

### ***Survey 5—9 July 1999***

Survey weather conditions were marginal, with low clouds and light rain. Winds were 2.1 mps to 3.6 mps from the east and west-northwest (80° to 330°), and temperature 12 to 16°C between 1100 to 1600 ADST (ASCC 1999). No caribou were recorded in the study area (Fig. A-5, Table A-1). Daily mean temperature was 12.0°C and daily mean wind speed was 3.0 mps (Table B-1). Indices of parasitic insect activity indicated conditions were suitable for mosquito activity for three hours and oestrid activity for one hour on 9 July; and sweep net sampling averaged 83 mosquitoes for the third highest number of mosquitoes collected (Table B-1). On the two days prior to the survey, indices indicated that conditions were not suitable for mosquito or oestrid activity. Sweep net sampling indicated mosquitoes were less active; 17.5 mosquitoes on 7 July and 26.9 on 8 July (Fig. 2, Table B-1).

### ***Survey 6—15 July 1999***

Survey weather conditions were good with a few scattered clouds, winds at 6.2 to 7.2 mps from the east (80° to 90°), and temperature 9 to 15 °C between 0900 to 1400 ADST (ASCC 1999). A total of 2000 caribou in 20 groups was recorded in the study area (Figures 5 and A-3, Tables 1 and A-1). Mean and 95% CI of group size was  $100.0 \pm 119.36$  caribou. The composition of classified caribou was 24% bulls, 59% cows, and 17% calves. Eighty-eight percent (1765 of 2000) of caribou were in three cow/calf dominated groups with more than 100 caribou (Figures 5 and A-5, Table A-1). Daily mean temperature was 10.2 °C and daily mean wind speed was 4.8 mps (Table B-1). Indices of parasitic insect activity indicated conditions were suitable for mosquito activity during three hours but that conditions were not suitable for oestrid activity. A few mosquitoes were collected during sweep net sampling however, average 7.3 mosquitoes (Table B-1). Indices indicated that conditions were not suitable for either mosquito or oestrid activity for the two days prior to the survey. Sweep net counts were also low on 13 July, 8.5 mosquitoes and on 14 July, 5.0 mosquitoes (Fig. 2, Table B-1). Direction of travel was recorded for eight caribou groups. One group was moving with the wind, one group was headed into the wind and six groups were moving with north and northeast crosswinds (Table 2).

### ***Survey 7—18 July 1999***

Survey weather conditions were marginal; overcast skies at 500 to 700 foot ceiling height, winds 2.6 to 4.1 mps from the north-northwest (330° to 350°), and temperature 4 to 5°C between 1700 to 2100 ADST (ASCC 1999). Low fog prevented flying transect lines south of 70°00' north latitude, resulting in 78% coverage of the study area. A total of 13 caribou in eight groups was recorded (Figures 5 and A-7, Tables 1 and A-1). Mean and 95% CI of group size

was  $1.6 \pm 1.18$  caribou. Daily mean temperature was  $4.3^{\circ}\text{C}$  and daily mean wind speed was 5.7 mps (Table B-1). Indices of parasitic insect activity indicated conditions were not suitable for mosquito or oestrid activity on 18 July (Fig. 2, Table B-1). Indices indicated mosquitoes but not oestrids could have been active for one hour on 16 July, when sweep net sampling averaged 29.5 mosquitoes. Conditions were not suitable for mosquito or oestrid activity on 17 July, sweep nets averaged 3.4 mosquitoes.

### *Survey 8 — 28 July 1999*

Survey weather conditions were marginal; overcast skies at 700 feet, winds 2.6 to 4.6 mps from the northeast to east-northeast ( $40^{\circ}$  to  $60^{\circ}$ ), and temperature  $3^{\circ}\text{C}$  between 1600 to 1900 ADST (ASCC 1999). Low fog prevented flying transect lines south of  $70^{\circ}00'$  north latitude, resulting in 76% coverage of the study area. A total of 42 caribou in five groups was recorded (Figures 5 and A-8, Tables 1 and A-1). Mean and 95% CI of group size was  $8.4 \pm 19.86$  caribou. The composition of classified caribou was 0% bulls, 62% cows, and 38% calves. Daily mean temperature was  $2.0^{\circ}\text{C}$  and daily mean wind speed was 3.0 mps (Table B-1). Indices of parasitic insect activity indicated conditions were not suitable for mosquito or oestrid activity on 28 July; and conditions were similarly not suitable during the two days prior to the survey (Fig. 2, Table B-1).

### **Post-Calving Distributions**

During the post-calving period on warm calm days, caribou tend to congregate in riparian and coastal insect-relief habitats in response to parasitic insect harassment. During the 1999 post-calving surveys, caribou did not appear to be using coastal habitats (Fig. 5). All groups, with more than 100 caribou, were more than 2 km inland from the Beaufort Sea coastline (Fig. 5). Distribution of caribou on 25 June 1999 suggests that caribou were closely associated with riparian habitats (Fig. 5). Indices of mosquito and oestrid activity indicate that these insects may have been active on 9 July and 15 July (Fig. 2). No caribou were in the study area on 9 July; and on 15 July, 96% of caribou (1923 of 2000) were more than 5 km inland from the coast.

In order to identify areas along the coast where caribou have concentrated, data for surveys covering the entire coastal portion of the study area were combined ( $n=25$  surveys in five years, Fig. 6). Weather conditions varied considerably between surveys, thus caribou may not have solely been seeking insect-relief habitats during all surveys. In fact, for the 25 post-calving surveys, caribou groups occurred within 2 km of the coast on only 15 surveys. One small area with 500 to 1000 total caribou for the combined 25 surveys was located near the estuary just east of Bullen Point. Coastal area with 100 to 500 total caribou for the combined surveys were: an

estuary and spit between Bullen Point and Point Gordon, Point Gordon and the area southwest of Point Gordon, the unnamed point between Point Sweeney and Point Thomson, the point near Point Thomson Unit #3 pad, and the area near the North Staines River #1 pad (Fig 6).

During 1999, caribou density peaked in the Bullen Point to Staines River study area on 29 June at 2.80 caribou/km<sup>2</sup>. In the Badami study area, density peaked at 3.20 caribou/km<sup>2</sup> on 1 July. During the post-calving period, four-100% coverage surveys were flown in the Bullen Point to Staines River study area from 26 June to 19 July 1999. Mean and 95% CI of caribou density for these surveys was 1.86 ± 1.54 caribou/km<sup>2</sup>. This is similar to the five-100% coverage surveys flown from 25 June to 15 July in the Badami study area; where mean and 95% CI of caribou density was 1.72 ± 1.93 caribou/km<sup>2</sup>.

When 72 caribou group locations from 1993 to 1999 were analyzed for habitats as mapped for the Point Thomson Unit Area (Noel and Funk 1999); 22% of groups (16 of 72) were located in water, 3% (2 of 72) were in emergent tundra, 26% (19 of 72) were in wet sedge and wet sedge complexes, 10% (7 of 72) were in moist/wet sedge complex, 32% (23 of 72) were in moist or dry tundra, and 7% (5 of 72) were in barren habitats (Tables 5 and 6). Habitat use-availability analysis (Manley et al. 1993) indicated that habitats were not used in proportion to occurrence ( $\chi^2 = 34.96$ ,  $df=12$ ,  $P = 0.00048$ ) with fewer than expected groups in water and no difference from expected for all other habitat categories (Table A-4). Although caribou groups do sometimes stand in water, especially along the coast in response to insect harassment, it is most likely that group positional error (300 to 400 m) is responsible for most of the 16 groups occurring in water. Nine groups recorded in 1999, occurred within the land cover map area and also included observer-recorded habitats. Of the nine groups, seven were recorded on moist sedge, shrub tundra. Five of these seven records matched observer-recorded and land cover mapped habitats, the remaining two were mapped as wet sedge and wet sedge/water complex. Two caribou groups were recorded on dry crustose lichen tundra. These two groups were both located on areas mapped as moist frost-scar tundra.

#### OTHER LARGE MAMMALS

A grizzly bear was observed in and just south of study area on 9 July and on 15 July 1999 (Figures A-5 and A-6, Table A-2). Muskoxen were observed during five different surveys (Figures A-1, A-6, A-7, and A-8; Table A-2). A cow/calf pair was observed on 4 June 1999 near Alaska State C-1. A group of seven to nine muskoxen was sighted along the East Badami creek corridor on each of the last four post-calving surveys from 9 July to 28 July 1999 (Figures A-6, A-7, and A-8; Table A-2). It is likely that this is a single group of animals, which ranged within approximately 10 km up and down the East Badami Creek riparian corridor. On 9 July this

muskoxen group was feeding on a gravel river bar; on 15 July a group was feeding on dry, dwarf shrub, crustose lichen tundra; on 18 July a group was resting on dry, dwarf shrub, crustose lichen tundra; and on 28 July muskoxen were again feeding but habitat was not recorded (Tables A-2 and A-4).

## DISCUSSION

During the nine systematic strip-transect surveys, 0 to 2529 caribou were recorded (Table 1). The most recent estimate of the population size of the CAH (1997) was 20000 (1997 count: 19730), with an estimated 8000 (1997 count: 7733) in the eastern segment of the CAH (E. Lenart, ADF&G, personal communication). Caribou calving between Bullen Point and the Canning River are generally considered the eastern segment of the CAH (Cameron and Whitten 1978, Lawhead and Curatolo 1984, Whitten and Cameron 1985, Cameron et al. 1989). Based on these 1997 population estimates and assuming that herd size was similar in 1999, 11% of the CAH and 28% of the eastern segment of the CAH used the Bullen Point to Staines River study area during calving. During post-calving, these percentages were 0% to 13% of the CAH and 0% to 32% of the eastern segment of the CAH in the study area.

Sex and age composition of classified caribou varied between surveys, but for the combined post-calving surveys, 8% were bulls, 65% were cows, and 27% were calves (12 bulls:100 cows and 43 calves:100 cows). The entire CAH composition in October 1996 was 61 bulls:100 cows and 67 calves:100 cows as determined by ADF&G (Hicks 1997). Our composition counts are for a limited part of the CAH range and methodology was not as comprehensive as the ADF&G composition surveys.

The area between Bullen Point and the Canning River has been used consistently by calving caribou in most years since 1969 (Pollard et al. 1992a). The distribution of cow/calf caribou pairs between 1 June and 20 June has varied both within and among years since surveys were initiated in 1993. In 1993 and 1998 there appeared to be higher calf numbers southwest of Bullen Point, toward Badami, which were reflected in the aggregated surveys. Few caribou calves occurred in this area in 1995, 1997 and 1999 (Pollard and Noel 1995, Noel 1998). Distribution may reflect survey timing within the calving period (early or late June) and/or spring snow and flood patterns (Whitten and Cameron 1985, Gavin 1983). In all study years (1993, 1995, 1997, 1998, and 1999) the northeastern portion of the Bullen Point to Staines River study area did not appear to be used by calving caribou (Fig. 3).

Calf production within the study area on 16 June 1997 was 70 calves:100 cows (Noel 1998). Calf production (pregnancy rate) for the entire CAH during calving period surveys in

June 1997 between the Colville River and the Canning River was 72 calves:100 cows (Hicks 1997). During 1998, calf production was 69 calves:100 cows on 12 June and 56 calves:100 cows on 19 June (Noel and Olson 1999). During 1999, calf production was 48 calves:100 cows on both 14 June and 19 June 1999.

During the post-calving period, weather-moderated insect activity probably influences caribou distribution, movements, and behavior more than any other environmental factor (White et al. 1975, Roby 1978, Dau 1986, Johnson and Lawhead 1989). In the Prudhoe Bay and Kuparuk oil fields, caribou move to coastal areas to ameliorate insect harassment (Roby 1978; Dau 1986; Johnson and Lawhead 1989; Pollard et al. 1996a,b). Caribou tend to drift inland and feed during periods of low temperatures and/or high wind velocities, which suppress mosquito activity (Curatolo et al. 1982, White et al. 1975, Dau 1986, Pollard et al. 1996b). In the Bullen Point to Staines River study area during the 1999 post-calving surveys, caribou did not appear to be using coastal habitats, and all groups with more than 100 caribou, were more than 2 km inland from the coastline. Indices of mosquito and oestrid activity indicated that insects may have been active on 9 July and 15 July. However, no caribou were in the study area on 9 July; and on 15 July, 96% of caribou (1923 of 2000) were more than 5 km inland from the coast. Although caribou group size generally begins to increase after peak calving, mosquito harassment is thought to cause large aggregations (Roby 1978; Johnson and Lawhead 1989). During 1999, mean caribou group size fluctuated from 2.3 (4 June) to 10.8 (14 June) caribou per group during the calving period, and increased to 100.0 (15 July) during the post-calving period.

In order to identify coastal concentration areas during the post-calving period, data for surveys covering the entire coastal portion of the study area were combined. Weather conditions varied considerably between surveys, and caribou may not have been in insect-relief habitats during all surveys. Caribou groups occurred within 2 km of the coast on 15 of 25 surveys. The area with the highest concentration of caribou was located near the estuary just east of Bullen Point. This contour was interpolated in response to one group of 600 total caribou at this location. Coastal areas with 100 to 500 total caribou for the combined surveys included the point near Point Thomson Unit #3 pad, and the area near the North Staines River #1 pad. Both of these contours were again drawn in response to one caribou group near each location (Fig. 6). The abandoned exploration pads at Point Thomson #3 and North Staines River #1 may be attractive as insect-relief habitat (Pollard et al. 1996a,b; Noel et al. 1998). The group near Point Thomson #3 was located on the spit just east of the pad site.

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