ALASKA DEPARTMENT OF FISH AND GAME

JUNEAU, ALASKA

STATE OF ALASKA
Bill Sheffield, Governor

DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

DIVISION OF GAME
W. Lewis Pamplin, Jr., Director
Steven R. Peterson, Research Chief

DEVELOPMENT AND ALTERATION OF CARIBOU MOVEMENT PATTERNS

By

Raymond D. Cameron
Kenneth R. Whitten
and
Walter T. Smith

Progress Report
Federal Aid in Wildlife Restoration
Project W-22-4, Job 3.29R

(Printed March 1986)

PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperator: None

Project No.: W-22-4 Project Title: Big Game Investigations

Job No.: 3.29R Job Title: Development and Alteration of Caribou Movement Patterns

Period Covered: 1 July 1984-30 June 1985

In lieu of a conventional Progress Report, we offer a paper which was presented at the Fourth International Reindeer/ Caribou Symposium, held during August 1985 in Whitehorse, Yukon Territory:

Cameron, R. D., K. R. Whitten, and W. T. Smith. In press. Summer range fidelity of radio-collared caribou in Alaska's Central Arctic Herd. Rangifer.

CONTENTS

SUMMER RANGE FIDELITY OF RADIO-COLLARED CARIBOU IN ALASKA'S CENTRAL ARCTIC HERD

R. D. CAMERON, K. R. WHITTEN, and W. T. SMITH

Alaska Department of Fish and Game
1300 College Road
Fairbanks, Alaska 99701, U.S.A.

ABSTRACT. Sixty-four adult (2+ years) female caribou (Rangifer tarandus granti), radio-collared in April or May 1975-82, were relocated during the following June and/or July within the summer range of the Central Arctic Herd (CAH). Relocations made during the following three summers were used to assess range fidelity. Cumulative relocations of radio-collared females in the Central Arctic region were equivalent to 91% of the projected availability based on transmitter life. A chronological analysis indicates that 98%, 91%, and 82% of radio-collared females were found there one, two, and three years later; most of the progressively lower relocation success is probably attributable to transmitter malfunctions rather than emigration. These observations suggest that summer range fidelity of adult females in the CAH is at least 90%, and may approach 100%.

Key words: caribou, range fidelity, emigration, radio collars.

INTRODUCTION

Previously we reported a low frequency of emigration of collared female caribou (Rangifer tarandus granti) from the Central Arctic Herd (CAH) (Whitten and Cameron, 1983a). Of 127 females marked on winter range with transmitter and/or visual (numbered) collars between 1975 and 1978, seven (6%) were later observed in the Porcupine, Western Arctic, or Teshekpuk Herds (see Davis, 1980). It was concluded that these resightings constituted inter-herd movements.

In retrospect, it appears that some of the caribou collared in the Central Arctic region were within zones of overlap with the winter ranges of adjacent herds, and that our conclusions regarding the extent of emigration of CAH caribou may have been inappropriate. There is considerable evidence that variable numbers of caribou, particularly from the Western Arctic Herd, share a common winter range with animals from the CAH. In November 1976 and 1981, for example, we observed approximately 1200 and 400 caribou, respectively, in the Upper Itkillik River/Galbraith Lake area (Fig. 1), some distance from known CAH caribou to the north; tracks indicated that they had moved in from the west. Carruthers and Jakimchuk (1985) reported a steady increase in the numbers of caribou wintering in the western portion of the Central Arctic region since 1981. They estimated that 38 000 caribou occupied the area during winter 1984-85, some 23 000 more than the approximate size of the resident CAH. And, finally, recent Alaska Department of Fish and Game radio-tracking studies indicate that some females from the Western Arctic and Teshekpuk Herds may winter as far east as the Sagavanirktok River (P. Valkenburg, personal communication).

Few specifics are available regarding overlap of the CAH and Porcupine Herd ranges. However, our recent observations of caribou distribution during summer, fall, and winter in the vicinity of the middle Canning River (Fig. 1) suggest that mixing of these two herds could also occur.

We report here on the summer range fidelity of CAH female caribou over a 10-year period. To avoid errors resulting from the inadvertent collaring of caribou from other herds, we first established CAH affiliation of radio-collared females based on use of the Central Arctic area during the first summer after collaring. Fidelity was then assessed by relocating those individuals during the following three years.

METHODS

In April or May 1975-78 and 1980-82, 90 adult (2+ years) female caribou were equipped with radio-transmitter collars (Table 1) on the Central Arctic Slope of Alaska, generally within 20 km of the Dalton Highway (Fig. 1.) Of these, seven were subsequently recollared (Table 1). Immobilization procedures, and the radio collars used through 1981, were described previously (Whitten and Cameron, 1983a). Transmitters used in 1982 were supplied by Telonics, Inc., Mesa, Arizona. All radio collars deployed after 1975 were equipped with a red and yellow numbered collar or coded with colored tape.

Radio-collared caribou were tracked and relocated using a fixed-wing aircraft equipped with a scanner/receiver and two dual element antennas (Telonics, Inc., Mesa, Arizona). Searches were conducted primarily within the area shown in Figure 1. Each year through 1980, relocation attempts were made once in February or March, at approximately 10-day intervals between April and October, and again in November. For the period 1981-1985, we attempted relocations in March and/or April, at irregular intervals between May and August, and again in September and November. However, inclement weather and logistical problems occasionally prevented our completing radio-tracking flights as scheduled.

Radio-collared caribou observed between the Colville/Itkillik and Canning River drainages (Fig. 1) at least once during the first June or July after capture were considered members of the CAH. Fidelity to CAH summer range was evaluated one, two, and three years thereafter.

Mortalities of collared caribou and occurrences of shed transmitters were confirmed by visual inspection during routine tracking flights. Inoperative transmitters were identified through opportunistic sightings by air or from the ground, followed by verification that signal transmission had ceased. Radio-collared caribou not relocated in the Central Arctic region during the prescribed period and not otherwise accounted for (i.e., by confirmation of mortality, shed collar, or inoperative transmitter) were assumed to have left the area. However, such missing individuals were monitored for at least one year after the date of last relocation, both by us and by other biologists routinely tracking collared individuals from the other three Arctic herds. A radio-collared caribou observed on the summer range of another herd, after first being relocated on CAH summer range, was assumed to have emigrated to that herd.

RESULTS

The cumulative relocation data indicate a high degree of repeated use of CAH summer range by radio-collared female caribou (Table 1). Between 1975 and 1982, 64 of the 90 females collared were observed in the study area during the first summer after collaring. Assuming the manufacturer's projected 3.3-year transmitter life and adjusting for mortality, shed collars, and confirmed transmitter failures, we calculated that known CAH caribou were potentially available for a total of 142 caribou-years of radio-tracking. Caribou were relocated in the Central Arctic region 129 of those years, indicating an overall fidelity of 91%.

An analysis across years yields similar results (Table 2). Of those radio-collared caribou located on CAH range the first summer after collaring, 98% were located in the Central Arctic area for an additional summer, 91% for two more summers, and 82% for three more summers (Table 2).

In a number of cases we were able to document CAH summer range fidelity for periods exceeding the 3.3-year standard operational life of transmitters. A few females were recollared (Table 1), some transmitters functioned longer

than expected, and others with expired collars were sighted incidental to other activities. Eight radio-collared females were observed on CAH summer range for five consecutive years, one for five of six years, one for six of eight years, and one for seven of nine years.

DISCUSSION

These data indicate a strong affinity of CAH female caribou to their summer range. Only seven radio-collared females accounted for all of the apparent range infidelity (Table 2; one in year 1, three more in year 2, and three more in year 3). Of these, only one was a confirmed emigration and another, with a weak transmitter, was eventually found dead on CAH summer range. The remaining five were never accounted for, and four of those were difficult to track because of weak or intermittent signals when last located.

The probability of a caribou with a failed transmitter remaining in the CAH undetected would have been high. Between 1975 and 1979, the likelihood of observing a collared caribou without the use of telemetry was only ca. 60% (Whitten and Cameron, 1983a). Since then, the proportion of collared caribou in the CAH has decreased with continued herd growth (Whitten and Cameron, 1983b; Smith, unpublished data), and general surveys of the CAH have been far less frequent and intensive.

Eleven transmitter failures were detected during the course of this study. That an additional six malfunctioned seems likely, especially considering that five were known to be weak or intermittent. Thus, transmitter malfunction was the probable cause of most of the supposed infidelity. Nevertheless, for the calculations in Table 2, individuals not accounted for during a given summer were considered available for the projected 3.3 years of transmitter life. If the six missing female caribou are assumed to have been unavailable for tracking, the fidelity values increase to 100, 98, and 97% in years 1, 2, and 3, respectively (Table 2). We believe that the latter estimates are more realistic. Viewed from another perspective, the data indicate that emigration to the summer range of an adjacent herd was confirmed in only one of 64 cases.

Likewise, the available evidence indicates that little or no immigration into the CAH occurs. Since 1979, at least 200 adult female caribou have been radio-collared in the adjacent Western Arctic, Porcupine, and Teshekpuk Herds. However, not a single animal, having once been found on any of these herds' calving grounds or summer range, has been later observed on the summer range of the CAH.

Fidelity to a discrete calving area is the generally accepted criterion for assigning herd status to a particular group of barren-ground caribou (Skoog, 1968). Unfortunately, our data are insufficient to directly address the specific question of calving location. In most years, logistical complications or weather problems prevented our relocating all collared cows during the calving period in early June. When radio-tracking was attempted, however, all collared individuals found were on the CAH calving grounds (see Whitten

and Cameron, 1985). Furthermore, our year-round relocation schedule (see Methods) provided fairly complete movement information on the majority of collared females. Caribou present on CAH summer range in late June and/or July, but not relocated at calving time, were known to have wintered in the Central Arctic region (Fig. 1). It seems highly unlikely that a pregnant female would move to the calving ground of an adjacent herd and then rejoin Central Arctic caribou on summer range (with a young calf) some 3-6 weeks later; in fact, no such movements have ever been documented. Hence, we believe that our estimates of summer range fidelity are a reasonably accurate reflection of calving ground fidelity.

Although patterns of range fidelity may differ among barren-ground caribou across North America, the preponderance of data on seasonal distribution and movements indicates that caribou occur as separate subpopulations or herds, each occupying a calving ground and summer range distinct from that of any other. Thus, censuses and composition counts conducted during summer provide the most reliable data on a given herd. In contrast, range overlap by adjacent herds during winter and/or spring is not uncommon, dictating that results obtained during those seasons be interpreted with caution.

ACKNOWLEDGMENTS

This study was funded by Federal Aid in Wildlife Restoration Projects W-17, W-21, and W-22. Alyeska Pipeline Service Company and Northwest-Alaska Pipeline Company also provided logistical and financial support. We are grateful to J. R. Dau, P. Valkenburg, and D. D. Roby for expert technical assistance, and to W. L. Regelin, D. C. Heard, and S. Mahoney for their critical reviews of the manuscript.

REFERENCES

CARRUTHERS, D. R., and JAKIMCHUK, R. D. 1985. The distribution and numbers of caribou in the central Arctic region of Alaska, 1984-1985. Renewable Resources Consulting Services, Ltd. Report to ARCO Alaska, Inc., Chevron U.S.A., Inc., Conoco, Inc., Exxon Company, U.S.A., and Sohio Petroleum Company. 43p + Appendix. [Available from Renewable Resources Consulting Services, Ltd., 9865 W. Saanich Road, RR#2, Sidney, B.C., Canada B8L 351.]

DAVIS, J. L. 1980. Status of Rangifer in the U.S.A. In: Reimer, E., Gaare, E. and Skjenneberg, S. (eds.). Proceedings of the Second International Reindeer/Caribou Symposium, Røros, Norway, 1979. Trondheim: Direktoratet for vilt og ferskvannsfisk. 793-797.

SKOOG, R. O. 1968. Ecology of caribou (Rangifer tarandus granti) in Alaska. Ph.D. Thesis, University of California, Berkeley. 699p.

WHITTEN, K. R., and CAMERON, R. D. 1983a. Movements of collared caribou, Rangifer tarandus, in relation to petroleum development on the Arctic Slope of Alaska. Canadian Field-Naturalist 97(2):143-146.

_____. 1983b. Population dynamics of the Central Arctic herd, 1975-81. Acta Zoologica Fennica 175:159-161.

_____. 1985. Distribution of caribou calving in relation to the Prudhoe Bay Oil Field. In: Martell, A. M. and Russell, D. E. (eds.). Caribou and human activity. Proceedings of the First North American Caribou Workshop, Whitehorse, Yukon, 1983. Canadian Wildlife Service Special Publication, Ottawa. 35-39.

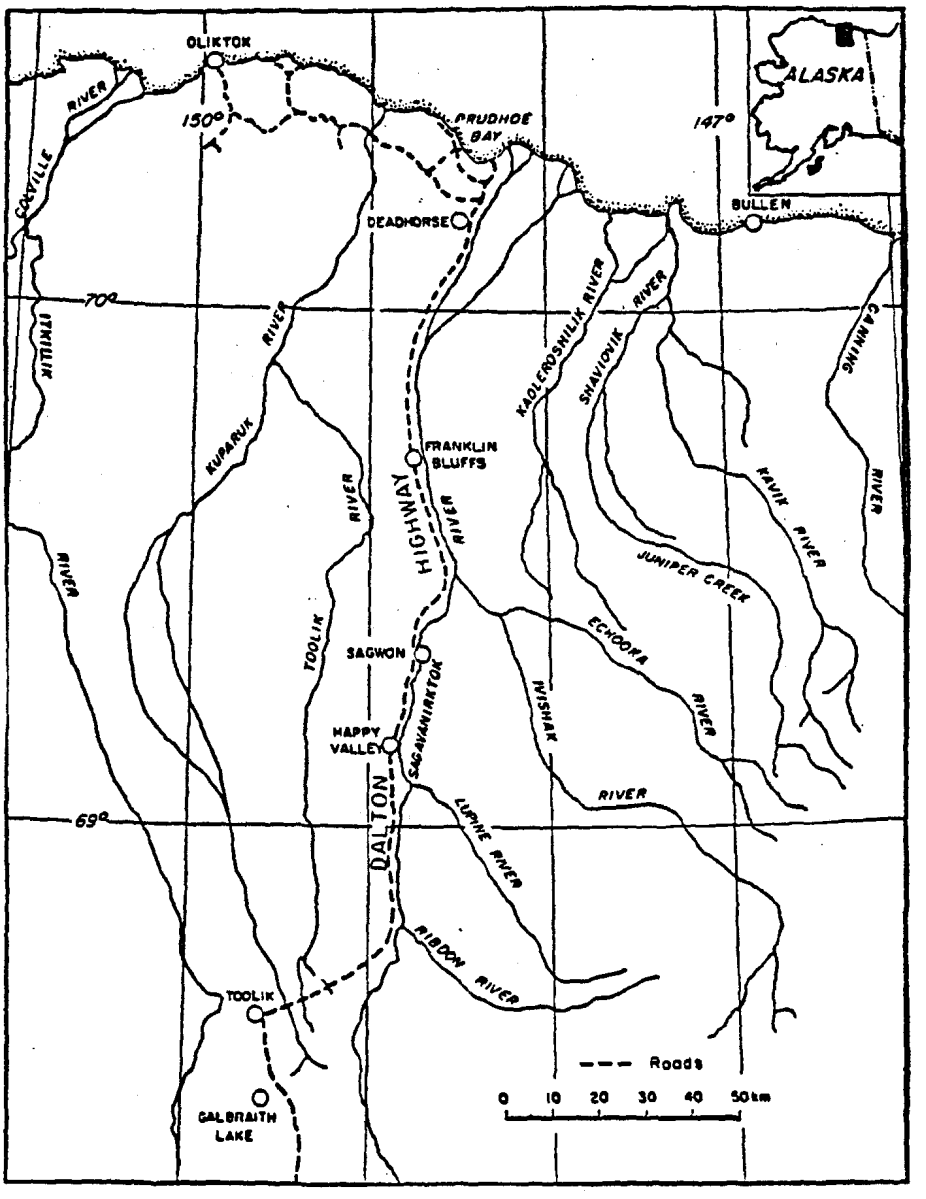

Figure 1. The Central Arctic region of Alaska.

Table 1. Numbers of female caribou radio-collared, 1975-82, and the projected numbers of years that radio-collared caribou were available for tracking vs. years relocated in the Central Arctic region (Fig. 1), Alaska, during summer.

Year	Number of caribou collared[a]	Number of caribou recollared[a]	Number of collared caribou in Central Arctic, 1st summer[b]	Cumulative number of caribou-years available for tracking[c,d] after 1st summer[b]	Cumulative number of caribou-years relocated in Central Arctic[c] after 1st summer[b]
1975	8	1	5	4	4
1976	10	--	2	3	3
1977	12	1	9	22	22
1978	8	1	8	24	23
1980	13	--	8	9	8
1981	18	4	15	36	29
1982	21	--	17	44	40
Total	90	7	64	142	129 (91% fidelity)

[a] In late April or early May.

[b] June-July.

[c] Excludes known mortality, shed collars, and transmitter failures.

[d] Assuming 3.3 years transmitter life.

Table 2. Analysis across years of the fidelity of radio-collared female caribou to the Central Arctic region (Fig. 1), Alaska, during summer.

Year	Number of collared caribou: total[a]	unavailable for tracking[b]	available for tracking	leaving Central Arctic[c]	relocated in Central Arctic during summer[d]	% Fidelity
0	90	17	73	4	64	--
1	64 (64)	13 (14)	51 (50)	0	50	98 (100)
2	51 (50)	7 (9)	44 (41)	1	40	91 (98)
3	44 (41)	6 (9)	38 (32)	0	31	82 (97)

[a] Number of caribou collared (year 0), or the maximum numbers of collared caribou initially available for tracking (years 1, 2, and 3).

[b] Visual confirmation of mortality, shed collar, or transmitter failure.

[c] Confirmed present on the summer range of the Porcupine, Western Arctic, or Teshekpuk Herd.

[d] During June and/or July.

NOTE: Values in parentheses are recalculations assuming six transmitter failures (one in year 1, two in year 2, and three in year 3). See text for details.