Latitude N	Longitude W
Banks1	10	0	2	4	8	24	74.14	122.43
Banks2	3	0	0	1	2	6	74.16	122.71
Banks3	3	0	0	0	3	6	74.14	122.57
Banks4	8	0	0	0	6	14	74.26	122.48
Banks5	0	1	0	0	0	1	74.26	122.49
Banks6	6	1	0	1	4	12	74.23	123.57
Banks7	3	0	1	1	1	6	74.24	123.93
Banks8	3	0	0	1	1	5	74.29	124.07
Banks9	3	0	0	0	3	6	74.23	124.32
Banks10	1	0	0	0	0	1	74.15	124.21
Banks11	1	1	0	0	0	2	74.11	124.00
Banks12	0	2	0	0	0	2	74.00	123.77
Banks13	0	1	0	0	0	1	74.11	123.79
Banks14	3	0	0	3	3	11	74.17	123.78
Banks15	4	0	0	0	3	7	74.17	123.59
Banks16	3	0	0	0	3	6	74.19	123.33
Banks17	5	0	2	1	5	11	74.29	123.28
Banks18	1	0	0	1	1	3	74.39	121.46
Banks19	1	0	0	1	1	3	72.53	120.50
Banks20	9	0	0	1	8	18	72.54	120.46

Group	Adult Females	Adult Males	Young Males	Year-lings	Calves	Total Animals	Latitude N	Longitude W
Banks21	0	1	0	0	0	1	72.59	120.46
Banks22	1	0	0	1	0	2	72.58	119.56
Melv1	0	3	0	0	0	3	74.74	111.86
Melv2	0	4	0	0	0	4	74.63	113.28
Melv3	15	3	0	3	12	33	74.63	113.36
Melv4	0	6	0	0	0	6	74.63	113.36

APPENDIX 2

Classification and location of all groups of Peary caribou classified on Banks and Melville Islands, July 1999.

Group	Adult Females	Adult Males	Young Males	Year-lings	Calves	Total Animals	Latitude N	Longitude W
Banks1	1	0	0	1	1	3	74.18	122.15
Banks2	7	0	0	2	6	15	74.18	122.47
Banks3	6	0	0	1	4	11	74.20	122.80
Banks4	5	0	0	0	5	10	74.19	122.83
Banks5	1	0	0	0	0	1	74.25	123.06
Banks6	1	0	0	0	1	2	74.23	123.28
Banks7	3	0	0	1	3	7	74.07	123.29
Banks8	3	0	0	0	3	6	74.05	123.32
Banks9	1	1	0	1	0	3	74.12	123.56
Banks10	7	0	1	0	6	14	74.17	123.51
Banks11	6	1	0	4	4	15	74.25	123.50
Banks12	0	1	0	0	0	1	74.10	123.73
Banks13	5	0	0	2	2	9	74.07	123.17
Banks14	0	3	0	0	0	3	74.08	124.44
Banks15	2	0	1	1	1	5	74.10	124.43
Banks16	2	0	0	1	2	5	74.20	124.02
Banks17	5	0	0	1	2	8	74.20	123.98
Banks18	5	0	1	3	3	12	74.21	123.95
Banks19	4	0	1	2	1	8	74.18	123.93
Banks20	2	0	0	2	2	6	74.18	123.90

Group	Adult Females	Adult Males	Young Males	Year-lings	Calves	Total Animals	Latitude N	Longitude W
Banks21	5	0	2	1	4	12	74.18	123.92
Banks22	7	0	1	2	5	15	74.17	123.86
Banks23	0	3	0	0	0	3	74.12	123.53
Melv1	0	1	0	0	0	1	74.65	113.17
Melv2	1	0	0	1	1	3	74.57	113.07
Melv3	12	0	3	3	7	25	74.58	113.16
Melv4	4	0	0	0	3	7	74.62	113.07
Melv5	0	4	0	0	0	4	74.64	113.22
Melv6	0	2	0	0	0	2	74.63	113.23
Melv7	0	2	0	0	0	2	74.62	113.21
Melv8	0	0	0	1	0	1	74.55	113.39
Melv9	0	2	0	0	0	2	74.71	113.62
Melv10	3	0	1	1	2	7	74.55	113.02
Melv11	3	0	1	0	0	4	74.55	113.01
Melv12	4	0	2	1	0	7	74.58	112.90
Melv13	1	0	0	1	0	2	74.58	112.89
Melv14	1	3	1	1	0	6	74.60	112.95