CALVING, POST-CALVING, AND AGGREGATION OF THE CENTRAL ARCTIC CARIBOU HERD BETWEEN THE KUPARUK AND COLVILLE RIVERS 1980, 1981, and 1982

by

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ABSTRACT

Counts of Central Arctic Herd (CAH) caribou were made during May through July, 1980, 1981, and 1982 to describe areas occupied during calving and post-calving aggregation. The study area was 2,100 km^2, bounded by the Beaufort Sea, the Kuparuk River, the Colville River, and inland approximately 45 km. Although calving occurred within the study area, the majority of the CAH appears to use a broad area of the coastal plain for calving. However, the study area was used heavily for post-calving aggregation in July. Post-calving aggregations reached densities as high as 56 caribou km^2 in some areas adjacent to the coast. There were no obvious indications that petroleum development in the study area influenced the CAH's utilization of the area.

Key words: Caribou, calving areas, aggregation, petroleum development

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INTRODUCTION

The seasonal activities of barren ground caribou (Rangifer tarandus granti) form an annual cycle of spring migration, calving, post-calving aggregation/migration, August dispersal, fall migration and overwintering. This cycle is closely related to changes in weather, snow cover, food quality and availability, and insect harassment (Banfield, 1954; Curatolo, 1975; Kelsall, 1968; Whitten and Cameron, 1980). Timing of some of these phases of the cycle is remarkably predictable. For example, most calves in northern Alaska (80%) are born within a ten day period beginning in late May (Lent, 1965; Skoog, 1968).

The Central Arctic Caribou Herd (CAH) utilizes the Arctic Coastal Plain of Alaska near Prudhoe Bay during summer (Fig. 1). In 1981 the herd size was estimated at 9,000 caribou (Cameron, et al., 1983). Although the annual cycle of the CAH has not been studied in detail, general aspects of seasonal distribution and movements of the CAH during the spring and summer months have been reported (Cameron and Whitten, 1979; Child, 1973; Fancy, 1983; Roby, 1978; White et al., 1975). These and other unpublished reports also address the interactions and responses of caribou to industrial activity. Activities and structures of the oil and gas industry are scattered throughout the area between the Colville and Sagavanirktok Rivers, but are concentrated near Prudhoe Bay and Kuparuk base camps (Figure 1).

During the 1980-1981 winter a pipeline was constructed along the road connecting the Kuparuk River Oil Field base camp and the Trans-Alaska Pipeline pump station No. 1 located several miles south of the Prudhoe Bay Oilfield. In addition, activities and the number of structures at the Kuparuk River Oilfield base camp increased in 1981 to support that oil field. These structures and activities are located within a calving area of the CAH, and an area of the CAH's summer range.

Several locations within the study have been reported by Cameron and Whitten (1979) to be areas of high caribou usage. These locations roughly correspond to blocks 4, 5, 6, and 7 in Figure 1. Blocks 3 and 8 encompass the Kuparuk River Oilfield, the Kuparuk Pipeline, and the main road from the oilfield to Prudhoe Bay. Therefore, emphasis was placed on examining caribou usage in blocks 1 through 10.

This study was designed to determine the extent of caribou calving and other caribou usage in the area shown in Figure 1. In addition, we looked for yearly changes in calving and summer usage to assess obvious effects, if any, of the Kuparuk Pipeline, the increased activity and more structures that were present in the summer of 1981 and 1982 than were present in 1980.

The extent of caribou calving is described by calf percentage of caribou observed. Cameron and Whitten (1979, 1980) and Cameron et al. (1979) have suggested that calf percentage is the most reliable indicator of calving area locations. Areas of high calf percentage are assumed to be areas of high caribou calving. Similarly, the extent of seasonal caribou usage can be described by the estimated number of caribou/km^2, referred to in this paper as caribou density. Thus, areas of high caribou density are assumed to be areas of high caribou usage.

METHOD

Location. The 2,100 km^2 study area (Figure 1) is located between the Colville and Kuparuk Rivers, bounded by the Beaufort Sea to the north. The 23 grid units (referred to as blocks in this report) correspond to townships (93.24 km^2) on U.S.G.S. topographic maps for Beechy Point and Harrison Bay, Alaska.

Observations. Caribou numbers in each block were recorded by one of the authors (AG) while flying in a helicopter. East-west transects at 10 km intervals were flown at an altitude of 155m above ground level, unless occasional fog or a low cloud required a different altitude. Flights were attempted every seven days but inclement weather altered the schedule.

The first flight of each survey season began in the fourth week of May before calving began. Flights were conducted during daylight hours, between 0830 and 1700 hours, and usually lasted about four hours.

The pilot and observer scanned to the front and both sides of the aircraft with the unaided eye and with binoculars. Both pilot and observer (seated in co-pilot seat) held U.S.G.S. topographic maps. The pilot navigated in part by observing the unique arrangement and shapes of thaw lakes throughout the study area. Flight transects were flown through the center of the townships.

As caribou were spotted, the helicopter moved towards them, allowing the observer to count them and make other observations. The helicopter then returned to the transect line and continued the survey. The number of caribou observed within approximately 2.5 km of the transect line in each township was recorded directly on

the topographic map. Other observations (sex, age, etc.) were recorded verbally on a cassette recorder. Caribou were classified where possible as cows, calves, bulls, yearlings, and unclassified. When caribou group size was large e.g. (300), counting (and classification) was difficult, and numbers were estimated.

Numbers of caribou in blocks 1 through 23 (Figure 1) were estimated by extrapolation. Approximately 50km^2 of area within each block was surveyed. The estimated number of caribou in each block was obtained by multiplying the number of caribou actually observed by the ratio of block area (in km^2). Caribou density was then expressed as number of caribou/km^2.

Extrapolation increases any observational error. Undercounting is more likely than overcounting if the animals are uniformly dispersed. However, large groupings may increase the visibility of animals, leading to overcounting, especially when a large group extends beyond the observational strip boundary. The observational error also increased when the number of caribou within a block was greater than 300, and the observer had to estimate the number of caribou.

RESULTS

Periods of Usage

Calving Period (June 1-13). The first observation of calves varied each year from May 21 (1981) to June 3 (1980). However, the major calving activity began about June 1 in each year. Figure 2 shows a sharp increase in calf percentage which occurred between June 1 and June 10. During this period, the number of caribou in the study area, excluding the number of calves, remained constant and relatively low (1980 - 394; 1981 - 636; 1983 - 886). Cows, calves, and yearlings made up over

97% of the caribou observed during the calving period. Bulls were conspicuously absent.

Post-Calving Period (June 13 - June 23). This seven to ten day period was characterized by a stable calf percentage and an increase in the total number of caribou in the study area. Animals moving into the study area were cows, calves, and yearlings. Bulls made up less than 3% of the caribou observed.

Aggregation Period (June 23 - July 20). The number of caribou observed during this period increased six-fold or more over the number observed during the calving period. Cows and calves continued to move into the study area, as evidenced by the stable calf percentages recorded in 1981 and 1982. The large numbers of caribou made composition counts difficult and unreliable. However, bulls still made up less than 3% of the caribou observed when composition counts were attempted.

The largest number of caribou observed in the study area occurred during this period. In two years (1980, 1982) this occurred during the first week of July. In 1982 the number of caribou within the study area was estimated to be 9,540 on July 6.

Dispersal Period (After July 20). The number of caribou observed after July 20 decreased dramatically throughout the study area. Bulls made up a much larger percentage of the caribou observed. During the July 31, 1981 flight, a total of 75 caribou were counted of which 27 (36%) were bulls.

Areas of High Usage

Caribou were observed throughout the study area during all periods. However, the distribution of caribou was highly variable. Several areas were used much more by caribou than other areas.

During the calving season, calves were observed in all blocks of the study area. More calves were observed in blocks 4, 5, 6, and 7 than in other blocks, particularly during the 1981 calving period (Figure 3). Calves in blocks 4, 5, 6, and 7 comprised 43%, 74%, and 36% of the calves observed in 1980, 1981, and 1982 respectively. These percentages compare with an expected 17%.

During the post-calving periods, blocks 4, 5, 6, and 7 were also used more by caribou than other blocks. Calf numbers recorded in these blocks comprised 43%, 32%, and 26% of calves observed during this period in 1980, 1981 and 1982.

In general, the area of highest caribou usage was the northeast quarter of the study area, especially after June 10. On some observation days (June 28, July 5, 1980; July 18, 23, 1981) over 90% of the caribou observed were in blocks 3 through 8, which represent approximately 25% of the study area. These same blocks occasionally had few caribou recorded in them. For example, fewer than 30% of the caribou observed on July 1 and 9, 1981 were observed in these blocks.

Figure 3 presents caribou density (caribou/km^2) for five block pairs (see Figure 1). Caribou density was highly variable, but the greatest caribou density occurred in block pair 5-6 (up to 56 caribou/km^2). This block pair is bounded on the north by the Beaufort Sea. Farther inland caribou densities exceeded 20 caribou/km^2 only twice, both times in block pair 3-8.

DISCUSSION

Observations from this study suggest that the primary CAH use of the study area is as an aggregation area late in June and into July. Calving occurred throughout the study area, but especially in blocks 4, 5, 6, and 7. However, the small number of caribou (900, excluding calves) in the study area during calving periods, relative to the number of caribou in the CAH (9,000) suggests that other calving areas exist for this herd.

The low density of caribou within the study area during the calving period is not indicative of a high use calving area. The maximum caribou density during calving occurred June 10, 1981 in block pair 5-6, when 4.25 caribou/km^2 were recorded by Alaska Fish and Game researchers. In 1980 and 1982, caribou densities during calving did not exceed 1.75 caribou/km^2. Caribou of the CAH do not form calving aggregations typical of other Alaskan and Canadian herds (Lent, 1964; Skoog, 1968). For example, Calef (1981) found typical barren ground caribou density on calving grounds to be 3.9 to 7.8 caribou/km^2, up to a maximum of 11.7 caribou/km^2.

The CAH probably calves within a broad area of the coastal plain. Roby (1978) observed that lone cows accompanied by new-born calves were widely scattered over the CAH calving grounds. Gavin (1978) reported that the majority of 171 CAH calves were born 85 km south of the coast, as a result of heavy snow in the path of migrating caribou. Kelsell (1968) gives examples of caribou herds that shifted calving areas, apparently in response to environmental conditions. Nonetheless, certain areas such as blocks 4, 5, 6, and 7 appear to be areas of higher calving usage relative to other areas available to the CAH.

Caribou herds that utilize a large area for calving may have an evolutionary advantage. A large area, and the flexibility to shift calving within the area, would allow the herd to adapt to environmental conditions (heavy snow, flooding, industrial disturbance, etc.) which would preclude a specific site for calving.

Observations of caribou actually in the act of calving are rare: most reports, including this one, record only the number of calves seen. The assumption is that the calf was born in the immediate area. This assumption needs to be verified to assure that areas suspected of being calving grounds are not areas of cow-calf aggregation soon after birth.

Blocks 3 through 8 of the study area appeared to be used annually for post-calving aggregation. Caribou comprising these aggregations probably included cows that calved there, cows and calves migrating from calving grounds beyond the study area, and other caribou from the winter range.

Caribou density increased rapidly after the second week in June (less than 1.0 caribou/km^2 to 56.0 caribou/km in 1980. Calf percentage also increased (Figure 2) during post-calving aggregation in accordance with Curatolo's (1975) observation that a positive relationship exists between post-calving aggregation and calf percentages in the Forty-mile herd.

Densest post-calving aggregations in all three years were in blocks 5 and 6, adjacent to the coast. Dense aggregations in 1980, 1981 were also found in blocks 3 and 8, which encompass the Kuparuk River Oilfield. Caribou movement during post-calving aggregation are thought to be governed largely by the degree of insect harassment (Curatolo, 1975; Fancy, 1983; Skoog, 1968). Coastal breezes reduce the degree of

harassment, while harassment is greater on warm, calm days. The CAH consistently occupied blocks 5 and 6 during July, when mosquito and oestrid fly harassment was greatest.

In summary, blocks 3 through 8 of the study area appear to be heavily utilized by CAH caribou as a post-calving aggregation area and, to a lesser extent, as a calving ground. Calving grounds of the majority of the CAH are probably extensive, encompassing the coastal area between the Colville and Canning Rivers, from the Beaufort Sea coast to the foothills of the Brooks Range. Beginning in the second week of June, after the calving period, the CAH began the post-calving aggregation reaching densities as high as 56 caribou/km^2 in blocks 5 and 6. No obvious effects due to industrial activities and structures located in blocks 3 and 8 were observed.

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Angus Gavin, consulting naturalist to Atlantic Richfield Company, passed away in October 1982. No words can express the loss of this gentle and wise man of the Arctic. He was one of only a few who really knew and felt the nature of the Arctic. We will miss him.

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FIGURE LEGENDS

Figure 1. The study area. The numbered blocks are townships, 93.24km^2 (36 mi^2). The 10 blocks within the heavy outline include blocks most frequently used by caribou.

Figure 2. Calf percentages and numbers of caribou observed within the study area at weekly intervals. Caribou life cycle stages corresponding to the dates of observation are shown at the bottom of the figure. Data for June 11, 1980 and June 10, 1981 are from a similar survey conducted by the Alaska Department of Fish and Game.

Figure 3. Caribou density (caribou/km^2) for five block pairs (see Figure 1). Note that highest densities occurred during the aggregation and dispersal life cycle stages. Data for June 11, 1980 and June 10, 1981 are from a similar survey conducted by the Alaska Department of Fish and Game.

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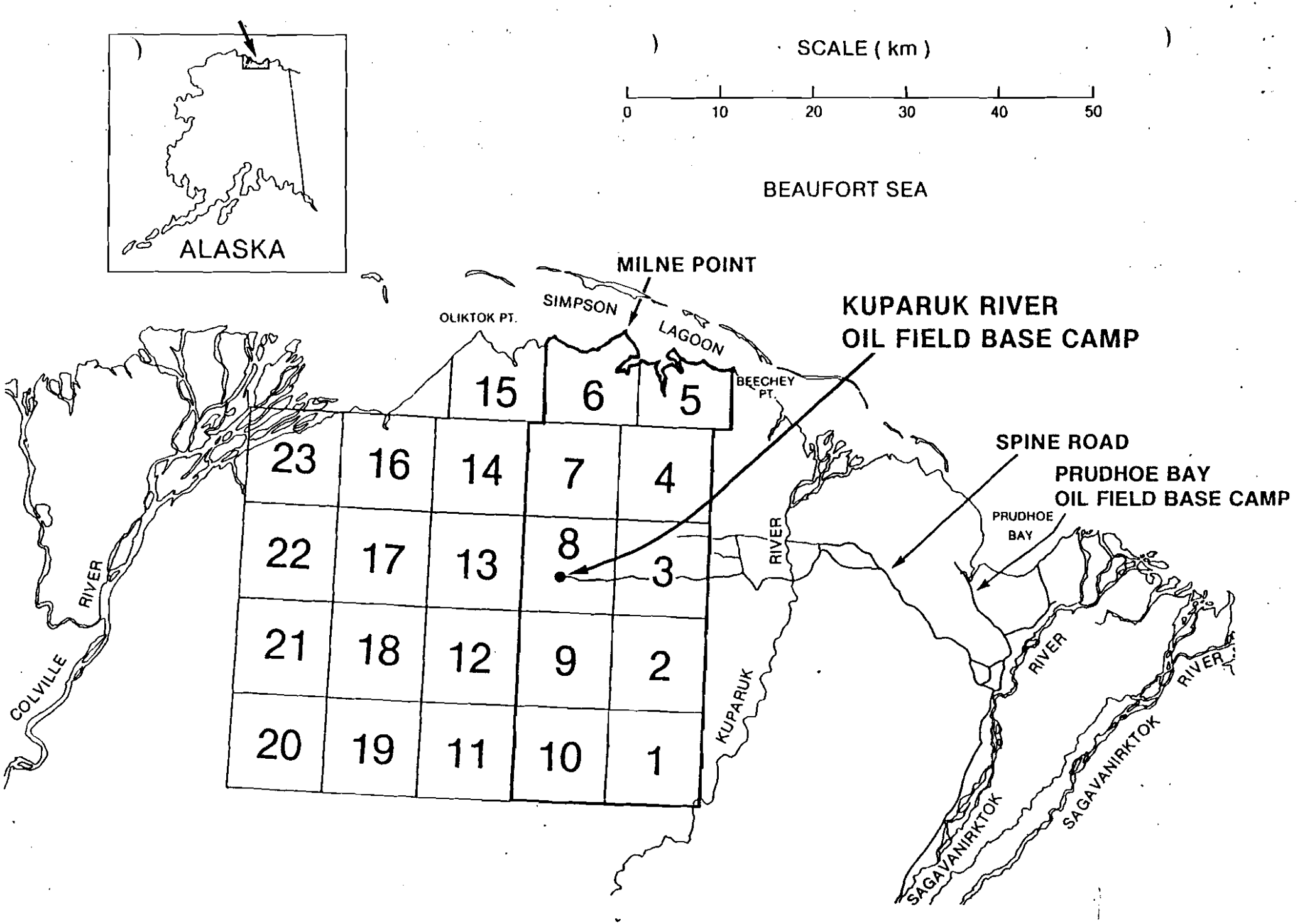
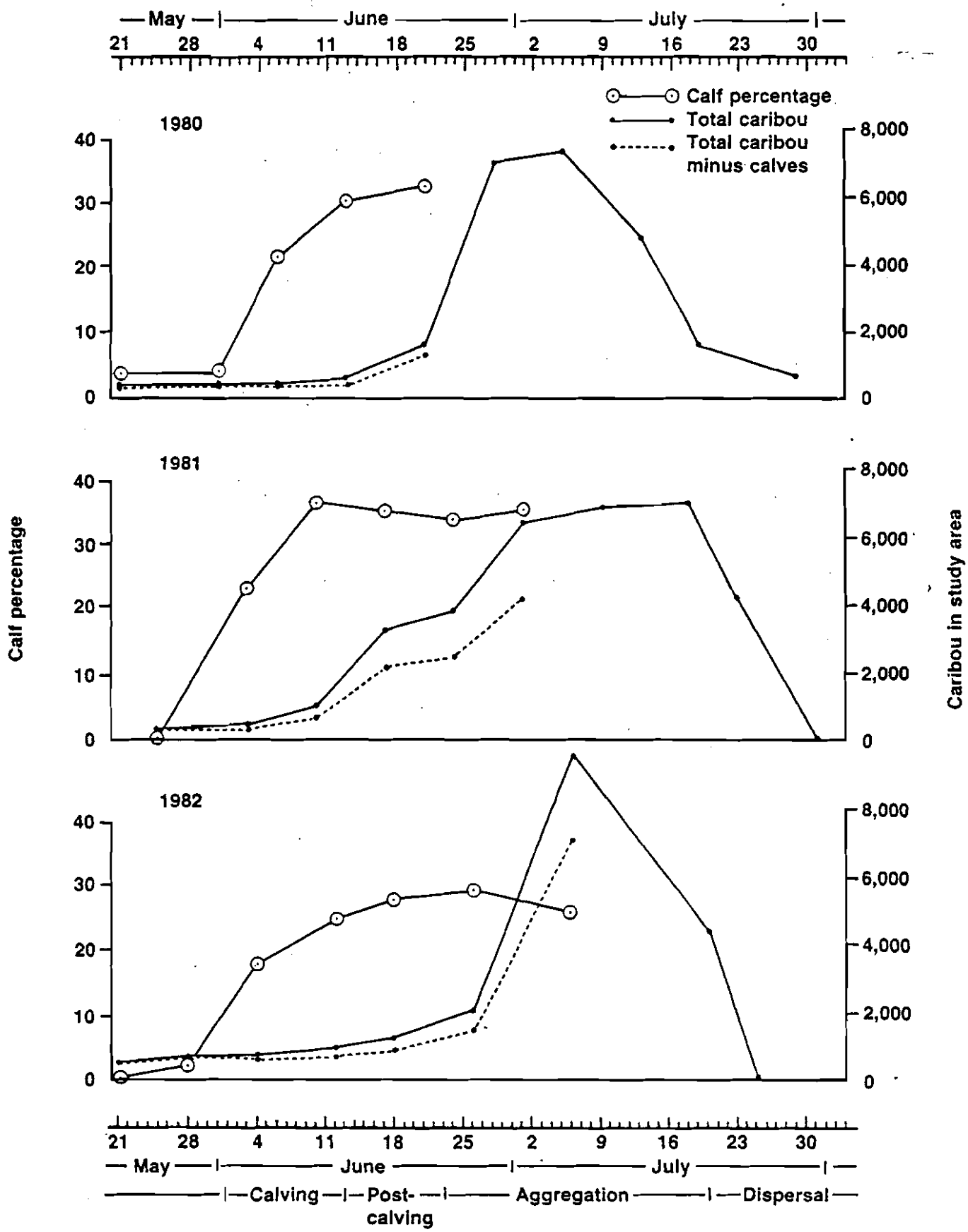
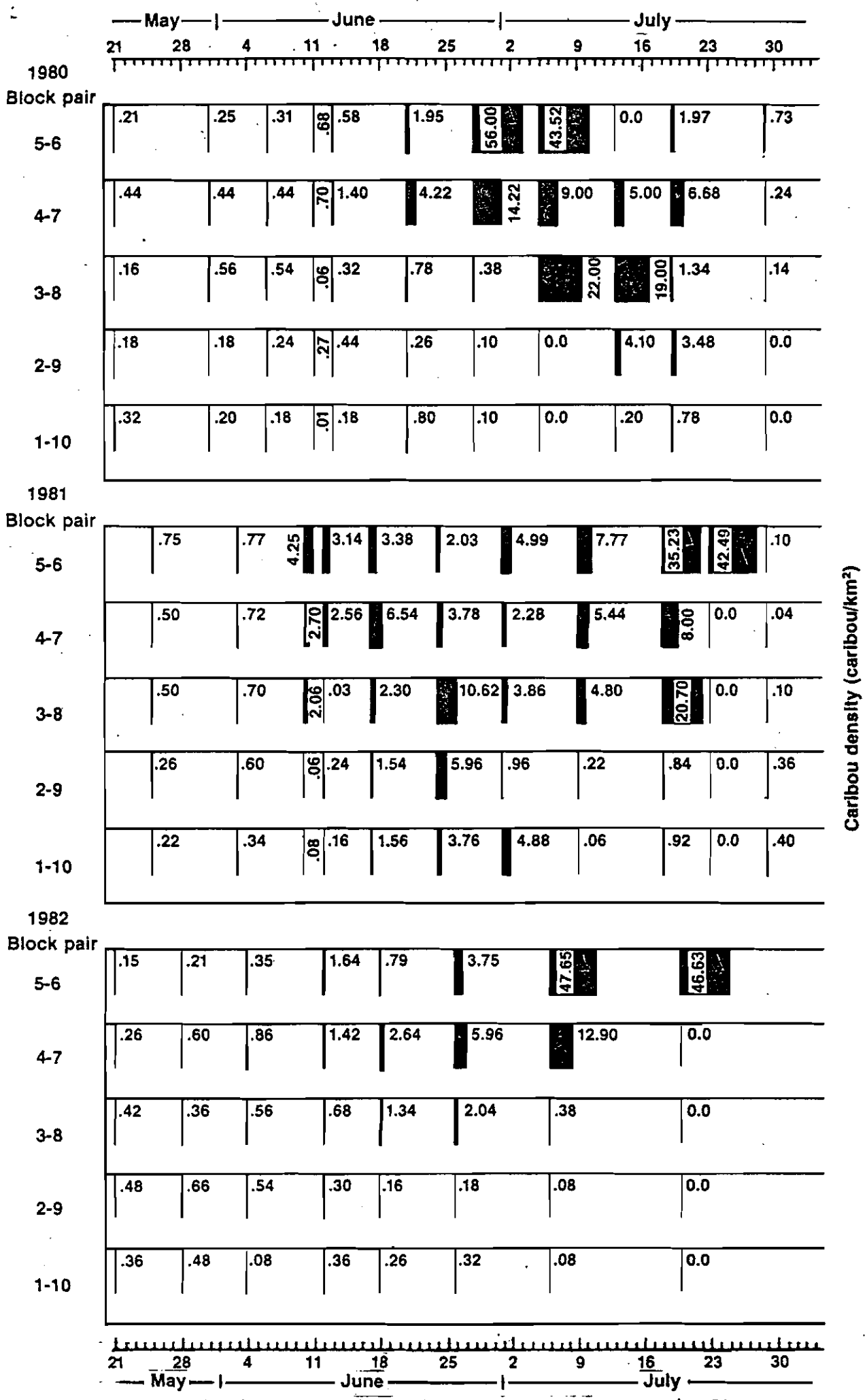

ALASKA
SCALE (km)
0
10
20
30
40
50
BEAUFORT SEA
MILNE POINT
OLIKTOK PT.
SIMPSON
LAGOON
BEECHEY PT.
KUPARUK RIVER
OIL FIELD BASE CAMP
SPINE ROAD
PRUDHOE BAY
OIL FIELD BASE CAMP
PRUDHOE BAY
15
6
5
23
16
14
7
4
22
17
13
8
3
21
18
12
9
2
20
19
11
10
1
COLVILLE RIVER
KUPARUK RIVER
SAGAVANIRKTOK RIVER
SAGAVANIRKTOK RIVER


May
June
July
21
28
4
11
18
25
2
9
16
23
30
Calf percentage
Total caribou
Total caribou minus calves
1980
1981
1982
40
30
20
10
0
8,000
6,000
4,000
2,000
0
Calf percentage
Caribou in study area
Calving
Post-calving
Aggregation
Dispersal


May
June
July
21 28 4 11 18 25 2 9 16 23 30
1980
Block pair
5-6 .21 .25 .31 .68 .58 1.95 56.00 43.52 0.0 1.97 .73
4-7 .44 .44 .44 .70 1.40 4.22 14.22 9.00 5.00 6.68 .24
3-8 .16 .56 .54 .06 .32 .78 .38 22.00 19.00 1.34 .14
2-9 .18 .18 .24 .27 .44 .26 .10 0.0 4.10 3.48 0.0
1-10 .32 .20 .18 .01 .18 .80 .10 0.0 .20 .78 0.0
1981
Block pair
5-6 .75 .77 4.25 3.14 3.38 2.03 4.99 7.77 35.23 42.49 .10
4-7 .50 .72 2.70 2.56 6.54 3.78 2.28 5.44 8.00 0.0 .04
3-8 .50 .70 2.06 .03 2.30 10.62 3.86 4.80 20.70 0.0 .10
2-9 .26 .60 .06 .24 1.54 5.96 .96 .22 .84 0.0 .36
1-10 .22 .34 .08 .16 1.56 3.76 4.88 .06 .92 0.0 .40
1982
Block pair
5-6 .15 .21 .35 1.64 .79 3.75 47.65 46.63
4-7 .26 .60 .86 1.42 2.64 5.96 12.90 0.0
3-8 .42 .36 .56 .68 1.34 2.04 .38 0.0
2-9 .48 .66 .54 .30 .16 .18 .08 0.0
1-10 .36 .48 .08 .36 .26 .32 .08 0.0
Caribou density (caribou/km²)
21 28 4 11 18 25 2 9 16 23 30
May
June
July
Dispersal