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JUNEAU, ALASKA

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CARIBOU INVESTIGATIONS

by

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Volume III
Annual Project Segment Report
Federal Aid in Wildlife Restoration Act
Project W-6-R-3, Work Plan C

The subject matter contained within these reports is often fragmentary in nature and the findings may not be conclusive; consequently, permission to publish the contents is withheld pending permission of the Department of Fish and Game.

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State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 1 Title: Statewide Caribou Distribution

PERIOD COVERED: May 1, 1961 to April 30, 1962

ABSTRACT

This year, from May 22 to June 5, 1961, an inventory was taken of the caribou occupying northeastern Alaska. This region encompasses about 75,000 square miles, bounded roughly by north 67 and 70 degrees latitudes and west 141 and 152 degrees longitudes. The census was accomplished by: 1) making aerial reconnaissance of 14 hours in a chartered Comanche to determine caribou distibution, movements, range conditions, and the main calving area being used, and using 2) two aircraft for 100 hours to delineate the calving grounds more precisely and to take counts of total animals, calves, and parturient cows.

Only one major calving area was being utilized at the time of the census. Only one herd, the Porcupine, was involved. A few thousand animals from the Arctic herd to the west had wintered in the western portion of this region, but had departed to the northwest early in May. The reconnaissance flights yielded an excellent description of the vegetation, topography, and past caribou movements. From these flights and from records of past observations, a movement pattern for this herd was described. The total population of the Porcupine herd was estimated at 110,000 animals.

RECOMMENDATIONS

None.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
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State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 1 Title: Statewide Caribou Distribution

PERIOD COVERED: May 1, 1961 to April 30, 1962

OBJECTIVES

To determine the distribution and relative abundance of caribou on a Statewide basis; and to classify these caribou according to herds and home range, and to assess the status of each.

TECHNIQUES

This year the inventory was confined to the caribou in northeastern Alaska. The survey covered that area north of the Arctic Circle lying to the east of approximately 152 degrees West longitude. It was initiated to complement the caribou work being done to the west by the Atomic Energy Commission's Cape Thompson project, to furnish a more complete set of data concerning the herds ranging arctic Alaska. The work was planned for the period May 18 through June 6, 1961. Ten days were considered adequate for the survey itself, but additional time was necessary to allow for unforeseen delays. As a major portion of the area to be examined included the Arctic Wildlife Range, administered by the U. S. Fish and Wildlife Service, that organization was invited to participate. Thus two crews were used: two Department employees, Jones and Skoog, flying a Champion "150" Challenger on ski-wheels, and two U. S. Fish and Wildlife Service employees, Burkholder and Watt, flying a Cessna 180 on ski-wheels. These aircraft work well together: the Cessna, because of its moderate speed, long range, and large carrying capacity, can reconnoiter the distant areas most efficiently and can haul the equipment and supplies needed for such a project; the Champion, because of its slower speed and greater maneuverability is needed for

landings at marginal sites for necessary ground work. The ski-wheel combination is an absolute necessity at that time of year, both as a safety measure and to facilitate the work. The airplanes should also be equipped with ADF (automatic radio direction finder) as a necessary safety aid, as the weather is generally poor and unpredictable.

The initial planning included choosing a base of operations, establishing a gas supply at various locations, providing for adequate safety measures, and assembling the supplies needed. Peters Lake was tentatively chosen as a base camp, because it is centrally located for flights east or west along the north slopes, where extensive calving activity seemed most probable. In view of the high cost of shipping aviation gas to the Arctic, it was decided to use only 2 supply depots: Peters Lake, 10 drums and 20 cases of gas; and Arctic Village, 4 drums. The latter supply was to be used only in case of unexpected flights along the south slopes. Case gas was to be shuttled from Peters Lake to various localities as needed. A Norseman was chartered to fly the gas to Arctic Village and a C46 to ferry gas and supplies to Peters Lake. Weather conditions, however, resulted in the latter load being dropped at Barter Island and that site became the main base camp. The Air Force was contacted to obtain permission to use the facilities of the DEW-line sites along the arctic coast whenever necessary. Both airplanes were to maintain radio contact with one another and/or with any radio facility station so that the general location of each plane was known at all times. Adequate maps, both World Aeronautical Charts and Geological Survey Quadrangles, and adequate survival gear, including food, sleeping bags, clothing, tents, and snowshoes, provided personnel with a good margin of safety and enabled them to carry out the project efficiently.

Reconnaissance flights out of Fairbanks and Fort Yukon were made on May 23 and 24 in a Piper Comanche--an economical, moderately fast, long range aircraft, well suited for this type of work. The main purpose of these flights was to trace major movements and concentrations to locate major calving areas, major migration routes or areas showing heavy usage by caribou, and to record a general description of the vegetation and terrain. The regular field notebook and a portable, battery-operated tape recorder were used to record this information.

After the calving areas had been located, they were examined intensively by the two crews with the small aircraft. The boundaries of each calving area were delineated as accurately as possible, and the area divided into segments readily identified by natural boundaries. The total number of caribou (calves excluded) in each segment was approximated by tallying as many caribou as possible by direct count. Many animals were missed, of course, so an estimate of these was necessary to complete the census. At the same time, an aerial composition count was made of calves, adults, velvet-antlered bulls (3 years old and older), and parturient cows (those with calves and/or hard antlers). Final figures thus included an approximation of the total caribou on the calving grounds and total parturient cows in the herd. The calf tally revealed the relative size of the calf crop and the approximate peak of calving. The remaining portion of the herd was estimated by using various sex-ratio and fertility data available from other work, with certain necessary assumptions. Census technique was developed specifically for this particular job and has been reported upon in a regional report. The survey as described provides current population status of a caribou herd as follows: 1) total numbers, 2) size of calf crop, 3) approximate peak of calving, 4) relative success of calving, and 5) relative size and survival of the previous year's calf crop. The reconnaissance flights also supplied valuable information regarding movement patterns and range conditions. The survey ended on June 5. All data obtained are on file at the Anchorage Game office of the Alaska Department of Fish and Game.

FINDINGS

The survey proved quite successful in spite of many unavoidable delays. A good general knowledge of northeastern Alaska's terrain and vegetation was obtained. Caribou distribution was determined fairly well, as were the areas of major caribou usage. We were able to cover the arctic region east of 152 degrees West longitude well enough to state that only one major calving area was used during 1961. We were also able to obtain good approximations of the total size of that herd, the calf crop, and the peak of calving. Ten days of flying the airplanes logged a total of about 100 hours, and the chartered Comanche logged an additional 14 hours. The total cost of the survey was approximately $2,500, excluding salaries and per diem.

The results obtained are summarized below.

Description of Area

The region examined during this survey approximates 75,000 square miles in area, bounded roughly by 67 degrees and 70 degrees North latitudes and 141 degrees and 152 degrees West longitudes. The Brooks Range lies in a west-southwest - east-northeast line across the center of this region and encompasses all or a part of the British, Davidson, Romanzof, Franklin, Philip Smith and Endicott Mountains. Major drainages to the north include the Kongakut, Jago, Hulahula, Canning, Sagavanirktok, and Colville Rivers; those to the south include the Coleen, Sheenjek, Chandalar, and Koyukuk Rivers. The flat arctic plain stretches southward from the Arctic Ocean - about 20 miles in the northeast, and about 80 miles in the northwest, to low, rolling foothills which rapidly change to steep, rugged mountains whose peaks reach to 9,000 feet. This rugged portion of the Brooks Range extends 60 to 75 miles to the south and then becomes a more rolling, foothill topography, which drops gradually to the flats adjacent to the Koyukuk and Yukon Rivers.

The dominant vegetation type of the region draining northward is the Sedge Meadow. The northern foothills and much of the arctic plain have extensive, seemingly pure, stands of the sedge tussock (Eriophorum vaginatum) which almost dominate the landscape. This is broken only by water, gravel bars, willow-lined drainage-ways, or a Dryas-Heath type. Dryas-Heath type is prevalent on the relatively few dry, well-drained sections. Dryas-Heath becomes more common southward, in the more rugged terrain, where it, Sedge Meadow, and Willow become the three major vegetation types, with Sedge still perhaps the most common. Above 4,000 feet the mountains seem to be mostly bare of vegetation, as viewed from the air. Good lichen stands were extremely scarce in all the area traversed, and in most cases were confined to the Dryas-Heath type. Poplar occurred along some of the streams, but such stands were not numerous nor extensive in area. No evidence of spruce was observed along the northern drainages.

In that portion draining southward, the dominant vegetation

type is the Spruce, which extends northward along the streams beyond 68 degrees North latitude to an elevation of between 2,000 and 2,500 feet. Sedge Meadow, Heath, and Dwarf Birch are common types, and White Birch-Poplar is dominant on the many burned areas to the south. North of about 68 degrees North latitude there appears to be little vegetation above 4,000 feet elevation. The area as a whole seems well drained, and lakes are not abundant. Excellent stands of lichen are present in several places along the Koyukuk and Chandalar Rivers, but not extensively. For the most part, lichens are not abundant, although much more common than to the north. The main portion of the Brooks Range is steep, rocky and mostly free of vegetation; big-game populations must exist primarily along and adjacent to the major stream valleys.

Caribou Distribution

On the basis of this survey it is evident that two major groups of caribou use the region under discussion. West of about 148 degrees West longitude the dominant group is that which ranges west to the Bering Sea and probably does not calve in this eastern section. East of 148 degrees West longitude the dominant group is the so-called Porcupine herd, which spends much of the year in Canada, ranging east as far as 136 degrees West longitude and south as far as 65 degrees North latitude.

West Arctic Herd(s)

Most of the caribou of the western arctic were to the west of the region surveyed on this trip, and apparently the bulk had also wintered to the west. Bush-pilot Andy Anderson told us that a group of about 8,000 caribou wintered in the Wiseman-Big Lake area during 1960-1961 and that they had moved north and west about the first of May. We confirmed these observations. Winter sign was noted near Squaw and Chandalar Lakes with one to three week old trails proceeding up the North Fork of the Chandalar River. Scattered groups of caribou bulls were sighted along the Dietrich River, northwest of Big Lake, and trails moved up that stream. Other non-calving groups were noted along the upper reaches of the North Fork of the Koyukuk River and along the upper Anaktuvuk River. Heavy trails were directed northward down the Itkillik River and westward from the upper Anaktuvuk. The Itkillik trails

were noted again farther to the north, as were a few other heavy trails directed northward along the middle portion of the Sagavanirktok River. These trails were picked up farther north and were noted to swing west across the Colville River. No caribou sign was noted in the Allen River-Wild Lake area, which lies directly west of the Wiseman wintering ground.

These observations indicate that perhaps 10,000 caribou wintered in the Wiseman-Big Lake - Chandalar Lake region, and that most of them moved north-westward in early May, out of the area now under discussion, leaving scattered groups of bulls and yearlings. No other caribou from the western group(s) were encountered, and all calving by such group(s) must have taken place to the west. During some years, large numbers of the western caribou may move into the region east of 152 degrees West longitude during fall and winter. Data regarding these caribou are being gathered by the Cape Thompson Project, under the direction of William Pruit and Peter Lent. Presumably all other observations of caribou made during this trip pertained to the Porcupine herd.

Porcupine Herd

Movement-Pattern--Caribou distribution and movements in and through the eastern Brooks Range seem confined mostly to the stream valleys, as evidenced by heavily used trails along many of the drainageways. One gains the impression that caribou spend only short periods in the main portion of the Range, most likely in summer during the fly season, and otherwise simply are moving to the more gently sloped mountains in the north or south. Evidence of extensive north-south movements, in the form of deeply cut trails, occur along every major northern drainage from the Sagavanirktok River to the Alaska-Yukon border, funneling into the upper portions of the Sagavanirktok, Canning, Hulahula, Kongakut, and Firth Rivers and onto the upper tributaries of the East Fork of the Chandalar River, the Sheenjek, Coleen and Old Crow Rivers. Heavy east-west trails are evident along the foothills edging the arctic plain, being most noticeable toward Canada. Other east-west trails were sighted along the East Fork of the Chandalar at the mouth of Cane Creek and near Old John Lake, along the Sheenjek River near Helmet Mountain and north of Sheenjek Lake, along the Coleen River south of Bear Mountain, and between the upper Sagavanirktok and Canning Rivers at Porcupine Lake.

Fresh sign of caribou was limited mostly to the east and north sections of the region, except for a few scattered groups of bulls just south of Old John Lake. Other groups were noted in the hills lying between the Coleen and Old Crow Rivers. These were stragglers of a larger group (perhaps 10,000 animals) that moved northward in early May from someplace south of Bilwaddy Creek to the Firth River. Most of them moved down the right bank of the Firth, but a few moved north to the Kongakut River. The vast majority of the Porcupine herd reached the arctic plain in mid-May via the British Mountains in Canada, along the Firth and Malcolm Rivers. Many crossed westward from the Malcolm to the Kongakut River and many swung west along the foothills just south of the plain. The calving groups proceeded westward as far as the Canning River, with very few moving farther. By June 1 the caribou were spread over the arctic slopes from the Canning to the Babbage Rivers, with many stragglers to the south. The boundaries of the main calving area were the Canning and Kongakut Rivers on the west and east, respectively, extending north to within 10-15 miles of the coast, and south to about the 2,000 foot contour level. Non-pregnant cows, yearlings, and bulls were most abundant to the east, but a few pregnant cows were east of the Kongakut. East of the Firth River were mostly yearlings and bulls.

The basis of the above observations enables one to piece together a hypothetical movement pattern for this herd. The main wintering grounds lie to the south, mostly in Canada, probably along the upper drainages of the Porcupine River. The East Fork of the Chandalar River, Sheenjek, and Coleen Rivers may be used at times also. The spring migration passes north, primarily along the Kongakut Rivers as it did this year. The post-calving movements bring the caribou into the mountains to the south where presumably they spend much of the summer. In the fall the herd swings southeast to the wintering grounds, with the rut probably taking place in Alaska. Segments of the herd will winter in different localities on occasion, as happens with other herds, so that one winter a large portion may remain in Alaska as well as another in Canada. Caribou from the west very possibly winter along the Chandalar River drainages from time to time, so there may be an intermingling during some winters.

Total Size--After the calving area was delineated,the next step in obtaining a total herd estimate was to determine the number of adults (older than calves) and the number of breeding cows (those with calves and/or hard antlers) within the area. The calving grounds approximated 2,500 square miles in area and presented a problem gaining adequate coverage. The area was divided into five segments according to drainages to facilitate the counts and these segments were listed from west to east as follows: 1) Canning River to Katakturak River, 2) Katakturak River to Hulahula River, 3) Hulahula River to Jago River, 4) Jago River to Aichilik River, and 5) Aichilik River to Kongakut River.

Each plane crew was assigned the task of counting the adults in one or more of these segments. The procedure was to fly back and forth in a systematic manner, tallying as many animals as possible. Obviously some animals were not included in the census, the number missed varying with the sighting conditions. In some areas as much as 60 per cent snow-cover remained, and a patchwork of snowdrifts across the ground proved to be an effective camouflage. The observers in each plane had no alternative to estimating the numbers missed, a rather subjective, difficult type of "censusing." This census resulted in 29,703 adults being tallied, with a final estimate of 60,000 for the calving area between the Canning and Kangakut Rivers.

Aerial composition counts were needed to obtain the number of breeding cows present and to obtain a calf-cow ratio. The Alaska Department of Fish and Game Champ was used for these counts because of its greater maneuverability slower speed and greater visibility. Counts were made in segments 1, 3 and 4 as listed above. Weather prevented us from getting a count in segment 2, an important calving area, so a limited compostion count of 181 animals, obtained by the U. S. Fish and Wildlife crew while flying the total census, provided the only data. I suspect the calf-cow ratio obtained (.29) is rather low. No count was made in segment 5 because of weather and time, but that was the least important for total numbers of calving animals; the calf-cow and cow-adult ratios probably compared closely with those of segment 4.

It is so assumed for the purpose of the computations presented below. A composition count total of 5,694 animals was obtained and segregated into calves, adults, and parturient cows. Table 1 lists the segments noted above and the counts and estimates obtained for each.

The results indicate an estimated 60,000 adults on the calving grounds, of which about 40,000 or 67 per cent were parturient cows. The remaining were yearlings, young bulls, and non-pregnant cows. Fertility data from the Nelchina herd productivity studies show that in that herd about 70 per cent of the cows one year and older actually became pregnant. That fertility rate probably could be applied to most caribou herds, although some variations probably occur. That rate will be used to compute the total cows (two years and older as of June 1, 1961) in the Porcupine herd, on the basis of the above estimate for parturient cows. If 40,000 represents 70 per cent of the total, then the total cow figure approximates 57,000. The bull-cow ratio in the Nelchina herd is about 65/100. This is a herd in which, during the past ten years of hunter harvests, the bull kill consistently has averaged 70 per cent of the total kill. It does not seem out of line to assume at least such a sex ratio in the Porcupine herd, which undoubtedly does not have such a biased bull kill. That sex ratio would indicate a total bull (two years and older) population approximating 37,000. The only segment remaining is the yearling age-class of both sexes. This varies from year to year, depending upon the calf crop the previous year and its survival through the winter. In the Nelchina herd, with a good calf crop and good survival, the yearlings constitute about 19 per cent of the total herd in early May. The large number of yearlings sighted on this survey indicated there was not a heavy mortality during the year, and I believe a 15 per cent figure would not be too high. Such a percentage totals about 16,000 yearlings. An estimated 57,000 cows, 37,000 bulls, and 16,000 yearlings result in a total population figure of 110,000. This probably is minimal, for I believe most of the census and computations are underestimated.

Peak of Calving--The peak of calving is the point at which 50 per cent of the pregnant cows have dropped their calves, assuming a normal distribution curve. The composition counts taken on this survey readily permit the computation of this calf-cow ratio and, although the data obtained, as shown

Table 1. Total and composition counts obtained on main calving area in northeastern Alaska, May 30 to June 2, 1961.

Date	Segment of Calving Area	Adults Tallied	Est. Total Adults	Composition Counts					Est. Total Parturient Cows	Cows* w/calves
				Calves	Adults	Breed. Cows	Calf/ Cow	Cow/ Adult		
5/30	Canning R. - Katakturak R.	12,238	20,000	1,068	1,661	1,565	.68	.94	18,800	12,784
5/30	Katakturak R. - Hulahula R.	3,300	10,000	30	151	103	.29	.68	6,800	1,972
5/31	Hulahula R. - Jago R.	5,380	15,000	160	1,245	651	.25	.52	7,800	1,950
6/2	Jago R. - Aichilik R.	6,235	10,000	371	1,008	529	.70	.53	5,300	3,710
6/2	Aichilik R. - Kongakut R.	2,550	5,000	-	-	-	.70	.53	2,650	1,855

* Using figures for 5/30 and 5/31 for peak of calving information:
Total parturient cows -- 33,400
Total cows w/calves -- 16,706
Calv/cow ratio -- 50.0%

Note: Parturient cows were considered to be those with calves and/or hard antlers.

in Table 1, are not adequate for pin-pointing the peak, they do give a fair indication. The composition figures obtained for calving-area segments 1, 2 and 3 are used because they were obtained about the same time (May 30 and 31, 1961) and also contain the majority of the parturient cows - 33,400 of the total 41,350. Of these, some 16,700 had calves with them on those dates, or about 50 per cent. Calf mortality prior to those counts would cause that figure to be low. I also believe the calf-cow ratio obtained for segment 2 to be low.

The peak of calving probably was no later than May 31 and very likely a few days earlier. Interior herds seem to peak about May 26, so the Porcupine herd possibly is two or three days later. More data are needed to be able to fill this gap in our knowledge.

Evaluation

It is difficult to determine how close the population estimate obtained is to the true figure. Past census work regarding this herd has been minimal, except for general estimates of large concentrations. Cooperative surveys conducted 1950-1953 by the U. S. Fish and Wildlife Service and the Canadian Wildlife Service resulted in a population estimate of 30,000 for 1952. In view of the estimates made at the same time for other herds in Alaska, which were later found to be quite conservative, it is likely that this figure was also low. Later census work in Alaska has revealed that total numbers are difficult to determine by simple aerial reconnaissance, and most professional wildlife personnel tend to underestimate caribou numbers. The 1952 population might well have been 40,000 or 50,000. Table 2 shows hypothetical annual populations for the Porcupine herd for the years 1952-1961, based upon "original" populations of 30,000, 40,000 and 50,000, assuming a ten per cent annual increment. Such an increment has been maintained by the Nelchina herd over a ten-year period in which the annual hunter harvest has averaged about 3,500 animals. It seems logical that the Porcupine herd has had a similar rate of increase in view of its limited harvest.

It would appear that the 1952 population might have been closer to 45,000 or 50,000, barring any ingress of animals.

Table 2. Hypothetical annual populations of the Porcupine herd, 1952-1961, based upon initial estimates and upon a ten per cent annual increment.

Year	Population Size		
Initial Estimate	30,000	40,000	50,000
1952	30,000	40,000	50,000
1953	33,000	44,000	55,000
1954	36,300	48,400	60,500
1955	39,900	53,200	66,600
1956	43,000	58,500	73,300
*1957	47,300	64,400	80,600
1958	52,000	70,800	88,700
1959	57,200	77,900	97,600
1960	62,900	85,700	107,400
1961	69,200	94,300	118,100
Final Estimate	69,000	94,000	118,000

* Ingress of Steese-Fortymile caribou would have occurred here.

After the winter of 1956-1957, a large segment of the Steese-Fortymile herd did not return to Alaska as expected. It is presumed that those animals (possibly 30,000) joined the Porcupine herd. If such were the case, the 30,000 figure for 1952 would fit the current estimate.

The above discussion merely serves to indicate that the population estimate obtained is possible, based upon past information. The type of survey used in this inventory was, of necessity, rather subjective in nature, because of the large area involved, the short time available, and the relatively few personnel participating. The Brooks Range presents further problems in the form of logistics and high cost of operation, and the particularly nasty and unusual weather inherent to the arctic coast in the spring. The caribou themselves, of course, are always a problem, and even under ideal circumstances precise data are often difficult to obtain. The movement pattern discussed is based upon a synthetic type of reasoning, using the information gleaned from the reconnaissance flights and certainly that information was not complete. There is little doubt that during May-June, 1961, in arctic Alaska east of 152 degrees West longitude, only one major calving area was utilized and only one herd was involved. The total estimate obtained for the Porcupine herd - 110,000 animals, calves excluded - very probably is minimal.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 2 Title: Nelchina Herd Studies

a) Assessment of Herd Status
b) Movements and Distribution
c) Herd Composition
d) Productivity
e) Analysis of Range
f) Winter Range Utilization
g) Mortality
i) Census of Nelchina Herd
j) Reports on Caribou Research

PERIOD COVERED: May 1, 1961 to April 30, 1962

ABSTRACT

The Nelchina caribou herd has increased steadily during the past ten years as a result of high calf crops and low mortality. At present the animals are in excellent condition and thriving. The range is beginning to show signs of deterioration, and there is some indication that the carrying capacity has been reached. The winter of 1961-1962 was the most severe of the past six-seven years. Herd statistics for the period May 1, 1961 to April 30, 1962 are summarized below:

1) No known egress nor ingress or caribou took place, although major segments of the herd wintered outside the normal boundaries of the Nelchina range.

2) About 40 per cent of the calves survived their first winter, and an estimated 9,000 yearlings were added to the herd.

3) An estimated 9,500 adults, or 14 per cent of the total, succumbed during the year.

4) Hunters killed an estimated 8,000 animals, including calves.

5) The annual increment was insignificant, as mortality for all practical purposes equalled the yearling crop.

6) The population size of the herd, as derived from an intensive aerial census February 25-27, 1962, was estimated at 70,000 animals.

RECOMMENDATIONS

The Nelchina studies are progressing well, and valuable data are being gathered. The population work should continue in order to assess the dynamics of this expanding population, especially in relation to the brucellosis recently detected in the herd. A concerted effort on certain segments of the range studies could complete those phases. In view of the extensive movements now being made by the herd, it will be necessary to be alert to detect any mass egress of animals.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

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PERIOD COVERED: May 1, 1961 to April 30, 1962

OBJECTIVES

To determine the seasonal movements and distribution, and gains or losses in numbers resulting from ingress or egress of caribou on the Nelchina range.

To determine sex and age ratios in order to ascertain calf survival and herd composition as an index to the current population status of the herd.

To obtain information regarding fertility and natality rates, magnitude of the calf crop, and survival of calves to the yearling age.

To establish permanent enclosures in as many portions of the winter range of the Nelchina caribou as possible.

To identify and record the principal areas used by the Nelchina caribou during the winter months.

To determine the incidence of mortality from various factors other than hunting.

To determine the magnitude and composition of the hunters' kill, and to evaluate the characteristics of the harvest as related to management.

To determine the current size of the Nelchina caribou herd.

To compile and analyze all pertinent data resulting from field investigations of the Nelchina caribou herd relating to herd status.

To review, compile, analyze, and prepare for publication biological data obtained from management studies of the Nelchina caribou herd.

TECHNIQUES

Periodic aerial surveys were conducted to ascertain major movements, seasonal distribution, and range use by the Nelchina caribou. Where possible, information was gathered from local residents as a supplement to the above.

Aerial counts were made in mid-June, late October, and late March to determine calf production and survival primarily, but also to gain data on the segregation taking place at those times. A ground count was planned in early October to obtain sex-ratio data, but other duties interfered. Carcasses of female caribou were examined during the November-April period whenever possible as an index to the fertility rate.

Most of the summer was spent in analyzing the vegatation in the range stations constructed during 1960. A two-man crew consisting of Eide and Skoog visited these sites by chartered aircraft and by Department vehicles. Control plots were established at each site and the vegetation was analyzed by the modified Hult-Serander scale as applied to meter-square quadrats, used by the late Dr. Herbert C. Hanson, who initiated the Nelchina range work.

The period September 1-10, 1961,was spent in trying to develop an aerial technique to be used in determining the distribution of the major vegetation types over the Nelchina range. Transects across the range were the basis for this determination, and various

methods of approach were tested in order to find the most practical one. Unfortunately, weather hampered the operation and prevented the final application of the method developed.

A major task this year was the censusing of the Nelchina caribou herd. In view of the wide dispersal of the caribou last winter, most of them in rugged mountainous terrain, it was necessary to devise a new aerial censusing method. Accordingly, several sampling techniques were tested during December and January. A method using equal area sampling units was adopted. Basically, the technique can be described as follows: 1) The caribou concentrations are plotted and estimates made of the numbers; 2) On the basis of caribou densities, the concentrations are divided into various "strata", each being gridded with four-square-mile quadrats; 3) These strata and quadrats are outlined on U. S. Geological Survey quadrangle maps; 4) The estimates of caribou numbers are used to allocate the number of quadrats to be sampled; 5) The quadrats are numbered and the ones to be sampled are chosen by use of random numbers; 6) A certain number of these quadrats are assigned to each plane crew for censusing, each crew having a large-scale map (1:63,000) depicting the stratum and quadrats assigned; 7) Each quadrat to be sampled is flown completely to count all the caribou within its boundaries; and 8) The results are analyzed using standard statistical procedures. In order to obtain the most satisfactory results, personnel of the Bureau of Sport Fisheries and Wildlife, U. S. Fish and Wildlife Service, were asked to help. The cooperative venture proved quite successful.

FINDINGS

Movements and Distribution

In March 1961, the Nelchina caribou still remained on their wintering grounds, in 4 major concentrations: Cantwell area--5,000+ caribou; Nadiwen Lake-Monahan Flat--20,000+; Talkeetna River--10,000+; and Lake Louise Flat--5,000+. Animals were present in practically every portion of the range, and the adult bulls had dissociated themselves from the main groups as usual.

At the end of March a major southwest movement began from the Nadiwen Lake area, proceeding along Watana Creek and across the Susitna River into the mountains south of Fog Lakes. The pre-calving movements were in full swing during April with the calving groups moving toward the Clarence Lake region. In early May a

southeast movement began. The main calving area during the May 20-June 10 period encompassed Goose Creek, Black River, the middle portions of the Oshetna and Little Oshetna Rivers, and upper Sanona Creek. This area has been the principal calving grounds of the Nelchina herd for many years.

The post-calving movements began about June 12, and the calving groups proceeded westward to the Talkeetna River. This movement is the first such recorded for that time of year: in the past,the animals have grouped and drifted southward into the mountains at the heads of the Oshetna and Little Oshetna Rivers. The movement reversed in late June and early July and most animals returned to the Clarence Lake area before swinging northward across the Susitna River, although many moved directly northeast from the Talkeetna River. The main summering grounds encompassed the alpine areas of Watana, Butte, Coal, and Jay Creeks. In early August, a group of 15,000-20,000 moved eastward along the Alphabet Hills, with 5,000 of these breaking off and heading north to the foothills of the Alaska Range, near Boulder Lake.

An eastward and southward movement began in early September. A group of several thousand moved into the Black River-Oshetna River region and another moved up the Tyone River. The main movement progressed eastward across the Moraine Flat, joined by animals summering to the north of the Denali Highway. These caribou swung southward and in late September the main concentration of Nelchina caribou occurred on the northern half of the Lake Louise Flat. A clockwise movement began on the Flat, typical of the past, and the main herd began crossing the Lake Louise Road in mid-October. The Oshetna River concentration apparently dropped southward directly to the Eureka area.

During the latter half of October, a dispersal began to occur which continued throughout November. Many of the foregoing movements reversed themselves. The Lake Louise Road was crossed four times, the last passing to the northeast in late November. A major movement to the east across the Richardson Highway began in late October from the Lake Louise Flat; by early December about 15,000 animals had moved eastward to the Mentasta region, the first record of such a movement. In early November another major movement was taking place along the upper Susitna River; some 30,000 caribou moved northwestward into the Nadiwen Lake-Monahan Flat-Cantwell region. During the same period another 25,000 moved northward into the Isabel Pass-Paxon Lake area.

By mid-January 1962, the caribou had settled on the wintering grounds, and only local movements occurred until March. Three main wintering grounds were occupied: 1) Cantwell-Nadiwen Lake region--29,000 caribou; 2) Isabel Pass-Paxson Lake--24,000; and 3) Mentasta Pass--13,000. In addition, another 3,000 caribou wintered in the Talkeetna River basin, and 1,000 along the Glenn Highway between Eureka and Glennallen.

The movement pattern during 1961-1962 varied considerably from what has been considered the "norm" and major segments of the herd extended beyond the artificial boundaries of the Nelchina range. Several thousand moved at least as far as the upper Kantishna River to the northwest, with many others scattered between there and Cantwell. The 13,000 in the Mentasta Pass region to the east were completely off their usual range. In the northeast, many caribou extended beyond the Black Rapids Glacier. It is presumed that all or most of these caribou returned to the Nelchina range in the spring of 1962. Extensive flights during late May revealed no evidence of a permanent egress, even though the calving groups seemed quite reduced in total numbers from what was expected. The wide dispersal of Nelchina caribou throughout the year provided caribou hunters with unusual accessibility and was the major reason for the high kill in 1961.

Herd Composition

The only composition counts made during the year were taken in late March and early April 1962, primarily to determine calf survival. These aerial counts were made in the three main wintering areas, and are listed accordingly in Table 1. The calf:adult ratio was lower than expected, probably due to a larger than usual winter mortality. The age structure of the hunters' kill, as derived from a collection of lower jaws from carcasses of hunter-killed caribou, appears in the "Hunter Harvest Report", Job 2h. It is thought that the female segment of the kill most nearly represents the herd's true age structure above two-year olds, because little hunter bias exists in the shooting of adult cows of different ages. As such, the data indicate that the 3 older age-class, i.e. Prime (3-7 years), Mature (8-12 years), and Old (13+ years), are represented in the herd, respectively, in the following proportion: 10 to 3 to 1. Such is what one might expect in a healthy, expanding herd. There was no indication in these data nor in any of the field observations during the year that the sex and age structure of the herd had changed significantly from the previous year.

Table 1. Results of aerial composition counts taken in late March and early April 1962, Nelchina caribou herd.

Date of Count	Area	Total Animals	Calves	ADULTS *		
				Total	♀♀ and Young ♂♂	♂♂ over 2 years
3/29	Mentasta Pass	786	150	636	--	--
		707	129	578	550	28
3/30, 4/2, and 4/11	Summit-Paxson	2,446	292	2,154	--	--
		2,197	278	1,919	1,740	179
4/11	Cantwell	1,742	191	1,551	--	--
		1,583	174	1,409	987	422
Totals	All	4,974	633	4,341	--	--
		4,487	581	3,906	3,277	629

* Based upon antlers: most bulls over two years of age have shed their antlers. The few three-year-olds still having hard antlers can be identified by antler size, for the most part.

Productivity

An aerial calf count was made on June 15, 1961,to ascertain the calf crop after the initial post-natal mortality had taken place. The main calving groups were scattered in the hills south of Fog Lakes and east of the Talkeetna River, and included the parturient cows, calves, non-parturient cows, many of the young bulls, and some of the adult bulls. A count of 2,647 animals included 693 calves, 1,931 cows and young bulls, and 23 adult bulls. These figures revealed a calf:adult (minus the adult bulls) ratio of 36 per cent (693:1,931). The adult bulls seldom are represented in the same proportion and hence they are omitted when computing the calf:adult ratio in order to provide a base of minimum variation. The ratio obtained was significantly below the 45 to 50 per cent figure expected. The reason for this drop in productivity is not known. The mild calving season tends to preclude a heavy calf mortality due to weather. Perhaps a lower fertility occurred among the cows, although no evidence of such was found in the examination of 16 adult cows in April 1961.

The 36 per cent calf:adult ratio indicates a calf crop of about 20,000 calves as of June 15, 1961, based upon the total herd figure of 70,000 obtained in February 1962. Aerial counts the following spring, listed in Table 1, revealed a calf:adult (minus adult bulls) ratio of 18 per cent (581:3,277). The calf survival between June 1961 and April 1962 actually is less than the 50 per cent indicated, due to the mortality occurring on the base segment of cows and young bulls. Hunting and natural mortality reduced that segment by about 7,500 animals. Thus, for comparative purposes the April calf:adult ratio should be adjusted to 16 per cent. Therefore, approximately 45 per cent of the calves alive in mid-June survived to early April, and about 9,000 yearlings were added to the herd.

Analysis of Range

Most of the range work during the summer of 1961 concerned the vegetation analysis of range enclosures established in 1960. Due to limited range-experienced personnel it was decided to field a fence-building crew to erect the enclosures that year and to postpone the vegetation analyses until the following year. The locations of these enclosures were described in last year's report. Control plots have been established at all sites and vegetation analyses have been completed at all stations. Most of this work

took place during July and August. Each range station consists of a fenced Plot A and an un-fenced control Plot B, each plot containing two meter-square quadrats. The vegetation in each quadrat was analyzed by the modified Hult-Serander method used by the late Dr. Herbert C. Hanson, as described in Job Completion Report 6, W-3-R-12, June 30, 1958. In addition, a complete description of the vegetation stand was made, as well as a complete enumeration of the plant species present. It is not thought desirable to present the vegetation analyses here, for there will be little value until the vegetation is examined again to assess the changes occurring over a period of time. The main purpose of this study is to provide a means for comparing vegetation changes taking place on areas open to caribou grazing as opposed to those closed. So far, 38 stations have been established in important wintering areas and in the major vegetation types utilized by caribou during that season.

An important phase of range work yet to be completed in the Nelchina area is determining the areal distribution of the major plant communities. A week was spent in early September testing various aerial techniques in order to find the best one for the purpose. Weather prevented as thorough a testing as desired, but enough was accomplished to develop what is thought to be a feasible, accurate method. A brief description of this follows below.

After the autumnal color change has taken place in the plants, the major vegetation types become readily discernible from the air by their contrasting colors. The color change hinges upon weather, but usually it doesn't take place much before September 1 and by September 20 most of the foliage has dropped from the key plants over most of the caribou range. Aerial transects provide the means for measuring the distribution of the various types. East-west and north-south base lines are established across the Nelchina caribou range, using U. S. Geological Survey quadrangle maps. Along each base line starting points for aerial transects are chosen by use of random numbers, and the transects are laid out perpendicular to the base lines. These two sets of transects will be used for comparative purposes in order to test the results of each. An observer will fly along a transect, and every 15 seconds record the vegetation type occurring at a point on the ground determined by sighting along 2 fixed points on the airplane (cockpit and strut). The resulting data can be analyzed using standard statistical methods. This phase of the range studies will be completed as soon as possible.

Winter Range Utilization

This study was mostly inactive except for recording range use, due to a lack of equipment and personnel. The Nelchina Range has been divided into 15 units, as discussed in the P-R completion report for W-3-R-13, May 1, 1959, and as depicted in last year's report (W-6-R-2). These units were employed in recording caribou usage during the winter period, mid-October to mid-April. Those areas receiving major use by caribou included Range Units 1 (Upper Nenana River), 4 (Chulitna Mountains), 5 (Deadman Lake) and 6 (Tangle Lakes). The Tanada Lake area of the Wrangell Mountains also received heavy use by Nelchina caribou, as did the eastern portion of Mt. McKinley Park, but both are outside the Nelchina Range. Those areas receiving moderate use included Units 13 (Lake Louise Flat) and 11 (Talkeetna River), and those of minor use, Units 2 (Monahan Flat), 7 (Chistochina River), 8 (Upper Susitna Bottomland), 9 (Alphabet Hills), 10 (Chunilna Hills), and 15 (Caribou Creek).

The winter of 1961-1962 was one of heavy snowfall throughout the range. As a result, the caribou did not move much after early January 1962. The areas of large caribou concentrations thus received heavy, intensive feeding use, i.e. Range Units 1, 5, and 6, notably. Most of the feeding took place in the alpine areas where the wind kept the snow cover thin.

Mortality

The main purpose of this job is to record all instances of natural mortality affecting the Nelchina caribou. At present this job has been relegated to the background, and data are obtained only in conjunction with other studies. The hunters' kill has been evaluated in another completion report.

During the past year, 70 carcasses of man-killed caribou were examined in the field. All but four of these were in good to excellent condition. Of the four, one (an adult female killed in October) had a mange condition, and three (two adult females and one adult male) had pockets of pus scattered over the body, mostly along the sides and hind-quarters, probably indicating a general infection of some sort. Another adult female had extensive adhesions of the viscera to the body wall, but was in good condition. Two adult

males killed in November had greatly swollen testes, possibly an indication of brucellosis, judging from recently obtained information; the animal was in good condition. In addition to the above 70 carcasses, the viscera of 103 hunter-killed animals were examined Parasites were present in all the animals, although parts of the viscera of some were not available for examination. The following incidence of parasitism was recorded: warbles--100 per cent (49 of 49); nose bots--91 per cent (41 of 45); tapeworm cysticerci--40 per cent (63 of 157); lung hydatid cysts--8 per cent (13 of 164); lung worms--1 per cent (2 of 164); and mange--1 per cent (1 of 70). Except for the mange, the above types of parasitism seem to have little affect upon the host; heavy infestations, however, in conjunction with a severe winter might well cause mortality. Serological tests for brucellosis, leptospirosis, anaplasmosis, and Q fever have all been negative.

The Nelchina caribou herd seems to be in excellent condition, with little evidence of disease and physical deformities or injuries. Cripples are uncommon, and only 14 (0.1 per cent) of 12,472 animals observed closely were noted to limp. Of 20 carcasses sighted from the air, 12 were thought to be wolf kills, 5 undetermined, and 3 natural deaths. The last were so judged because the carcasses were intact and in positions suggesting non-violent deaths.

A wolf census on February 24, 1962, resulted in a population estimate by Game Biologist Gerry Atwell of 145-165 wolves on the 18,000 square miles of the Nelchina Range. This population continues to show a steady increase since the low point in 1955, but predation on caribou still seems to be relatively light for few carcasses are sighted. This can be explained partly by the fact that the wolves are preying largely upon moose.

It is difficult to evaluate natural mortality at this time because of the lack of substantial data. All evidence available, however, suggests a low mortality. An estimate of 4,000 (6 per cent) such deaths (excluding calves, whose mortality from all causes is reflected in the yearling counts) probably is liberal.

Census

The Nelchina wolf-caribou census took place during the period February 23-27, 1962. Paxson Lodge, in the northeast portion of the range, served as the base of operations. The project utilized

21 men and 6 airplanes (4 Piper Supercubs and 2 Champion Challengers) from the Alaska Department of Fish and Game, and 7 men and 4 airplanes (3 Cessna 180's and 1 Piper Supercub) from the U. S. Fish and Wildlife Service, Bureau of Sport Fisheries and Wildlife. Two hundred eighty-five hours were flown during the operation, including transportation to and from the base headquarters. Total cost of the census, excluding salaries, was $8,578.30, broken down as follows: gasoline and oil, $1,058.60; airplane charter, $4,428.10; supplies (maps, tie-down ropes, firepots, chamois, emergency gear, etc.), $896.60; and personnel costs (per diem and commercial transportation), $2,195.

All personnel assembled at Paxson Lodge on February 23. Each plane was flown along a different route on the fly-in to determine the relative distribution of caribou. The wolf census took place the next day, each plane crew being assigned a specific portion of the Nelchina range to obtain a total wolf count; in addition to counting wolves, each crew was to plot the exact boundaries of the caribou concentrations and to estimate the caribou numbers therein. That night the information on caribou distribution was assembled, and the censusing procedure was laid out as described under "Techniques." Three days were used for the caribou census.

Three major and two minor areas of caribou concentration were evident, as described in the section on "Movements." For the most part the animals were in rugged terrain above timberline. It was hoped that the sampling technique could be used on the three major concentrations, but a lack of adequate maps for one of these prevented its use in that area (Mentasta). Thus, two of the areas (Cantwell and Paxson) were sampled by the method described, and all others were censused by direct count. The Cantwell area was divided into four strata based upon estimated caribou densities, and the Paxson area, into two strata. Each stratum was divided into four-square-mile quadrats, or sampling units. The number of these units to be sampled in each stratum was allocated on the basis of the population estimates made prior to the count. Table 2 depicts the results of the census, listed by area and coverage, with the final estimate for population size.

A detailed statistical analysis has been presented in a publication soon to be released, and so it will not be repeated here. Suffice it to say that a sampling error of about 22 per cent was computed for the sampled portion (53,000) of the count. No exact

Table 2. Results of Nelchina caribou herd census, February 25-27, 1962.

Area/Stratum		Sample: Total Units	Sample: Units Smpld	Sample: Per cent Coverage	Caribou Tallied: No.	Caribou Tallied: Sub-Total	Caribou Tallied: Total	Expanded Estimate: No.	Expanded Estimate: Subtotal	Expanded Estimate: Total	Final Estimate
Sampled Portion											
Cantwell	A	400	98	24.5	2,168			9,000			
	B	30	10	33.3	256			1,000			
	C	61	37	60.7	9,903			16,000			
	D	18	6	33.3	1,074			3,000			
						13,401			29,000		
Paxson	E	70	39	55.7	11,455			20,000			
	F	120	21	17.5	697			4,000			
						12,152			24,000		
							25,553			53,000	51,000
Total Count Portion											
Mentasta				100		12,505			*13,900		
Talkeetna River				100		2,967			* 3,300		
Glenn Highway				100		799			* 900		
Other Areas		Reconnaissance			Estimate only				900		
							16,271			19,000	19,000
Total Caribou							41,824			72,000	70,000

* These figures are based upon an estimate that the crews missed 10 per cent of the animals in the total-count areas.

evaluation of the direct counts is possible, but each plane crew estimated that they probably missed at least 10 per cent of the caribou in the areas of total coverage. The number of caribou outside the count areas was estimated to be at least as large as that recorded for the Glenn Highway area (900). The 72,000 expanded estimate from the counts was rounded off, for a final estimate for the Nelchina caribou herd of 70,000 animals. That figure is thought to be conservative.

The Nelchina herd census of 1955 disclosed a population estimate of 40,000 animals. That census was repeated in 1956, and the results were similar. The transect method used is not as reliable as the quadrat-grid method used in 1962, but the fact that 28,910 caribou were actually tallied in the 1956 census, before extrapolation, suggests that the 40,000 figure was reasonable and probably conservative. Using that as a base, the Nelchina herd has expanded by 30,000 (75 per cent) animals during the seven year interval, at an average annual rate of about 10 per cent.

Conservative annual estimates of the population have been made each year since the 1955 census, based upon known productivity and mortality data. In 1959 an effort was made to reconstruct past populations during the period 1945-1959, using various data, estimates, and assumptions. The results disclosed an average annual herd increment of 9 per cent, from an estimated 16,000 animals in April 1945, to about 52,000 in April 1959. Apparently that rate of increase was close to that determined as a result of the 1962 census. The 60,000 figure used immediately prior to the census was ultra-conservative; actual computations placed the herd size at 65,000. Based upon more recent fertility and sex-ratio data, the population estimates have been recomputed. The results are summarized in Table 3. The figures are based upon known hunter kills, fertility rates, calf survival, and sex ratios. Natural mortality has been estimated at 4 per cent of the total herd figure, and includes a 1 per cent estimate for predation losses.

Table 3 shows an April 1962 herd size of about 69,000 animals. The census revealed a probable minimum of 70,000 animals. The discrepancy could result from inaccurate calf survival counts; sometimes it is quite difficult to obtain representative counts due to the herd's distribution and segregation. A difference of a few per cent in the survival rate for any year could alter the resulting population estimate significantly. The natural mortality estimate

Table 3. Estimated population sizes of the Nelchina caribou herd since the 1955 census figure, based upon known productivity and mortality data.

Year	April Total Population	Computed Adult Mortality	Initial Calf Crop	Total Calf Mortality	Herd Increment No.	Herd Increment %
1955	40,000	5,200	13,800	5,700	2,900	7
1956	42,900	4,800	15,000	6,600	3,600	8
1957	46,500	4,300	16,300	6,300	5,700	12
1958	52,200	5,300	18,100	6,700	6,100	12
1959	58,300	5,900	20,000	9,200	4,900	8
1960	63,200	7,000	22,300	9,600	5,700	9
1961	68,900	9,500	24,100	14,300	300	--
1962	69,200	--	--	--	--	--

of 4 per cent seems low, yet is reasonable considering the low wolf population, low incidence of disease, few cripples, mild winters, plentiful forage, and few sources for accidental deaths. Unless various compensating errors are present which are not readily evident, it seems the techniques being used to assess herd status are adequate. Care should be taken, however, to obtain representative calf counts, insofar as possible, to insure a valid calf survival percentage.

Reports on Caribou Research

The main purpose of this job is to analyze all the data collected from the studies of the Nelchina caribou herd and present the results for publication. Unfortunately, work during the past year was too time-consuming and interrupting for the detailed task of writing for publication. A start was made, however, in gathering library references and organizing material and outlines for two publications, both concerning certain segments of caribou productivity. It is hoped that these publications and others will be written shortly.

Assessment of Herd Status

The status of a caribou herd hinges upon a number of factors. Among these are the availability and condition of the food plants, movements on or off the range, the success of reproduction, the extent of mortality, the prevalence of disease and the general condition of the animals, and the population structure. The Nelchina studies are designed to provide an evaluation of these factors.

Range studies have been in progress for four years, the ultimate goal being an evaluation of the carrying capacity of a caribou range. So far, however, too few data exist for any conclusions on this aspect. Work this year concentrated on the establishment of more range enclosures, which will be used to evaluate the effect of caribou upon the vegetation. Much of the 18,000 square miles of the Nelchina range has been examined either quantitatively, qualitatively, or superficially. Although some sections show signs of excessive use (e.g. Lake Louise Flat, Deadman Lake, Tangle Lakes, and Alphabet Hills) forage plants generally are abundant and in good condition. Good growths of the forage lichens occur in many portions of the western and northern sections. Sedges, the other major winter food, are abundant throughout. Summer range is practically unlimited. The trend in range condition as a whole, however, seems to be downward. If the present herd of 70,000 continues

to increase or even to remain at its present level, there is little doubt that the Nelchina range will continue to deteriorate.

The large increase in the population since the early 1950's has resulted in the herd's becoming more migratory, as compared with its more sedentary behavior of the past. In recent years the herd has split into several segments during the winter and pushed to the borders of the range and even beyond. The western and northern sections are being used extensively now. Movements during the past year were the most extensive recorded thus far. Some 15,000 animals moved eastward, completely off the range, into the Mentasta-Mt. Sanford region. Segments of another 25,000 pushed northward beyond the Black Rapids Glacier in the northeast. To the northwest some 25,000 animals moved to the Alaska Railroad and beyond, with several thousand moving well into Mt. McKinley Park. It is presumed that most of the animals returned in the spring. No evidence exists at present to show they did not return. Once on their wintering ranges, however, the caribou remained rather stationary, probably due to the heavy snow-cover throughout the region. The winter of 1961-1962 was the most severe of the past six-seven years.

The Nelchina herd has continued to maintain a high productivity over the past 12-13 years plus a high calf survival. The past year, however, represents the first instance of low reproduction. Post-calving counts in mid-June revealed a calf:adult ratio of only 36 per cent, as compared with the 45-50 per cent expected. The severe winter also exerted a heavy toll on the calves. In total only about 40 per cent of the initial calf crop survived to the yearling age class. Approximately 9,000 yearlings were added to the herd in April 1962.

Caribou were accessible to hunters throughout the August 20-December 31 season, and as a result the herd experienced the highest hunter harvest on record--8,000 animals, about 12 per cent of the total herd. Natural mortality on adults was estimated at 4 per cent, or about 2,800 animals. The total calf mortality was estimated at about 60 per cent, as computed from calf:adult ratios. The relatively heavy mortality during the year approximately equalled the yearling crop, so the Nelchina herd did not have an annual increment. Nelchina caribou generally seem to be in excellent condition, judging from carcasses examined during the year.

The intensive census made in February 1962, resulted in a population estimate of 70,000. Thus the herd has increased by 75 per cent since the 1955 census estimate of 40,000. This represents an annual rate of increase of about 10 per cent.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 2-h Title: Characteristics of the Hunter Harvest, Nelchina Herd

PERIOD COVERED: August 1, 1961 to January 31, 1962

ABSTRACT

The 1961 caribou hunting season extended from August 20 to December 31. The estimated harvest of 8,000 caribou taken during this period was the highest kill ever recorded for the Nelchina herd. Harvest information was obtained from two check stations operated from August 20 through October 5, from field checks of hunters, from a sampling check station operated in October and November, and from interviews with guides, lodge proprietors, and residents. The data gathered are summarized below.

1. The total hunter harvest was estimated at 8,000 caribou, 59 per cent of which occurred during October through December.

2. The season's bag for successful caribou hunters was 42 per cent with 1 caribou, 29 per cent with 2, and 29 per cent with 3. Twenty- one per cent of the sampled hunters hunted more than once.

3. Males composed 51 per cent of the animals taken; 87 per cent of the animals were judged as less than 8 years of age, and 54 per cent less than 3.

4. Of the total number of caribou hunters checked during August and September, 96 per cent indicated Alaskan residency; 64 per cent from Southcentral Alaska, 32 per cent from the Interior and less than 1 per cent from Southeastern. "Out-of-State" hunters comprised 4 per cent of the total. Four

foreign countries were represented in the "out-of-State" hunters.

5. Sixty-two per cent of all August-September hunters were successful: Southcentral caribou hunters were 66 per cent successful and took 73 per cent of the kill; Interior caribou hunters were 51 per cent successful and accounted for 23 per cent of the kill; Southeastern caribou hunters, 71 per cent and 1 per cent; and "out-of-State", 78 per cent and 3 per cent.

6. Of the total caribou hunters checked during August and September, 12 per cent utilized commercial transportation, with 80 per cent successful, accounting for 19 per cent of the kill for that period. Four per cent of the caribou hunters checked employed the services of guides, with 87 per cent successful, taking 5 per cent of the August-September harvest.

7. Fifteen per cent of the August-September caribou hunters stated at the check station that they intended to have their game butchered commercially; however, a survey of the same hunters after December 31 showed that 41 per cent actually utilized commercial butchers.

RECOMMENDATIONS

Harvest information for previous years shows an obvious gap for the latter portions of the season. An effort should be made to obtain a representative sample for that period.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
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PERIOD COVERED: August 1, 1961 to January 31, 1962

OBJECTIVES

To determine the temporal and spacial distribution, the magnitude, and the composition of the hunter harvest; to determine hunter success and the factors influencing that success; and to evaluate the characteristics of the harvest as related to management.

TECHNIQUES

Information relating to caribou hunter harvest was obtained from three hunter check stations. One station located at mile 47, Glenn Highway, just south of Palmer, checked hunters from August 20 to October 1, 1961. Another at mile 2, Denali Highway, operated from August 20 to October 5, 1961. A third at the junction of the Lake Louise Road and the Glenn Highway (mile 159 on the Glenn) operated October 10 to November 15, 1961. The last was operated on an intermittent basis, and harvest information for that period, ie, October and November, was supplemented with estimates obtained by two men who patrolled the hunting area. A final check was made the last week of December to obtain harvest estimates from guides, lodge proprietors, and local residents. Additional harvest statistics were obtained by a post-season survey of successful caribou hunters. This survey was conducted by telephone and personal interviews in the Anchorage, Fairbanks, and Palmer areas.

Detailed information was obtained from each hunting party checked. Figure 1 is a copy of the form used at the check station to record this information and illustrates the type of data collected. Lower jaws were collected from hunter kills whenever possible to provide an index to the age structure of the harvest. Reproductive tracts were collected and preserved for future studies on productivity.

ALASKA DEPARTMENT OF FISH AND GAME
CHECK STATION FORM

Code Value

No. Hunters in Party:_____
Check Station:_____
Recorder:_____
Date:_____
Time:_____
Hunter's Name:_____
Place of Residence:_____
Permit Number:_____
Resident:_____ Non-Resident:_____
Did you hunt? Yes_____ No_____
Area Hunted:_____
Species Hunted:

	Code Value		Code Value	Code Value
Moose		Black Bear		
Caribou		Brown Bear		
Sheep				
Goat				

Days Out:_____
Commercial Transportation Used: Yes_____ No_____
Name:_____
Guide Used: Yes_____ No_____ Name_____
Method of Butchering: Private_____ Commercial_____ Unknown_____

Species Killed	Code Value	Sex	Code Value	Age	Date Killed	Code Value	Location	Code Value	

Specimens:_____

Remarks:_____

Figure 1. A copy of the card used by hunter check stations during the 1961 hunting season showing the type of data collected.

FINDINGS

Conditions Affecting the Harvest

The 1961 caribou season extended from August 20 to December 3, 1961, a total of 134 days. Weekends and holidays represented 31 per cent (42 days) of the season. The bag limit was three animals per hunter with no restriction on sex.

Access to caribou in the Nelchina range is accomplished mainly by three highways--Glenn, Richardson, and Denali--which transverse the Nelchina range on the south, east, and north. Road-hunting is the most common method of hunting. Many hunters, however, use cross-country vehicles (swamp buggies and weasels), boat, aircraft, horse, and later in the season, snow tractor and dog sled. Hunter access to the western part of the range is provided by the Alaska Railroad.

Caribou were readily available to hunters when the season opened in late August. There were many scattered groups in the region between the upper Maclaren River and Summit Lake. Animals from this region continued to move across the Denali Highway; this movement attracted humters to that area and hunter success was good. A concentration of bulls was situated in Monahan Flat and upper Clearwater Creek. Caribou were also distributed along the Alphabet Hills and were hunted largely by hunters who utilized weasels. In late September a segment of the herd moved past the Tangle Lakes area across the lower end of Paxson Lake and continued in a "clockwise" direction with several thousand caribou crossing the Lake Louise Road and appearing in the Eureka area in early October. This particular movement accounted for a large portion of the season's harvest which was taken predominantly by road hunters. In November caribou were in the region behind Eureka and remained there most of that month. Hunters using cross country vehicles continued to exert hunting pressure on these animals during that period. Caribou were still appearing along the Richardson Highway and further east on the Tok Road. Caribou were available through the remainder of the season to hunters.

The weather during late August and early September was rather good for hunting. There were a considerable number of clear days, however, rain showers were not uncommon. As temperatures dropped in September the fly problem became practically

non-existent. In late September and particularly early October, snow began to fall. The month of December was characterized by extreme low temperatures with a low of -62° F recorded at Gulkana. Consequently, hunter pressure was rather low for this period.

The Denali Highway became closed to traffic on October 23 due to snowdrifts; maintenance had been discontinued for the winter earlier that month. This closing had little influence, if any, on the harvest because the caribou were concentrated in the vicinity of Lake Louise and Sourdough at this time. The Lake Louise road remained open through most of the winter so travel was not impaired in that area. Hunter access on the Richardson Highway was hindered on several occasions due to snow, but never for a prolonged period. The Glenn Highway remained open through the winter.

Characteristics of the Harvest

The quantitative material presented in this section is predominantly representative of the August-September portion of the hunting season when two main check stations were in operation. Information was obtained relating to number of hunters, hunter success, bag size, hunter effort and pressure, hunter residency, guiding, transporting, and meat processing.

Caribou Hunters, Success and Bag Size

Table 1 is a summary presentation of the data gathered from hunters. These figures represent the number sampled rather than the true total for the hunting season. Caribou hunters were 58 per cent successful. The 67 per cent success for non-resident hunters can be attributed to the higher utilization of guides and commercial transporters by these hunters. A field bag check showed that 57 per cent of the successful hunters had 1 caribou when checked; 27 per cent had 2; and 16 per cent had 3. Fifteen per cent of the non-residents had more than one animal. These figures represent the hunter's bag only at the time he was checked and is not necessarily his season's bag.

According to a post-season survey of 423 successful caribou hunters, 21 per cent hunted more than once. Of these, 64 per cent were successful, and 47 per cent succeeded in filling the bag limit. Fifty-eight per cent of the total hunters sampled

Table 1. 1961 hunter harvest data, Nelchina caribou herd: summary of check station, field bag check, and post season hunter survey data.

	Res.		Non-Res.		Total	
	No.	%	No.	%	No.	%
Check Station:						
Total hunters checked	3484	94	210	6	3694	100
Caribou hunters	2701	94	169	6	2870	100
Successful caribou hunters	1557	93	114	7	1671	100
% success	--	58	-	67	--	58
Caribou checked	2477	95	135	5	2612	100
Caribou per successful hunter	1.6	--	1.2	--	1.6	---
Field Bag Check*						
Successful caribou hunters sampled	1865	100	118	100	1983	100
Hunters w/1	1032	55	101	85	1133	57
Hunters w/2	519	28	15	13	534	27
Hunters w/3	314	17	2	2	316	16
Post Season Hunter Survey:						
Successful caribou hunters sampled					423	100
Hunters hunting more than once					90	21
Those taking 0 more caribou					32	36
Those taking 1 more caribou					37	41
Those taking 2 more caribou					21	23
Hunters who filled bag limit by additional hunts					42	47
% success on additional hunts					--	64
Season's bag for sample hunters						
Total caribou					794	
Caribou per successful hunter					1.9	
Hunters w/1					176	42
Hunters w/2					123	29
Hunters w/3					124	29

* Includes check station data and field bag check of successful caribou hunters. These figures represent the bag size of hunters when checked rather than their total bag for the season.

took more than one caribou during the hunting season. The sample was largely composed of resident hunters.

Hunting Effort, Pressure, and Success

August-September--Figure 2 illustrates the chronological distribution of hunting pressure and success, in relation to the harvest, for the first 48 days of the season, i.e. August 20 through October 6. The hunting pressure peaks exhibit a lag behind the harvest peaks; the day recorded for individual hunter effort was that day the hunter was interviewed at the check station which might not be the day the hunter was actively hunting. As shown in Figure 2, as the season progressed, total hunter effort became less. There are several possible explanations--loss of interest, colder weather, the rut, moose season, school. Hunter success tended to be higher on week days than on weekends. All seven weekend peaks in hunting pressure exhibited an inverse relationship with the peaks of hunter success.

Table 2 represents an analysis of the data in Figure 2 by weekends and holidays as compared to week days. Forty-three per cent of the kill was taken by 42 per cent of the successful hunters on weekends and holidays. Weekend-holiday caribou hunters were 50 per cent successful, while week day hunters were 66 per cent successful. Table 3 presents the data collected from 2,335 hunters relating to hunter pressure. Resident hunters as a whole spent less time (2.8 days/hunter) in hunting caribou than non-residents (4.4 days/hunter) hunters. The total hunting pressure for all hunters was 2.9 days per hunter.

October-December--During this period hunter success was considerably variable depending upon such factors as caribou availability, hunting pressure, weather, and relative skill of the hunter. Caribou were generally available to hunters along the various road systems. During October, caribou were crossing the Lake Louise Road. Check stations were not run continuously during this time; however, on October 22, 1961, 284 hunters passed through the Lake Louise check station; this was the largest concentration of hunters observed during that period. Hunter success was noted on October 27 at 85 per cent. Winter weather after October contributed to the decreased hunting activity in the latter portion of the season.

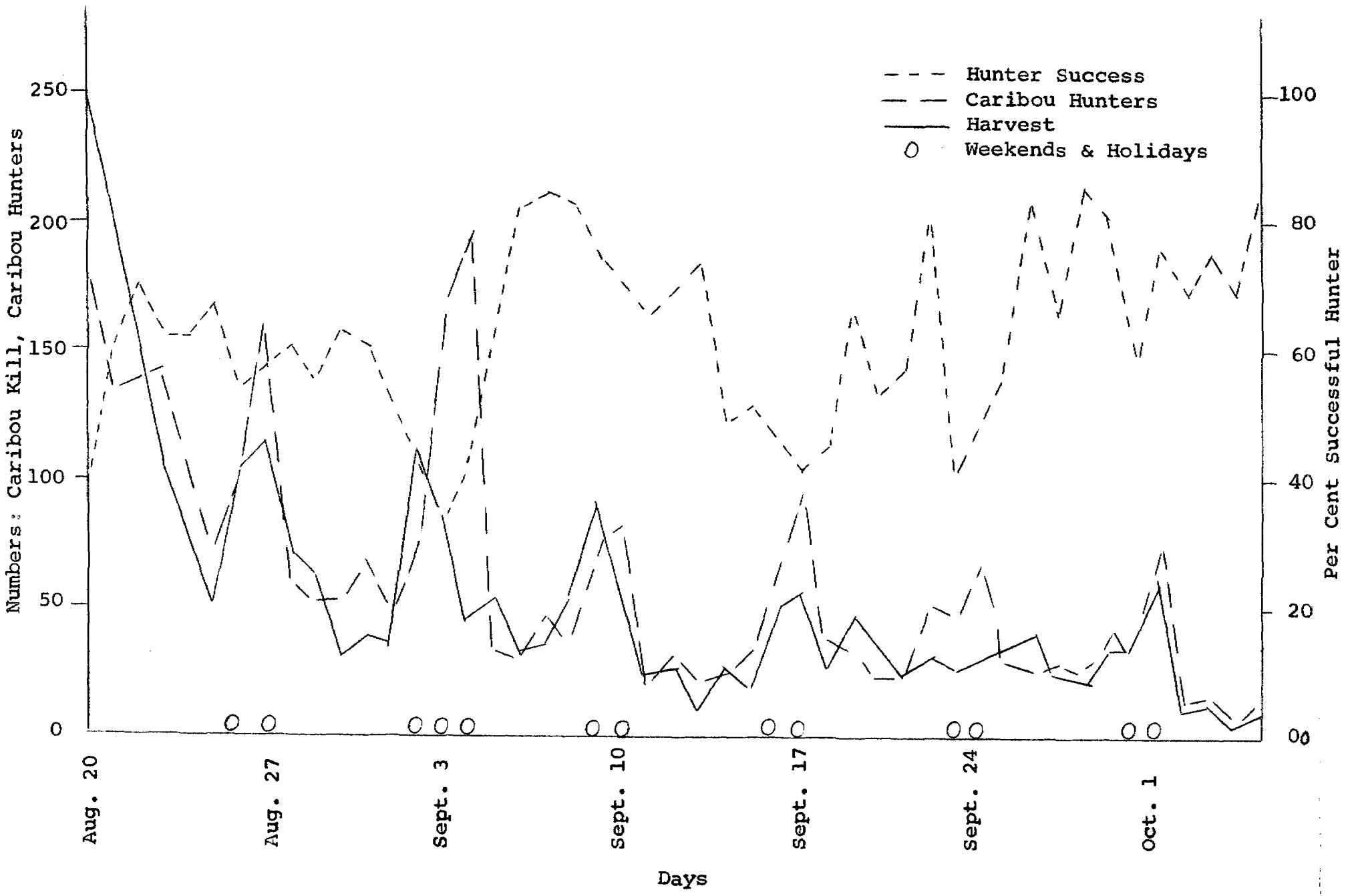

Figure 2. Chronological distribution of the 1961 caribou harvest, caribou hunters, and hunter success--Nelchina herd--for the first 48 days of the season.

Table 2. Hunter harvest data for 1961, Nelchina caribou herd: hunter pressure and success as related to weekdays and weekends, August 20 - October 6.

	Days		Caribou Hunters			Kill			Successful Caribou Hunters			%	Caribou/ Successful
	#	%	#	%	#/ day	#	%	#/ day	#	%	#/day	Success	Caribou Hunter
Weekends & Holidays	14	29	1426	49	102	1124	43	80	707	42	51	50	1.6
Week Days	34	71	1490	51	44	1497	57	44	986	58	29	66	1.5
Total	48	100	2916	100	61	2621	100	55	1693	100	35	58	1.5

Table 3. Hunter harvest data for 1961, Nelchina caribou herd: hunting effort, as obtained from hunter check stations.

	Resident			Non-Resident			Total		
	Palmer	Denali	Total	Palmer	Denali	Total	Palmer	Denali	Total
Man Days Hunting	510.5	5750.0	6260.5	31.0	394.0	425.0	541.5	6144.0	6685.5
Hunters Checked	151	2087	2238	9	88	97	160	2175	2335
Days/Hunter	3.4	2.8	2.8	3.4	4.5	4.4	3.4	2.8	2.9

Residency

August-September--Data on hunter's residency were gathered at the check stations and is presented in Table 4. Alaskan hunters were grouped into three categories of residency--Interior, Southcentral, and Southeastern. Interior hunters included those hunters whose place of residence was north of the Alaska Range, and Southeastern hunters, those from Yakutat Bay southward. Caribou hunters from Southcentral Alaska constituted 64 per cent of the total caribou hunters checked; the Interior was represented by 32 per cent; less than 1 per cent were from Southeastern and the remaining 4 per cent came from "out-of-State. The 14 Southeastern caribou hunters checked had the highest success ratio of 71 per cent. Southcentral hunters had a success ratio of 66 per cent and took 75 per cent of the harvest by Alaskans. Interior hunters were 51 per cent successful. Alaskan hunters constituted 96 per cent of those hunters hunting caribou and took 97 per cent of the total caribou harvest for the period checked. Four foreign countries were represented in the non-residents, three of which are located in Europe.

October-December--From close field contacts with hunters during this period it was concluded that the hunting public was largely composed of Southcentral hunters.

Guiding

August-September --Table 5 illustrates the data which were accumulated on guiding at the check stations, as obtained from a sample of 2,928 caribou hunters. Twenty-three per cent of the non-resident caribou hunters employed guides and 2 per cent of the resident hunters utilized guides in hunting caribou. Four per cent of the caribou hunters used guides and took 5 per cent of the harvest. Hunter success was better for guided hunters (87 per cent) than non-guided hunters (58 per cent).

October-December--Guided hunts were less frequent during this period due to decreased trophy hunting as compared to meat hunting. Caribou availability and composition made trophy hunting a more time consuming venture during that period.

Table 4. Hunter harvest data for 1961, Nelchina caribou herd: hunter's residency as related to the caribou harvest and hunter success for the period of August 20 to October 6, 1961.

Place of Residency	No. Hunters Checked	% of Total Hunters Checked	No. Caribou Hunters	% Hunters Checked	No. Successful Caribou Hunters	% Success	Caribou Killed	% Total Caribou	No. Caribou per Success. Caribou Hunters
Alaska									
Interior	1103	24	1049	95	538	51	765	24	1.4
Southcentral	3416	75	2072	67	1364	66	2411	75	1.8
Southeast	18	1	14	78	10	71	17	1	1.7
Subtotal	4537	100	3135	69	1912	61	3139	100	1.7
% of Total	96	---	96	---	95	---	97	---	---
Out-of-State									
Eastern U.S.	54	29	34	63	30	88	33	32	1.1
Northwestern U.S.	51	28	34	67	24	71	26	25	1.1
Southeastern U.S.	78	43	50	64	38	76	44	43	1.2
Subtotal	183	100	118	64	92	78	103	100	1.1
% of Total	4	---	4	---	5	---	3	---	---
Foreign									
Canada	4	50	4	100	3	75	6	86	2.0
Denmark	1	13	1	100	1	100	1	14	1.0
France	1	13	----	---	---	---	----	---	---
Germany	2	24	----	---	---	---	----	---	---
Subtotal	8	100	5	63	4	80	7	100	1.8
% of Total	0	---	0	---	0	---	0	---	---
Total	4728	100	3258	69	2008	62	3303	100	1.6
Total %	100	---	100	---	100	---	100	---	---

Table 5. Hunter harvest data for 1961, Nelchina caribou herd: use of guides by resident and non-resident caribou hunters as related to hunter success and harvest.

Guiding Categories	Hunters Checked	Successful Hunters	% Success	Kill		Caribou/ Successful Hunter
				No.	% Total	
Non-Guided Hunters:						
Resident	2693	1572	58	2360	96	1.5
% of total res.	98	97	--	96		
Non-Resident	130	77	59	88	4	1.1
% of total n-res.	77	68	--	67		
Total	2823	1649	58	2448	100	1.5
% of total	96	95	--	95		
Guided Hunters:						
Resident	66	54	82	86	66	1.6
% of total res.	2	3	--	4		
Non-Resident	39	37	95	44	34	1.2
% of total n-res.	23	32	--	33		
Total	105	91	87	130	100	1.4
% of total	4	5	--	5		
Total						
Resident	2759	1626	59	2446	95	1.5
% of total res.	100	100	--	100		
Non-Resident	169	114	67	132	5	1.2
% of total n-res.	100	100	--	100		
Total	2928	1740	59	2578	100	1.5
% of total	100	100	--	100		

Transportation

August-September--Information pertaining to methods of transportation employed in hunting caribou was gathered from 2,870 caribou hunters and is summarized in Table 6. Thirty-three per cent of the non-resident hunters utilized commercial transportation, i.e. swamp buggies, weasels, airplanes, and other cross-country type vehicles; 11 per cent of the resident hunters employed such transportation. Eighty-eight per cent of the 2,870 caribou hunters sampled used non-commercial transportation and took 81 per cent of the caribou harvest checked. Hunter success was higher for those hunters who hunted by means of commercial transportation (80 per cent) than hunters who used non-commercial transportation (55 per cent).

October-December--Caribou hunters utilized commercial transportation to lesser extent during October-December. Caribou were readily available to road hunters, consequently commercial transporters were less active during that time.

Meat Processing

Statistics relating to methods of meat processing, i.e. commercial or non-commercial, were gathered by the check stations and the post-season hunter survey. Table 7 contains a summary presentation of this information. There occurs a significant change in the intentions of the hunters regarding the type of game processing used. In the sample of 1,153 unsuccessful hunters (resident and non-resident) 26 per cent indicated that if they had been successful they would have taken their game to a commercial establishment. While of the successful hunters, 21 per cent had intentions of utilizing commercial facilities. In the post-season survey, which contains data sampled from 409 hunters on a weekly basis through the entire season, 15 per cent of the successful caribou hunters stated intentions of using commercial processors, however it was later found that 41 per cent of these same hunters actually had taken their game to a commercial butcher. There is a difference between the intentions of a successful hunter in the field as compared with what he actually did regarding meat processing and the intentions of a successful hunter and an unsuccessful hunter.

Table 6. Hunter harvest data for 1961, Nelchina caribou herd: use of commercial transportation by resident and non-resident caribou hunters as related to hunter success and harvest.

Transportation Categories	Caribou Hunter Checked	Successful Caribou Hunter	% Success-ful	Kill No.	Kill % of Total	Caribou/ Succ. Hunter
Non-Commercial						
Resident	2400	1322	55	2051	97	1.6
% of total res.	89	85		83		
Non-Resident	113	63	56	73	3	1.2
% of total n-res.	67	55		54		
Total	2513	1385	55	2124	100	1.5
% of total	88	83		81		
Commercial						
Resident	301	235	78	426	87	1.8
% of total res.	11	15		17		
Non-Resident	56	51	91	62	13	1.2
% of total n-res.	33	45		46		
Total	357	286	80	488	100	1.7
% of total	12	17		19		
Total						
Resident	2701	1557	58	2477	95	1.6
% of total res.	100	100		100		
Non-Resident	169	114	67	135	5	1.2
% of total n-res.	100	100		100		
Total	2870	1671	58	2612	100	1.6
% of total	100	100		100		

Table 7. Hunter harvest data for 1961, Nelchina caribou herd: check station and post-season hunter survey information concerning methods of butchering for caribou hunters as related to residency.

Butchering Facilities Used	Caribou Hunters Checked		
	Successful	Unsuccessful	Total
Check Station Data:			
Non-Commercial -			
Resident	1179	815	1994
% of total res.	80	74	77
Non-Resident	53	37	90
% of total n-res.	56	71	62
Total	1232	852	2084
% of total	78	74	77
Commercial -			
Resident	291	286	577
% of total res.	20	26	22
Non-Resident	41	15	56
% of total n-res.	44	29	38
Total	332	301	633
% of total	21	26	23
Combination			
Resident	7	3	10
% of total res.	0	0	1
Non-Resident	0	0	0
% of total n-res.	-	-	-
Total	7	3	10
% of total	1	-	0
Total -			
Resident	1477	1104	2581
% of total res.	100	100	100
Non-Resident	94	52	146
% of total n-res.	100	100	100
Total	1571	1156	2727
% of total	100	100	100

Post Season Hunter Survey:	No.	%
Successful caribou hunters sampled	409	100
Non-commercial - stated intentions	346	85
- actual use	240	59
Commercial - stated intentions	63	15
- actual use	169	41
Hunters changing minds about non-commercial processing	106	26

Magnitude of the Harvest

The harvest data are presented in Table 8. Hunter check stations and a two man field crew provided most of the known kill figures. These figures were supplemented with estimates obtained from interviews with guides, lodge proprietors, and local residents. Figure 3 is a graph of the caribou harvest by week for the hunting season, the data for the last portion of the season were lumped, due to the unavailability of accurate information for this period. The 8,000 estimate is a sizeable increase over the previous year's harvest of 5,500.

Table 8 represents the area harvest distribution. Three major areas sustained 79 per cent of the season's harvest. Of these 3 areas the Lake Louise area was the source of the heaviest kill (2,850), with the Denali Highway second (2,600). The Lake Louise kill occurred predominantly in October and November and the Denali harvest occurred mostly in August and September. The Eureka, Richardson and Glenn Highways, and the Tok Road harvests presented in Table 8 were characteristic of the latter portion of the hunting season--October to December. Approximately 59 per cent of the harvest actually occurred during the second portion of the season; this includes an estimated crippling loss of 300 animals.

In Figure 3, the distribution of the harvest by weeks, 14 per cent of the harvest occurred during the first week of the season. The week of October 8 through 14 illustrates the large crossing of caribou which occurred on the Lake Louise road during that time period; 16 per cent of the harvest was sustained during that week. It was impossible to break the total 8,000 harvest down into weekly segments, particularly in the second portion of the season. Figure 3 is representative of about 7,600 animals and a number of the percentages are based largely on estimates.

Structure of the Harvest

Caribou carcasses were checked for sex as the hunters passed through the checking stations. Lower jaws were also collected at this time for age. The collecting effort for lower jaws was intensified during the latter portions of the hunting season; hence age statistics for that time period dominate our jaw sample. Reproductive tracts were collected for fertility

Table 8. Hunter harvest data for 1961, Nelchina caribou herd: 1961 kill estimate.

Area	Data Source	Caribou Kill Known	Caribou Kill Est.Total
Major Hunting Areas			
Lake Louise	Check station, talks with residents, estimate	1507	2850
Denali Highway[1]	Check station, talks with residents, estimate	2419	2600
Eureka	Talks with guides, estimate	276	900
Subtotal		4202	6350
Minor Hunting Areas			
Richardson Hwy.	Talks with residents, estimate	159	500
Glenn Highway	Talks with residents, estimate	131	450
Tok Road	Talks with residents, estimate	16	50
Subtotal		306	1000
Other Harvest Sources			
Airplane Hunters	Estimate	10	350
Crippling Loss	Estimate	7	300
Subtotal		17	650
Total		4525	8000[2]

[1] Distribution of harvest on Denali Highway of 1,899 hunters checked:

	No.	%
Mile 0-40	1001	53
Mile 40-80	516	27
Mile 80-135	375	20
Mile 135 - Cantwell	7	0

[2] Distribution of harvest by the August-September and October-December time periods.

	Known	Est. Total	% of Total
August-September	2612	3300	41
October-December	1913	4700	59
Total	4525	8000	100

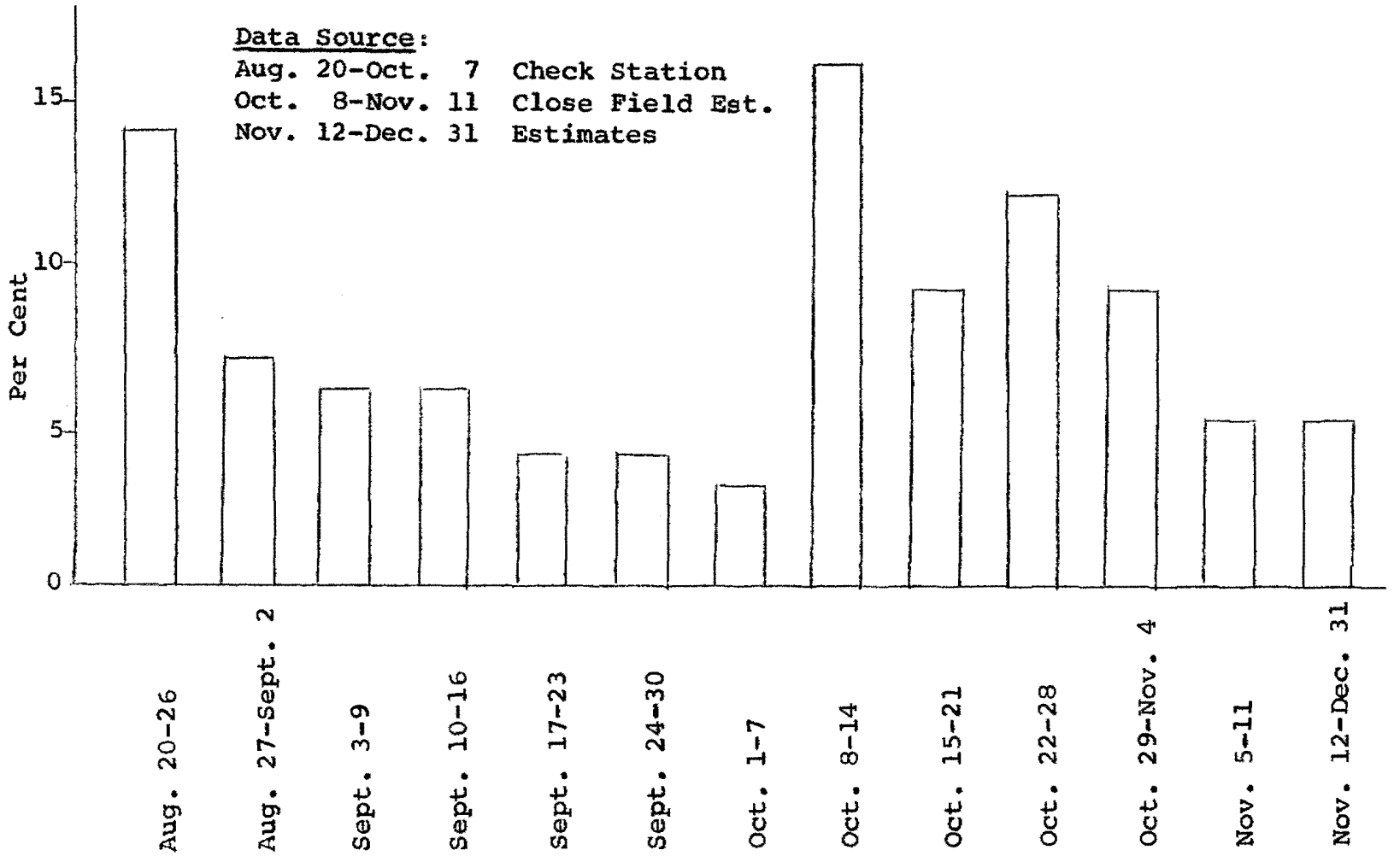

Figure 3. Chronological distribution of the 1961 caribou harvest, Nelchina herd, as determined by check stations and estimates.

data. Table 9 presents the sex and age structure of the 1961 harvest for the August-September and October-December periods of the hunting season. Because approximately 3,300 animals of the season's 8,000 harvest were taken in the August-September portion of the hunting season, and the remaining 4,700 taken in October to December, the sex and age ratios for the season were weighted, i.e. by .41 for August-September and .59 for the October-December period, to give a more representative picture of the harvest structure for the season as a whole. The weighted sex ratio of the 1961 caribou harvest is presented in Table 10. Table 11 contains the extrapolated age structure of the 1961 harvest as determined from aged animals and examinations of hunter kills.

Sex Ratios

Table 9 illustrates the sex ratio of the harvest by the two time periods. A comparison of the sex ratios of hunter-killed animals checked for the two time periods reveals a definite difference. During August and September the ratio was in favor of males (65:35) and during the second time period the ratio was in favor of females (43:57). Table 10 contains the extrapolated sex ratios for the season's harvest. The sex composition of the harvest for the season as a whole approached nearly a 1:1 ratio, 52 per cent males in the checked hunter kills. This close similarity between the sex ratio of aged and checked animals indicates that the jaw sample is fairly representative of the age structure of the harvest for the season.

The sex ratios analyzed by age-classes are presented by the two time periods in Table 9 and for the season in Table 10. In the aged animals for the August and September period, the females dominate the calf age class (60 per cent), the prime age category (55 per cent), and the old class (67 per cent); while for the October-December period, females were dominant in the calf, mature, and old-age classes (58, 75, and 83 per cent). In Table 10 the female composition was greater in 4 of the 6 age-classes, 59 per cent of the calves, 52 per cent of the prime, 57 per cent of the mature, and 77 per cent of the old animals.

Hunter selectivity and caribou availability seem to account for this marked shift in the harvest sex ratio between the two time periods. Trophy hunters are more prevalent

Table 9. Hunter harvest data for 1961, Nelchina caribou herd: sex and age structure of the 1961 harvest, as obtained from checked hunter kills.

Age Class	Males						Females						Unknown		Total					
	Aug-Sept			Oct-Dec			Aug-Sept			Oct-Dec			Oct-Dec		Aug-Sept			Oct-Dec		
	#	%	$\%P_1$	#	%	%P	#	%	%P	#	%	%P	#	%	#	%	%P	#	%	%P
I. Calf	6	8	40	18	13	42	9	16	60	25	18	58	19	40	15	12	100	62	19	100
II. Yearling	17	23	77	22	16	61	5	9	23	14	10	39	14	30	22	17	100	50	16	100
III. Two Year	17	23	63	38	28	68	10	18	37	18	13	32	14	30	27	21	100	70	22	100
IV. Prime (3-7)	21	29	45	50	36	50	26	46	55	51	37	50			47	36	100	101	31	100
V. Mature (8-12)	11	15	73	8	6	25	4	7	27	24	18	75			15	12	100	32	10	100
VI. Old (13+)	1	2	33	1	1	17	2	4	67	5	4	83			3	2	100	6	2	100
Total	73	100	57	137	100	50	56	100	43	137	100	50	47	100	129	100	-	321	100	-
	#	%		#	%		#	%		#	%				#	%		#	%	
Sex Ratio	1716	65		558	43		918	35		731	57				2634	100		1289	100	

$\%P_1$ = Percentage of total animals in each age class for that time period (Ex. August-September).

Table 10. Hunter harvest data for 1961, Nelchina caribou herd: extrapolated sex ratio of estimated total 1961 harvest, using data in Table 9 as base.

Aged Animals	% ♂♂ in Class				% ♀♀ in Class				Total
I. Calf	(.40)	(.41)[1]+(.42)	(.59)[2]	= 41	(.60)	(.41)+(.58)	(.59)	= 59	100
II. Yearling	(.77)	(.41)÷(.61)	(.59)	= 68	(.23)	(.41)+(.39)	(.59)	= 32	100
III. Two Year	(.63)	(.41)÷(.68)	(.59)	= 66	(.37)	(.41)÷(.32)	(.59)	= 34	100
IV. Prime (3-7)	(.45)	(.41)÷(.50)	(.59)	= 48	(.55)	(.41)÷(.50)	(.59)	= 52	100
V. Mature (8-12)	(.73)	(.41)÷(.25)	(.59)	= 45	(.27)	(.41)÷(.75)	(.59)	= 55	100
VI. Old (13+)	(.33)	(.41)÷(.17)	(.59)	= 24	(.67)	(.41)÷(.83)	(.59)	= 76	100
Total	(.57)	(.41)÷(.50)	(.59)	= 53	(.43)	(.41)÷(.50)	(.59)	= 47	100
Checked Hunter Kills:	(.65)	(.41)÷(.43)	(.59)	= 52	(.35)	(.41)÷(.57)	(.59)	= 48	100

[1] Weighted value for the August-September time period when 41 per cent of the season's harvest occurred.

[2] Weighted value for the October-December time period when 59 per cent of the season's harvest occurred.

Table 11. Hunter harvest data for 1961, Nelchina caribou herd: extrapolated age structure of estimated total 1961 harvest, using data in Table 9 as base.

Age Class	Males % Composition			Females % Composition			Total in %		
I. Calf	(.08)	(.41)[1]+(.13)	(.59)[2]=11	(.16)	(.41)+(.18)	(.59)=17	(.12)	(.41)+(.19)	(.59)=16
II. Yearling	(.23)	(.41)+(.16)	(.59)=19	(.09)	(.41)+(.10)	(.59)=10	(.17)	(.41)+(.16)	(.59)=16
III. Two Year	(.23)	(.41)+(.28)	(.59)=26	(.18)	(.41)+(.13)	(.59)=15	(.21)	(.41)+(.22)	(.59)=22
IV. Prime (3-7)	(.29)	(.41)+(.36)	(.59)=33	(.46)	(.41)+(.37)	(.59)=41	(.36)	(.41)+(.31)	(.59)=33
V. Mature (8-12)	(.15)	(.41)+(.06)	(.59)=10	(.07)	(.41)+(.18)	(.59)=13	(.12)	(.41)+(.10)	(.59)=11
VI. Old (13+)	(.02)	(.41)+(.01)	(.59)= 1	(.04)	(.41)+(.04)	(.59)= 4	(.02)	(.41)+(.02)	(.59)= 2
Total			100			100			100

[1] Weighted value for the August-September time period when 41 per cent of the season's hunter harvest occurred.

[2] Weighted value for the October-December time period when 59 per cent of the season's hunter harvest occurred.

during the first portion of the hunting season, coupled with the fact that large bull caribou were more readily available to hunters during August and September. In October, the Denali Highway became closed due to snow and hunters turned their efforts towards other areas where caribou were available (Eureka, the Lake Louise Road, and the Richardson Highway). The caribou in these areas were predominantly young bulls, cows, and calves; consequently, the harvest sex ratio for this second portion of the season was in favor of females.

Age Structure

Table 9 contains the age structure of the harvest by the two time periods and Table 11 summarizes the age structure of the harvest for the season. The age structure for the two time periods shows that the calf age-class was characterized by a high percentage in October-December (19 per cent as compared to 12 per cent in August-September). The prime age-class shows a difference of 5 per cent between the two periods, the August-September period having the greater percentage of 3 to 7 year old animals. In Table 11 the age structure of the harvest for the season is characterized by 54 per cent of the animals being 2 years of age or less, 33 per cent prime, and 2 per cent 13 years or older. The harvest age structure of the bulls was greater in the juvenile age-classes for October-December.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-a Title: Assessment of Herd Status

PERIOD COVERED: July 1, 1961 to June 30, 1962

ABSTRACT

Beginning about mid-April the cows began moving out of Canada and the Fortymile country toward the White Mountains. However, probably fewer than half the number of cows calving in the White Mountains in 1960 calved there in 1961 - the remainder apparently calving south of the highway. The herd again dispersed and summered in the Tanana Hills and later, in October, crossed the Taylor Highway on their way to Canada. But this year (1961) more caribou than usual wintered in Alaska. In February and March 1962, an estimated 5,000 to 7,000 caribou were reported in the flats near Circle.

The fall composition counts showed 40 per cent cows, 18 per cent calves, 12 per cent yearlings, and 30 per cent bulls. The sex ratio, as taken from the hunter information cards, was 52 per cent females and 48 per cent males.

An initial calf-adult ratio was not obtained this year. Calf-adult ratios during the southbound Steese Highway crossing and the Taylor Highway crossing were 61:100 and 35:100, respectively, which indicate a summer calf mortality of approximately 43 per cent, disregarding adult mortality.

Approximately 1,572 hunters killed about 1,645 caribou, including 180 caribou killed during a Bureau of Indian Affairs sponsored caribou hunt. Residents comprised 97 per cent of the caribou hunters and military personnel comprised 22 per cent.

There is no reason to believe that the size of the herd has decreased. In fact, the herd may have increased in numbers due to a possible influx of animals from the Nelchina caribou herd.

RECOMMENDATIONS

The status of the Steese-Fortymile caribou herd does not appear to have changed from that of the preceding year. The hunter-kill of caribou in 1961 was one of the greatest ever, but still far below the herd's potential annual increment.

The management practices that can be utilized on this herd due to its migratory nature are restricted to the manipulation of hunting seasons and bag limits. As the herd is normally available to hunters for a short period of time, changes in these regulations would not materially affect the harvest.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-a Title: Assessment of Herd Status

PERIOD COVERED: July 1, 1961 to June 30, 1962

OBJECTIVES

To compile and analyze all pertinent data resulting from field investigations of the Steese-Fortymile herd.

TECHNIQUES

In order to effectively serve the requirements of management, all data bearing on herd characteristics and trends, both past and present, must be synthesized. The findings resulting from investigations of caribou numbers, distribution, movements, sex and age composition, productivity, survival, and mortality have been analyzed in this report to achieve this objective. An attempt was made in other job completion reports, covering the individual phases of research performed, to analyze the findings in each case; hence, this report will attempt to condense and synthesize these findings.

FINDINGS

By mid-April the female caribou were moving out of Canada and the Fortymile country toward the calving grounds in the White Mountains. However, probably fewer than half the number of cows calving in the White Mountains in 1960 calved there in 1961 - the remainder calving south of the Steese Highway. After calving, a general, wide dispersal throughout the Tanana Hills occurred between the Steese and Taylor Highways. In mid-August many caribou were seen at the heads of the Chena and Salcha Rivers.

During the latter part of September the caribou began to bunch and shift southeastward and by early October were crossing the Taylor Highway. This crossing was completed by about October 20 and most of the herd continued on into Canada, mainly along the Ladue, Sixtymile, and Fortymile Rivers. This year, more caribou than usual wintered on the Alaskan side of the border. Many caribou were seen wintering in the upper Tanana River drainages and flats around Northway. Also, caribou were reported along the Taylor Highway in February 1962. Heavy concentrations of caribou were reported in the Chapman Lake and Peel Plateau areas of the Yukon Territory. In early February and March 1962, an estimated 5,000 to 7,000 caribou were seen in the flats near Circle.

Herd Composition

Composition counts made during the year provided the following information. The composition of the calving group was found to be 51 per cent cows, 37 per cent calves, 11 per cent yearlings, and 1 per cent bulls. Counts obtained as the herd crossed the Taylor Highway in the fall, when the bulls are interspersed within the herd, gave the following breakdown: 40 per cent cows, 18 per cent calves, 12 per cent yearlings, and 30 per cent bulls. The sex ratio, as taken from the hunter report cards, was found to be 52 per cent females and 48 per cent males.

Productivity and Survival

An initial calf:adult ratio on the calving grounds was not determined this year because an aerial count could not be made during the peak of the calving season. However, at the time of the last aerial count, a calf:adult ratio of 50:100 was obtained. A calf:adult of 61:100, based on a complete composition breakdown of 1,976 caribou, existed at the time of the southbound Steese Highway crossing. Composition counts in October along the Taylor Highway gave a calf:adult ratio of 35:100. A calf:adult ratio was not obtained in April, as is usually done, because of bad flying weather and an overcrowded schedule. Bulls are not represented in these calf:adult ratios.

The above figures suggest a summer calf mortality (June Steese Highway crossing to October Taylor Highway crossing) of 43 per cent - if the composition figures for the caribou calving north of the Steese Highway are representative of the entire Steese-Fortymile caribou herd. The Steese Highway composition counts indicated a

calf crop of approximately 3,500 north of the highway. The size of the calf crop south of the highway could not be determined. Because April composition counts were not possible this year, the herd increment could not be calculated.

Hunter Harvest

Except for a few scattered bands on the Steese Highway, the caribou were not available to the hunters until they crossed the Taylor Highway in October. Approximately 1,572 hunters killed about 1,645 caribou for a hunter success of slightly over one caribou per hunter. The crippling loss was estimated to be under 10 per cent, but more than 1960's estimated 5 per cent. The Bureau of Indian Affairs sponsored a caribou hunt in which approximately 60 Natives from Northway, Tetlin and Tanacross took 180 caribou. Residents comprised 97 per cent of the caribou hunters and military personnel comprised 22 per cent. Fifty-two per cent of the caribou kill occurred between miles 90 to 110. The Fairbanks area furnished 61 per cent of the hunters, the Tok area 21 per cent,and the remainder of the State,18 per cent.

Numbers

There is no reason to believe that the size of the Steese-Fortymile caribou herd has decreased from 1960's estimate of 50,000. The calf crop of 3,500 north of the Steese Highway and an undetermined number south of the highway should have been more than sufficient to cover the loss of an estimated 2,000 hunter-killed caribou (including Canadian kill and crippling loss) and those lost to natural mortality.

The size of the herd may have increased due to an influx of caribou from the Nelchina herd. Several thousand Nelchina caribou were seen traveling north through Isabell Pass, and it is possible that some of these may have eventually intermingled with Steese-Fortymile caribou.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-b Title: Movements, Distributions, and Numbers

PERIOD COVERED: April 1,1961 to March 31, 1962

ABSTRACT

By mid-April the cows were moving northwest out of Canada and the Fortymile country toward the calving grounds in the White Mountains, but probably less than half calved there. The remaining cows calved south of the Steese Highway. After calving, the caribou again dispersed throughout the Tanana Hills for the summer. In late September the caribou began moving southeast toward the Taylor Highway, and almost all had crossed by October 20, 1961. Most of the caribou moved on into Canada via the Ladue, Sixtymile and Fortymile Rivers. More caribou than usual wintered on Alaska's side of the border, especially in the Tanana River drainages and flats around Northway. In February and March 1962, an estimated 5,000 to 7,000 caribou were reported along lower Birch Creek and in the flats near Circle.

RECOMMENDATIONS

None.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-b Title: Movements, Distributions, and Numbers

PERIOD COVERED: April 1, 1961 to March 31, 1962

OBJECTIVES

To determine the seasonal distribution and movements, total numbers, and gains or losses in numbers resulting from ingress or egress of caribou on the Steese-Fortymile range.

TECHNIQUES

Aerial surveys were made whenever possible during the year in an attempt to locate and trace the Steese-Fortymile caribou movements and to determine the distribution of the animals. Additional information was gathered from Mr. Fitzgerald, Director of Fish and Game at Whitehorse, Yukon Territory, local trappers, and Department personnel.

FINDINGS

The general patterns of movement and distribution from April 1, 1961 to March 31, 1962, were very similar to those of the preceding year. The Steese-Fortymile caribou wintering in Canada returned to Alaska for calving. However, in 1961, fewer cows calved in the White Mountains, as compared to 1960, with a large number of cows apparently calving south of the Steese Highway. After calving, the caribou dispersed throughout the Tanana Hills for the summer.

In early fall the caribou, including the bulls, crossed the

Taylor Highway with most of them moving on into Canada. The caribou crossing into Canada wintered in the Yukon Territory, probably southeast of Dawson. Caribou not crossing the border were seen wintering in the upper Tanana River drainages and flats around Northway. The year's movements and distribution are discussed in detail beginning with the spring.

Movements and Distribution

Spring (April-June 1961). By mid-April, caribou wintering in the Fortymile country and joined by the largest segment of the herd which had wintered in Canada, had started moving toward the calving grounds in the White Mountains. The herd then moved generally along Birch Creek toward the calving grounds. However, this year not as many cows calved in the White Mountains as did last year (1960). Apparently a large number of cows calved south of the Steese Highway. The cows calving in the White Mountains were concentrated mainly at the heads of Faith, Beaver and Bear Creeks.

The first caribou moving out of the calving grounds were observed on June 9, 1961, as they crossed the Steese Highway at Eagle Summit. The crossing reached its peak June 11, and was apparently over by June 13, 1961. Five thousand three hundred and seventy-two caribou were counted crossing the highway; in addition, an estimated 3,900 caribou also crossed. The entire herd gradually dispersed into the Tanana Hills.

Summer (June-August 1961). The caribou dispersed over the entire Steese-Fortymile area south of the Steese Highway during the summer months. In mid-August a few caribou were seen along the Richardson Highway between the Chena and Salcha Rivers and many were seen at the heads of these same two rivers.

Fall (September-November 1961). Little change in movements and distribution occurred in the first half of September, but in the last half the caribou began to bunch and shift southeast toward the Taylor Highway. Hunters reported seeing a few caribou cross the highway during the last few days of September. However, a reconnaissance flight on October 2, 1961, disclosed that the caribou were mostly in the timber just north of the highway, and trail sign of many caribou was found along all the high ridges from Ketchumstuk to the summit. The main caribou crossing,

judged from hunter kills, occurred approximately from October 5, 1961, through October 18, 1961. These caribou crossed the highway from mile 11 through mile 130; the largest concentration crossed between miles 90 to 110 and a smaller concentration crossed between miles 31 to 60. After crossing the Taylor Highway, most of the caribou moved along the Ladue, Sixtymile and Fortymile Rivers and crossed the border into Canada.

Winter (December 1961-April 1962). More caribou than usual wintered on the Alaskan side of the border. Caribou were seen wintering along the Ladue River and in the upper Tanana River drainages and flats around Northway. Also, caribou were reported along the Taylor Highway in February 1962, and resident hunters were allowed a bonus of two caribou (in addition to the regular three-caribou limit) so that some of the animals could be utilized. The only report of caribou locations in Canada came from Mr. Fitzgerald, Director of Fish and Game, Whitehorse, Yukon Territory. He reported heavy concentrations of caribou in the Chapman Lake and Peel Plateau areas.

In early February 1962, a trapper reported an estimated 2,000 caribou crossed the Steese Highway between Birch Creek Bridge and Circle City--heading North. In March 1962, an estimated 5,000 caribou were reported along lower Birch Creek and in the flats near Circle.

Numbers

Numbers were not calculated this year because of the small number of caribou counted during the southbound Steese Highway Crossing. However, there is no reason to believe that the numbers have been reduced from 1961's figure of approximately 50,000 animals. There is a possibility that the numbers may have increased due to an influx of caribou from the Nelchina Herd. During the latter part of February 1962, Nelchina caribou were observed moving north through Isabell Pass; it is possible some of these animals may have moved far enough north to intermingle with the Steese-Fortymile caribou. If an influx of Nelchina caribou occurred, possibly it will show up in the spring during the Steese Highway crossing.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-e Title: Characteristics of Hunter Harvest, Steese-Fortymile Area

PERIOD COVERED: August 20, 1961 to December 31, 1961

ABSTRACT

Two checking stations - one at nine-mile of the Steese Highway and the other at six-mile of the Taylor Highway - were used to collect hunter harvest information and biological specimens.

It was another poor year on the Steese Highway as far as caribou numbers were concerned, and only 40 were checked through the Steese checking station by approximately 440 hunters.

The caribou started crossing the Taylor Highway on approximately October 5, 1961, judging from hunter returns. The crossing lasted until about October 18, 1961, at which time the hunter caribou kill slumped considerably.

Approximately 1,572 hunters on the Taylor Highway killed about 1,645 caribou for a hunter success of slightly over 1 caribou per hunter.

In a Bureau of Indian Affairs sponsored caribou hunt, 180 caribou were killed by approximately 60 hunters.

Crippling loss is thought to be more than last year's but still under 10 per cent.

Residents comprised 97.1 per cent of the caribou hunters and military personnel comprised 22.2 per cent.

The main caribou kill occurred between miles 90 and 110 and also between miles 31 and 60.

Four hundred and twenty-six jawbones and 374 eyeballs were collected at the Taylor checking station.

The sex composition of the Steese-Fortymile caribou kill this year came to 52 per cent females and 48 per cent males.

The total 1961 caribou kill from the Steese-Fortymile caribou herd is estimated at 2,019.

RECOMMENDATIONS

A tagging system should be set up so that it is possible to determine how many caribou a hunter has legally killed and thus eliminate writing on the backs of the hunters' licenses. Information obtained by this system, combined with checking station data, would provide a more accurate and complete harvest record.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-e Title: Characteristics of Hunter Harvest, Steese-Fortymile Area

PERIOD COVERED: August 20, 1961 to December 31, 1961

OBJECTIVES

The objectives are to determine the total number of hunters, number of caribou taken, the distribution of the kill, and the age classification of the herd.

TECHNIQUES

Two checking stations were used to collect hunter harvest information and caribou specimens. One checking station was located at the nine-mile of the Steese Highway - just below the junction of the Steese and Elliott Highways, and was operated from August 26, 1961, through September 30, 1961. The other checking station was maintained at six-mile of the Taylor Highway from August 26, 1961, through October 22, 1961.

A single hunter information card was filled out for each car-load of hunters. At every opportunity, the lower jawbone and an eyeball were collected from the caribou.

The term "hunter," as used in this report, means anyone hunting on any particular day and checking through the checking station, but actually indicates the number of hunter-trips.

FINDINGS

Results of this year's hunt further support the statement that hunter success is dependent on the movement and distribution or availability of caribou near or across the Steese and Taylor Highways. The condition of the roads is also important by making it possible or impossible for the hunters to reach the caribou when they are available. Fortunately, this year the roads were in good condition (although the Taylor Highway was a little slippery) when the caribou were available to the hunters.

Steese Highway

Except for a few scattered bands, the caribou were again unavailable (as they were in 1960) to the Steese Highway hunters. Hunters checked through 40 caribou - 30 or 75 per cent during the first week of the season.

The hunters coming through the Steese checking station this year were not asked what particular game they were after. Therefore, those hunting on the Steese Highway were classified as caribou hunters in this report because it was assumed that they would shoot a caribou if they saw one and because normally caribou are not available on the Elliott Highway, but generally are on the Steese Highway. Using this classification, 440 caribou hunters on the Steese Highway killed 40 caribou for a hunter success of 9 per cent. The Steese checking station data are summarized in Table 1.

Taylor Highway

At the start of the season approximately 22 caribou were taken by hunters primarily after moose. These caribou (called "local" because they were seen wintering in the area) were taken away from the road (primarily around Taylor Mountain) by hunters using weasels and swamp-buggies.

During the last few days of September, a few hunters reported seeing caribou tracks and also a couple of caribou near Mosquito Fork Creek (approximately mile 62). However, it was not until approximately October 5, 1961, that the caribou really started crossing the highway in numbers.

Table 1. Steese Highway checking station.

Moose	164			
Caribou	40			
Black Bear	25			
Wolf	6			
Coyote	1			
Snowshoe Hare	344			
Spruce Grouse	987			
Ptarmigan	233			
Ducks	54			
Geese	4			
Total number of hunters		1033		
Total number of caribou hunters		440		
Resident hunters		406	or	92.3%
Non-resident hunters		32	or	7.7%
Civilian hunters		369	or	83.9%
Military hunters		71	or	16.1%
Total number of man-days hunting caribou		937		
Number of days per hunter		2.13		
Number of man-days per caribou		23.4		
Hunter success on caribou				9.1%

October 5 was a Thursday, and word of the start of the caribou crossing travelled fast. Apparently the caribou hunters, especially in the Fairbanks area, were packed, ready-to-go and just waiting for the word; during the weekend of October 7-8, the greatest numbers of hunters and caribou were checked through the station. The caribou were not crossing the highway in large numbers after October 18. Table 2 lists the game species checked through the Taylor checking station.

Hunter Success

Hunter success on the Taylor Highway in 1961 was the best it has been in recent years. Both the number of hunters (1,572) and the number of caribou killed (1,645) increased over 1960's totals - 1,404 hunters and 1,231 caribou. The hunter success amounted to slightly over one caribou per hunter. Table 2 reveals that 1,572 hunters spent 2,427 man-days to kill 1,645 caribou or 1.48 man-days per caribou, or in reverse, 0.68 caribou per man-day. Comparative figures are as follows:

1961 - 0.68 caribou per man-day
1960 - 0.59 "
1957 - 0.23 "
1956 - 0.46 "
1955 - 0.46 "

The hunter success was boosted some by a Bureau of Indian Affairs sponsored Native caribou hunt. Approximately 60 Natives from Northway, Tetlin, and Tanacross were transported by truck to the caribou crossing area (85 to 105 mile), and took 180 caribou for a limit of 3 each. The Natives were apparently quite good at picking out cows, even from young bulls, as cows comprised by far the greatest percentage of the kill.

Crippling Loss

The 1961 crippling loss appears to have been more than 1960's. More dead animals, either not found or else left behind, were seen and more crippled animals were reported by hunters this year than were seen or heard about last year. Also, with more hunters on the road there was a greater chance for more animals to be crippled.

Table 2. Taylor Highway checking station.

Moose	121
Caribou	1645
Black Bear	9
Wolf	1
Snowshoe Hare	66
Spruce Grouse	221
Sharp-tailed Grouse	29
Ruffed Grouse	10
Ptarmigan	62
Ducks	17
Little Brown Crane	1

Total number of hunters	2394	
Total number of caribou hunters	1572	
Total number of man-days hunting caribou	2427	
Number of days per hunter	1.54	
Number of man-days per caribou	1.48	
Number of caribou per man-days	0.68	
B.I.A. sponsored Native kill	180	
Hunter success on caribou	1.05	per hunter

All this indicates that the crippling loss for 1961, estimated to be under 10 per cent, is greater than 1960's estimated 5 per cent.

Hunter Residence

The Fairbanks area (including the two military bases - Eielson A.F.B. and Ft. Wainwright) supplied by far the greatest number of caribou hunters on the Taylor Highway as well as on the Steese Highway. The Tok-Tanacross area supplied most of the remaining hunting pressure. Military personnel comprised 22.2 per cent and non-residents only 2.9 per cent of the total caribou hunters. The hunter residence data are broken down and presented in Table 3.

Caribou Crossing

The greatest percentage of the caribou crossed the Taylor Highway at two areas. When the caribou began crossing the highway in large numbers, during the first week-end of October (7-8), they were crossing mainly between miles 90 and 110. During the second week-end, October 14-15, there was a good crossing of caribou around Mount Fairplay, between miles 31 and 60.

The caribou crossed more consistently between miles 90 and 110 than anywhere else along the highway, and over one-half the total caribou kill came from this 20-mile stretch of road. The checking station data show that 52.3 per cent of the caribou kill occurred between miles 90 and 110, with 37.1 per cent taken between miles 90 and 100 and 13.3 per cent between miles 31 and 60.

Biological Specimens

A good sample of lower jawbones and eyeballs were obtained from the caribou this year; 426 jawbones and 374 eyeballs were collected.

Fortunately, there was sufficient help during the two peak weekends so that the specimens could be collected without too much delay to the waiting hunters. Five Department personnel were kept busy during those two weekends. Before the Native kill

Table 3. Hunter residence - Taylor checking station.

	Number	Per Cent
Total hunters (August 26-October 22)	2394	
Resident hunters	2304	96.2
Non-resident hunters	90	3.8
Civilian hunters	2025	84.6
Military hunters	369	15.4
Fairbanks area	890	37.2
Eielson AFB	153	6.4
Ft. Wainwright	135	5.6
	1178	49.2
Tok area	647	27.2
Northway-Tetlin-Tanacross Natives	60	2.5
	707	29.7
Delta Junction	101	4.2
Ft. Greely	69	2.9
	270	7.1
Haines	56	2.3
Juneau area	58	2.4
	114	4.7
Anchorage area	116	4.9
Miscellaneous	55	2.3
Caribou hunters (October 1-October 22)	1572	
Resident hunters	1527	97.1
Non-resident hunters	45	2.9
Civilian hunters	1223	77.8
Military hunters	349	22.2
Fairbanks area	674	42.9
Eielson AFB	147	9.4
Ft. Wainwright	132	8.4
	953	60.7
Tok area	242	15.5
Northway-Tetlin-Tanacross Natives	60	3.8
Dot Lake	19	1.2
	321	20.5

Table 3. (Continued)

	Number	Per Cent
Delta Junction	64	4.1
Ft. Greely	60	3.8
	124	7.9
Haines	48	3.1
Juneau area	14	0.9
	62	4.0
Anchorage area	40	2.6
Chicken	6	0.4
Miscellaneous	30	2.0

Hunter Residence - Steese Checking Station

Total hunters (August 20-September 30)	1033	
Resident hunters	994	96.2
Non-resident hunters	39	3.8
Civilian hunters	868	84.0
Military hunters	165	16.0
Fairbanks area	732	70.9
College	72	7.0
Ft. Wainwright	106	10.3
Eielson AFB	49	4.7
	959	92.9
Miscellaneous	9	0.9
Unknown	65	6.2

was hauled away, three Department personnel spent the better part of two days removing jawbones and eyeballs from the cows only. An age classification chart is shown in Table 4.

Table 4 indicates that there are fewer calves than yearlings, but this was probably due to one or more of the following reasons: 1) probably most of the hunters, while wanting tender meat, wanted a full-grown animal and thus passed up the calves; 2) calves offer a smaller and more difficult target by being partially hidden by the larger animals in a milling or moving herd - the size of the target being important to some hunters; 3) quite a few yearlings were probably shot unknowingly or mistakenly for older cows; and 4) there are probably some hunters who prefer and can pick out yearlings. The specimen data in Table 4 also indicate that there was a much greater proportion of 7-9 year-old females taken than males.

Sex Composition of the Kill

This year's sex composition, 48 per cent males and 52 per cent females, was reversed from that of 1960, which was 54 per cent males and 46 per cent females.

On the Steese Highway 25 of the 40 caribou killed were bulls and only 15 were cows.

Until the big caribou crossing on the Taylor Highway, the majority of the kill was bulls. After the caribou started crossing the highway in large numbers and there were many hunters on the road, the kill quickly switched to more cows. This indicates a preference for cows by the hunters. Also, the way many of the hunters talked about not wanting any "stinking" bulls further indicated that cows were preferred for meat. Table 5 shows this switch from bulls to cows.

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Table 4. Age distribution of caribou jaws collected at Taylor checking station - October, 1961.

Age	Male No.	Female No.	Sex Unknown No.	Total No.	Total Per Cent
Calf	24	22	4	50	11.7
Yearling	30	36	10	76	17.8
2 yrs.	26	38	0	64	15.0
3 yrs.	27	41	0	68	16.0
4-6 yrs.	35	76	3	114	26.8
7-9 yrs.	8	41	0	49	11.5
10+ yrs.	3	2	0	5	1.2
TOTALS	153	256	17	426	100.0

Table 5. Sex composition.

	Number	Per Cent
Steese Highway		
Total caribou through station	40	
Male	25	62.5
Female	15	37.5
Taylor Highway		
Total caribou through station	1645	
Total caribou sexed	1608	
Male	765	47.6
Female	843	52.4
Through October 6, 1961		
Male	78	63.4
Female	45	36.6
October 6-22, 1961		
Male	687	46.3
Female	798	53.7
Total caribou - Steese & Taylor Highways		
Male	790	47.9
Female	858	52.1

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-d Title: Productivity of the Steese-Fortymile Herd

PERIOD COVERED: May 1, 1961 to April 30, 1962

ABSTRACT

New calves were first observed on May 17, 1961. An initial calf:adult ratio was not obtained, but a calf:adult ratio of 50:100 existed at the time of the last aerial count on May 22, 1961.

Between June 9 and June 12, 1961, 5,372 caribou were counted as they crossed the Steese Highway, and an estimated 3,900 animals were thought to have crossed. A complete sex and age breakdown of 1,976 caribou was obtained as follows: cows - 1,001 or 50.7 per cent; calves - 741 or 37.5 per cent; yearlings - 219 or 11.1 per cent; and bulls - 15 or 0.7 per cent. The calf:cow ratio was 74:100.

Calf mortality and survival to the yearling stage could not be computed because an initial calf:cow ratio was not obtained on the calving grounds in 1960, and no aerial composition counts were made prior to calving in 1961. However, the available information indicated a calf mortality of 43 per cent during the summer months.

Herd increment, in numbers, could not be determined this year.

RECOMMENDATIONS

None.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 3-d Title: Productivity of the Steese-Fortymile Herd

PERIOD COVERED: May 1, 1961 to April 30, 1962

OBJECTIVES

To obtain quantitative data regarding fertility rates, parturition and survival to the yearling age; and to determine the factors affecting these elements.

TECHNIQUES

Productivity on the calving grounds was recorded by means of aerial surveys. Ground counts made of the calving groups returning across the Steese Highway from the calving grounds and of the caribou herd crossing the Taylor Highway in October revealed calf survival.

FINDINGS

Movements and Distribution

The Steese-Fortymile caribou moved out of the Canadian wintering grounds toward the White Mountains, with probably less than half the cows arriving on the calving grounds in the White Mountains. After calving, the groups dispersed throughout the Tanana Hills for the summer. In October the herd again crossed the Taylor Highway. Detailed descriptions of these movements are presented in report W-6-R-3, Job C-3b, "Movements, Distribution and Numbers."

Calving

No calves were observed on a flight over the calving grounds.

on May 13, 1961, but 4 days later, May 17, 1961, 7 calves were observed among 123 caribou. Therefore, calving probably started sometime between those two dates, which coincides with the calving time in 1960. The data obtained on progression of calving are presented in Table 1.

Table 1. Progression of calving obtained by aerial counts.

Date	Total Count	No. Adults	No. Calves	Per Cent Calves
May 13, 1961	50	0	0	0
May 17, 1961	123	116	7	6
May 19, 1961	323	257	66	20
May 22, 1961	644	432	212	33

An initial calf:adult ratio on the calving grounds was not obtained this year because an aerial count could not be made during the peak of the calving season. At the time of the last aerial count a calf:adult ratio of 50:100 existed.

Post-calving counts at Eagle Summit showed a calf:adult ratio of 61:100 which compares favorably with the 1960 calf:adult ratio of 65:100, the highest ever recorded. Therefore, even though an aerial survey of the calving grounds could not be made during the peak of the calving period, it is felt that the initial productivity of the Steese-Fortymile caribou this year was more than ample to sustain the herd.

Post Calving - Highway Crossing at Eagle Summit

Between June 9 and June 12, 1961, 5,372 caribou, including calves, were counted as they crossed the Steese Highway. An additional estimated 3,900 caribou also crossed the highway.

During the count, the heaviest crossing occurred on June 11, 1961, and by June 13, 1961, the crossing was over. Fewer caribou were counted this year (as compared to last year-1960) because fewer cows calved north of the Steese Highway and because a full counting crew was not available at the time of the crossing.

Herd Composition

A complete breakdown into cows, calves, yearlings, and bulls was obtained on 1,976 caribou with 2,771 of the remaining counted caribou broken down into adults (1,924) and calves (847). The composition figures are shown in Table 2.

Based on the above figures, the composition for the total calving groups counted crossing the Steese Highway, including the 3,900 estimated, are presented in Table 3. A comparison with previous years is shown in Table 4.

The figures in Table 4 indicate that the Steese-Fortymile caribou herd had another very productive year. The calf:cow ratio of 74:100 compares very favorably with last year's (1960) highest record of 78:100. Survival was also very good with a yearling cow ratio of 22:100, which is the highest on record.

Calf Mortality

Because aerial counts were not made during the peak of the calving period, an initial calf:cow ratio was not obtained with which to compare the calf:cow ratio obtained at the highway crossing. Thus, we have little basis for judging early calf mortality.

A few cases of attempted and successful caribou predation were observed during the highway crossing. In the first case, a black bear was futily chasing a band of caribou; in the second case, a blonde-colored grizzly was observed in pursuit of a small band of caribou - the outcome was unknown; and in the third case, five wolves were seen to take two caribou calves.

Calf Survival to the Yearling Stage

Aerial counts were made in late September and early October 1961, but served mainly to locate the caribou before they started crossing the Taylor Highway. No aerial counts were flown in April 1962, due to bad flying weather and a crowded schedule. Most of the fall composition counts were obtained by patrolling the Taylor Highway in Department vehicles. Most counts were made between miles 90 to 110. A composition count on 1,110 caribou revealed 911 adults (including 338 bulls) and 199 calves.

Table 2. Composition of caribou crossing the Steese Highway, June 1961.

Class	Number	Per Cent
Cows	1,001	50.7
Calves	741	37.5
Yearlings	219	11.1
Bulls	15	0.7
Total	1,976	100.0

Calf:Adult ratio	61:100
Calf:Cow ratio	74:100
Yearling:Cow ratio	22:100

Table 3. Composition of total animals.

Class	Number	Per Cent
Cows	4,701	50.7
Calves	3,477	37.5
Yearlings	1,029	11.1
Bulls	65	0.7
Total	9,272	100.0

Calf:Adult ratio	61:100
Calf:Cow ratio	74:100
Yearling:Cow ratio	22:100

Table 4. Percentage composition of caribou calving in the White Mountains, 1954-1961.

Class	1954	1956	1958	1960	1961
Calves	37	32	36	39	37
Yearlings	11	11	4	10	11
Cows	51	59	60	50	51
Bulls	1	T	T	1	1
Calf:Cow ratio	73:100	54:100	62:100	78:100	74:100
Yrlg:Cow ratio	21:100	16:100	9:100	19:100	22:100

Figures suggest a summer calf mortality (June Steese Highway crossing to October Taylor Highway crossing) of 43 per cent, if the composition figures for the caribou calving north of the Steese Highway are representative of the entire Steese-Fortymile caribou herd. However, there is the possibility that the cows calving south of the Steese Highway had poorer calving conditions, resulting in either a lower calf crop than normal or an unusually high mortality at or shortly after birth. If these conditions existed, then the overall calf:adult ratio at the time of the Steese Highway crossing should have been lower; also, this would explain, in part, the apparent, extremely high summer calf mortality.

Unfortunately, due to bad flying weather and an overcrowded schedule, no composition counts were made in April, and no calf-adult ratio were obtained with which to compare the preceding spring's (June crossing) calf-adult ratio for an indication of calf mortality and survival to the yearling age.

Herd Increment

Herd increment from calving could not be determined this year, but the available information indicates that it probably was low due to the apparent high calf mortality during the year. However, the herd size may have been increased through an influx of caribou from the Nelchina herd.

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JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 5 Title: Distribution and Abundance of Kodiak Island Feral Reindeer

PERIOD COVERED: July 1, 1961 to June 30, 1962

ABSTRACT

A population of between 500 to 700 feral reindeer presently inhabits the greater portion of southern Kodiak Island from Olga Bay in the south to the Karluk River in the north. The Kodiak reindeer herd stems from an introduction of domestic stock made in the 1920's which rapidly increased to nearly 2,000 animals in the early 1940's, only to crash to approximately one quarter of that number in a few years. Aerial surveys conducted during the spring and fall served to delineate seasonal range and patterns of movement from wintering range in the north to the calving grounds in the south.

RECOMMENDATIONS

Attention should be directed to bring the large herds of feral reindeer inhabiting southern Kodiak Island under management as a game animal.

JOB COMPLETION REPORT
RESEARCH PROJECT SEGMENT
FEDERAL AID IN WILDLIFE RESTORATION

State: Alaska

Project No: W-6-R-3 Name: Alaska Wildlife Investigations

Work Plan: C Title: Caribou Investigations

Job No: 5 Title: Distribution and Abundance of Kodiak Island Feral Reindeer

PERIOD COVERED: July 1, 1961 to June 30, 1962

OBJECTIVES

To obtain information concerning the abundance and distribution of feral reindeer herds on Kodiak Island.

TECHNIQUES

This job attempts to assess the status and distribution of Kodiak Island feral reindeer herds through aerial reconnaissance. In order to evaluate seasonal movements,two aerial surveys were flown during fiscal year 1962. The initial survey of four hours duration was flown in October and a follow-up flight of four hours was made in April. As a result of these two flights and information supplied by personnel of the Kodiak National Wildlife Refuge, the identification of winter and spring ranges was possible. In addition, the survey flown during April served to delineate calving grounds in the vicinity of Olga Bay.

FINDINGS

Pre-Calving and Calving Movements

Movements away from wintering grounds usually begin in late February and early March with a gradual drift of animals into the Olga Bay area. Observations in April indicate the shift from winter to spring range is completed early in that month,at which time much of the calving segment can be found throughout the "traditional" calving grounds, which comprise approximately 40 square miles of tundra between Olga Bay and the Pacific Ocean.

Usually by the second week of April segregation of the sexes and age classes has occurred and the parturient cow segment has moved onto the calving grounds. During this period non-calving animals are found scattered throughout the southern portion of the range.

An aerial survey of calving grounds flown on April 24, 1961, indicated 111 cows with calves suggesting that the peak of calving that year had occurred by this date.

The entire shift of animals from their winter range to the calving grounds seldom exceeds more than 35 to 40 air miles and as such is not considered a migration in the normal use of the word.

Post-Calving Movements

By late May the calving segment has usually been joined by bulls and non-calving females and the herds are again heterogeneous in composition. Data regarding summer movements are few but suggest that a gradual shift of animals from the calving grounds commences by June.

Pre-Rut Movements

Early in June the reindeer begin to bunch and move in the direction of their wintering grounds some 30 to 40 miles northward. This shift from the calving grounds to the winter range requires most of the summer and early fall. During this period the rut has commenced.

Post-Rut Movements

By the middle of September all reindeer had departed the summer range and were well on their way to their winter range in the north. A reconnaissance flight was flown the second week of October 1961, and at that time five herds totaling 460 animals were observed in the Red River System - Halibut Bay areas, indicating the major segment of the population had reached their wintering grounds by this date. During the same flight an additional 123 animals were noted in scattered bands throughout the lower Red River watershed.

No observations were made of reindeer movements between November and early March, but information supplied by personnel of the Kodiak National Wildlife Refuge indicates that the major

portion of the reindeer population remains in the Red River, Halibut Bay, and Sturgeon River areas throughout the winter, only to begin their southern movement sometime in late February or early March.

Populations

On the basis of observations made during aerial surveys of southern Kodiak Island and information provided by personnel of the Kodiak National Wildlife Refuge, it is believed safe to assume that a population of feral reindeer numbering between 600-700 animals presently occupies the southern portion of Kodiak Island.

The present population of feral animals stems from an introduction of domestic stock made in 1921 which rapidly increased until early in the 1940's when nearly 2,000 animals were reported, only to crash a few years later to a level approximately one quarter that number. The decline of Kodiak reindeer herds during the latter 1940's perhaps results from damage to the sedge range by a population that had greatly exceeded the carrying capacity of the range resource. Information provided the writer indicates that a somewhat stable population of between 500 and 700 animals has occupied southern Kodiak Island since the decline in the late 1940's. Data regarding herd recruitment are not presently available to indicate any recent change in population status.

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