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JUNEAU, ALASKA

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CARIBOU REPORT

by

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Annual Project Segment Report
Federal Aid in Wildlife Restoration
Project W-15-R-1 and 2, Work Plan L

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TABLE OF CONTENTS

WORK PLAN SEGMENT REPORT

FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO: W-15-R-1 and 2 TITLE: Big Game Investigations

WORK PLAN: L TITLE: Caribou Studies

JOBS: 1 thru 6 (both Project Segments)

PERIOD COVERED: January 1, 1966 to December 31, 1966

ABSTRACT

Arctic Herd

1. Two large segments of the Arctic caribou herd wintered south of the Kobuk River in the Pah River Flats and along the headwaters of the Selawik River. The northward movement to the calving grounds began about the middle of March. The main calving grounds were located on the headwaters of the Ketik, Meade, Awuna, Utakok Rivers, and also along the heads of Disappointment and Carbon Creeks. During the summer months, caribou were widely dispersed. The southward fall migration arrived on the Kobuk River in late September.

2. The main calving grounds were located about 75 miles west of the 1965 calving areas. This year's calf crop may have been lower than normal.

3. The 1966 Arctic caribou harvest is estimated to be 24,000 animals. The previous year's harvest was estimated to be 29,000 animals.

4. Hunter use of gasoline-powered tracked snow vehicles has increased in the Arctic. Replacement of dog teams by snow machines will decrease the need for caribou meat as dog food.

5. The sex and age structure of the 1966 harvest continues to show a low percentage (18.3%) of animals in the younger age classes. Hunters select larger animals when possible. Calves are usually sought after only in late summer-early fall, hence the low representation of young animals does not necessarily indicate low calf production or survival.

6. Blood samples from 199 Arctic caribou were tested for brucelosis in 1966. Tests reveal 12.3% of the animals were positive Brucella reactors. This is approximately the same as the 12.5% found in 1965 and the 14.0% in 1964.

Nelchina Herd

1. The Nelchina herd wintered in two main concentrations: the Mentasta-Wrangell Mountains and the Tazlina-Eureka area. Evidence of permanent caribou egress was noted in three locations during an active migration in early winter. Movements from the wintering areas towards the calving grounds started about April 15. Pregnant females from both wintering areas reached Fog Creek-Grebe Mountain calving area on May 14. The post-calving segment concentrated along Tsitsi and Kosina Creek. Extensive flying on June 14 failed to reveal any other post-calving segment. On July 17, a concentration of animals thought to contain the entire Nelchina caribou herd was observed at Soule Lake. This is the first recorded instance of cows and calves joining with the bulls at this time of year.

2. Two calving areas were found separated by a distance of 10 miles. The Grebe Mountain calving area contained animals that had wintered in the Eureka-Tazlina area. The Fog Creek calving area contained animals that wintered in the Mentasta-Wrangell Mountains. Aerial and ground composition counts revealed the peak of calving occurred in both areas on May 26.

3. Access to the calving grounds and observation of the progression of calving was accomplished with the use of a Bell G-2 helicopter. This aircraft proved superior to fixed-wing craft because it could place a man on any part of the calving ground and could operate during periods of adverse weather. Best results were obtained at an altitude of 150 feet at an air speed of 20 mph. When the helicopter was used in a proper manner, little or no harassment to the animals was evident. Cost of the operation was comparable to fixed-wing aircraft cost since the base of operation was on the calving ground, thus eliminating ferrying time.

4. The Denali Check Station was in operation from August 15 through October 10, during which time 2,799 hunters harvested 857 caribou. The 1966 kill is down 44% from the previous two-year average. The total caribou harvest for calendar year 1966 is estimated to be 4,800 animals. This is the lowest recorded kill for the past three years and reflects the general inaccessibility of caribou during the hunting season.

5. Blood sera from 63 Nelchina caribou were tested for brucellosis. Less than 2% was found to be Brucella positive. Surveys of the calving grounds revealed only one cow with postnatal complications.

6. Fall caribou hunters prefer to take male caribou. Of 849 caribou checked through the station, 71% were males and 29% were females.

7. The first 15 range plots which were established in 1955 and 1956 were reread in 1966. Little difference could be detected between the fenced and the unfenced plots. Quantitative comparison of all collected data will be postponed until there is an increase in work plan personnel or until the services of a range ecologist are available. All 38 Nelchina range exclosures were checked and repairs were made as required.

8. At the present level of abundance, snow machines have little or no effect on the distribution and movements of the Nelchina caribou herd. The caribou harvest is increased by snow machine use mainly in areas occupied by caribou near highway systems.

Steese-Fortymile Herd

1. During the winter of 1965-66, the Steese-Fortymile caribou herd wintered north of the Steese Highway, and along the Tanana River from the Salcha River to the Ladue River in Canada.

2. Calving took place in late May and early June on the foothills of Mt. Harper. In late July the herd had moved northeast to the Seventymile River.

3. Caribou crossed the Taylor Highway from August 5 through December 31. The kill was estimated at 900 animals, with 47% of the animals killed within the first 21 days of the season.

4. During the summer of 1966, three major fires occurred north of the Tanana River and east of the Taylor Highway. These fires destroyed approximately 729,000 acres of winter range used by the Steese-Fortymile caribou herd.

Adak Herd

1. Two composition counts on Adak during June and August, 1966 gave information on productivity. These counts revealed that at least 70% of the female segment had given birth. Autopsy data from hunter-killed animals suggest that a non-pregnant yearling would be an exception on Adak. A lactating yearling was also killed this year on Adak proving that some caribou calves are breeding at 5-6 months of age.

2. The either-sex hunting season was extended from August 10 to December 31; only 15 of the desired 30 animals were harvested. Lack of access to the hunting area continues to hinder the harvest.

3. All documented range work was accomplished on Adak Island during August. Permanent study quadrats were established and the vegetative study was completed at each of the six exclosure stations. Permanent photographic stakes were established and photographs both in black and white and color recorded the present condition of plants within each quadrat.

WORK PLAN SEGMENT REPORT

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OBJECTIVES

To record the distribution and movement of the various herds as needed to determine population shifts, movement patterns, and range use.

To determine the magnitude and composition of the hunter-kill. To determine variations which may exist in the population structure of caribou herds at different levels of abundance.

To provide information needed for an annual status evaluation of Alaska's caribou population in terms of total numbers, productivity, mortality, and general condition of the animals and range.

To provide to the hunting public current information regarding caribou distribution. To promote the desired harvest.

To identify and evaluate mortality factors affecting caribou populations.

To determine caribou utilization of the Nelchina range throughout the year, recording for specific areas animal density and duration of use.

To describe the range and establish permanent range stations in areas used by caribou recently transplanted to Adak Island. To monitor the harvest and collect data necessary to the future management of the herd.

To evaluate the effects of snow vehicle use on the caribou harvest. To determine the effects, if any, of hunting by snow vehicles on caribou distribution and movement. To observe and record the behavior of caribou when hunted by snow machines.

METHODS

Reconnaissance flights provided the principal means for determining distribution, movements, range use, and location of calving, summering, and wintering areas. Aerial observations also provide information on productivity including fertility, mortality, and calf survival.

Information of the caribou harvest from the western Arctic was obtained by visiting the northwestern villages. Arrangements were made with a person in each of these villages to collect caribou jaws and harvest data. Cooperators were paid one dollar for each jaw collected.

When possible, hunter-killed animals were examined for disease and parasites and blood samples were collected for serological determinations. Antler and body measurements were made as well as observations on general body condition. Checking stations were operated in the Fortymile and Nelchina herd units. Hunters checking through the station were requested to return to the station jaw bones and blood samples from their kills along with dates and locations of kills. Caribou specimens were also collected from hunter-killed animals by Department personnel.

The Cooperative Brucellosis Study to determine the effects and prevalence of brucellosis in Alaskan caribou was continued by the cooperating agencies: Arctic Health Research Center, U. S. Department of Agriculture, and Alaska Department of Fish and Game.

Caribou from the Arctic, Nelchina, and Alaska Peninsula herds were collected for radiation analysis by the Atomic Energy Commission. In addition to the meat, bone, marrow, and rumen samples collected for the radiation analysis, other pertinent data gathered included weights, measurements, pregnancy rates, and information on the incidence of disease and parasites.

Eight permanent range quadrats were established at each of the six range exclosures on Adak Island. Complete plant collections in addition to photographic records were made of the study areas. The hunting season was monitored by Department and U. S. Navy personnel and specimens were collected from hunter-killed caribou when possible.

Observations were made on caribou behavior when stimulated by the presence of snow machines. Caribou were approached and/or pursued using snow machines. Detailed observations were made according to habitat type, closeness of approach, etc. Hunters were interviewed to determine success, opinions, observations of caribou behavior and distribution of kill.

Recognition is given to the following personnel who devoted time to caribou project work: Charles Lucier for his continuous contribution to caribou work, Karl Schneider for his observations on the use of snow machines by caribou hunters in the Nelchina area, Howard Wood for work done on the Fortymile caribou herd, and to Terry McGowan whose leadership and planning made possible the completion of much of the field work.

FINDINGS

Arctic Herd

Distribution and Movements

There are no Department personnel stationed in the northwest Arctic villages; therefore, reports of caribou were received largely from bush pilots and resident Eskimos. During the winter of 1965-66, the majority of caribou which wintered in the western Arctic did so south of the Kobuk River. Little is known of winter caribou movements east of Kobuk Village.

In the southwestern part of their range, two large wintering areas were in use from January through March: the Pah River Flats, and the headwaters of the Selawik River west to the Tagagawik River. Selawik hunters traveled 25-40 miles southeast from the villages for caribou during the first three months of 1966. Villagers from Kiana hunted in the same area which suggests a lack of animals north of the lower Kobuk River. Kivalina residents, however, reported a small herd wintering in the DeLong Mountains and in the Mulgrave Hills.

The northward migration started about the middle of March. By April 1, the caribou that had wintered on the drainages of the Selawik River moved to the west and the kill increased steadily in Selawik as caribou moved north on either side of the village. Residents of Ambler, while camped at "Hot Springs" on the headwaters of the Selawik River, observed thousands of caribou migrating northwest through the Shekluk shuk Mountain Range. This large migration continued past their camp from March 10 through 20, after which the hunters returned to Ambler.

During April, the caribou passed near most of the villages on the Kobuk and Selawik Rivers. The kill reached a peak in April and then tapered off. Caribou were crossing the Kobuk River as late as early June.

Specific information concerning the percentage of animals which calved south of the Brooks Range is not available. It is known that the animals were late in arriving on the calving grounds. This situation may have been due to their extensive southern migration the previous fall. The extent to which distance between wintering and calving areas determines the ability of caribou to reach traditional calving grounds is not known. Lent (1966) states that in 1962 unusual snow conditions prevented most cows that wintered south of the Brooks Range from reaching the Utukok River calving grounds. These cows, however, continued to move north after calving until they reached the south edge of their normal calving area. They then mixed with other caribou and the post-calving movement proceeded as in previous years.

Caribou apparently were widely dispersed during the summer. Ambler residents reported caribou were available all summer with significant numbers located between the Redstone and Miluet Rivers.

Fall weather conditions were unseasonably mild in October and undoubtedly contributed to the laggard fall caribou migration. By the middle of October, caribou were still north of the Brooks Range. Hunters at Anaktuvuk Pass reported only a few caribou moving through the pass.

Below is a comparison of 1965 and 1966 dates of caribou arrival in fall near some western Arctic villages.

	1965	1966
Ambler	Oct. 1	Sept. 1
Noatak	Oct. 30	Sept. 1
Kobuk	Oct. 25	Oct. 20
Kivalina	Oct. 10	Oct. 27
Point Hope	Oct. 5-10	Nov. 27
Selawik	Oct. 15	Nov. 29

By the end of November, caribou were still in migration. Undoubtedly, the caribou will not be settled on their winter range until the end of January 1967. Reports received from villages in late December suggest caribou will settle in several locations both north and south of the Kobuk River.

Productivity

Because project personnel were involved in the Kenai caribou transplant and Nelchina calving studies, little information was obtained on Arctic calving success. Information gathered from the western Arctic villages, however, revealed that at least a portion of the Arctic herd calved south of the Brooks Range.

The spring migration started north, crossing the Kobuk River in the middle of March. The last cows were observed crossing the Kobuk River near the village of Ambler in early June, when some cows accompanied by calves were seen.

The main calving grounds of the Arctic caribou herd were located about 75 miles west of the 1965 calving areas as reported by McGowan (1966). The major calving concentrations in 1966 were located north of the Colville River on the headwaters of the Ketik, Meade, Awuna, and Utakok Rivers and also the heads of Disappointment and Carbon Creeks.

Little information is available on the production of calves. Department personnel studying birthing difficulties on the calving grounds have indicated that this year's calf crop may have been lower than normal.

Mortality

Hunter Harvest

The harvest of Arctic Alaska caribou continues to be achieved almost exclusively by local subsistence hunters. In spite of increased use of imported foods, caribou meat is, and probably will be for some years, a staple food for men and dogs within the region.

The take of caribou in the Arctic fluctuates from year to year depending upon accessibility of herds to village hunters. Owing to sampling limitations, we can determine the magnitude of the harvest in rough numbers only. The 1965 harvest of about 29,000 was probably higher than the usual kill in recent years because caribou migrations passed close by most towns and villages in the western part of the Arctic around Kotzebue Sound as far south as Buckland. The 1965 Arctic caribou harvest is even more impressive when we consider the number of caribou taken exceeded the combined kill of all other big game species in Alaska including moose, deer, walrus, black, brown, grizzly, and polar bears, sheep, goat, elk, and bison (McGowan, 1966). The 1966 kill of 24,000 animals is down somewhat. Estimates are based on observations by local hunters, pilots, and State game personnel.

The taking of caribou in the Arctic is attained largely along migration routes or in areas where caribou overwinter in proximity to human settlements. Hunters use dog team transportation, and increasingly, gasoline-powered, tracked snow vehicles, popularly known as "sno-gos" to intercept the caribou. It is not known what percentage of animals are taken by hunters using tracked vehicles; but these are increasing in number whereas, the number of dog teams is decreasing as hunters convert from dog power to gasoline power. An estimate of 100 snow machines in this area excluding the larger settlements of Barrow and Kotzebue is probably conservative. The main impact of the snow machine is expected to be an increase in hunter ease and mobility under the right snow conditions and a decrease in the amount of caribou needed for dog food--though some individuals are keeping their dog teams after purchase of the machine substitute. It is reasonable to expect a spurt in snow machine use and a "shake-down" period during which the merits of the machine and their limitations under varying conditions will either result in a balance between dog teams and snow machines or the practical elimination of the dog team. A complete reversion to dog traction seems unlikely. Due to purchase and replacement parts costs, it is expected that some hunters will continue to use dogs for traction; which though expensive to maintain in terms of human time and labor can be provided for from the renewable resources of the region. The quantity of caribou actually consumed in villages is expected to decline with fewer dogs to feed, but whether efficiency of utilization of caribou killed will decline is not known. In any case, under present conditions of the high caribou population in the Arctic (300,000+ animals) it is improbable that either technological change such as has occurred with the introduction of the snow machine or even a sizable increase in need for caribou meat because of local human population growth will seriously threaten caribou survival in the near future.

A sample of 60 caribou harvested in 1966 at the village of Noatak though small by comparison with the total kill gives insight into the present range of subsistence hunters. Means of transportation was by dog sled and snow machine. Distance, direction of kill from Noatak, and numbers of animals killed is given below:

10 miles north, 4 caribou

15 miles north, 3 caribou

18 miles north, 4 caribou

20 miles north, 12 caribou

30 miles north, 11 caribou

80-100 miles north up Noatak River, 26 caribou

Twenty-six (43%) of the caribou in the Noatak sample were taken 80-100 miles upriver in September; the remainder, 34 (57%) were taken within 30 miles of Noatak in April, October, November and early December. Twenty-three animals (38%) were taken within a 20 mile radius of Noatak.

Of 32 caribou jaws collected at Ambler on the upper Kobuk River, locations of kill are given variously as 3, 4, 7, 9, and 20 miles from the village. Both dog sleds and snow machines are in use at Ambler.

Natural Mortality

A number of residents of Arctic Alaska commented on the condition of caribou harvested for food in 1966. At Anaktuvuk Pass there were complaints by residents concerning animals in poor condition, as characterized by low body fat and poor bone marrow. At the extreme western edge of the range at Noatak, Eskimo hunters noted the condition of 60 animals. Of 29 males, 12 were listed as in good condition, and 17 as only fair. All males were three years old or older. Of the 31 females, 16 were classified by the hunters as in good condition, 13 were fair, and two (both calves) were listed as "skinny." Overall, 41% of the males were given as in good condition; of the females, 52% were judged to be in good condition. Hunters at Noatak report a low point in female body condition in April-May. Males are reportedly hunted less in October during the period of active rut.

In 1966, blood samples from 204 Arctic caribou were tested for brucellosis by the U. S. Public Health Service, Arctic Health Research Center. Of these, 25 (12.3%) were positive, including weak reactors. Similar tests conducted by the U. S. Department of Agriculture on 198 blood samples gave 8% brucellosis positive, also including weak reactors. The 8-12% of animals found positive for brucellosis in 1966 [1/] is somewhat lower than the 12.5% rate for 1965 and

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[1/] Work Plan P Job No. 1 reports positive reactors found by U.S.D.A. only.

the 14% found positive in 1964. Resident hunters at Anaktuvuk Pass contributed all except one of the samples tested and reported on. Collections of blood begun in late 1966 by residents of several western Arctic villages should contribute in the future to a better understanding of the incidence of brucellosis in the Arctic caribou herd.

Population Structure

The age structure of the 1966 Arctic harvest is shown in Table I. A total of 443 caribou mandibles, including 38 of unknown sex were collected from native hunters in the villages of Anaktuvuk Pass, Point Hope, Kivalina, Noatak, Ambler, and Selawik. The number of mandibles obtained is small in comparison to last year when 1,170 jaws were collected. However, the sex and age composition of the harvest for both years is comparable. The greatest portion of the harvest (68%) came from the three to five year age-class and as expected old animals represent a small part of the kill (2.3%). The harvest continues to show a low percentage (18.3%) of animals in the younger age classes. Interviews with hunters reveal a bias towards collecting large animals. Hunters from the village of Noatak stated that calves are sought during a short period only, usually in late summer and early fall, since at that time the pelt is of prime quality for garment making. The low representation of young animals in Table I then does not necessarily indicate a low calf production or survival.

TABLE I

SEX AND AGE STRUCTURE OF THE 1966 HARVEST OF ALASKA'S ARCTIC CARIBOU, AS DETERMINED BY TOOTH REPLACEMENT AND WEAR

	Anaktuvuk Pass					*Other Villages					TOTAL	
Age Class	♂	♀	Sex Unk	Total No.	%	♂	♀	Sex Unk	Total No.	%	No.	%
Juvenile:												
Calf	2	1		3	1.8	2	7	2	11	4.0	14	3.2
1 Yr.	4	3		7	4.1	3	17		20	7.3	27	6.1
2 Yrs.	1	6		7	4.1	7	22	4	33	12.0	40	9.0
Total	7	10		17	10.0	12	46	6	64	23.3	81	18.3
Prime:												
3-5 Yrs.	84	31	10	125	74.0	70	95	15	180	65.7	305	68.8
Mature:												
6-9 Yrs.	11	5	5	21	12.4	10	14	2	26	9.5	47	10.6
Old:												
10+ Yrs.	3	3		6	3.6	1	3		4	1.5	10	2.3
TOTAL	105	49	15	169	100.0	93	158	23	274	100.0	443	100.0

*Other Villages - Point Hope, Kivalina, Noatak, Kobuk, Ambler and Selawik.

Nelchina Herd

Distribution and Movements

Fall, 1965

In September caribou moved eastward from the western portion of the range and reached the Richardson Highway on October 10, 1965. The herd then split. The larger portion of the herd continued east, crossing the highway between Meiers Lake and Slana-Tok Cutoff. The remainder of the herd turned southwest and reached the Eureka area on October 20.

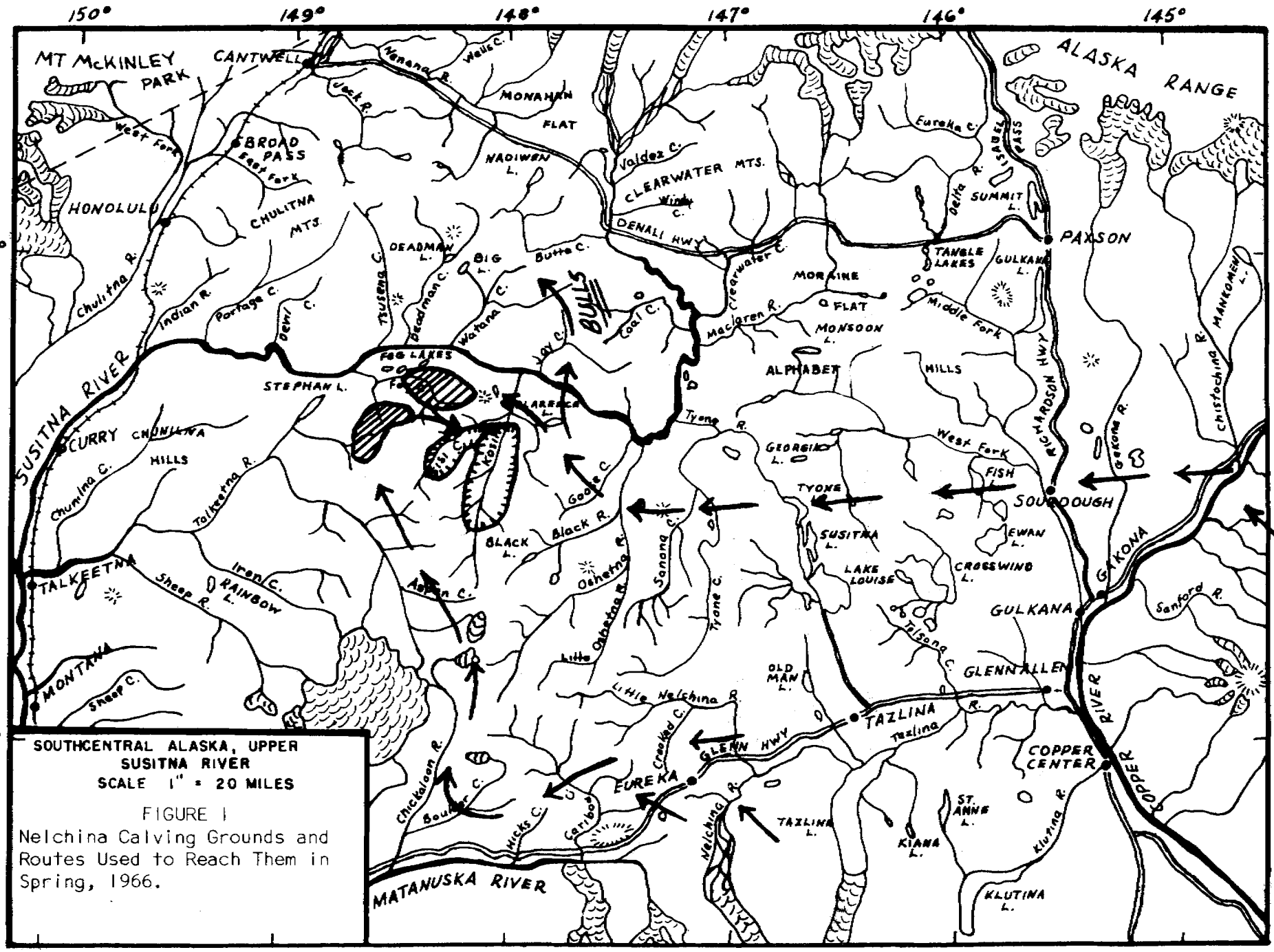
The herd wintered in two main areas in 1965-1966. By December, caribou were located throughout the Mentasta Mountains and along the north slopes of the Wrangell Mountains. The remainder of the herd wintered in the Tazlina-Eureka area. Scattered caribou were also present in the Nabesna Valley. By January 1966, little movement was evident as the animals settled on their winter range.

In December, before the Mentasta herd segment settled, a permanent egress may have taken place. I observed evidence of this in three different locations. First, caribou trails were observed going down the east side of the Copper Pass towards Chisana. Trails indicated that 15 to 20 caribou had gone through the pass. A check of the area several days later revealed that no further movement through the pass had taken place. The second egress was noted on the Chesina River. Here heavy trails were observed going down river; these trails continued northeast crossing the Nabesna River and spreading out in the general direction of the Tanana River. Ground fog prevented further tracking. The third possible egress was observed in the Tok Junction area by residents and Department of Fish and Game personnel.

Spring, 1966

The spring migration started March 23. In the Wrangell Mountains, large numbers of caribou were forming near Black Mountain. In the Mentasta Mountains, animals had shifted to the west. In the Tazlina-Eureka area, large numbers of caribou were moving slowly north and west towards the Chickaloon River.

Definite movement from the wintering areas towards the traditional calving areas started about April 15 (Figure 1). Bands of caribou, mostly adult females accompanied by calves approaching one year of age and yearlings nearly two years old were observed on the east side of the Copper River near Chistochina Lodge. Animals from the Mentasta Mountains moved south into the Nabesna Valley meeting animals coming out of the Wrangell Mountains. Almost all of the animals crossed the Copper River within several miles on either side of Chistochina Lodge. The Work Plan Leader, flying a reconnaissance flight on April 23 in preparation for the caribou transplant operation, estimated 50,000 or more caribou in the area. The first river crossings were observed April 16. These increased progressively and a peak was reached on April 30 and May 1 and 2. A few stragglers were still



SOUTHCENTRAL ALASKA, UPPER SUSITNA RIVER
SCALE 1" = 20 MILES

FIGURE 1
Nelchina Calving Grounds and Routes Used to Reach Them in Spring, 1966.

Refer to Page 9A for the Legend

LEGEND FOR FIGURE 1


Movement from wintering areas to calving grounds


Calving grounds


Post-calving concentration

crossing the river as late as May 12. Caribou reached the calving grounds 125 airline miles west of the Chistochina River on May 14.

The route of migration was almost in a straight westerly direction from Chistochina to Fish Lake, Tyone Lake, Lone Butte, and then northwest to Clarence and Watana Lakes. The caribou migration split near Clarence Lake. The cows, calves, and yearlings continued on to Fog Creek where calving took place. The bulls and a few cows, calves, and yearlings turned north in the Clarence Creek area and crossed to the north side of the Susitna River. The male segment remained in the Watana-Deadman Creeks area until the cows and calves joined them in the latter part of June.

The Tazlina-Eureka herd moved west to the calving grounds by way of the Chickaloon River. They then proceeded north through the mountains on the east side of the Talkeetna River to Grebe Mountain where calving commenced. Both herds reached the calving grounds at about the same time and were separated only by about 10 miles when the peak of calving occurred.

On May 27, one day after the peak of calving occurred, lead animals from the two groups joined three miles west of Watana Mountain. On June 14 the entire herd had moved south and was concentrated along Tsitsi and Kosina Creeks. At this time I believe these two drainages contained almost the entire cow-calf segment of the Nelchina herd. Extensive flying failed to reveal any other post-calving segment. Similar post-calving concentrations have been noted by Skoog (1964), although no past observations of the above magnitude have been recorded for the Nelchina herd. An attempt was made to census this area using a Bureau of Land Management aircraft equipped with suitable aerial photographic equipment. Unfortunately, a delay due to mechanical trouble prevented the census.

Summer, 1966

The post-calving segment remained along Tsitsi and Kosina Creeks for about one week, or until June 21, after which time this segment started north. After crossing the Susitna River, the adult females and calves joined the bulls in the Deadman-Nadiwen Lakes area.

On July 17, a concentration of animals which is thought to have been the entire Nelchina herd was observed north and south of Soule Lake. The herd was concentrated in an area about 12 miles long and $3\frac{1}{2}$ miles wide and was moving south towards Tsusena Butte. This is the first recorded instance where the Nelchina herd cows and calves joined the bulls before dispersing. At this time of year, the animals, particularly the adult bulls, are usually widely dispersed. The bulls do not generally join the cows and calves until September. This was also the last time animals were observed in large numbers through the summer.

Fall, 1966

An eastward and southward movement began in late September. Several thousand caribou were observed scattered south of the Denali Highway from Wells Creek to the McLaren River. By the first of October, large numbers of caribou were observed south of the Alphabet Hills and north of Tyone Lake. Animals were also seen as far east as Fish Lake and a few were killed by hunters in the Eureka area from October 15 to 25. A flight on October 24 revealed several thousand caribou along the east side of the Talkeetna River from Aspen Creek north to Prairie Creek. Many of the foregoing movements reversed themselves several times. Animals between the Alphabet Hills and Tyone Lake moved in a clockwise fashion. By the end of October, a northward and eastward migration was evident. At that time, animals extended from Butte Creek east to Dickey Lake. On October 30, caribou started crossing the Richardson Highway from the lower end of Paxson Lake to Sourdough.

Winter, 1966

On November 5, the migration came to a halt. At this time, animals were strung out from Monahan Flat east to the Chistochina River. During the remainder of November and December, the caribou separated into smaller herds. As of December 31, the Nelchina caribou herds were located in the following areas (Figure 2), with approximate numbers for each herd listed.

1. East Fork of the Susitna River to Valdez Creek - 8,000
2. Broad Pass - 15,000
3. Yanert Fork - 300
4. Tangle Lakes - 2,000
5. Mentasta-Wrangell Mountains, and Nabesna Valley - 35,000
6. Tyone Lake - 20,000
7. Eureka - 3,000
8. Stephan Lake - 15,000
9. Upper Talkeetna River - 5,000
10. Meiers Lake-Sourdough - 2,000

The caribou are still in the process of migration; it is not expected that they will settle until the end of January, 1967. Their present distribution is unusual and it is anticipated that they will winter in eight or more widely separated herds. The reason for the present herd dispersal is not known.

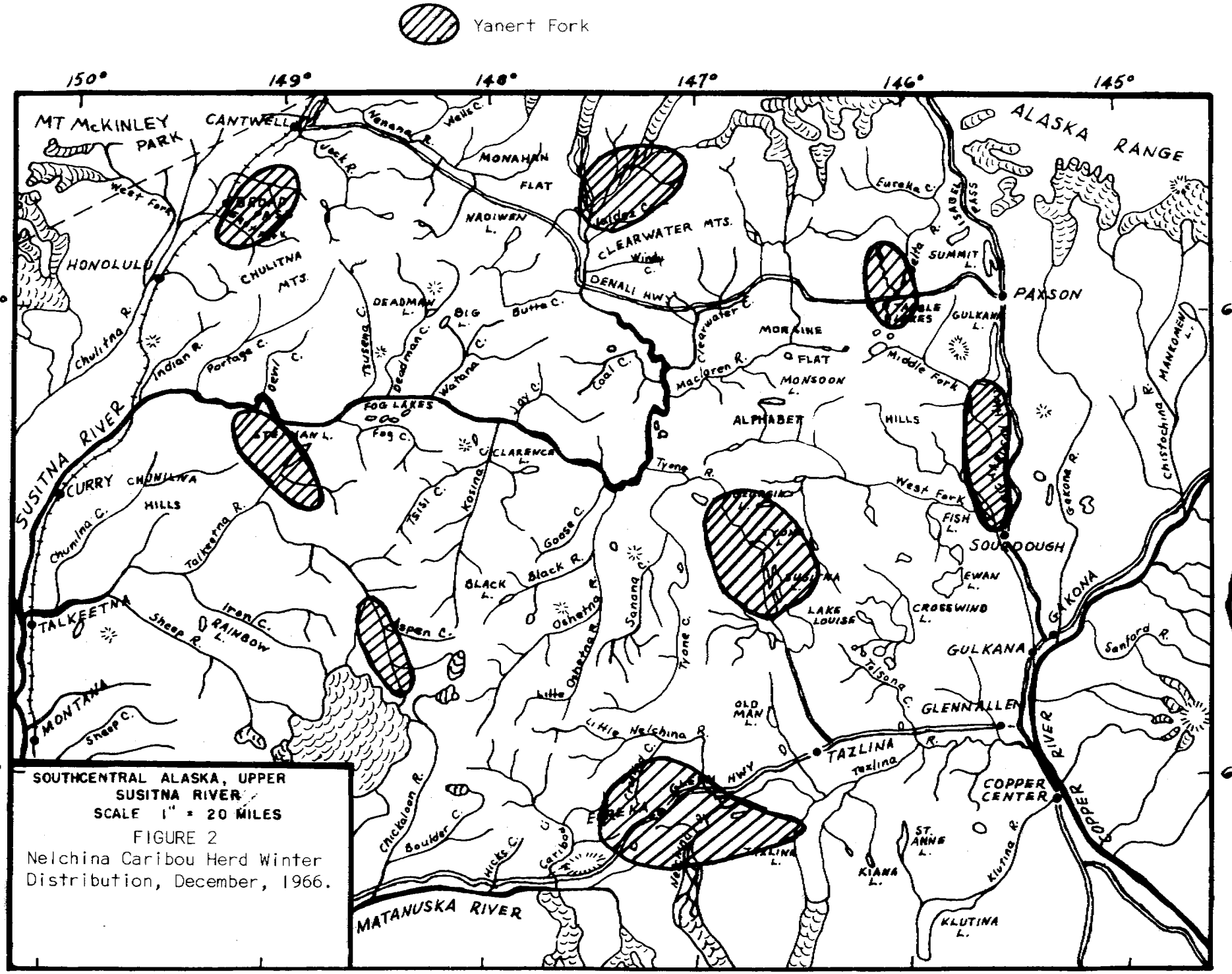


FIGURE 2
Nelchina Caribou Herd Winter Distribution, December, 1966.

Calving, 1966

A local bush pilot flying in the Clarence Lake area reported sighting a newborn caribou calf on May 14, 1966. R. O. Skoog (1964) reports the earliest sighting of a newborn calf was on May 9 although in most years the earliest sightings occur between May 12 and May 15.

Aerial and ground composition counts were made on the calving grounds May 25, 27, and 28. Adverse weather conditions prevented counts from being made on May 26. Adult females were classified according to whether or not they had hard antlers and were with or without calves. Nonpregnant cows usually shed their antlers before mid-May; pregnant cows retain their hard antlers usually up to the time of parturition and in most cases three or four days after parturition. This classification (antlered versus unantlered) serves only as an index to natality since these two groups are seldom equally represented on the main calving areas. The peak of calving (time when 50% of the pregnant females have given birth) is determined by counting in only those areas that contain a high percentage of pregnant animals. As would be expected, the calf:cow ratio showed a progressive increase on successive days. The ratios also indicate that the peak of calving occurred on May 26 (Table 2).

Counts from the two calving areas were combined (their respective locations were only 10 miles apart) since they were considered one calving ground. It is interesting to note that the two calving segments reached almost identical calving locations at about the same time, even though the distance traveled was less for the Eureka-Tazlina group (175 as compared to 85 airline miles). No difference in the progression of calving was evident between the two areas.

TABLE 2

RESULTS OF AERIAL CALF:COW COUNTS OF THE NELCHINA CARIBOU HERD

Date	Total Cows Counted	Parturient Cows	Non-Parturient Cows	Calves	Calves: Par. Cows	Calves: Total Cows
May 25	1,014	796	218	393	.48	.39
May 27	2,316	2,120	196	1,172	.55	.51
May 28	658	596	69	362	.61	.55

Counts in the Fog Creek area were difficult because the animals were dispersed and the calving segment was mixed with other caribou. There is a tendency in counting mixed groups to count cows with calves and ignore bands of questionable composition. The helicopter proved to be advantageous in this situation since its low speed and maneuverability enabled the observer to efficiently count in bands of mixed composition. For this reason, it is felt

that classification counts made from a helicopter are very accurate. Composition counts on the Grebe Mountain group were made under ideal conditions since the parturient segment was conspicuous. The animals were moving in one direction, at a uniform speed (calculated to be about .4 mile per hour), and were easily recognized in the treeless snow covered areas.

Mortality

Hunter Harvest

The total caribou harvest for calendar year 1966 is estimated to be 4,800 animals including 650 taken by guided and fly-in hunters. This is the lowest kill on record for the past three years and reflects the general inaccessibility of caribou during the hunting season.

The 1965-1966 caribou hunting season closed on March 31. Caribou that wintered in the Tazlina-Eureka area provided excellent hunting during the first three months of 1966. Very little hunting was done in the Wrangell-Mentasta Mountains as the animals remained inaccessible to the foot hunter. A few hunters were taking caribou in the Nabesna Valley with the use of snow machines. The use of snow machines for caribou hunting increased over the previous year and undoubtedly effected a harvest that otherwise would not have been made. The estimated harvest from January 1 through March 31, 1966 is 900 animals. The harvest during the winter to an unknown extent consists of subsistence hunting. These subsistence hunters are usually residents of the Copper River Valley and surrounding area.

When the season opened August 10, 1966 caribou were not available to road hunters. Fly-in hunters were having good success. Ninety-two caribou were checked through the Denali Hunter Check Station in August. In September the kill increased steadily with 411 caribou counted through the check station. Caribou were scattered south of the Denali Highway between Deadman Lake and the Alphabet Hills by the end of September and during October. During the time the Denali Check Station was in operation, August 15 through October 10, 2,799 hunters harvested 857 caribou. The 1966 kill for this period is down 44% from the previous two years average.

The first major highway crossing occurred on October 30. The Nelchina caribou herd started crossing the Richardson Highway from the lower end of Paxson Lake to Sourdough. Caribou were available along the Denali Highway until it was closed due to snow on November 8. Hunting pressure in the Paxson-Sourdough area was heavy through the weekend of November 5 and 6. Paxson and Sourdough Lodges were filled to capacity by the evening of November 5. The owners of Paxson Lodge commented that their business during this time was the best in seven years, including business on Labor Day and 4th of July weekends. On November 6, I flew the Richardson Highway from Paxson to Hogan Hill in order to survey hunting pressure. Forty-two snow machines and 206 cars were counted along the 25 miles distance. An estimated 1,500 caribou were harvested from October 11 through December 31.

On November 5, caribou were crossing the Slana-Tok Highway from the Chistochina River east to Slana. Hunting activity in this area was light with approximately 400 animals taken. Caribou were available in the Eureka area about December 10; between this date and December 31 approximately 500 animals were taken. No animals were available along the Lake Louise Road during the entire season.

Natural Mortality

Blood sera from 63 Nelchina caribou were tested for brucellosis by the U. S. Department of Agriculture in 1966; of these, one sample, or 1.5% was found to be Brucella positive, compared to a brucellosis incidence of approximately 1% in 1965. The Nelchina herd in prior years is reported to have had a higher rate of Brucella infection, for instance, Skoog (1963) reports that 6% of 284 animals tested in 1962 had positive titers. In 1963 (Lentfer, 1965) the incidence of brucellosis was 4% of 342 animals tested. In 1964 (Lentfer op. cit.), the incidence of Brucella reactors had fallen to 1% of 232 animals, or near the current level of infection.

Surveys of the calving grounds revealed only one cow with calving difficulties. The animal was without calf and had retained afterbirth. Autopsy of this animal revealed that the fetal membrane was firmly attached to the cotyledons and was in an advanced stage of decay. When collected, the cow was in a weakened condition. I believe that death would have ensued as a result of the postpartum problem. Calf mortality due to birthing difficulties appears to be low; however, continued annual surveys of the calving grounds are planned to assess cow and calf health and survival in relation to disease and other environmental factors.

Population Structure

Table 3 shows the sex and age structure of Nelchina caribou as derived from study of caribou jaws collected at the Nelchina Check Station.

Of 849 caribou checked through the station, 71% were males and 29% were females. Skoog (1964) found males constituted 66% of the harvest over a 10 year period. As in the past, hunters show a bias toward male caribou. A comparison of sexes in the three to five and six to nine year age classes shows a proportion of 70♂:30♀. When possible, hunters will select a bull; however, during the rut and later in the season, this is not the case. During the winter months hunters are primarily interested in meat as opposed to trophy animals; therefore, at this time the sex and age structure of the harvest more nearly represents the true composition of the herd. The composition of the herd as determined by counts in the fall of 1962 was 42% male and 58% female.

TABLE 3

SEX AND AGE STRUCTURE OF HUNTER-KILLED CARIBOU CHECKED THROUGH THE NELCHINA CHECKING STATION IN 1966

Age Class	Male		Female		Total Sex Unknown		Total Sex Known & Unk.	
	No.	%	No.	%	No.	%	No.	%
Juvenile:								
Calf	4	1.7	4	1.7	8	3.3	23	7.0
1 Yr.	16	6.7	8	3.3	24	10.0	41	12.4
2 Yrs.	10	4.1	1	0.4	11	4.6	19	5.7
Total	30	12.5	13	5.4	43	17.9	83	25.1
Prime:								
3-5 Yrs.	94	39.0	40	16.6	134	55.6	167	50.5
Mature:								
6-9 Yrs.	35	14.5	15	6.2	50	20.7	64	19.3
Old:								
10+ Yrs.	8	3.3	6	2.5	14	5.8	17	5.1
GRAND TOTAL	167	69.3	74	30.7	241	100.0	331	100.0

Analysis of Range

The first permanent range plots (fenced and unfenced) which were established in 1955 and 1956 were reread. In general, no visual difference could be detected between the fenced and the unfenced plots. Quantitative comparisons of all collected data will be postponed until there is an increase in work plan personnel or until the plots can be analyzed by a range ecologist. If a significant difference is detected between the fenced and the unfenced plots by ocular estimate or actual measurement, it will be difficult or impossible to attribute the change to caribou or other animal use. Differences, if any, between fenced and unfenced plots may be due to micro climate changes caused by the fence rather than animal use. The plots should, however, provide clues to trends of successional changes and conditions on portions of the Nelchina range and give experience which may be applied to future range studies. Photographs were retaken in August, 1966 at each of the established photo points for comparison with the original photos.

All 38 of the Nelchina range exclosures were checked in order that repairs could be made as required. Thirty-one were found to be in good condition and seven required repairs. Four of the seven exclosures were damaged by moose and damage to the remainder was attributed to frost heave. While such damage is unavoidable, it points out the need for frequent exclosure observation and maintenance.

Monthly reconnaissance flights have been continued through the past year. Such flights are necessary in order to derive the greatest benefit from the range work being done. Flights of this type are used to determine caribou utilization of the Nelchina range through the year, recording for specific areas the animal density and the duration of use. Interpretation of data and weight given to the above factors may have a considerable influence on the resulting vegetational comparison.

Snow Machine - Caribou Relationship

The following is a summary of observations made by Department personnel, recording the behavior of caribou when hunted by snow machines.

1. In most cases, snow and terrain conditions limit snow machine activity to a relatively small area. In areas where snow and terrain were not limiting, hunters did not become concentrated enough to influence caribou movements.

2. Caribou were not alarmed by the sound of a snow machine even at very close ranges (as close as 20 yards).

3. Caribou let a snow machine pass as close as 75 yards if it did not head directly at them.

4. Caribou usually moved away from a machine heading directly at them at 200 yards but did not actually run away until it was within 75 yards.

5. Caribou permitted a pursuing machine to get within 25 to 30 yards without breaking into a gallop.

6. Caribou resumed their previous activity immediately after being chased.

7. Caribou passed close to an idling machine without noticing it.

8. Heavy concentrations of very mobile hunters (probably averaging 5 to 10 hunters per square mile) made possible by snow machines, reduced the number of caribou in the immediate area.

9. Caribou in areas adjacent to a heavy concentration of snow machine hunters were not affected.

10. The caribou kill was increased by the use of snow machines in all areas observed.

11. Most hunters left their machines 400 to 500 yards from the caribou and stalked on foot. (This probably was not the case on the lakes in the Sourdough-Paxson area in November; however, recent publicity has been such that hunters have been watching each other for herding and shooting violations.)

The above observations were made during November and December. Most of the information was gathered from the following areas: Paxson to Sourdough on the Richardson Highway, Mile 12 to 17 on the Denali Highway, and along the Glenn Highway in the Eureka area. Those observations on the Denali and Richardson Highways permitted the observer to record the behavior of a migrating caribou herd as compared to sedentary animals on winter range in the Eureka area.

Steese-Fortymile Herd

Distribution and Movement

During the winter of 1965-66 the Steese-Fortymile caribou herd wintered north of the Steese Highway, and in a belt 30 to 60 miles wide along the Tanana River from the Salcha River to the Ladue River in Canada. During March and April, the animals north and west of the Steese Highway crossed the highway near Circle Hot Springs and moved south-southeast into the headwaters of the Healy River, Goodpaster River, and Middle Fork of the Fortymile River. Here they joined the animals which had converged on the area from hills bordering the Tanana drainage.

Calving took place during late May and early June on the foothills of Mt. Harper at the heads of the Goodpaster, Healy and Middle Fork Rivers. In early June, bulls and yearlings were interspersed in the herd, which consisted of bands of several thousand each. Scattered small bands were also present adjacent to the main concentration.

Starting in early June, the caribou moved north and east from Mt. Harper and moved counterclockwise through the Middle Fork of the Fortymile River, Charley River, and Salcha River. By early July, they were moving southeast between Lost Creek and the "Splits" on the Salcha drainage. In mid-July, animals had reached Mt. Harper. By late July the herd had moved northeast to the Seventymile River.

Information from lodge owners, hunters, and highway maintenance crews indicated that portions of the herd (probably 5,000 to 10,000 animals) crossed the highway from August 5 through August 10 between Mile 100 and 145 heading southeast into the lower Fortymile and upper Sixtymile drainages. The animals returned west, recrossed the Taylor Highway between Mile 70 and 145 in late August and early September and joined animals which were moving west. This westward movement proceeded through the Charley River.

In early October, animals in bands of usually less than 100 assembled in a front 15 to 30 miles wide and 50 to 70 miles long and proceeded southeast past Mt. Harper, across the head of the Healy River and the Middle Fork of the Fortymile River. The movement continued from the Middle Fork southeast through the Mosquito Fork and West Fork of the Dennison River. Animals began crossing the Taylor Highway in the steep, heavily wooded area between Miles 39 and 41 on October 20. The crossing soon spread and by October 25 animals were crossing from Mile 22 to Mile 55.

Mortality

An estimated 1,900 caribou were killed on the Steese and Taylor Highways in 1966. The kill is 40% greater than in 1965, and about six times greater than the 1963 and 1964 harvest average. The sex and age structure of the Fortymile caribou harvest is shown in Table 4.

TABLE 4

SEX AND AGE STRUCTURE OF A SAMPLE OF THE STEESE-FORTYMILE CARIBOU HARVEST, 1966

Age Class	Male	Female	Sex Unk.	Total No.	Total %
Juvenile:					
Calf to 2 Yrs.	8	7	3	18	26
Prime:					
3-5 Yrs.	23	14	5	42	62
Mature:					
6-9 Yrs.		2		2	3
Old:					
10+ Yrs.	4	2		6	9
TOTAL	35 (51%)	25 (37%)	8 (12%)	68	(100%)

Range

During the summer of 1966 three major fires occurred north of the Tanana River and east of the Taylor Highway. These three fires as shown in Figure 3 destroyed approximately 729,000 acres. The largest burn, comprising some 500,000 acres started in Canada and moved west across the U.S.-Canada border. This area is generally hilly and low-lying with extensive lichen cover. The wider river bottoms have stands of white spruce, the hillsides have scattered black spruce, and the hilltops are treeless with brush and heath vegetation. The fire advanced on a broad front burning an estimated 90% of the vegetation within its perimeter.

Alaska Peninsula Herd

During the last half of April, a State game biologist contacted people in various communities on the Alaska Peninsula to assess the 1965-66 caribou harvest. People were asked questions related to the availability and abundance of caribou and the numbers of animals harvested.

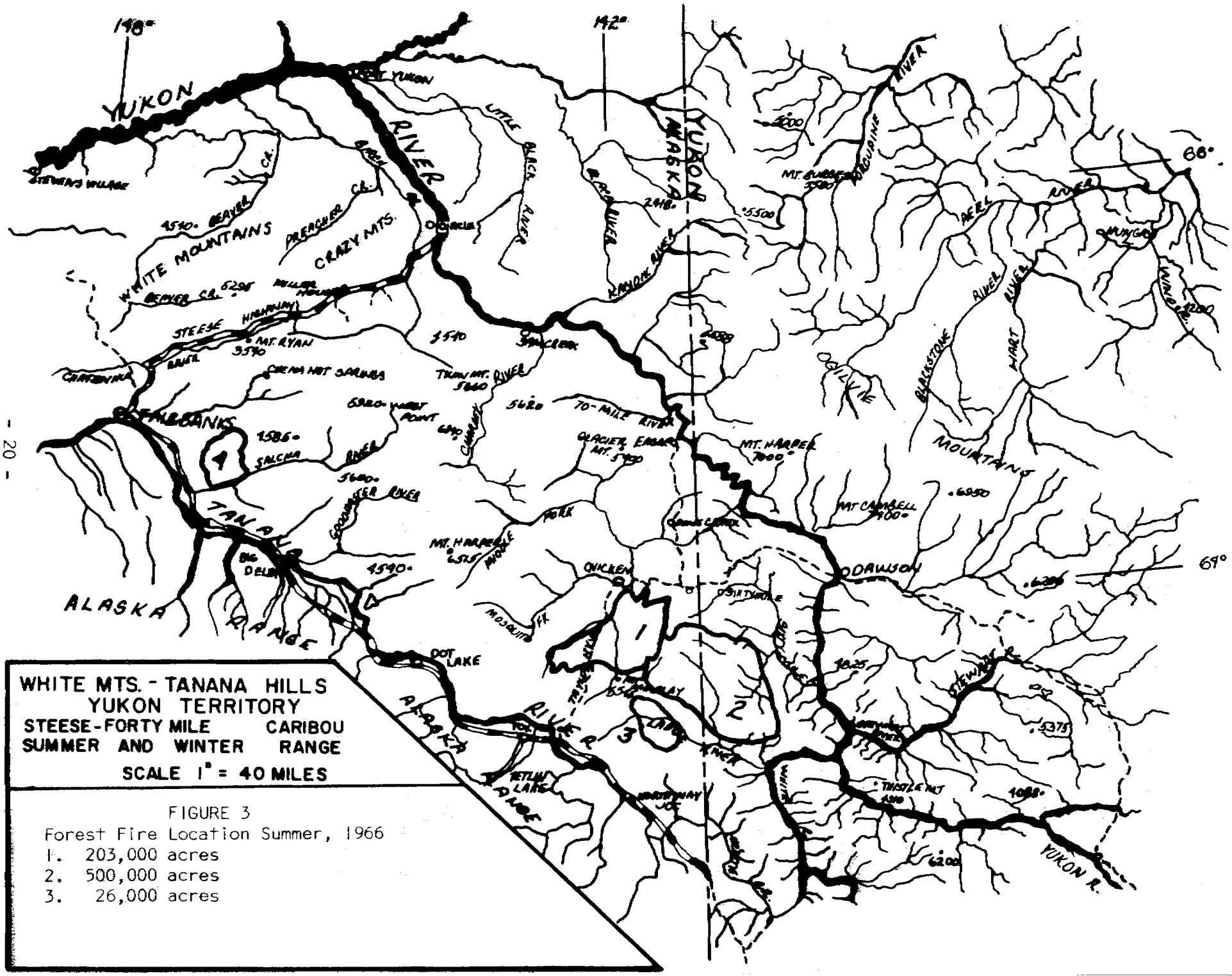


FIGURE 3

Forest Fire Location Summer, 1966

1. 203,000 acres
2. 500,000 acres
3. 26,000 acres

The resident kill for the Peninsula herd is estimated to be 300 animals and represents an increase of 30% over the 1964-65 resident kill. All individuals who were contacted reported the caribou to be in good condition. Two collections of caribou for radiation analysis in March and November also revealed the animals were in good condition. In addition to the local resident kill, an estimated 175 animals were taken by guided and unguided fly-in hunters.

Reports on distribution and movements of the Alaska Peninsula herd were gathered from bush pilots, native hunters, and State game personnel working on the Peninsula. Residents of Naknek estimated 5,000 caribou wintered between Naknek and Egegik, and an additional 5,000 wintered in the Becharof Lake during 1965-66.

During the March 30-31 collection of caribou for radiation analysis, about 2,000 animals were observed along the west shore of Upper Ugashik Lake and another 1,000 were located in the foothills to the north of Becharof Lake. Occasional small bands were present at least as far south as Sandy River. The station manager at Port Heiden airfield reported caribou moved south past Port Heiden towards the calving grounds in February, although the usual spring movement begins in April. Residents of Meshik at Port Heiden reported 2,500 caribou migrating past their village in March. These observations indicate movement towards the calving grounds. During an April 19-23 field trip, 93 observations were made totaling 1,701 caribou. The caribou were scattered in small bands between the Cinder River and Port Moller. Little migratory movement was evident since the animals had moved onto the calving areas. The main calving areas extend between Port Heiden and Port Moller from the Bering Sea coast inland about 15 miles (Skoog, 1964). Observations made in November revealed the caribou were again located north of the Egegik River on their normal winter range.

Adak Herd

Distribution and Movements

Caribou on Adak Island continue to extend their range. Caribou tracks and sightings have now been observed near Shagak and Finger Bay. Both areas are connected by road with the U. S. Naval Base.

During the past winter caribou have been utilizing both Cape Yakak and the Caribou Peninsula (Figure 4). In mid-December animals that were using the Caribou Peninsula moved to Cape Yakak. This area received less snow cover than other parts of the island.

During the summer the animals disperse over the southern half of the island. In general, the bulls are separated from the cows and calves. The largest group observed in August contained 26 cows and calves and two bulls.

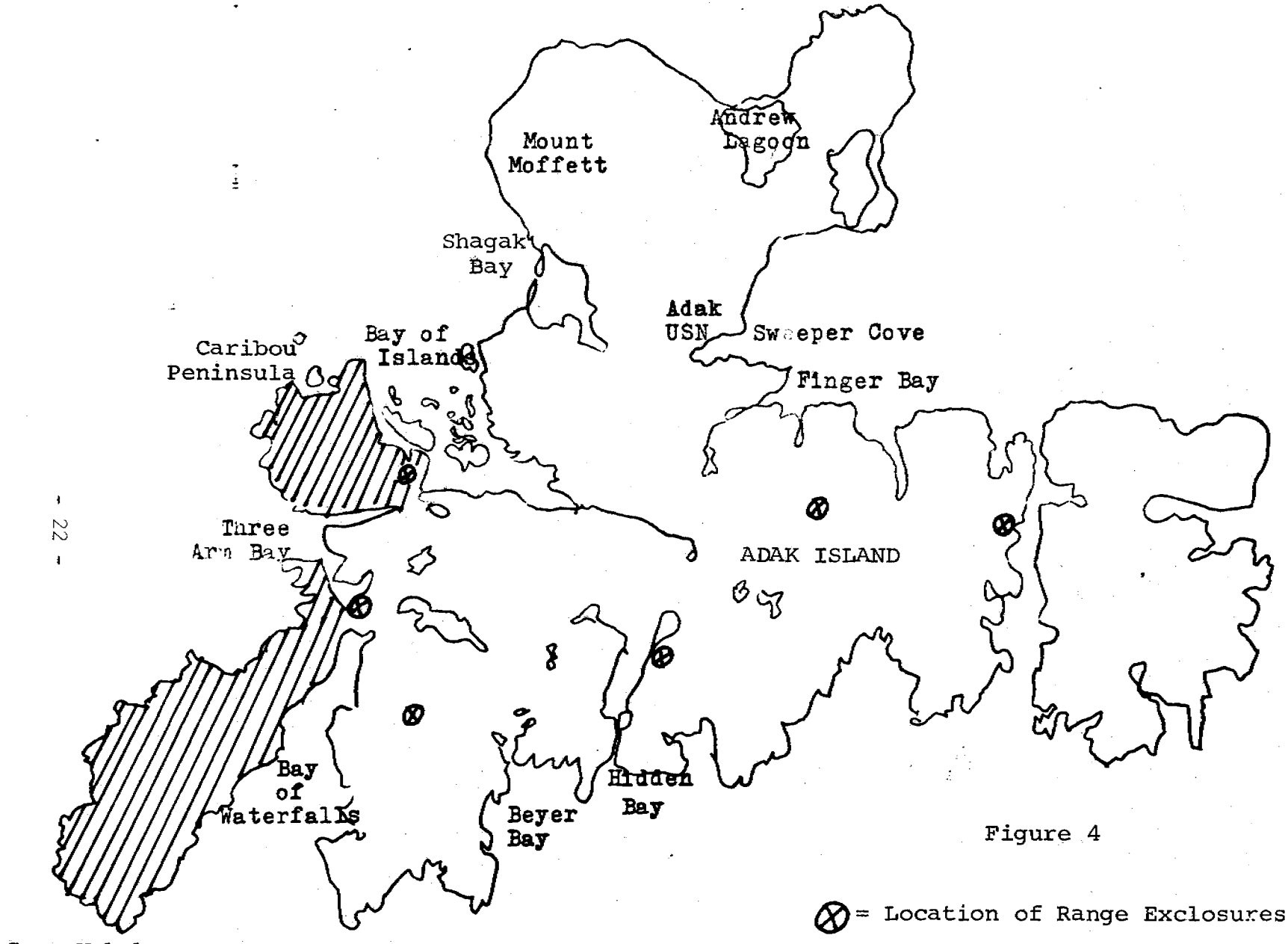

Mount Moffett
Andrew Lagoon
Shagak Bay
Adak USN
Sweeper Cove
Finger Bay
Caribou Peninsula
Bay of Islands
Three Arm Bay
ADAK ISLAND
Bay of Waterfalls
Beyer Bay
Hidden Bay
Cape Yakak
= Location of Range Exclosures
= Caribou Winter Range

Figure 4

Productivity

Two aerial counts by Navy personnel using a helicopter were made in June, 1966 and January, 1967. The first count was 157 and the second, 126 animals. This discrepancy can be explained by the total known mortality of 20 animals in the period between the counts. It is likely that the remaining 11 animals were actually missed or represent animals which were counted twice.

Two composition counts on Adak gave information on productivity. Both counts were made in the area north of Beyer and Hidden Bays. The figure for the first count was obtained through correspondence with Dr. David R. Klein (Unit Leader, University of Alaska). This count was made from the ground on June 25; it is not known what method was used to identify cows from juvenile males. I made an aerial count on August 22, the results are listed below.

	June 25	August 22
Cows	73	51
Calves	51	50
Bulls	5	10
Unknown Sex	0	19
TOTAL	129	130

It is assumed the same animals were tallied in both instances, since the animals were in the same general location, and the calves counted in both instances were about equal in number. Computations made on the basis of the June 25 count indicate 70% of the adult females were accompanied by calves. Skoog (1964) states the annual calf:cow percentages obtained over the years for other Alaskan caribou in mid-June, after the initial calf mortality has subsided, approximates 60% of cows two years and older. This percentage then would be lower in comparison to the Adak percentage where yearlings are included in the computation.

Assuming the sex ratio on Adak Island to be 50:50, the annual increment to the herd is 35%. The validity of the above two percentages (70% calf production and 35% annual increment) checks out when applied to total counts made on the herd since 1962. Thirty-six animals were censused in January, 1962, 87 in February, 1965 and 157 in June, 1966 after calving.

Autopsy data from hunter-killed animals suggest most yearling females breed. The percentage of pregnant yearlings which exist in other Alaskan herds can be inferred from small samples only; however, the pregnancy rate appears to be low. A lactating yearling (15 months old) was killed on Adak Island this year proving that some caribou calves are breeding at 5-6 months of age. The above information gives weight to the calculated annual population increment of 35%.

Mortality

Caribou hunting progressed slowly on Adak, though the either-sex hunt in conjunction with the extended season (August 10 through December 31) did increase the caribou harvest. Fifteen animals (10 females and 5 males) or one-half the desired kill was obtained. In addition, two animals (one male and one female) were collected for scientific purposes by the University of Alaska, two animals (one male and one sex unknown) died as a result of entangling their antlers in World War II communications wire, and one animal died of unknown causes.

Of the 15 harvested by sport hunters, two were killed by hunters walking out from the U. S. Navy Base and the remainder were taken by persons using private boats as transportation to the hunting area. Caribou harvested, including animals killed as late in the season as December, were fat and in excellent condition.

Through the cooperation of hunters and U. S. Navy personnel, five caribou blood samples from the herd were tested in 1966 for brucellosis. All animals were found to be negative reactors. Futher collection of blood from hunter-killed animals is planned for 1967 in order to continue testing for the presence of brucellosis.

A decomposed caribou carcass, estimated to have been dead several months and bearing the ear tag Number C-119 was found on Adak. The Refuge Manager, Bob Jones, of the Aleutian Island National Wildlife Refuge stated that C-119 was a cow from the original 1958 transplant. The jaw is therefore from an eight-year-old animal since the caribou were transplanted as calves. By our present aging method (tooth replacement and wear), it would have been aged as a four-year-old. This raises the question of whether our present method of aging is in error or whether tooth wear on Adak differs from other Alaskan caribou herds. There is some evidence to indicate the latter to be the case. Next year we will check current aging techniques with the sectioning method in order to count annuli in the cementum.

Analysis of Range

All documented range work was completed on Adak Island in August. Transportation of men and equipment to and from the study area (Figure 4) was provided by a U. S. Navy helicopter.

Permanent study quadrats were established inside and outside of each exclosure. The vegetation in each quadrat was analyzed by the modified Hult-Sernander method used by Dr. Herbert C. Hansen (Job Completion Report W-3-R-12, Job 6, June 30, 1958). Slight deviation from the above method was employed and will be described in a future report. Line intersects were established near several of the exclosures in order that adjacent plant communities might be described. Permanent photographic points were staked immediately outside of each quadrat and photographs were taken in both color and black and white. A complete plant collection was made of species present on Adak Island. Lichens collected will be sent to the University of Wisconsin for positive identification. All raw data and a duplicate plant collection are filed in the Anchorage office. All photographic negatives have been sent to the Juneau office of the Division of Game for storage.

APPENDIX

CARIBOU REINTRODUCTION ON THE KENAI PENINSULA

TABLE OF CONTENTS

CARIBOU REINTRODUCTION ON THE KENAI PENINSULA

PERIOD COVERED: April 24 to May 2, 1965 and April 22 to 30, 1966

ABSTRACT

1. Two caribou transplants were made from the Nelchina area to the Kenai Peninsula. On May 2, 1965, 12 females and three males were released on the Pipeline Airstrip adjacent to the Chickaloon River (Table 1). These animals were transported from Gulkana airport via a C-130 cargo plane furnished by the Alaska Air National Guard.

2. The initial transplant was bolstered by a second release of 26 females and three males in late April, 1966 (Table 2). The Department chartered a C-46 aircraft for the second transplant. Animals from the 1966 capture were released at the recreational area on Watson Lake near Sterling. After landing at Soldotna airport the caribou were trucked to the Watson Lake release site.

3. All caribou were captured near Chistochina, east of the Copper River. A Hiller 12-E helicopter was used to locate and pursue the caribou which were shot with cap-chur darts utilizing succinylcholine chloride (trade name--Anectine or Sucrostrin) as the immobilizing drug. Tranvet (propiopromazine hydrochloride) was used for tranquilizing after capture, during handling and shipment.

4. The 1966 transplant was completed with only minor difficulties aside from air transport delays. Accumulated experience and improved techniques were quite evident on the second transplant. During the 1966 transplant, 2.4 times as many caribou were captured and released as compared with the achievement in 1965.

RECOMMENDATIONS

1. If additional transplants are to be made it is imperative that the caribou be held as short a time as possible to improve the survival rate of the captured animals. A delay such as occurred in the 1966 transplant when the commercial air carrier was about four hours late due to conflicting commitments should be avoided in the future, possibly through use of reserve aircraft.

2. A veterinarian should be in attendance during the holding and transporting of caribou in future transplant operations. The presence of a veterinarian by virtue of his specialized knowledge and experience will insure improved care and handling of the caribou at little or no added cost.

TABLE 1 KENAI CARIBOU TRANSPLANT - May 2, 1965

Caribou Captured Chistochina Area
Released Pipeline Strip Adjacent to the Chickaloon River

	Ear Tag Number					
	Right Ear	Left Ear	Sex	Estimated Age	Condition At Release	Remarks
1)	2380	2381	female	adult	fair	pregnant
2)	2384	2385	male	2 years	good	
3)	2377	2376	female	last year calf	good	green plastic in left ear
4)	1176	none	male	adult	fair to good	
5)	2400	none	female	2 years	good	
6)	2396	2398	female	adult	fair to good	
7)	2392	2393	male	adult	poor to fair	large bull
8)	2339	none	female	adult	good	pregnant, orange plastic left ear
9)	1178	none	female	adult	fair	probably pregnant
10)	2386	2387	female	2 years	fair	probably not pregnant
11)	2390	2391	female	adult	good	pregnant
12)	1179	none	female	adult	fair to good	red paint on rump, pregnant
13)	1177	none	female	adult	good	pregnant
14)	1180	none	female	adult	fair to good	pregnant
15)	2399	none	female	2 years	good	not pregnant

Total: Twelve females and three males

TABLE 2 KENAI CARIBOU TRANSPLANT, APRIL 24 - 28, 1966

Caribou Captured Chistochina Area - Released at Recreation Area on Watson Lake Near Sterling

	Tag Number	Age	Sex	Antler Condition	Date Captured	Remarks
1)	4101 left ear	Adult	Female	Antlered	4/24/66	Pregnant
2)	4102 left ear	Adult	Female	Antlered	4/24/66	Pregnant
3)	4103 left ear	Adult	Female	Antlered	4/24/66	Pregnant
4)	4104 left ear	Adult	Female	Antlered	4/24/66	Pregnant
5)	4105 left ear	Calf	Female	Antlerless	4/24/66	(11 months)
6)	4106 left ear	Adult	Female	Antlered	4/24/66	Preg.-Died at release site
7)	4107 left ear	Adult	Female	Antlered	4/24/66	Pregnant
8)	4108 left ear	Adult	Female	Antlered	4/24/66	Pregnant
9)	4109 left ear	Adult	Female	Antlered	4/24/66	Preg. Died at Gulakna before shipping
10)	4110 left ear	Adult	Female	Antlered	4/24/66	Pregnant
11)	4111 left ear	Yearling	Male	Antlered	4/24/66	(Long yearling) 23 months
12)	4112 left ear	Adult	Female	Antlered	4/25/66	Pregnant
13)	4113 right ear	Yearling	Female	Shed	4/25/66	(Long yearling)
14)	4114 left ear	Yearling	Female	Shed	4/25/66	(Long yearling)
15)	4115 left ear	Calf	Female	Antlerless	4/25/66	
16)	4116 left ear	Calf	Female	Antlerless	4/25/66	

These animals were released on 4/26/66.

TABLE 2 Continued

	Tag Number	Age	Sex	Antler Condition	Date Captured	Remarks
17)	4117 left ear	Adult	Female	Antlerless	4/26/66	
18)	4118 left ear	Adult	Female	Antlerless	4/26/66	Escaped at Chistochina
19)	4119 left ear	Calf	Female	Antlerless	4/27/66	
20)	4120 left ear	Adult	Female	Antlerless	4/27/66	
21)	4121 left ear	Calf	Male	Rt. Antler only	4/27/66	Died at Gulkana
22)	4123 left ear	Yearling	Female	Antlerless	4/27/66	
23)	4126 left ear	Adult	Male	Antlerless	4/27/66	Large animal
24)	4127 left ear	Adult	Female	Antlered	4/27/66	Pregnant
25)	4128 left ear	Calf	Male	Rt. Antler only	4/27/66	
26)	4129 left ear	Calf	Female	Antlerless	4/27/66	
27)	4130 left ear	Yearling	Female	Antlerless	4/27/66	
28)	4131 left ear	Adult	Female	Antlered	4/27/66	Died at release site
29)	4133 left ear	Yearling	Female	Antlered	4/28/66	
30)	4134 left ear	Yearling	Female	Antlerless	4/28/66	
31)	4135 left ear	Adult	Female	Antlered	4/28/66	Pregnant
32)	4136 left ear	Yearling	Female	Antlerless	4/28/66	
33)	4137 left ear	Adult	Female	Antlerless	4/28/66	
34)	4138 left ear	Calf	Male	Antlered	4/28/66	Died at Gulkana
35)	4139 left ear	Calf	Female	Left antler only	4/28/66	

This latter group released on 4/28/66

Total: Twenty-six females and three males

CARIBOU REINTRODUCTION ON THE KENAI PENINSULA

PERIOD COVERED: April 24 to May 2, 1965 and April 22 to 30, 1966

OBJECTIVES

To capture live caribou (Rangifer tarandus) from the Nelchina caribou herd in Southcentral Alaska, and to reintroduce them to the Kenai Peninsula, Alaska.

INVESTIGATIONS AND AGREEMENTS

Feasibility of Reintroduction

Caribou were present on the Kenai Peninsula prior to the late 19th century. Fires on the Kenai destroyed much of the vegetation during the 1890's and early 1900's. The last recorded caribou was taken on the Kenai Peninsula in 1910 (P-R Report, Vol. 7, 1952-53).

In 1953, the U. S. Fish and Wildlife Service (op. cit.) completed a report, "Investigations to determine practicability of re-establishing caribou on the Kenai Peninsula." Results of this study indicated three potential areas for reintroduction of caribou. These were the Mystery Creek-Chickaloon River area on the Kenai National Moose Range and U. S. Forest Service land, the Tustumena Lake-Skilak Lake area entirely on the Moose Range, and the Caribou Hills on both Moose Range and State land. In 1964, a State game biologist in cooperation with Refuge personnel reexamined these areas for final selection. The Mystery Creek-Chickaloon River area was favored to receive the transplant of caribou because it contained sufficient lichen winter range to support a small herd, and the area contained good hunter access in the event a huntable herd were established.

The feasibility studies for this activity, preparation of the biological reconnaissance report, and the initial 1965 stocking were conducted under Project W-11-D-2, according to plan. The 1966 bolster-type release was later deemed advisable and made on an emergency basis; hence, State monies were used but for the short-time supervisory services of Federal Aid personnel.

Cooperative Agreement

In May, 1965 the State of Alaska, Department of Fish and Game, entered into an agreement with the U. S. Bureau of Sport Fisheries and Wildlife. Briefly the principal parts of this agreement are:

1. To reintroduce adult or subadult caribou on the Kenai Moose Range National Wildlife Refuge in the general area between Chickaloon River and Mystery Creek north of the Sterling Highway.

2. All animals planted shall be tested for brucellosis and only clean animals to be utilized.

3. The actual stocking project will be accomplished by the Alaska Department of Fish and Game.

4. Regional Supervisors for the Department and the Refuge Supervisors in Alaska for the Bureau will mutually determine when there is a harvestable surplus and further mutually agree upon and prepare regulations to harvest such surplus in accordance with Federal Aid Regulations and other State and Federal statutory requirements.

TECHNIQUES AND ACCOMPLISHMENTS

Capture and Release

Problems in an operation of this kind are many. Considerable time was spent in advance planning to insure success. It was decided to capture animals from the Nelchina caribou herd in the spring. Advanced reconnaissance flights indicated the caribou would cross the Slana-Tok Highway near Chistochina on their annual migration to traditional calving grounds. The chronology of movement in both 1965 and 1966 was similar. Movements from the wintering grounds in the Mentasta-Wrangell Mountains area were somewhat behind those of 1965. Caribou did not reach the Copper River in numbers until April 20, 1966.

Several days were spent collecting the necessary drugs, capture equipment and supplies, and arranging for personnel, vehicles, and aircraft. Three days were devoted to working on techniques for taking caribou from a helicopter with a cap-chur gun. A special harness had to be developed and tested for slinging and transporting the caribou by helicopter. Holding pens were constructed at Chistochina Lodge using standing trees and snow fencing as material. Small pens measuring approximately 4 by 8 feet which provided room to hold one or two caribou were found to be the most desirable. Pens of this size restrict animal movements and thus reduce self-inflicted injury. It was found that in large pens caribou can run and jump under proper circumstances over a 7½ foot fence.

On April 26, 1966, 16 caribou were trucked to Gulkana where a commercial C-46 aircraft picked them up and made delivery to Soldotna. A team headed by a State game biologist handled the release at Kenai. A second shipment of 18 animals was made on April 28. Due to the late arrival of the transporting aircraft, several of the animals required extra drugs for restraint; others showed obvious symptoms of distress from the prolonged delay.

Thirty-four caribou were captured and held at Chistochina and 29 live animals were released on the Kenai Peninsula. The 29 released consisted of 13 adult females, seven yearling females, six calf females, one calf male, one yearling male and one adult male. Two of the five animals which died were males, hence we were possibly short of the desired number of males. The animals were in much better condition than those released in 1965. Eleven of the adult females were thought to be pregnant.

Prior to handling the animals for shipment, blood sera from all captured caribou were field tested by a U. S. Department of Agriculture veterinarian for Brucella sp. All samples were found to be negative at 1:25 titer. Additional sera samples were sent to the State-Federal Animal Disease Laboratory at Olympia, Washington for corroborative testing for brucellosis and anaplasmosis.

Immediately after the animals were brought in from the capturing area their antlers were removed and cattle-type ear tags were placed on their ears. The ear tag numbers were recorded along with date of capture, sex, age, whether the animal was an adult, yearling or calf, its antler condition, and other pertinent remarks (Tables 1 and 2).

Immobilizing and Tranquilizing

A Hiller 12-E helicopter was used to locate and pursue the caribou and this craft proved to be ideal as far as power and maneuverability was concerned. Caribou were shot with cap-chur darts using a carbon dioxide powered cap-chur gun. The distance from gun muzzle to animal varied from 25 to 50 feet and the rump was the point of aim. The immobilizing drug used was a solution of succinylcholine (trade names--Anectine or Sucrostrin). Succinylcholine chloride produces muscular immobilization or muscular paralysis by producing blockage of nervous transmission at the myoneural junction. The drug is rapidly hydrolyzed after injection accounting for the short (several minutes) duration of action and rapid recovery of normal muscle tone.

Dosages were found to be critical--the proper one being the amount of drug necessary to cause relaxation of skeletal muscles but not enough to bring about apnea. Animals of the same approximate age, sex, body weight and injected in the rump often exhibited varying responses. Some individual adult females showed relaxation of skeletal muscles without apnea when administered .6cc of 20 mg/cc solution succinylcholine chloride; other females of approximately the same weight were immobilized more rapidly and suffered respiratory depression. Since the drug is rapidly hydrolyzed, artificial respiratory exchange was frequently successful in saving the animals.

The following dosages of succinylcholine chloride were found effective for the sex and age classes indicated:

Weight of Succinylcholine Chloride	Dose	Sex	Age
12 mg	.6 cc (20mg/cc)	♀	Adult
10 mg	.5 cc (" ")	♀	Yearling (23 months)
8 mg	.4 cc (" ")	♀	Calf (11 months)
8 to 10 mg	.4 to .5 cc (" ")	♂	Adult
8 mg	.4 cc (" ")	♂	Yearling (23 months)
less than 8 mg	less than .4 cc (" ")	♂	Calf (11 months)

As indicated above, males are more susceptible to the drug than females.

Succinylcholine chloride solutions should be fresh and stored under refrigeration. Perhaps the best field technique is to use the powdered form, making a new solution each day and discarding any left over. Powdered succinylcholine chloride should not be stored in a refrigerator.

Tranvet (propiopromazine hydrochloride) was used for tranquilizing after capture, during handling and shipment. Some apparently strong animals were administered (intramuscularly) Tranvet within three to five minutes after immobilization with succinylcholine chloride and at least three animals so treated died. It could not be determined whether Tranvet caused these deaths. Tranvet was successfully used when administered 15 to 20 minutes after recovery from the effects of succinylcholine chloride.

The following dosages of Tranvet were found effective for the age classes listed below and no difference in action was noted between the sexes.

Amount of Propiopromazine Hydrochloride	Effective Dose	Age	Est. Weight
125 mg	5 cc (25mg/cc)	Large adult male	300-400 lbs.
100 mg	4 cc (" ")	Adult	200+ lbs.
75 mg	3 cc (" ")	Yearling	110-150 lbs.
50 mg	2 cc (" ")	Calf	70-90 lbs.

These dosages resulted in "relative" tranquility for at least 12 hours; however, one adult female did not respond to a dose of 8 cc's of Tranvet.

Dosages range from 0.25 to 0.65 mg/lb. of body weight. The maximum recommended dosage for cattle tranquilization or for use as a pre-anesthetic is 0.5 mg/lb. Caribou are able to tolerate double the maximum recommended cattle dosage without observable ill effects.

Caribou Sightings

Numerous reports were received throughout the year from persons observing caribou on the Kenai Peninsula. The number of caribou observed has ranged from one to 25 and has been reported by reliable sources. The largest number sighted was during November when U. S. Forest Service personnel observed 20 caribou on East Creek, a tributary of Resurrection Creek on the Kenai Peninsula. The Refuge Manager, Kenai National Moose Range, counted nine caribou four miles east of Swan Lake on the Moose River Flats. He comments that the animals had been in the area throughout December. The area is of semiopen habitat with scattered black spruce.

Sightings of caribou after both transplants indicate some animals scattered over a large area. There is evidence to indicate that several of the animals moved off the Kenai Peninsula. It is not known if this behavior is a manifestation of homing instinct or a result of random dispersal. A few of these sightings are as follows:

June 7, 1966. A pilot reported sighting a caribou on the Palmer Duck Flats. The pilot observed that the animal was wet and theorized that it had just emerged from the water.

August 18, 1966. An engineer and a workman on the caboose of the Alaska Railroad train saw a single caribou near Eklutna Village about 35 miles northeast of Anchorage.

August, 1966. Two caribou sightings were made on Indian Creek southeast of Anchorage.

Conclusions

It appears that the transplant is a successful one and that the present stock is sufficient for a successful reintroduction on the Kenai Peninsula. Reports of caribou indicate a large portion of the animals from the two transplants have survived, reproduced and remained fairly close to the release site. The success of the transplant also demonstrates that late pregnancy caribou can be captured and transplanted with at least partial assurance of successful parturition.

Cost

Accurate cost figures are not available for the 1965 transplant. The following cost breakdown will pertain only to the 1966 transplant. A skeletal crew of eight persons including the helicopter pilot and mechanic was required at the capturing and holding area. The cost excluding salaries was

approximately $6,800. This figure does not include cost of personnel and equipment at the release site. The above figure includes $4,094 for 35.6 hours of helicopter charter, $240 for two-place aircraft charter, $1,400 for two charter trips with the C-46 transport aircraft, $800 for drugs and capturing equipment, and $266 for equipment rental. This represents a cost of $234 per caribou released. Cost per animal on the second transplant was undoubtedly much lower than on the first transplant because of increased efficiency attributable to the experience gained from the original transplant.

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