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CARIBOU STUDIES IN NORTHWESTERN ALASKA
(A Contribution From Alaska
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Introduction

Federal Aid supported studies of barren ground caribou in Alaska have been under way for eighteen years. These studies have concentrated on basic life history of the Steese and Nelchina herds in Central and Southcentral Alaska. Research activities on the Arctic caribou herd in Northwestern Alaska were initiated in the late 1950's on a small scale.

This paper is to present additional information on movements, distribution, productivity, mortality, and sex and age structure of the Arctic herd in Northwestern Alaska.

Skoog (MS. in prep.) identifies eleven distinct caribou herds in Alaska and estimates the total state population at 600,00 animals. The Arctic herd in Northwestern Alaska is estimated by Skoog to contain 300,00 animals, or half the state total. The Arctic herd in addition to its large size is important because of the meat and skins harvested by the resident subsistence hunters.

According to Banfield (1961:56) in his monograph on the taxonomy of the genus Rangifer, the Arctic herd caribou as well as all caribou in Alaska are barren ground caribou, which he classifies as Rangifer tarandus granti.

Description of Area

The caribou of the Arctic herd range in an area mostly north of the Arctic Circle from approximately 149° to 166° West Longitude and 66° to 71° North Latitude. This area consists of 150,000 to 160,000 square miles or an area about the size of California. The major geological feature is the rugged Brooks Range, which bisects the area from east to west with mountains to 10,000 feet high. The principal drainage of the Arctic Slope north of the Brooks Range is the Colville River and its tributaries. The Colville River flows east for 175 miles, paralleling the Brooks Range, then turns north to empty into the Arctic Ocean. The DeLong, Baird, Schwatka and Endicott Mountains are prominent features south of the Brooks Range and the Noatak, Kobuk, and Koyukuk Rivers form the principal drainages of these mountains.

The Brooks Range and the area north and west to

the sea is tundra biome and is relatively homogenous in plant composition. The tundra, of course, is treeless, and is characterized by tussock-heath vegetation consisting primarily of sedge, heath and lichens. Riparian willows occur throughout the area and muskegs and lakes are very numerous in the Arctic Coastal Plain Province between the Colville River and Arctic Ocean. Portions of the area south of the Brooks Range also consist of tundra, particularly near the coast, but most of this area is lightly forested with white spruce.

The central portions of the herd range are uninhabited by man. Small villages are located along the Arctic Ocean and Chukchi Sea coasts and a few villages are situated on the river drainages south of the Brooks Range.

The Arctic herd is interesting because of its remoteness and because these animals live in possibly the most hostile environment encountered by large herbivores anywhere in the world. This is a land of extremes: solar radiation varies from 24 hours per day in mid summer to none in mid winter; temperatures vary from 80° F. to -60° F. and the habitat is snow covered eight to nine months each year.

Methods

Aerial observations provided most of the information on caribou movement, distribution and location of calving, summering and wintering areas for this report. Aerial counts also provided the basic data for calf production determinations.

Caribou harvest data were obtained by direct observation of hunting activities and from reports of local residents, pilots and guides. In the fall of 1964 forms were posted in selected villages for hunters to record their kills by month. These forms were collected in May, 1965. This method was unproductive, so, in 1965 the following method was tried: in early fall 1965 letters were sent to village council presidents describing our objectives and needs in their respective areas, and requests were made for each council to select a competent person to gather caribou jawbones from the hunters and to keep a chronological record of the harvest in their areas. This method proved very satisfactory. The individuals were paid for their efforts according to the number of jawbones collected.

Spring and fall field trips to Anaktuvuk Pass were made in 1963, 1964, and 1965 as part of a cooperative caribou brucellosis study by the Alaska Department of Fish and Game, Arctic Health Research Center (U. S. Public Health Service) and U. S. Department of Agriculture. Hunter killed animals were examined at Anaktuvuk Pass during the spring (April-May) and fall (October-November). The carcasses

were examined for disease and parasites and blood samples were collected for serological examinations. Antler and body measurements were made as well as observations on general body condition. Fetal weights were taken and the pregnancy rate was determined.

Calving ground studies were made along the Colville and Utukok Rivers during late May and early June in 1963, 1964, and 1965. These studies consisted of aerial counts and reconnaissances, and collection of caribou.

Movements and Distribution

The nomadic behavior of caribou has long interested man and many theories have been proposed to explain the extensive and frequently unpredictable movements. No single theory, however, seems adequate to account for these long treks. Usually two movements take place each year: movements to the calving grounds by the cows and young caribou in the spring; and the movement in the fall when the animals gather to breed, then move on to the wintering grounds.

Studies to develop an understanding of the major movements and distribution of the Arctic herd were initiated in the late 1950's. Olson (1958, 1959), and Lent (1966) reported caribou movements and distribution which, in general, showed: 1) major concentrations of caribou calving north of the Brooks Range along the Colville and Utukok Rivers, 2) a summer distribution north of the Brooks Range and 3) wintering concentrations in 1957 and 1958 north of the Brooks Range between Barrow and Umiat and between the Chandler and Etivluk Rivers, and wintering herds in the early 1960's south of the Brooks Range in the drainages of the Noatak, Kobuk and Selawik Rivers. During this period movements through the DeLong Mountains and passes in the Brooks Range were observed as the animals moved north in April, May, and June to the calving grounds and south in August, September, and October to the wintering areas.

Wintering Areas

During the winter of 1962-1963 Skoog (1963:5) reported major segments of the herd in the drainages of the Kobuk River and in the western portion of the Baird Mountains. Lentfer (1965:3) indicated caribou wintered further south in 1964-65 than previous years, concentrating in the lower and middle Koyukuk River, southeast of Bettles between the Koyukuk and Yukon Rivers, and in the Noatak and Kobuk River drainages. In 1965-1966, McGowan (1966:6) reported that caribou wintered around the headwaters of the Kobuk River and concentrated in the area between the Kobuk and Koyukuk Rivers and as in 1963-1964, large numbers of caribou wintered southeast of Bettles between the Koyukuk and Yukon Rivers.

Calving Areas

In 1962-1963 the major calving ground was the area drained by the headwaters of the Colville, Utukok and Meade Rivers. In 1964 the main calving ground was further to the east, and mostly south of the Colville River between the Nuka and Anaktuvuk Rivers. Calving activities in 1965 centered north of the Colville River in the rolling hill country which drains into the Meade and Ikpiuk Rivers. In 1962 and again in 1965, a small segment calved north of the Kobuk River about 100 miles south of the main calving ground.

Movement routes to the north in the spring have varied according to the wintering areas used but in general, animals wintering in the southeastern portion of the range move north along the upper tributaries of the Koyukuk River through the Brooks Range via Chandler Lake, Anaktuvuk Pass and passes to the Killik River. Upon reaching the north slope the animals move westward towards the headwaters of the Colville and Utukok Rivers. Those animals wintering along the Noatak and Kobuk Rivers move north through the many passes in the DeLong and western Brooks Range to the Utukok and Colville where they reportedly mingle with the eastern segment of this herd.

Post-calving movements find some animals moving north to the sea coast and others going west toward the DeLong Mountains. Southward movements to wintering areas generally follow the routes used in the spring.

A review of available movement and distribution data indicates: 1) a southward extension of the wintering areas in both the southeastern and southwestern portions of the Arctic range, 2) wintering grounds used for several years are frequently abandoned and new areas utilized, 3) the chronology of spring and fall movement is well defined with occasional delays of up to one month noted in spring movements during years of deep, lasting snow, and 4) the calving ground is the center in herd movement and is the most consistent and predictable distribution of the herd.

Mortality

The harvest of caribou in the Arctic herd consists almost entirely of subsistence hunting. These animals provide a substantial portion of the protein in the diet of the people of the Arctic and in Anaktuvuk Pass the residents depend almost entirely on caribou for human and dog food. The skins are used to make efficient mukluks, parkas, trousers, and mitts for cold weather wear.

Caribou hunting regulations provide for unlimited hunting with no closed season and no bag limit. The regulations have little effect on the kill other than permitting

the people to take the maximum number of animals desired when this is possible. The annual harvest is primarily determined by the accessibility of the caribou to the villages. In those years when caribou migrate close to the villages on treks to and from the calving grounds, the harvest is large in terms of caribou per resident.

Hunter harvest data for the Arctic herd are lacking except for 1963 and 1965. Data for 1964 are incomplete. An estimated 20,000 caribou were taken in 1963 and 29,000 in 1965. The 1965 kill was probably the largest in recent years. In 1965 caribou were readily available in the fall and early winter and hunters from Barrow and Wainwright were able to take animals during the summer months. A visit to these villages was made just after the southward migration, permitting a comparison of observed harvest with reports by village residents. The reports, in general, gave accurate pictures of the chronology and size of harvest.

The harvest from January through May, 1965 was low in most of the villages on the west coast. From July 15 through August 10, 1965, hunters on the north coast - primarily from Wainwright - had a good harvest. These hunters were selective and took large bulls when possible. Hunters from Noatak and Kotzebue used boats for access to harvest caribou from a herd moving across the Noatak River in early September, 1965. Caribou were available to Anaktuvuk Pass hunters throughout the winter (1965) and good kills were made during both the northward (spring) and southward (fall) migrations. On the western coast (from Point Hope to Selawik) the largest harvest was during October as the caribou moved close to the villages on the southward movement to wintering areas.

Mortality from natural causes is extremely difficult to determine. Wolves and grizzly bears prey on caribou and are common in parts of the range, but the overall effect on the population is unknown. Clues to some causes of natural deaths were obtained from animals taken by hunters. The collection of unthrifty animals or those with obvious defects also provided information on natural mortality. Anaktuvuk Pass hunters reported the general body condition of caribou to have improved from a low in December, 1965, and in April, 1965, both bulls and cows had moderate amounts of fat. This report was confirmed by autopsy of 77 caribou collected in Anaktuvuk Pass in mid-April, 1965. These animals, including ten animals with positive Brucella titers, had moderate amounts of fat in the mesenteries, and around the heart and kidneys. Subcutaneous fat was lacking in most animals.

Blood samples from 128 animals were tested for brucellosis by the U. S. Public Health Service, Arctic Research Center, and the U. S. Department of Agriculture. From the 128 samples, 16 (12.5%) were found to have positive titers. Neiland (1965:7) reported of Alaskan caribou, "The

disease (brucellosis) in wild caribou judging from serological titre values is usually mild although occasional cases of sterility (massive orchitis), abortion and/or placental retention, and crippling (arthritis) have been bacteriologically confirmed, sometimes in association with low titres."

Brucellosis is certainly a likely cause of natural mortality in Arctic caribou either directly or by reducing the vitality of the animals permitting other factors to lead to death. The overall effect of brucellosis, however, is unknown.

Generally the Arctic caribou came through the winter of 1964-1965 in good condition in contrast to the winter of 1963-1964.

Population Structure

In 1965, one thousand one hundred and seventy mandibles, of which all but 284 were from animals of known sex, were collected from hunter kills in the villages of Anaktuvuk Pass, Point Hope, Kivalina, Noatak, Kobuk, Shungnak, Ambler, Kiana, and Selawik. This collection constituted approximately four percent of the total estimated kill of 29,000. Data from this collection, along with the 1964 sex and age information, are shown in Table 1. In 1964 and 1965 the greatest portion (55 and 68.1%, respectively) of the harvest came from the 3 to 5 year age class. The low percentage of old individuals was expected but the low percentage (20 and 17.8%) of animals under 2 years old indicates hunter bias towards larger animals or perhaps a low calf production and/or survival during 1963 and 1964.

On two occasions in October, 1965, I observed hunters take all animals from two bands of caribou except 2 calves in a band of 12, and 2 calves from a band of 17 caribou. Whether or not this selection took place at other times of the year or in other villages is unknown. Aerial composition counts on the calving ground in 1964 showed a calf-cow ratio of 64:100. This ratio is minimum since the counts were made before calving was complete. Calf:cow ratios from the Fortymile and Nelchina herds have averaged 58 and 60% respectively over the past nine years. The harvest data for 1965, when these calves would be available to the hunters for the first time, indicated a contribution of only 2.4% to the total harvest. Unless survival of 1964 calves was very low, hunter selectivity is apparently the main reason for low harvest of the younger age classes. Caribou are utilized for human and dog food and some hides are utilized for clothing. Very young calves four to six weeks old are sought for undergarments and high quality caribou sox but at this age most of the calves are inaccessible to hunters.

A 1964 sample of 69 hunter harvested caribou (Table I) consisted of 16% male and 84% female. In 1965 a sample of 886 consisted of 48% male and 52% female and is probably close to the actual sex ratio of the herd. A small sample as in 1964 could easily be biased because caribou movements to the calving grounds show some sex and age segregation. The procession to the calving grounds is lead by pregnant females often accompanied by their calves of the previous year, with bulls and barren females lagging behind. During this period a harvest from a segment of this procession would likely be non-representative of the sex and age ratio of the herd.

Productivity

While working with Eskimo hunters in the Anak-tuvuk Pass area between April 11 and May 27, 1965 one hundred ninety-six female caribou carcasses, two years old or older, were examined for pregnancy, and 162 (83%) were found to be pregnant. In 1964 a sample of 58 females, also two years old or older, from the same area revealed a 76% pregnancy rate. These pregnancy rates compare with the 79% of 63 adults found by Kelsall (1957:44) in Canada. Skoog (MS. in prep.) reported 72% of 110 adult females (two years old or older) from the Arctic and 83% of 210 in the Nelchina herd in Alaska were pregnant.

During this same period (spring, 1965) six yearling females were autopsied and one was found pregnant. Skoog (MS. in prep.) found three of 23 female yearlings pregnant in the Nelshina herd for a 13% pregnancy rate. A larger sample of female yearlings will have to be examined to determine the contribution of this segment to production.

Aerial classification counts were made on the Arctic calving grounds in 1965 (Table II). On the counts females were classified as with or without antlers and with or without calves. Pregnant females retain their hard antlers until parturition and the non-pregnant ones usually shed their antlers in April. By mid-May practically all have completed shedding. Parturient cows in Table II are those cows with calves and/or antlers.

Several sources of error probably affect these classifications. Under certain lighting conditions the antlers are difficult to see against the dark tundra background and calves are often difficult to discern when standing under the cow or lying between grassy tussocks. In spite of these problems these counts give a good idea of the progression and success of calving. The classification data summarized in Table II indicate the 1965 peak of calving occurred between June 5 and June 7. The peak of calving is the time when 50% of the pregnant females have given birth. In 1964 Lentfer (1965:4) reported the peak between June 6 and June 11.

TABLE I

Sex and Age* Structure of the 1964 and 1965 Harvest of
Alaska's Arctic Caribou

Age Class	1964					1965				
	Male	Female	Sex Unk.	Total No.	%	Male	Female	Sex Unk.	Total No.	%
Juvenile: Calf	0	0	12	12	4	8	8	12	28	2.4
1 yr.	0	0	17	17	6	7	27	31	65	5.5
2 yrs.	0	7	24	31	10	24	61	30	115	9.9
Total	0	7	53	60	20	39	96	73	208	17.8
Prime: 3-5 yrs.	9	33	126	168	55	329	296	172	797	68.1
Mature: 6-9 yrs.	2	15	40	57	19	45	56	35	136	11.6
Old: 10+ years	0	3	16	19	6	11	14	4	29	2.5
Total	11	51	182	244	80	385	366	211	962	82.2
GRAND TOTAL	11 (16%)	58 (84%)	235	304 (100%)		424 (48%)	462 (52%)	284	1,170 (100%)	

*Age determined by tooth replacement and wear.

TABLE II
RESULTS OF AERIAL COW/CALF COUNTS OF ALASKA'S
ARCTIC CARIBOU HERD, 1965

	Total Cows Counted	Parturient Cows	Non- Parturient Cows	Calves	Calves/ Parturient Cows	Calves/ Total Cows
June 5	966	645	321	149	.23	.15
June 7	3,028	2,340	788	1,947	.66	.64
June 10	4,940	4,028	912	3,431	.85	.69

Conclusions

The 1965 caribou harvest from the Arctic herd exceeded the harvest of all other big game species in Alaska (moose, deer, walrus, black, brown, grizzly, and polar bears, sheep, goat, elk, and bison). The arctic caribou harvest in 1963 and 1964 approximately equaled the total harvest of all other big game species.

The Arctic herd has increased in recent years and the highest harvest recorded is under 10% of the estimated total population. Under this relatively low harvest the population can be expected to reach a maximum population level if this point hasn't already been reached.

This herd has brucellosis at the epidemic level (15 to 20% compared to 1 to 4% in Southcentral Alaska) and the animals are smaller and usually in poorer condition or at least were in 1963 and 1964, than caribou in more southerly herds.

The importance of this herd and the problems outlined above have been recognized by the Alaska Department of Fish and Game and future studies have been designed to:

1. Inventory the Arctic herd in 1966 by aerial reconnaissance of the calving segment, make sample counts of the cows and calves and extrapolate the data to determine herd size, calf crop and the relative size of the yearling age class.
2. Continue cooperative brucellosis studies with the U. S. Public Health Service and U. S. Department of Agriculture.
3. Continue distribution and movement investigations.
4. Increase efforts to gather hunter harvest data and chronology of kill.

5. Continue examination of hunter killed animals for pathology and radiation studies.

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