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DEVELOPMENT AND ALTERATION OF CARIBOU MOVEMENT PATTERNS

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Progress Report
Federal Aid in Wildlife Restoration
Project W-22-3, Job 3.29R

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PROGRESS REPORT (RESEARCH)

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SUMMARY

Forty-one radio-collared caribou (Rangifer tarandus granti) cows and 15 radio-collared offspring were located 232 times between June 1983 and June 1984. Initial calf production by radio-collared cows was 80% in June 1983, and oversummer and overwinter survival of these calves was 83% and 58%, respectively. The crossing rate of the Trans-Alaska Pipeline corridor/Prudhoe Bay Complex (TAP/PBC) by radio-collared individuals was double that of the previous year (16.0 crossings/100 locations vs. 7.7 crossings/100 locations). During June 1984, 32 (84%) radio-collared cows and their radio-collared offspring were found within 50 km of the coast, in 4 previously identified areas. Yearlings appear no more likely to return to their estimated birth sites than cows are likely to return to sites where they have previously calved. The mean distance between subsequent locations of adult radio-collared cows in June was 41.7 km (SD 34.7). Yearlings were located 37.2 km (SD 34.5) from their approximate birth sites (i.e., locations of the collared dams the previous June). Radio-collared 2-year-olds were located almost twice as far from their approximate birth sites and locations as yearlings, 79.3 km (SD 62.3) and 70.1 km (SD 36.4), respectively.

Key words: caribou, radio-collared, movement patterns, Rangifer tarandus granti, Trans-Alaska Pipeline Corridor.

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BACKGROUND

This study was designed to determine the mechanisms by which caribou (Rangifer tarandus granti) movement patterns are established and subsequently sustained or altered. In April 1982, 20 adult female caribou and 2 short yearlings were collared. These collared animals were relocated periodically during the ensuing year. In March 1983, an additional cow and 7 short yearlings (offspring of radio-collared cows) were equipped with transmitters and relocated in April and June 1983. Preliminary data analysis indicated that most radio-collared cows calved within 50 km of the coast. Crossings of the Trans-Alaska Pipeline corridor/Prudhoe Bay Complex (TAP/PBC) were relatively infrequent (Cameron et al. 1984). This report is a brief update of progress made through June 1984, the 2nd year of a 5-year study.

OBJECTIVES

To evaluate the degree to which the seasonal movements of individual adult caribou are influenced by their 1st-year movements as calves.

To determine sexual differences in the development of caribou movement and dispersal patterns, social relationships, habitat preferences, and range fidelity.

To identify and describe any disturbance-related alteration of seasonal distribution and movements of such caribou.

PROCEDURES

Beginning in June 1981, movements of adult radio-collared female caribou were periodically monitored. Offspring of these cows, radio-collared as short yearlings, will be relocated for the functional life of the transmitters (ca. 3 years). For each resighting, location, group composition, habitat type, and any local disturbance are recorded; for relocations of collared offspring, the presence or absence of their dam (visual collars will remain after transmitters expire) is noted.

The 1st-year movements of collared cows and their calves will be compared with the subsequent activities of the offspring as yearlings and adults. Particular attention will be focused on sexual differences in distribution, movement chronology, habitat use, and group structure. This program will also provide an opportunity to examine patterns of sex- and/or age-related mortality and fecundity.

Radio-collared caribou were located 7 times between June 1983 and June 1984. Locations were recorded on 1:250,000 USGS topographic maps.

Seven more radio collars were placed on short yearlings of radio-collared cows during March and April 1984. An additional 14 adult cows and 3 cows whose transmitters were about to expire were collared during the same period.

Between-year comparisons of the locations of adult cows, yearlings, and calves were calculated for June 1981, 1982, 1983, and 1984. All locations were transferred to 1:250,000 USGS topographic maps, and distances were measured directly to the nearest km.

FINDINGS AND DISCUSSION

Calf Production and Survival

Forty-one adult collared cows, both collared 2-year-olds (BY9, BY10), all 7 yearlings (G2-G8), and all 6 calves (B1-B8; B4 died within a month of being collared) were located at least once within the study area between June 1983 and June 1984 (Table 1). During this period, 3 transmitters expired (RY1, RY2, and RY83), 2 caribou either died or shed their collars (RY5 and RY82), and 3 were not located (RY10, RY53, and YB17 male).

Twenty of 25 (80%) collared cows were seen with calves at heel in June 1983. One of 2 radio-collared cows located in July but not found in June had a calf, indicating that 21 of 27 cows

(78%) had produced calves in 1983. By September 1983, 4 collared cows could not be relocated. Of the remaining 23 cows, 18 were accompanied by calves in early July, 15 in September, 11 in November, and 8 in March 1984, indicating an oversummer and overwinter survival of 83 and 58%, respectively, compared to 83% and 38% in the previous year (Cameron et al. 1984). Given an estimated initial production of 80 calves/100 cows and no mortality of adult cows, this translates to a spring calf/cow ratio of 39/100, approximately one-half of the ratio calculated from direct counts of the CAH in March 1984 (ca. 69 calves/100 cows, $\underline{N}$ = 560). Nevertheless, both data sets are similar to estimates obtained previously for the CAH (32-60 calves/100 cows; Cameron et al. 1982, 1983) and indicate continued good recruitment to the herd.

Crossings of TAP/PBC

Based on 232 relocations, radio-collared caribou crossed the TAP/PBC a minimum of 37 times between June 1983 and June 1984. The crossing rate between June 1983 and June 1984 was double that of the previous year (16.0 crossings/100 locations vs. 7.7 crossings/100 locations). Most caribou (20) crossed the pipeline during the rutting period (Sep-Nov), while 9 crossed during winter, and only 3 in summer (Table 1). Eight caribou crossed the pipeline corridor at least once (4 to the east, 4 to the west), 8 crossed the corridor twice, 3 crossed 3 times, and 1 had crossed each time she was relocated; the latter (RY68) was the only radio-collared cow that calved in the foothills, and the only collared cow with a calf that did not move to the coast during the insect period. Crossing rates were similar among various sex/age categories: adult cows (17.4 crossings/100 locations); yearling males (16.7 crossings/100 locations); and yearling females (14.3 crossings/100 locations).

Calving Distribution

Of 38 collared caribou located at the beginning of June 1984, 32 were found within 50 km of the coast (22 adult cows, 1 3-year-old cow, 3 of 6 2-year-olds, and all 4 yearlings). Three adult cows and 3 2-year-olds were found inland, one as far south as the mouth of the Lupine River.

Most of the parturient cows were located in 4 previously identified calving areas (Cameron et al. 1983): between the lower Canning and Kavik Rivers, the Milne Point/Kuparuk River area, the vicinity of the upper Miluveach/Ugnuravik Rivers, and between the Sagavanirktok and lower Toolik Rivers. Between-year differences in coastal vs. inland calving distribution are apparently related to spring snow cover, the progress of snow

melt, and/or the extent of flooding within the coastal zone (Cameron et al. 1983). Hence, with persistent snow cover and extensive flooding in June 1982, approximately one-third of the radio-collared cows calved 50 km or more inland, whereas with an early, dry spring in 1983, virtually all of the collared cows were found within a narrow coastal band. In spring 1984, weather on the coastal plain was cool, but with little moisture, and an intermediate number of parturient cows came to coastal areas as compared to 1982 and 1983. Locations were made 2-3 weeks earlier (1 Jun) than in previous years; consequently, initial calf production for collared cows could not be determined in 1984.

Range Fidelity in June

Thirteen radio-collared cows and their radio-collared offspring were located a total of 59 times on 11-14 June 1981, 17-22 June 1982, 22-23 June 1983, and 1 June 1984. All combinations of relocations were used for between-year distance comparisons. For instance, RY20 was located in 1982, 1983, and 1984, and distances between relocations in 1982-83, 1983-84, and 1982-84 were measured.

Although yearlings are commonly found with cow/calf groups during the calving period, only 1 of 10 radio-collared yearlings was found in the same group as its dam. Our data indicate that yearlings are no more likely to return to their estimated birth sites than cows are likely to return to sites where they have previously calved. The mean distance between subsequent resightings of collared cows in June was 41.1 km (SD 34.7), and the average distance between birth site (previous June location of collared dam) of 9 calves and their location as yearlings the following June was 37.2 km (SD 34.5). Furthermore, the average distance between mother and yearling appears to increase during June, 35.0 km (SD 9.0) 1 June 1984 compared with 55.2 km (SD 35.0) 22-23 June 1983. The distance between estimated birth site and location as a 2-year-old was more than twice as great, 79.3 km (SD 62.3). The distance between sightings of individuals as yearlings and as 2-year-olds was similar, 70.1 km (SD 36.4).

Most comparisons of differences in location according to sex could not be determined because relatively few (5 of 15) of the collared short yearlings were males and because of the relatively poor relocation record of the collared males and their dams. However, the mean distance of yearlings from the coast in June was virtually the same for both sexes (n = 3 males, $\bar{x}$ = 33.7 km (SD 11.5); n = 10 females, $\bar{x}$ = 33.8 km (SD 18.0). During short yearling counts conducted concurrently with short yearling collaring, we have noted that many short yearling

bulls have separated from their mothers and joined bull groups, making them less likely to be collared with their dams. Bull groups move to coastal areas later than cows and are less likely to be found because inland areas are surveyed less intensively. This could explain why 2 bull yearlings, not found in June, were later relocated in postcalving aggregations in July.

Although we cannot presently make precise between-year comparisons because of differences in dates of relocation, analysis of frequent relocation data collected in cooperation with Alaska Biological Research during May, June, and July 1983 will permit a future evaluation of the chronology of movement patterns during the calving and summer periods.

The 1st full relocation cycle will be completed in summer 1985 when collars of the 1st yearling cohort expire. When all data are computerized, we will expand the distance analysis to include all relocation periods and between-year comparisons for cohorts.

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Table 1. Status of radio-collared caribou in the Central Arctic Herd, June 1983-June 1984.

Collar No.	Sex	Relocation attempts Jun 1983	Jul 1983	Sep 1983	Nov 1983	Mar 1984	Apr 1984	Jun 1984	Comments
RY1	F	E_c	E_x						Collar expired Jul 1984
RY2	F	E	E_x						
RY5						D_e			Died or shed collar
RY6	F	W_c	W_x		W_c	W		W_x	
G2	F	W	W_x	W	W_p		W	E_x	
RY8	F	W_c	W_x	W_c	E_c	E_c	R_{ec}	E_x	Recollared as RY96
B6	M						C_e		
RY9	F	W_c	W_x	W		W		W_x	
RY10	F								Teshekpuk?
RY11	F	W_{cp}	E_x	E_c	E	E		E_x	
G4	M	E	E_x	W	W_p	E		E_{xp}	
RY12	F	E_c	E_x	E_c	E_c		E	E_x	
G6	F	E	E_x	E_p	E_p	E		E_x	
RY13	F		E_p	W_{cp}	E	W_p			
RY14	F	E_c	E_c	W_{cp}	E_c	E	R_e		
G5	F	W_p	E_x	W	W	W_p		E_{xp}	
RY15	F	E_c	E_c			E_c	R_{ec}	E_x	Recollared as RY97
G8	M	E	E_x	E	E	E	E		
RY17	F	E_c	E_x		E_c	E_c	E_c		
B8	F						C_e	E_x	
RY19	F	W_p	W_x	W_x		W_x		W_x	Teshekpuk Lake, 28 Oct
RY20	F	W_{cp}	W_x		E_{cp}	E_c	E_c	W_{xp}	
G3	F	E	E_x		E	E	E	E_x	
B2	F					C_e	E	E_x	
RY52	F	E_c	E_x	W_c	E	E_p		E_x	
RY53	F								

Table 1. Continued.

Collar No.	Sex	Relocation attempts Jun 1983	Jul 1983	Sep 1983	Nov 1983	Mar 1984	Apr 1984	Jun 1984	Comments
RY54	F	E_c	E_c	W_{cp}	E_c	E_c		E_x	
B1	M					C_e	E		
RY55	F	W	W	W	W	W	W_x		
RY56	F	E_c	E_c	W_c	E_c	E_c	E	E_x	
B4	F					C_e	D_e		
RY57	F	E_c	E_x	W_c		E		E_x	
RY58	F	E_{cp}	E_x			W_x			
RY59	F	W_{cp}	E_c	W_{cp}	E_{cp}	E_{cp}	E_c	E_x	
B3	F					C_e	E	E	
RY60	F	E_c	E_x	E_{cp}	E_c	E_c	E_c	E_x	
B5	F						C_e	E_x	
RY61	F	W	W_x	W	W	W	W	W_x	
RY62						C_e	E_x	E_x	
RY63	F					C_{ec}	E_x	E_x	
RY64	F					C_e	E_x	E_x	
RY65	F					C_{ec}	E	E_x	
RY66	F					C_{ec}	E	E_{xp}	
RY67	F					C_e	E	E_x	
RY68 (0.895)	F						C_{wc}	E_x	
RY68 (1.458)	F		E_c	W_{cp}	E	W_p		E_x	
RY69	F						C_w	W_x	
RY70	F						C_{wc}	W_x	
RY82	F	E_c	E_x			D_w			Died or shed collar Mar 1984
RY83	F	E_c	E_x						Transmitter failed Jul 1983
G7	F	E	E_x			W		W	

Table 1. Continued.

Collar No.	Sex	Relocation attempts: Jun 1983	Jul 1983	Sep 1983	Nov 1983	Mar 1984	Apr 1984	Jun 1984	Comments
BY9	M	E	E_x			W_x			SW Umiat, 16 May
BY10	F	E	E_x	W	W	E		E_x	
YB17	F	W_c	W_x	W		W			
YB17	M								
YB48	F	W	W_x	W		W			
W1	F						C_e		
W3	F						C_{ec}	E_x	
W4	F						C_e		
W5	F						C_e		
W8	F						C_e	E_x	

C = Collared
D = Dead or shed
E = East
F = Female
M = Male
R = Recollared
W = West

c = with calf
e = east
p = within pipeline corridor (less than 5 miles from pipe)
w = west
x = presence of calf not determined

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