

WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE: Alaska

PROJECT NO.: W-6-R-5 TITLE: Alaska Wildlife Investigations

WORK PLAN: C TITLE: Caribou Investigations

JOB NO.: 1, 2, 3, 4, 5, 6, & 8

PERIOD COVERED: May 1, 1963 to December 31, 1963

OBJECTIVES

JOB 1: Population Status.

To survey each head in Alaska periodically to determine its status in terms of total size and current calf crop.

To evaluate annually Alaska's caribou population in terms of total numbers, productivity, mortality, and general condition of the animals and range, utilizing the information obtained from all studies.

JOB 2: Distribution and Movements.

To record the distribution and movements of caribou.

To provide current information regarding caribou distribution for public dissemination in the best interest of the hunting public.

To determine the main summering, wintering, and calving grounds.

JOB 3: Productivity.

To obtain information regarding the sexual cycles, breeding behavior, fertility and natality rates, and growth of the fetus and calf.

To determine the factors affecting productivity within and between herds, in relation to population size, body condition, and range quality.

To evaluate the relationship of antler growth, velvet shedding, and antler shedding to the sexual cycles and to body conditions, in order to develop field indices to fertility.

JOB 4: Hunter Harvest and Natural Mortality.

To determine the magnitude and composition of the hunter's kill.

To identify and evaluate the various mortality factors affecting caribou populations.

JOB 5: Population Structure.

To determine what differences may exist in the population structure of caribou herds at different levels of abundance.

To evaluate the changes taking place in the sex and age composition of a population due to differential mortality and fluctuations in total numbers.

JOB 6: Analysis of Range.

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

To determine quantitatively a) the relative distribution of the major plant communities on the Nelchina caribou range, and b) the distribution of lichens within those communities.

To make a preliminary range survey of the Alaska Peninsula as a base for future more intensive work.

JOB 8: Caribou Inventory.

To determine the distribution and relative abundance of caribou on a statewide basis and to classify them according to herds and home range and determine the status of each.

METHODS

An attempt is made each year to assess Alaska's caribou populations in relation to total size and current productivity. Emphasis has been placed on the Alaska Peninsula, Arctic, Fortymile, and Nelchina herds. The population assessments resulted from an analysis and synthesis of data obtained from all the caribou studies. Information concerning current productivity was obtained this year for the Arctic and Nelchina herds by means of aerial counts of calves, yearlings, and parturient cows during the calving period, May 25 - June 5.

Information regarding the distribution and movements of Alaska caribou was obtained from a variety of sources. Aerial flights supplied most of the data, which was recorded on specified forms distributed to all Alaska Department of Fish and Game personnel, to members of the U. S. Fish and Wildlife Service, and to various bush pilots and guides. Additional information was obtained from talks with local residents in certain areas. The data recorded included the observation date, specific area involved, relative caribou numbers seen, presence or absence of calves (to indicate which segment of the herd was represented), direction of movement, activity (feeding, calving, etc.) and the estimated length of time the animals had been in the area. Specific periodic flights were made in the Nelchina area to determine range use. In order to derive the greatest benefit from the range work being done, it is necessary to know the distribution of the main segments of the Nelchina herd throughout the year. These observations reveal the intensity of use to which certain portions of the range and certain plant communities are being subjected. In addition, prior to and during the hunting season periodic flights were made to provide the Regional Game Supervisors with current information regarding the whereabouts of the Fortymile and Nelchina caribou.

Productivity data were obtained for the Arctic and Nelchina herds by means of aerial counts made during the calving period. An extensive effort was made this year to obtain testes from Nelchina bulls during the August 1 to October 31 period. Most of these specimens were collected from hunter-killed animals, but a few animals were collected by Alaska Department of Fish and Game biologists in order to fill in obvious gaps. The main purpose of this study is to determine the spermatogenesis cycle and sexual maturity of bull caribou. Quantitative information regarding other manifestations of the rut was also obtained, i.e. shedding of velvet and of antlers, liver conditions, fat reserves, body weights, and sexual behavior, all to be correlated with the spermatogenesis cycle. It is hoped that in 2 - 3 years enough data will be accumulated for a complete description of the breeding biology of the caribou male.

This year the obtainment of mortality data was limited pretty much to an evaluation of the hunter harvest. Hunter-check stations were operated in the Nelchina and Forty-mile areas to obtain information on the magnitude, composition, aerial distribution, and chronology of the annual harvest. Various specimens were collected from the caribou killed, including testes and female reproductive tracts, blood samples (brucellosis tests), and mandibles (age-ratio data). To obtain an estimate of the kill in the Arctic herd the residents of northwestern Alaska were asked to record their kills on calendars supplied by the Alaska Department of Fish and Game for the 1963-64 hunting period -- about August 1, 1963 to April 30, 1964. Each village was contacted by an Alaska Department of Fish and Game representative, and meetings were held with the village council members and interested hunters to explain the caribou program.

Population structure data were obtained primarily from the examination of hunter kills. Mandibles were collected at hunter-check stations to provide a means for estimating the age-composition, the aging being done by the tooth-development-and-wear method. Residents of northwestern Alaska were asked to cooperate by saving the lower jaws of all the animals they killed. Department personnel collected these jaws during later visits (March, 1964). Past collections of mandibles from the Arctic, Fortymile, and Nelchina herds were re-examined to provide a more meaningful picture of herd composition.

A preliminary range survey of the Alaska Peninsula was made to provide a basic knowledge for more intensive work in the future. This range is of interest because of the scarcity of lichens, which are thought to be a necessary component of good caribou habitat. Thus, a comparison between this one and the Nelchina range, for example, might well provide some insight as to the relative role of lichens, as compared with other forage plants, in the biology of the caribou. Aerial reconnaissance flights were made along the Bering Sea side of the Aleutian Range between King Salmon on the north and Port Moller on the south. The Pacific Ocean side was examined between Wide Bay and Chignik. These flights permitted the identification of the major vegetation types present, and provided some knowledge as to their distribution and extent. In addition, numerous on-the-ground inspections permitted an evaluation of the patterns of plant succession, the floristic composition, and the environmental conditions within these main types. Detailed observations of the vegetation were recorded by means of a portable tape recorder.

In the Nelchina area the main range studies continued. Once again all the permanent range enclosures were checked during the summer and repairs were made where needed. In the fall the task of determining the distribution of the major plant communities was finally completed. The autumnal color change in the vegetation results in these

communities being readily discernible from the air due to their contrasting colors. For example, the willow leaves turn bright yellow and the dwarf-birch, reddish brown; thus, the willow-lined drainageways stand-out conspicuously amidst the dwarf-birch vegetation stands. This color contrast, together with his knowledge of the vegetation types, permitted the writer to use a system of aerial transects across the Nelchina range to provide the data needed for this determination. First, an east-west and a north-south base-line were established, using U. S. Geological Survey quadrangle maps. Twenty-mile segments were designated along each base-line, and each segment was divided into twenty points, each one mile apart. In each segment, one of the twenty points was chosen (by use of random numbers) as the starting point for a transect lying perpendicular to the base-line. These transects were drawn onto 1:250,000 maps of the area, and were flown by two Alaska Department of Fish and Game personnel in a Piper "150" Supercub. As the observer flew along a transect, every 15 seconds he recorded the vegetation type occurring at a point on the ground determined by sighting along two fixed points on the airplane (cockpit and strut). The two sets of data so obtained -- north-south transects and east-west transects -- provided a quantitative measure of the distribution of the major plant communities. The time of passing certain landmarks was recorded on the maps in order to provide a measure of ground speed, and so permit the actual plotting of each point on the map. Thus, to certain extent the actual locations of the major communities were determined as well.

The caribou inventory job seeks to identify the caribou herd(s) ranging a given area and to assess each as to home range, total numbers, and current productivity status (based on calf and yearling counts). Three areas remain to be investigated: Mulchatna-Rainy Pass, Chisana-White River, and upper Kuskokwim River. No work was done on this segment of the caribou studies this year.

FINDINGS

Alaska Peninsula Herd

This herd consists of two segments, one occupying the area north of Port Moller and the other, the area south, including Unimak Island. At present the main population ranges the northern portion of the Peninsula, between Port Moller and the Naknek Lake and River system. A census by the Alaska Department of Fish and Game in June, 1960, indicated a population of 7,000 animals to the north of Port Moller. Since then, with good calf crops and mild winters, the herd has increased steadily and is now estimated at 11,200 animals.

The other segment of the population was censused recently by Refuge personnel of the U. S. Fish and Wildlife Service. The current minimum estimate for caribou south of Port Moller is 1,000 animals, divided between the mainland and Unimak Island. According to Bob Jones, Refuge Manager of the Aleutian Islands National Wildlife Refuge, caribou commonly swim back and forth across Isanotski Strait during the year.

This herd is becoming increasingly important for recreational hunting. In recent years, large record-size trophies have been taken, and there is an ever increasing interest in the area by guides and non-resident hunters. The opportunity to bag trophy-class caribou, moose, and brown bear offers good incentive to sports hunters. Although the total kill during the 1963-64 season was estimated at only 400 animals,

it is expected that the annual harvest will increase rapidly in future years as more and more hunters utilize the area. At present, the herd appears to be in excellent condition, judging from the examination of carcasses and from the relatively high proportions of calves and yearlings present.

In view of the increased importance of this herd to recreational hunters, it would seem advisable to step-up the research studies in this region. Better information is needed regarding the annual productivity and extent of natural mortality. It has long been recognized that this caribou population ranges an area where forage lichens are exceedingly scarce. Many people have thought that lichens are essential to caribou, yet here is a population that seems to exist with a minimum of such food. For this reason it was decided to initiate a range study on the Alaska Peninsula, for comparison with a more "normal" type caribou range such as the Nelchina. As such, a preliminary survey was made during August, 1963, the results of which follow.

Alaska Peninsula Caribou Range Survey

The Alaska Peninsula extends southwestward for nearly 450 miles, lying approximately between 55 and 59 degrees North Latitude. The northwest shore of the Peninsula shelves off into the shallow Bering Sea, forming a lowland coastal plain with a comparatively even coastline. The northern half of the Peninsula is dotted with many lakes of varying size while the land adjacent to Bristol Bay is flat and poorly drained. Further inland the coastal plain rises to the rugged volcanic Aleutian Range, with peaks up to 8,000 feet, which extends the entire length of the Peninsula, and, on the south breaks off into the deep waters of the North Pacific. The Southeast shore of the Peninsula, unlike the north, is characterized by a rugged coastline with many deep bays along its entirety.

The vegetation that typifies the Alaska Peninsula becomes evident south of the Naknek River system. From the east, Sitka Spruce, Picea sitchensis, extends to its westernmost limit in the region above Becharof Lake. South of the Naknek River the area adjacent to Bristol Bay is poorly drained and supports a vegetation matrix of heath tundra, sedge meadow, and willow thickets. As the land rises to the eastward, the heath tundra becomes dominant in many of the better drained areas, while willow-grass and/or alder-grass communities become abundant. On poorly drained sites sedge meadows occur while a riparian shrubland of willow is found along most water courses. A complex shrub/grassland or a grassland/forb complex extends throughout the Aleutian Range to an elevation of approximately 1,200 feet, where it is replaced by an alpine heath frequently dominated by Empetrum nigrum or Dryas sp. Above 2,000 feet elevation the heath generally gives way to areas devoid of vegetation, although in the vicinity of Mount Veniaminof, Aniakchak Crater and Mount Peulik extensive barrenlands occur at all elevations.

The zonal differentiation of the vegetation of the Alaska Peninsula is complex, but the flora does, however, fall into fairly well defined vegetation types based on physical environment. Transition gradients between types occur throughout the region giving rise to an often complex mosaic of plant associations. Five major vegetation types were recognized, based chiefly upon the dominant vascular plants present: 1) Sedge, 2) Heath, 3) Grassland, 4) Shrub, and 5) Woodland. A general description of each of these is presented on the following pages, together with descriptions of various sub-types and important plant species.

Sedge. -- Widely distributed throughout the poorly drained coastal plain adjacent to Bristol Bay, the Sedge type constitutes a major segment of Alaska Peninsula vegetation. The type reaches the greatest development to the north and to the east of Port Heiden where extensive marsh and tundra meadows occur. Within this type occur three recognizable subtypes representing a sere from a pure Carex marsh to a complex dry sedge meadow.

The sedge marsh subtype occurs most commonly in the Port Heiden region. It is characterized by a lush emergent growth of Carex aquatilis in standing water, and is thought to represent the pioneer stage within the Sedge type.

The wet sedge meadow subtype represents a tundra meadow vegetation that usually is flooded for a portion of the year. This community occupies low, poorly drained, generally flat expanses with a variable plant cover. Various species of Carex, Eriophorum, Juncus, and Parnassia are the main constituents.

The dry sedge subtype occupies better drained sites than either of the preceding and is thought to represent a gradient or transition between the Sedge and Heath types. The lower areas generally are covered with dense moss, while sedges of the genera Eriophorum and Carex and the rushes Juncus are conspicuous. Higher areas or mounds occur in this formation and support such woody species as Ledum decumbens, Betula nana, and Empetrum nigrum.

Heath. -- The Heath type covers vast areas of the Peninsula and is typically found throughout the better drained, well developed soils from sea level to nearly 2,000 feet elevation. At the lower elevations, along the coastal plain, where it is the dominant type, the prevailing species comprising the tundra heath include Empetrum nigrum, Vaccinium vitis-idaea, Betula nana, Arctostaphylos uva-ursi, and Loiseleuria procumbens. At the higher elevations Empetrum, Cassiope tetragona, Phyllodoce sp., and Dryas sp. appear to be the dominants of the alpine heath. Five subtypes representing simple to complex communities were recognized within the heath type.

The Empetrum mat subtype is the simplest of several communities within the Heath type. It is dominated by a single species--Empetrum nigrum--and is believed to represent the pioneer stage in the early development of the heath matrix. By far the most common constituent of the Heath, it forms nearly continuous mats over much of the tundra and scattered mats throughout much of the alpine of the Aleutian Range.

The Empetrum complex subtype represents the next stage of advance in seral pattern, apparently arising with the further development of the tundra soils. The plant composition of this complex consists primarily of low ericaceous plants, dominated by Empetrum nigrum. Ledum decumbens, Betula nana and Spiraea beauverdiana are the taller elements, with Empetrum, species of Vaccinium, mosses, Rubus chamaemorus, R. pedatus, and Arctostaphylos uva-ursi, plus a number of forbs, comprising the lower elements.

The heath-dwarf-birch subtype is found commonly throughout much of the coastal plain tundra. This community is characterized mostly by low mats of Empetrum and Betula nana. Occasionally low forms of what appears to be B. pencaica occur. This subtype appears to be intermediary between the simple Empetrum mat and more complex heaths. It is most prevalent in the Mother Goose and Ugashik Lakes region.

The heath-grassland-forb-complex occurs on well drained, well developed tundra soils where it forms a mosaic of heath vegetation intermixed with a variety of perennial forbs and grasses. It is typified by dense mats of Empetrum interspersed with Vaccinium vitis-idaea, Arctostaphylos uva-ursi, Rubus chamaemorus, and occasional R. pedatus and Spiraea beauverdiana. Festuca, Agrostis, and Agropyron, along with a variety of perennial forbs, have invaded the typical Empetrum mat. Continued succession beyond this stage appears to be in the direction of a grassland prairie, although the successional pattern throughout the coastal plain has not yet reached this point. Without quantitative data it is impossible to make more than a conjecture of what the change will be.

The Dryas mat subtype occurs in the alpine regions, usually above 1,200 feet elevation, and is thought to be characterized by nearly continuous mats of Dryas sp. in which perennial forbs, a few grasses, and prostrate shrubs are scattered. In the lowland reaches of this vegetation a few important species found scattered include Rhododendron kamschaticum, Loiseleuria procumbens, Silene acaulis, Cassiope tetragona and Phyllodoce sp. No ground observations of the alpine areas were made, but aerial observations suggest that essentially pure stands of Dryas sp. (probably D. octopetala) comprise the extensive, low vegetation mats.

Grassland. -- As the coastal plain rises eastward the tundra heath is gradually replaced by extensive foothill grasslands--some simple in floristic composition, others representing a complex matrix of grasses, perennial forbs, and deciduous shrubs. In addition to the interior grassland types a prominent grass-forb association occurs along a narrow coastal fringe of Bristol Bay. Within this type, three subtypes are recognized.

The beachgrass-forb subtype occupies a narrow strip along the Bristol Bay coast and comprises the vegetative cover between high water and the coastal tundra. It is characterized by grasses, sedges and certain halophytic forbs including species of Lathyrus, Rumex, Astragalus, and Arenaria. The most conspicuous grass is Elymus mollis. Other grasses that occur are Hordeum nodosum and species of Glyceria, Agrostis, Poa, and Calamagrostis. The soil of the beach fringe is generally deep, well drained, and wind-blown, containing little organic matter. The initial phase of vegetation succession in this type appears to be an association of Elymus mollis and a variety of perennial forbs. As the soil builds these species are generally replaced by the invasion of Empetrum nigrum and Sphagnum sp. The trend of this successional pattern is apparently toward the surrounding tundra heath.

The Calamagrostis subtype, forming extensive stands of often rank vegetation (Calamagrostis canadensis), occurs throughout the developed and better drained soils of the Aleutian Range where it comprises, together with other associations, one of the major vegetations of the Alaska Peninsula. On many sites this type forms a complex Alnus/Calamagrostis/Heracleum association. In the many areas of the Alaska Peninsula where an Alnus crispa "die off" was observed, pure stands of Calamagrostis canadensis appeared to be invading.

The Calamagrostis-forb complex occupies much of the midland slopes of the Alaska Peninsula where, together with the Alnus shrub association, it comprises the dominant vegetation of the mountainous regions of the Alaska Peninsula. Important components of this complex are Calamagrostis canadensis and a variety of forbs including Epilobium angustifolium, Geranium erianthum, Heracleum lanatum, and species of Lupinus, Potentilla, Angelica, Rumex and Saxifraga.

Shrub. -- A shrub vegetation of alder and a variety of willows occupies extensive areas within the treeless reaches of the Alaska Peninsula. South of Becharof Lake overstory vegetation is in the form of deciduous shrub thickets. Alder (Alnus crispa) is particularly prevalent on the mountain slopes while willow (Salix spp.) occurs more commonly in the valley bottoms, on glacial moraines, and along water courses. Low willows and alders mixed with stunted birch (Betula kenaica) form a dense vegetation along many stream margins of the northern part of the Peninsula. Frequently the river valleys broaden at their mouths and Salix spp. and Populus balsamifera predominate with a dense understory of grass.

Woodland. -- In the region to the north of Becharof Lake a spruce forest formation is common and generally widespread throughout the drier uplands. The understory consists of a heath/lichen complex with Ledum decumbens, Cladonia alpestris, and dwarf birch abundant and widespread. In some areas spruce occurs in fairly compact, dense stands. South of Becharof Lake the woodland type is characterized by well developed stands of poplar Populus balsamifera which most commonly occur in the Mother Goose Lake region on deep-soiled, glacial moraines. The woodland type must be considered as a minor component of Alaska Peninsula's vegetation.

Arctic Herd

This caribou population presently is at a high level and is well distributed throughout much of northwestern Alaska. The main wintering grounds lie to the south and extend from the Waring and Baird Mountains eastward to the Wiseman area. During the winter of 1963-64, however, the herd extended farther south and east than they have for years. Segments of the herd wintered at the base of the Seward Peninsula, on the drainages of the lower and middle Koyukuk River, and in the mountains south-east of Bettles between the Koyukuk and Yukon Rivers. Elements extended eastward as far as Venetie on the lower Chandalar River. The main calving grounds are located along the upper portions of the Colville and Utukok Rivers. In summer, the animals spread out over a wide area extending from Cape Lisburne on the west to the Colville River on the east, generally on the north slopes of the Brooks Range but northward occasionally to Point Barrow and commonly to the Arctic Ocean shore west and east of Barrow.

The population probably is approaching a peak at this time. The actual size of the herd is difficult to determine, but based on the high kill during the 1963-64 hunting period the herd has been estimated at a minimum of 300,000 animals.

Distribution and Movements

Information regarding the movements of this herd during 1963 was obtained from personal observations on aerial reconnaissance flights, from talks with local residents, from bush pilots, and from various Alaska Department of Fish and Game personnel working in the area. The main wintering grounds in 1962-63 encompassed the lower drainages of the Kobuk River, notably the Waring Mountains and western Baird Mountains. Considerable numbers also wintered farther east, along various drainages of the upper Koyukuk River. By late April the spring movement was in full swing, and, as has been the pattern in past years, the animals moved north through the DeLong, Baird, Schwatka, and Endicott Mountains along various drainageways. In the west, the main routes passed along the Kugururok and Nimiuktuk Rivers; a large part of the central movement passed through Howard Pass; and, in the east, a large movement occurred along the Anaktuvuk River and parallel drainages. The magnitude of the eastern movement suggested that many more caribou wintered east of Bettles than had been supposed. Most of the herd was north of the Brooks Range by mid-May.

This year the main calving occurred north of Lookout Ridge, from the Ketik River eastward. Relatively few animals were observed along the upper Utukok and Colville Rivers, an area long recognized as the main calving grounds. According to Peter Lent, who was present in the Arctic during the mid-May to late-June period, the main herd never did pass through the Utukok River area as he had expected from previous years' work. As a result, his research effort that spring was rather inhibited. The writer and Bob Burkholder of the U. S. Fish and Wildlife Service were based at No Luck Lake until mid-June and were able to reach the calving groups via airplane.

Little is known about the post-calving movement other than the animals did not enter the foothills of the Brooks Range via the usual route along the Utukok River. It is quite likely, however, that the calving segment did move south along drainages farther to the east. It is customary for a large portion of the cows and calves to range the foothills and upper slopes of Brooks Range during early and mid-summer. The other animals, particularly the bulls, commonly roam the coastal plain between the Chukchi Sea on the west and the Colville River on the east. During early summer there is usually a strong westward movement into the DeLong Mountains and a return. This may be followed by a northward movement onto the coastal plain before the general southward migration takes place in late fall. No information was obtained regarding these summer movements during 1963.

By early October the southward movement toward the wintering grounds was in full swing. A large number of animals moved along the Chukchi Sea coast from Point Hope to Kotzebue. Many others funneled into the coastal movement via the lower Noatak River. Strong movements also occurred along the Ambler and Alatna Rivers and through Anaktuvuk Pass and adjacent drainageways. The main movements occurred during November and December, but caribou were accessible to the residents of the coastal villages from October to February, and thus a rather large kill occurred. By late January, 1964, the herd was pretty much settled on the wintering grounds, which extended from the base of the Seward Peninsula eastward as far as Venetie on the lower Chandalar River. The enormous area utilized by the herd that winter reflects well the huge size of the population.

Productivity

Information regarding the natality rate of the Arctic herd was obtained from the examination of carcasses in the Anaktuvuk area during April, 1963, and in the upper Colville River area during early June, 1963. Of 67 cows 2-years and older, 54 (81 percent) were pregnant. The April data included 58 such cows, 45 (78 percent) of which were pregnant. The latter probably is more valid, because cows taken on the calving grounds are much more apt to be parturient cows rather than non-pregnant ones. In either case, the natality rate does compare favorably with the Nelchina herd (82 percent pregnancy). The slightly lower percentage obtained in the Arctic herd very possibly reflects the general poor condition of the animals, and the presence of a rather high incidence of brucellosis.

A two-man field crew, comprised of the writer and Burkholder of the U. S. Fish and Wildlife Service, spent the May 21 to June 7 period along the upper Colville River. From a base camp at No Luck Lake, the two men attempted to assess the calving dynamics of the Arctic herd. Unfortunately, most of the work had to be done from the air, because very few landing spots were available on the extensive Eriophorum-covered slopes of the main calving areas. Significant data concerning the calving were obtained, however, and these are presented in Table 1.

TABLE 1

RESULTS OF CARIBOU COUNTS TAKEN ON CALVING GROUNDS OF ARCTIC HERD,
MAY-JUNE, 1963

A. Upper Colville River: 5/26-27/63.										
Total Animals	Cows 2-yrs+ and Bulls 2-yrs				** Yearlings		Bulls 3-yrs+		Remarks	
	w/ antlers		w/o antlers							
	No.	%	No.	%	No.	%	No.	%		
1,003	730	72.8	273	27.2	-	-	-	-	Yearlings and adult bulls comprise an <u>additional</u> 21%.	
813	-	-	-	-	162	19.9	12	1.5		

B. Ketik River: 6/2 and 6/7/63.										
Date	Total Adults Animals 1 yr+		Parturient Cows		Calves				Remarks	
			No.	% of Adults	% of Total Animals	% of Total Adults	% of Cows			
6/2	2,462	2,227						*1,196	53.7	235
6/7	2,351	1,582	1,026	64.9	769	32.7	48.6	75.0		
* 48 w/o antlers.										

C. Ketik River: 6/2-7/63.										
Total Cows w/ Calves	Cows w/ Bloody Perineums				Total Dead Calves		Cows w/ Calves 2 days old	Cows w/ Bloody Perineums		
	% of		w/Dead Calves	% of		No.		%		
	No.	Total		No.	%				No.	Total Cows
1,873	107	5.7	27	25.2	46	2.5	314	62	19.7	

** Counts taken on May 1, 1963, along Noatak River indicated that about 40 percent (52 of 127 animals tallied) of the animals south of the Noatak were yearlings; this indicates that yearling proportions on the calving grounds are not likely to be a true representation; in addition, of 31 yearlings checked closely only 1 still carried last year's antlers.

Aerial counts made on May 26-27, 1963, indicated that about 73 percent of the animals 2-years and older were parturient cows. The remaining 27 percent consisted of non-parturient cows (mostly the new 2-year olds, yearlings during the last breeding season) and of 2-year old bulls. Yearlings and adult bulls were tallied separately and these comprised about 20 and 2 percent, respectively, of the animals in the area covered.

An interesting phenomenon was detected once the calving started. It was noted that some of the cows apparently were having trouble at parturition, as reflected by the presence of various amounts of retained placental membranes and/or bloodied perineums. In the extensive calving studies of the Fortymile and Nelchina herds the writer had never observed this problem to occur. In a normal birth there is relatively little blood and the placental membranes are shed rapidly. The writer has had the opportunity to observe two births in the Nelchina herd and one in the Arctic, and has observed 28 cows within one-half hour of parturition, and in every case the membranes had been shed completely (believed so) and there was little evidence of blood on the perineum. These "abnormal" post-partum cows had a large percentage of the perineum covered with blood, and some had most of the placental membranes dangling from the vaginal opening. An examination of the carcasses of five cows having retained placental membranes (animals collected for examination) showed that the chorion was still firmly attached to one or more of the cotyledons. In two of the cows an infection of the uterus appeared eminent.

Believing the occurrence of bloodied perineums to be significant, the writer then sought to obtain some quantitative data. Aerial counts provided the means for obtaining the percentage of post-partum cows having this problem. As indicated in Table 1C, this percentage approximated 6 (107 of 1,873 cows tallied). In this count, however, were cows which had dropped their calves 1-2 weeks previously, and so may have retained their normal appearance. A tally then was made of only those cows with calves less than 3-days-old. In this group it was found that about 20 percent (62 of 314) of the cows had bloodied perineums. This percentage is thought to represent the actual proportion of parturient cows in the Arctic herd that were having trouble at parturition with retained placentae. In addition, of 107 such cows the calves of 27 had died--a percentage of 25, compared with the overall calf mortality of 3 percent (46 dead calves/1,873 cows-with-calves).

In summary, the data showed that about 20 percent of the Arctic herd parturient cows had retained placentae to some degree, and that about 25 percent of the calves born to these cows died. The reason for this phenomenon is not clear at present. At first brucellosis was thought to be the cause, but only 4 of 10 animals with retained placental membranes were found to have positive blood titers for that disease. The writer now believes the problem to be the result of poor nutrition, perhaps a vitamin-A deficiency resulting when lingering snows in the spring inhibit the new vegetation growth and force the caribou to subsist on less nutritious forage. More work is needed to check-out this intriguing problem.

The progression of calving seemed consistent with past years' observations by Peter Lent. Two counts of parturient cows (those with antlers and/or with calves) along the Ketik River indicated that the peak occurred sometime between June 2 and June 7 (see Table 1B). The calf: parturient-cow ratio probably reached 50 percent about June 5, in that segment of the herd. Because the entire calving segment of the Arctic herd was not under observation, it would be difficult to pin-point the calving peak for the entire herd. The Ketik River segment could easily have peaked earlier or later than the average. The calf crop probably compared favorably with that observed

for other herds, but minus the 5 percent additional mortality suggested by the retained placentae ($.25 \times .20 \times$ total calf crop).

Hunter Harvest

Caribou in the Arctic are normally killed in the greatest numbers when they are readily accessible from villages during their southward migration in the fall and the northward migration in the spring. Some years they are available to certain villages during the winter. This occurred during the winter of 1963-64 when they remained in the lower Noatak-lower Kobuk region through much of the winter and were available to hunters from villages in this area and from Kotzebue. As has been the case since 1956 there was no limit in the Arctic on the number of caribou an individual hunter could kill. Because caribou were available for an extended period and because there was no restriction on the number which could be killed, the total kill was fairly high, an estimated 20,000 in 1963 and an estimated 5,000 for the first 4 months of 1964. The method of obtaining 1963-64 harvest data, whereby native hunters were left calendars for the fall, winter, and spring months on which to record daily kills, was judged to be only fair. Some hunters did not fill out calendars either because they did not want to or forgot about them. Others apparently filled out calendars just prior to their being picked up. The total harvest for the year was estimated at 25,000 animals.

Population Structure

A total of 235 lower jaws was collected from the villages of Selawik, Shungnak, Noorvik, Kobuk, Kivalina, Kiana, and Noatak. The age data obtained from these jaws have been analyzed in the caribou segment report for W6R6, combined with data from other sources. Suffice it to say here that there is an indication of a low proportion of young animals (1-2 year-olds) in the population, which suggests poor survival of calves since the 1961 calving season. More data are needed to confirm this suggestion, however, because of a possible bias by the native hunters in selecting their animals.

Status

It has not yet been determined whether the population is increasing, decreasing, or remaining static. Although the calf crops have been considered high in recent years, there is an indication that calf survival to the yearling stage may be low. Seasonal calf counts are needed to supply this information. It has been found that a rather high degree of morbidity exists in the herd, including the prevalence of brucellosis and foot rot. In addition, the residents of Anaktuvuk generally agree that the animals killed by them are in poorer condition (less fat reserves) than those killed a few years ago. This observation is considered significant, because these Eskimoes are particularly observant and they utilize all the fat in the animals they kill. The lack of fat reserves suggests poor nutrition. On the other hand, there is no indication of serious range depletion. Extensive stands of lichens are present along the Kobuk River, and farther south, and summer forage seems unlimited. The vast stands of Eriophorum vaginatum on the north slopes of the Brooks Range might also provide winter forage. More detailed work is needed regarding this herd before the answers can be obtained.

Fortymile Herd

The population of this herd has fluctuated over the past ten years, presumably due to major movements into and out of the region. Poor calf survival during the three years 1956-58 was also a factor. The traditional wintering grounds extend from the Fortymile area of Alaska eastward into the Ogilvie Mountains north of Dawson and southeastward into the Sixtymile River area. In the Ogilvies, the Fortymile caribou frequently are in contact with animals of the Porcupine herd, which ranges northeast Alaska and adjacent Yukon Territory. It is known that during some springs large numbers of Fortymile caribou move north with the Porcupine herd. Such a movement occurred in 1957 and another, in 1964. It is the writer's opinion that a rather frequent interchange may occur between these two herds during the September to May period. Such an interchange would explain in part the "sudden" appearance of a few thousand animals in the Circle district, as has happened in the recent past, when the main groups were thought to be far to the south. Unfortunately the aerial reconnaissance work during the past ten years has not covered the Canadian part of the range to adequately document the population shifts that probably are occurring.

Movements and Distribution

The bulk of the herd wintered to the south of Dawson and to the east of the Yukon and White Rivers during 1962-63. In early April the calving segment was moving northwestward through the Fortymile area as expected. The main calving grounds lay southeast of the Steese Highway along the upper drainages of the Chena and Salcha Rivers. After calving, the herd remained scattered over the high country encompassing the upper portions of the Chena, Salcha, Charley, Goodpaster, and Fortymile Rivers.

In early September, a movement to the southeast commenced, with many moving across American Summit and across the Yukon River into Canada. Presumably only a small proportion of the herd took part in this early movement, however, for at the end of September the movement had reversed and long lines of animals were observed by the writer and Jim Whelan to be heading northwestward toward the Steese Highway. The main segment moved across the head of the Seventymile River, crossed the middle portion of the Charley River, and continued down the ridges west of the South Fork of Birch Creek. Relatively few animals reached the Steese Highway, however, for the movement swung to the southwest along the ridges between Birch Creek and the highway, and finally reversed and returned to the southeast across the upper Chena and Salcha Rivers.

A few thousand remained to winter along the upper drainages of the Goodpaster River and of the middle fork of the Fortymile River. The bulk of the herd continued eastward into Canada and wintered in the Ogilvie Mountains north of Dawson.

Productivity

Information on the 1963 calf crop was not obtained. General observations of caribou bands during aerial reconnaissance flights, however, indicated that calves seemed to be present in approximately normal proportions (i.e. about 20 percent of the total herd in early October). An extensive calving ground study was planned for late May, 1964.

Hunter Harvest

Unfortunately the herd was largely inaccessible during most of the hunting season. An estimated 110 animals were taken along the Taylor Highway during September and early

October, and about 215 along the Steese Highway. A large kill was expected on the Steese when it was determined that the herd was headed in that direction, and checking station preparations were made accordingly. The reversal of the movement, however, kept the hunters' take to a minimum. During the main crossing of the Taylor Highway in late October, the road was closed by snow. Residents of Eagle reported "thousands" of caribou moved through the town, some even bedding down at night in front of the cabins. Such an occurrence had not been recorded for 20-30 years, according to the "old-timers." The 1963 total kill was estimated at 335 animals.

Population Structure

An effort was made by the writer and biologist, Whelan, to reach the herd in early October from the Steese Highway to obtain composition counts. A walk of ten miles into the area north of Mt. Ryan brought them into the periphery of the movement, but during the next two days the main movement swung farther to the east. The problems of snow travel and camping inhibited mobility, and the men were not able to locate the "files" of caribou necessary for obtaining adequate data. Also, relatively few lower jaws were obtained from hunters' kills, because of the light harvest.

Status

The magnitude of the fall movement as viewed from the air indicated that the herd contained a large number of animals. Estimates by the writer on a flight along the migration route between American Summit on the Taylor Highway and Eagle Summit on the Steese Highway totaled 26,000 animals. Because the animals were moving along several fronts and also through timbered regions, it seems likely that at least half the animals were not tallied. Thus, the writer estimates the herd at 50,000 animals in October, 1963. In addition, the calf crop appeared to be good. The animals killed by hunters have been in excellent condition for the most part, with good fat reserves. Disease appears to be of low incidence. In view of these observations the herd apparently is healthy and probably increasing, judging from the low hunter harvests in recent years.

Nelchina Herd

This population long has been the most important in Alaska with respect to recreational hunting. This importance stems mostly from the herd's location relative to Alaska's human population and from the relative ease of access to the herd in comparison with other caribou populations. Usually the main herd comes within reach of the foot-hunter at least once during the long season (August - March), and stragglers are available throughout the year at many locations.

Caribou research in Alaska has concentrated on this herd because of the relative ease of gathering data. Since 1955 many data have been obtained regarding the population dynamics, hunter harvest, and the range vegetation. It was thought that a concentration of effort on one herd would provide much more meaningful data, and it is hoped that many of the results will be applicable to other herds. During 1963, increased emphasis upon other populations, notably the Arctic and Alaska Peninsula herds, diverted some effort away from the Nelchina studies. Most of the work done this year was directed at gathering hunter-harvest and range data.

Movements and Distribution

In early April, 1963, the caribou were still mostly on the wintering grounds. The bulk of the herd was in the northwest, from the Cantwell-Monahan Flat area northward to the upper Wood River and westward into McKinley Park. Smaller concentrations occurred along the Talkeetna River, near Nadiwen Lake, and on the Lake Louise Flats. The peripheries of the winter distribution extended onto the ranges of the McKinley and Delta herds, but as far as known, no egress of animals occurred.

In mid-April, the calving segment was moving toward the calving grounds as expected. The main calving concentrations in late May occurred along the Oshetna River and Goose Creek, with smaller groups occurring westward to Kosina Creek. The post-calving movement resulted in a distribution similar to that observed in past years: late June-early July concentration in the high country encompassing the upper reaches of the Little Nelchina, Little Oshetna, and Oshetna Rivers, followed by a northward movement in July to the Deadman-Nadiwen Lake area and to the Jay Creek-Coal Creek plateau. Major movements during September, October, and November brought the main portion of the herd into the Lake Louise region, with animals crossing the Denali and Richardson Highways and extending into the Eureka area as well.

In late November, the animals were enroute to the wintering grounds. The bulk of the herd moved northwestward to the Cantwell area, wintering along the drainages of Yanert Fork and ranging north to the upper Wood River and west into McKinley Park--much the same distribution as in the winter of 1962-63. Other major segments moved to the Chistochina River-Mentasta area, to the Tangle Lakes-Paxon Lake area, and to the upper Talkeetna River. Once again the winter distribution was wide and extended beyond what has been considered the "normal" range of the Nelchina herd. This wide dispersal that has been characteristic of the herd in recent years presumably results from the greatly increased size of the population. Ten years ago, when the herd was only half as large as now, the caribou were much more sedentary and, for the most part, occupied but one wintering ground.

Productivity

Extensive work in the Arctic during May-June, 1963, precluded any detailed study of calving in the Nelchina herd. In view of the volume of productivity data gathered in past years, however, it was felt that a brief survey of the Nelchina herd would suffice this year. Aerial observations in late May revealed the bulk of the calving segment to be distributed in the Oshetna River-Goose Creek area. As usual, parturient cows comprised the majority of the animals present and adult bulls (3 yrs.+) were quite scarce. The weather was mild throughout the calving period, so perinatal calf mortality should have been minimal. A flight in mid-June indicated that the calf crop was high, probably comparable to that in 1962 and in past years. In the 10 years previous the natality rate consistently has been high, and there was no reason to suspect otherwise this year. Short-yearling counts were not taken in the spring of 1964, but the proportion of yearling (19 percent) in the 1964 hunter kill indicated that the 1963 calf survival must have been good. In lieu of more precise data, it was assumed that productivity in the Nelchina herd during the 1963-64 period was estimated that about 13,000 yearlings were added to the herd on May 1, 1964. This estimate was based on the following assumptions: 1) a herd size of 75,000 on May 1, 1963; 2) a cow segment at that time totaling 36,000 animals; 3) a natality rate for these cows of 70 percent; and 4) a calf survival rate of 50 percent.

The study concerning the breeding biology of the caribou male continued with the collection of testes from hunter-killed bulls. These tissues will be examined histologically to determine the spermatogenesis cycle and minimum breeding age. An attempt will be made to relate the findings to antler condition and body condition (i.e. fat reserves, liver weight and appearance, etc.) to better understand the physiological changes taking place in the male during the rut. One or two more years will be needed before adequate data can be collected.

Mortality

Hunter Kill: During much of the 1963-64 hunting season caribou were available to the foot-hunter along the Denali, Richardson, and Glenn Highways. The bulk of the harvest occurred during the September - December period, with the hunting effort dropping off during the periods of extremely cold weather after mid-December, even though the animals were still available. Hunter-check stations were operated from August 17 through November 13, as follows: Denali Highway station, 8/17 - 10/28; Richardson Highway station, at Sourdough, 10/17 - 10/28; and Glenn Highway station, at the Lake Louise junction, 10/29 - 11/13. Table 2 summarizes the data obtained. As indicated, 97 percent of the 6,924 hunters checked in that area were caribou hunters. Of these 6,699 hunters, 36 percent (2,385) were successful in getting caribou. The caribou kill per successful hunter averaged 1.6 animals. Table 3 depicts the sex and age structure of the kill. The 61 percent male harvest is somewhat lower than that obtained in previous years, probably because the cow segment of the herd was represented more fully than usual in the animals available to the majority of hunters. The age structure of the hunters' kill compared closely with that of previous years, with most of the animals taken falling in the "Prime", or 3-5 year-old, age-class (55 percent). This year 64 percent of the animals killed were over two-years old, as compared with 60 percent in 1962.

During the 1963-64 season the major portion of the kill was rather uniformly distributed throughout the September - December period. The total harvest was estimated at 6,300 animals, with 6,000 being taken prior to January 1. Of the total, an estimated 756 were calves (12 percent; cf. Table 3), and thus the total number of adults 1-year+ killed was approximately 5,500 animals.

TABLE 2.

SUMMARY OF 1963 CARIBOU HARVEST DATA, AS OBTAINED FROM HUNTER-CHECK STATIONS--NELCHINA HERD

ITEM	DENALI (8/17-10/28)	RICHARDSON (10/17-10/28)	GLENN (10/29-11/13)	TOTAL (8/17-11/13)
Total Hunters Checked	4,773	1,181	970	6,924
Caribou Hunters: No.	4,568	1,179	952	6,699
%	95.7	99.8	98.1	96.8
Caribou Killed: No.	2,242	1,157	310	3,709
♂♂	---	---	---	2,255
♀♀	---	---	---	1,454
Successful Hunters: No.	1,462	723	200	2,385
%	32.0	61.3	21.0	35.6
Caribou/Successful Hunter	1.5	1.6	1.6	1.6

TABLE 3

SEX AND AGE STRUCTURE OF THE 1963 HUNTER KILL--NELCHINA CARIBOU HERD

AGE CLASS	MALE		FEMALE		UNKNOWN	TOTAL	
	No.	%	No.	%	Sex	No.	\$
Juvenile	117	30.6	79	35.8	42	238	36.0
(Calf)	(26)	(6.8)	(30)	(13.6)	(21)	(77)	(11.7)
(1 yr.)	(31)	(8.1)	(15)	(6.8)	(15)	(61)	(9.2)
(2 yrs.)	(60)	(15.7)	(34)	(15.4)	(6)	(100)	(15.1)
Prime (3-5 yrs.)	238	62.1	111	50.2	13	362	54.8
Mature (6-9 yrs.)	23	6.0	24	10.8	2	49	7.4
Old (10 yrs.+)	5	1.3	7	3.2	0	12	1.8
TOTAL	383	100.0	221	100.0	57	661	100.0
Animals Sexed	2,123	60.8	1,369	39.2	--	3,492	100.0

Natural Mortality: The Nelchina caribou continue to be in excellent condition, judging from the fat reserves present during most of the year and the general lack of disease. Field observations and the inspection of hunter kills revealed little evidence of disease or physical deformities. Parasites are common, notably the warble, nose bot, and tapeworm larvae, but few animals have infestations that would be detrimental to their health. Of 342 usable blood samples obtained from hunter kills in 1963, 13 (4 percent) had positive titers for brucellosis. In 1962 a sample of 284 caribou showed 16 animals (6 percent) positive.

Substantiated data are lacking at present for evaluating natural mortality. All evidence available, however, suggests a low mortality, similar to past estimates. An estimate of 4,500 (about 6 percent of the May 1, 1963, total population estimate) such deaths probably is liberal. Calves are excluded from this estimate, because all calf mortality is evaluated in the productivity studies.

Total Mortality: The above data and estimates indicate that some 10,000 animals (calves excluded) succumbed during the year due to hunting and natural causes. That figure represents about 13 percent of the estimated herd population in April, 1963.

Population Structure

No extensive effort was made during 1963 to obtain sex and age data, other than that obtained from the examination of hunters' kills. These data are presented in Table 3, as mentioned earlier, and they do not reveal any significant differences from past years' studies. Significant sex and age counts were obtained last year, and it is assumed that there has been little change since then.

Analysis of Range

During the summer of 1963 the range enclosures were checked once again, and repairs made where needed. Frost action and moose seem to be the prime factors in causing the fences to be disrupted. A certain amount of repair work is needed annually.

During the fall, field work finally was completed with regard to the distribution of the major plant communities on the Nelchina Range. This project had been planned for the past two years, but bad weather proved to be a major problem in preventing its completion. As discussed under "Methods" the technique utilizes the autumnal color change in the vegetation as a means for identifying the major plant communities from the air. This change does not occur fully until the first week in September, and about the earliest one can start the project is about September 6 or 7. By then snow is a continual threat in the high country, and a heavy snow-cover prevents the gathering of data. Fortunately, the fall of 1963 was near perfect with regards to weather and color change, and the project was completed with few problems during the period September 6-19.

The Nelchina caribou range has been divided by the writer into 15 Range Units, as illustrated in Figure 1, based upon terrain differences and differences in caribou usage. In this project an effort was made to record the data according to these Units, in hopes of being able to quantify their vegetation composition as well as that of the entire range. Transect routes were chosen as described under "Methods", and their approximate locations are shown on Figure 1 by the dashed lines. Table 4 notes the length of each transect and the number of sampling points. As indicated, 3,582 miles of transects were flown and 9,442 sampling points were obtained for the final analysis. This effort required approximately 75 hours of "Supercub" flying time, including 45 hours of actual transect flying and 30 hours of travel time.

In order to secure a more complete picture of the Nelchina range, detailed information was obtained concerning the area of the Range Units and the altitudinal distribution of the terrain in each. Table 5 presents these data, as obtained from planimeter readings from U. S. Geological Survey quadrangle maps, scale of 1:250,000. The total area of the range shown in Figure 1 thus approximates 17,490 square miles. This area has long been considered the main portion of the Nelchina herd's range, although in recent years the animals have been utilizing other areas as well, mainly in winter. If these areas are included than the Nelchina Range more nearly approximates 22,000 square miles. The transects, however, were confined to the smaller area.

One would suppose that more reliable results might be obtained if the sampling effort were distributed to each Range Unit in accordance with its relative size. This aspect was considered in the original plan, using rough estimates of the Unit areas, and the method of spacing transects (one per 20-mile segment along the base-line) was intended to provide the means for obtaining this type of distribution. As shown in Table 6, 49 per cent of the effort was covered by the north-south transects and 51 per cent, by the east-west. In 9 of the 15 Units the proportion of sampling points was equal to or greater than the areal proportion, and the proportions in the remaining 6 Units were quite close. On the average there was one sampling point for every two square miles of range.

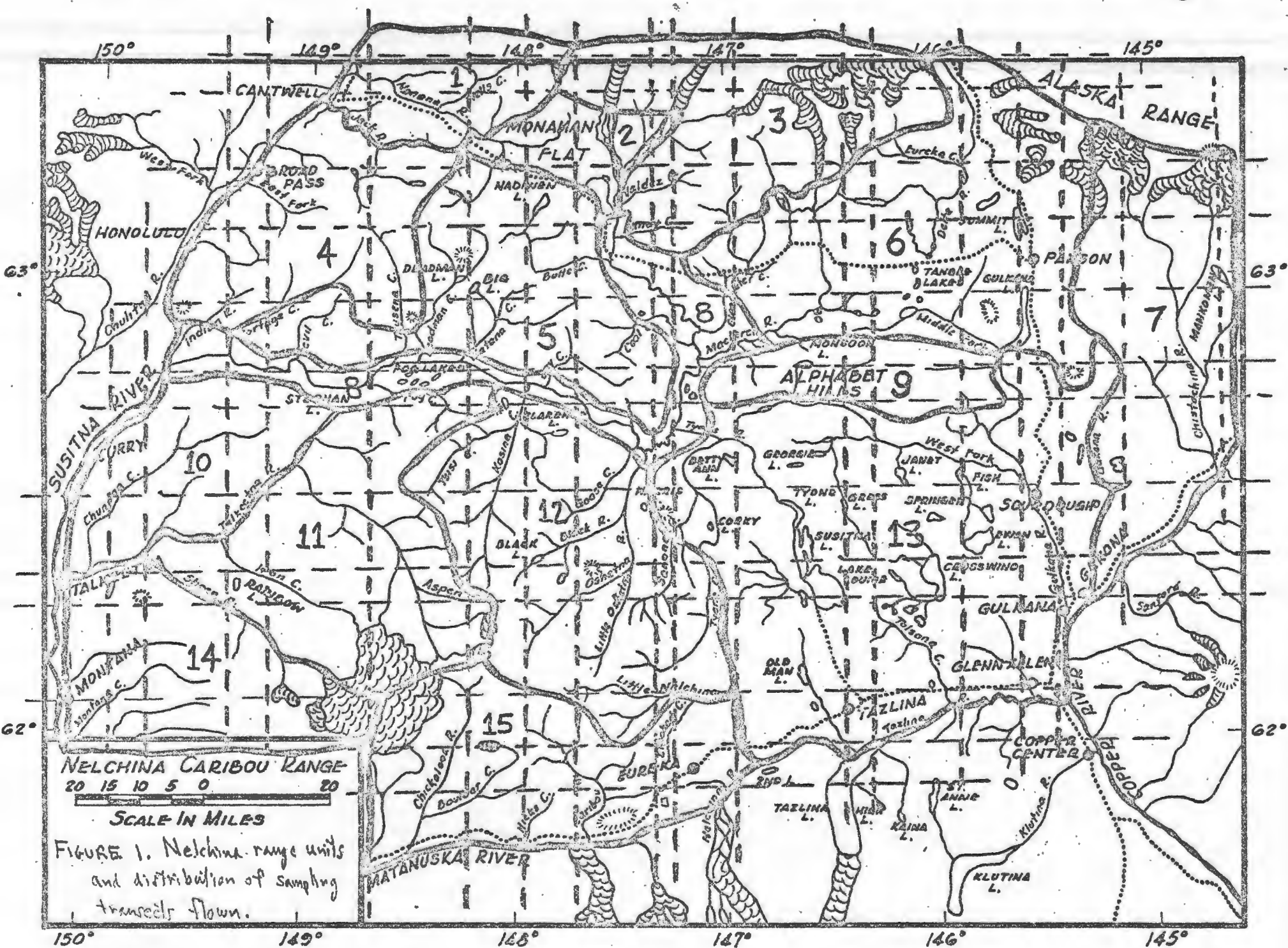


TABLE 4

TRANSECTS FLOWN ACROSS NELCHINA RANGE DURING SEPTEMBER, 1963,
INCLUDING THE LENGTH AND THE NUMBER OF SAMPLING POINTS FOR EACH.

NORTH-SOUTH TRANSECTS					EAST-WEST TRANSECTS				
#	LENGTH		POINTS		#	LENGTH		POINTS	
	Miles	%	No.	%		Miles	%	No.	%
A 15	49.5	2.8	128	2.8	A 20	54.0	3.0	164	3.4
B 13	50.0	2.8	146	3.2	B 16	111.0	6.1	301	6.3
C 12	84.5	4.8	217	4.7	C 9	153.0	8.4	388	8.1
D 2	94.5	5.4	264	5.7	D 17	159.0	8.7	400	8.3
E 9	107.5	6.1	306	6.6	E 10	166.0	9.1	460	9.5
F 20	121.0	6.9	342	7.4	F 10	173.5	9.5	459	9.5
G 18	123.5	7.0	326	7.0	G 17	168.5	9.2	455	9.4
H 13	124.5	7.1	311	6.7	H 6	168.5	9.2	447	9.3
I 18	125.5	7.2	338	7.3	I 7	169.5	9.3	468	9.7
J 5	126.5	7.2	328	7.1	J 11	158.5	8.7	426	8.9
K 8	120.0	6.8	318	6.9	K 9	141.5	7.7	379	7.9
L 20	110.0	6.3	256	5.5	L 12	110.5	6.0	263	5.5
M 9	107.0	6.1	269	5.8	M 2	93.5	5.1	202	4.2
N 15	101.5	5.8	332	7.2					
O 13	97.5	5.6	229	4.9					
P 8	87.5	5.0	218	4.7					
Q 4	65.5	3.7	148	3.2					
R 17	44.0	2.5	111	2.4					
S 4	15.0	0.9	43	0.9					
(19)					(13)				
TOTAL	1,755.0	100.0	4,630	100.0	TOTAL	1,827.0	100.0	4,812	100.0
%	49.0		49.0		%	51.0		51.0	
TOTAL MILES OF TRANSECTS FLOWN: 3,482									
TOTAL NUMBER OF SAMPLING POINTS: 9,442									

TABLE 5.

AREAS AND ALTITUDINAL LAND-DISTRIBUTION WITHIN THE NELCHINA CARIBOU RANGE,
WITH RESPECT TO THE FIFTEEN RANGE UNITS.

RANGE UNIT	AREA		ABOVE 5000'		ABOVE 4000'		ABOVE 3000'		BELOW 3000'		GLACIER	
	Sq. Mi.	% of Total	Sq. Mi.	% of Unit	Sq. Mi.	% of Unit	Sq. Mi.	% of Unit	Sq. Mi.	% of Unit	Sq. Mi.	% of Unit
1. Upper Nenana River.	460	2.6	50	10.8	130	28.3	330	71.7	130	28.3	10	2.2
2. Monahan Flat	270	1.5	0	0.0	0	0.0	20	7.4	250	92.6	0	0.0
3. Clearwater Mts.	1,430	8.2	610	42.7	1,080	75.5	1,320	92.3	110	7.7	330	23.1
4. Chulitna Mts.	870	5.0	140	16.1	390	44.8	640	73.6	230	26.4	T	---
5. Deadman Lake	1,350	7.7	30	2.2	250	18.5	990	73.3	360	26.7	0	0.0
6. Tangle Lakes	1,750	10.0	150	8.6	390	22.3	1,300	74.3	450	25.7	70	4.0
7. Chistochina R.	1,340	7.7	120	9.0	270	20.1	670	50.0	670	50.0	70	5.2
8. Upper Susitna Bottomland	720	4.1	0	0.0	0	0.0	T	---	720	100.0	0	0.0
9. Alphabet Hills	400	2.3	T	---	50	12.5	330	82.5	70	17.5	0	0.0
10. Chunilna Hills	730	4.2	0	0.0	T	---	220	30.1	510	69.9	0	0.0
11. Talkeetna R.	1,380	7.9	390	28.3	730	52.9	1,040	75.4	340	24.6	110	8.0
12. Oshetna R.	1,540	8.8	260	16.9	690	44.8	1,370	89.0	170	11.0	20	1.3
13. Lake Louise Flat	3,140	18.0	0	0.0	0	0.0	140	4.5	3,000	95.5	0	0.0
14. Sheep Creek	860	4.9	130	15.1	250	29.1	390	45.3	470	54.7	40	4.7
15. Caribou Creek	1,250	7.1	280	22.4	490	39.2	820	65.6	430	34.4	50	4.0
TOTAL	17,490	100.0	2,160	---	4,720	---	9,580	---	7,910	---	700	---
PERCENT		100.0		12.3		27.0		54.8		45.2		4.0

T < 5 Sq. Mi.

TABLE 6

DISTRIBUTION OF SAMPLING EFFORT WITH RESPECT TO RANGE UNITS AND UNIT AREA.

Range Unit	Transect Sample						Area of Units		Square Miles Per Sample Point	Deviation of Sample-Distribution Percentage from Area Percentage
	North - South		East - West		All Transects					
	No. Points	% of Total	No. Points	% of Total	No. Points	% of Total	Sq. Mi.	% of Total		
1	95	2.1	178	3.7	273	2.9	460	2.6	1.7	+0.3
2	108	2.3	48	1.0	156	1.7	270	1.5	1.7	+0.2
3	343	7.4	360	7.5	703	7.5	1,430	8.2	2.0	-0.7
4	211	4.6	251	5.2	462	4.9	870	5.0	1.9	-0.1
5	309	6.7	319	6.6	628	6.7	1,350	7.7	2.1	-1.0
6	507	11.0	438	9.1	945	10.0	1,750	10.0	1.9	0.0
7	302	6.5	390	8.1	692	7.3	1,340	7.7	1.9	-0.4
8	226	4.9	269	5.6	495	5.2	720	4.1	1.5	+1.1
9	94	2.0	128	2.7	222	2.4	400	2.3	1.8	+0.1
10	219	4.7	180	3.7	399	4.2	730	4.2	1.8	0.0
11	289	6.2	351	7.3	640	6.8	1,380	7.9	2.2	-1.1
12	471	10.2	381	7.9	852	9.0	1,540	8.8	1.8	+0.2
13	890	19.2	906	18.8	1,796	19.0	3,140	18.0	1.7	+1.0
14	288	6.2	254	5.3	542	5.7	860	4.9	1.6	+0.8
15	278	6.0	359	7.5	637	6.7	1,250	7.1	2.0	-0.4
TOTAL	4,630	100.0	4,812	100.0	9,442	100.0	17,490	100.0	1.9	0.0
%		49.0		51.0		100.0				

The major vegetation types and/or terrain categories used during this range survey are grouped as follows: 1) alder, 2) aspen-poplar, 3) bog (heath-moss-sedge), 4) bluejoint grass (Calamagrostis canadensis), 5) dwarf birch, 6) fescue (Festuca altaica), 7) heath, 8) meadow (sedge-grass-forb), 9) water sedge (Carex aquatilis), 10) spruce, 11) white birch, 12) willow, 13) glacier, 14) rock/bare ground, and 15) water. For the most part the vegetation types listed follow Dr. Hanson's designations resulting from his 1957 survey of the Nelchina range. Only 9 of his 11 types were used, however, because the Dryas-Kobresia and Mountain Sage types are extremely limited. Most alpine Dryas stands are closely associated with the Heath type, but pure stands are encountered commonly at elevations above 4,500 feet and in especially barren habitats, such as talus slopes and stream-beds. In any case, Dryas stands could not be distinguished from heath stands from the air, and so were included with the latter. Three vegetation types rather common along the western edge of the Nelchina range were added to those of Dr. Hanson: alder, bluejoint grass, and white birch.

During the actual survey these 15 main categories were broken down into various sub-groupings in order to obtain the maximum information possible. For example, "Bog" was separated into that which contained a great deal of heath plants and that which contained a great deal of sedge. "Spruce" was divided into 27 categories based on dense, open, or sparse growth, plus associations with white birch and/or alder, boglike habitat, and the evidence of fire. In total, 48 categories were used during the transect flying to classify the ground cover. For this report, however, only the 15 mentioned earlier will be used. A more complete presentation of the data for publication is intended later.

Tables 7 and 8 present a summary of the data obtained, in relation to the 15 Range Units and to the range as a whole. As one might expect, the Spruce type (including both white and black spruce) is the dominant vegetation on the Nelchina range, comprising about 30 percent of the total land cover. This figure, compared with the 45 percent indicated in Table 5 for the land below 3,000 feet elevation (timberline), shows close agreement to what might be expected. Glaciers, as indicated on U. S. Geological Survey maps, comprised 4 percent of the total land cover (Table 5); the transect data showed 3.3 percent. The difference in part could be due to the recession of the glaciers during the 15-year interval between the map data and the survey data. At any rate, the agreement is close. Rock/bare ground comprised about 11 percent of the total range; most of this occurred at elevations above 5,000 feet and hence might be compared with that data in Table 5. The 12 percent figure indicated for the amount of terrain above 5,000 feet includes in its total about 2.5 percent glacier. Hence, the glacier-free area would be somewhat less than 10 percent; again close agreement is indicated.

The abundance of the Dwarf Birch and Heath types (totaling about 29 percent) is to be expected, considering that about 43 percent of the range lies between 3,000 and 5,000 feet elevation, where these types predominate. The remaining 14 percent is easily accounted for by the Meadow, Fescue, and parts of other categories. It is interesting to note that about 18 percent of the range is of little use to caribou--glacier, rock, and water. Thus, only about 14,300 square miles of the total range should be used in computing carrying capacity.

The data concerning fire are summarized in Table 7, also. Evidence of fire could be detected from the air only in the Spruce type, and necessarily was based upon the presence of standing and/or downed dead timber. It is doubtful if such evidence would date further back than about 1930. Nevertheless, since some such time, about 38 percent of the Spruce type has been burned (Table 7: 1,085/2,885), or about 12 percent of the total range. This proportion is much less than that in many portions of interior Alaska, probably because of the relative isolation of the Nelchina range and the general lack of mining activity. The fact that 55 percent

TABLE 7.

DISTRIBUTION OF THE MAJOR VEGETATION TYPES ON THE NELCHINA RANGE AND WITHIN THE FIFTEEN RANGE UNITS,
AS DETERMINED BY THE NUMBER OF SAMPLING POINTS RECORDED FOR EACH TYPE OR CATEGORY.

VEGETATION TYPES/ TERRAIN CATEGORIES	NO. POINTS RECORDED BY RANGE UNITS															TOTALS	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	No.	%
1. Alder.	8	0	6	27	12	24	4	9	1	66	35	1	0	27	12	232	2.5
2. Aspen-Poplar.	1	0	0	3	0	0	9	10	0	4	2	0	31	0	13	73	0.8
3. Bog (heath-moss-sedge).	0	2	0	0	0	4	39	11	0	3	0	1	100	17	2	179	1.9
4. Bluejoint grass (<i>Calamagrostis</i>)	0	0	0	1	0	0	0	0	0	9	3	0	0	7	0	20	0.2
5. Dwarf Birch.	41	35	46	43	166	263	53	13	51	10	61	269	19	17	124	1,211	12.8
6. Fescue grass (<i>Festuca</i>).	6	7	13	4	44	61	5	0	3	0	1	61	2	0	21	228	2.4
7. Heath	78	4	163	152	168	122	44	3	44	101	227	203	0	101	121	1,531	16.2
8. Meadow (Sedge-grass-forb).	18	24	78	62	117	69	12	3	11	61	67	99	0	37	29	687	7.3
9. Water Sedge (<i>Carex aquatilis</i>)	1	6	0	2	7	13	19	11	1	0	1	5	84	2	3	155	1.6
10. Spruce (white-black).	27	36	4	22	32	82	339	388	79	78	72	78	1369	176	103	2,885	30.5
(*Burned areas.	1	0	0	3	3	11	150	63	0	0	0	31	768	0	55	1,085	11.5)
11. White Birch.	0	0	0	0	0	0	0	10	0	26	7	0	0	21	4	68	0.7
12. Willow (mostly drainage ways).	24	19	39	27	54	87	29	11	15	25	23	48	36	24	49	510	5.4
<hr/>																	
13. Glacier.	7	0	145	2	0	42	39	0	0	0	16	5	0	35	16	307	3.3
14. Rock/Bare ground.	55	4	201	109	20	124	72	1	13	8	116	68	1	71	133	996	10.6
15. Water	7	19	8	8	8	54	28	25	4	8	9	14	154	7	7	360	3.8
TOTAL																9,442	100.0

*Included w/Spruce.

PERCENTAGE COMPOSITION OF THE RANGE UNITS, WITH RESPECT TO THE
MAJOR VEGETATION TYPES OR LAND-SURFACE CATEGORIES.

[illegible]

of the area lies above timberline also is a contributing factor, because most fires tend to die once timberline is reached. The only large block of timber on the range is found in Range Unit 13, the Lake Louise Flat. The rather extensive stands of climax lichens which occur in much of the western half of the Nelchina range further attests to the lack of fires.

The composition of the total range, as shown in Table 7, is thought to be a close approximation of the true values. That of the individual Range Units probably contains a much greater error due to the smaller samples taken. The compositions expressed in Table 8, however, do seem to conform closely to what is known about each of the Units. A statistical analysis is needed to determine the significance of the data.

Status

No evidence exists indicating an egress of caribou from the Nelchina range, although such a movement could occur easily without detection. The wide dispersal of the herd during the winter to areas outside the "normal" range makes the loss of animals to adjacent herds (notably the McKinley, Delta, and Mentasta herds) a distinct possibility. In lieu of other information, however, it can only be assumed that the herd has remained intact. The animals appear to be in excellent condition; natural mortality is low; productivity remains high; and the range is in good condition, generally speaking, except for certain heavily used areas.

In April, 1964, an estimated 13,000 yearlings were added to the herd. During the year some 10,000 adults (older than calves) died, including those taken by hunters. The herd increment thus approximates 3,000 animals. The total herd estimate for April, 1964, is 80,000 animals.

Statewide Caribou Inventory

Little data were obtained regarding the other caribou herds in Alaska. A survey of the Mulchatna-Rainy Pass area was scheduled for the spring of 1964, but this was canceled due to the death of the biologist in that area, Le Roy Bohuslov. This inventory seeks to identify the caribou herds present throughout Alaska and to assess each in terms of home range, total numbers, and productivity. Three major areas remain to be investigated: Mulchatna-Rainy Pass, Chisana-White River, and Upper Kuskokwim River. These areas contain several small populations where status is unknown. The animals seem to be scattered widely during much of the year and it is difficult to state how many separate herds are involved. Calving-ground censuses are needed in each of these areas to complete the inventory of Alaska's caribou populations.

Submitted by:

Ronald O. Skoog
Study Leader

Approved by:

Don H. Steiner
Federal Aid Coordinator

James W. Brooks by DHS.
Director, Division of Game