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NELCHINA CARIBOU REPORT

by
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Volume I
Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-4, Job 3.7R (2nd half)
Project W-17-5, Job 3.1 (Survey and Inventory) (1st half)

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JOB PROGRESS REPORT (RESEARCH and SURVEY & INVENTORY)

State: Alaska

Cooperator: Gregory N. Bos

Project No.: W-17-4 Project Title: Big Game Investigations

Job No.: 3.1 (Survey and Inventory) Job Title: Population Dynamics and the Influence of Hunting on the Nelchina Caribou Herd

Period Covered: January 1, 1972 to December 31, 1972

SUMMARY

The 1972 photo-extrapolation census of the Nelchina caribou herd resulted in an October population estimate of 8,094 caribou. Only 15.5 calves per 100 females were tallied during the March, 1972 calf survival counts, indicating a low recruitment of yearlings to the herd. Post-calving composition counts in July yielded a ratio of 38.5 calves per 100 females suggesting poor neonate calf survival and/or reduced natality rates. Composition counts in October yielded the ratio of 18.1 calves: 61.2 cows:20.7 bulls, which was almost identical with the results of the October, 1971 composition counts.

Observed or reported natural mortality was low. The estimated kill by hunters in 1971-72 (8125) is the largest on record for the Nelchina herd. In addition, most of the estimated 2006 Mentasta caribou kill is believed to be composed of Nelchina caribou. Reported hunter success was 57 percent. The reported sex composition of the harvest was 46.6 percent males. The reduced season and bag limit in 1972-73 resulted in a greatly reduced harvest, preliminarily estimated at 500 caribou.

No range vegetation studies were conducted. The distribution and movements of the Nelchina herd were recorded throughout the year.

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BACKGROUND

Since inception of research and management programs for the Nelchina caribou (*Rangifer tarandus*) in 1948, the Nelchina herd has been the most important sport-hunted herd in Alaska in terms of size of the harvest, averaging approximately 5,000 animals annually since 1956. Concerted attempts to determine population size resulted in estimates of 37,000 in 1956 (Watson and Scott, 1956), 71,000±11,867 in 1962 (Siniff and Skoog, 1964) and 61,000 in 1967 (Hemming and Glenn, 1968).

The general sex and age structure of the population and estimates of yearling survival have been provided by sex and age composition counts conducted during early spring, early summer (postcalving) and the rut. Although sex and age characteristics have been described in the literature (Banfield, 1954; Banfield et al., 1955; Bergerud, 1958; Kelsall, 1968 and Skoog, 1968), methods used for classifying these animals in Alaska have been variable, and seasonal sex and age segregation and stratification of caribou groups have not been adequately studied.

Acquisition of harvest statistics prior to 1968 was largely done by field contacts, questionnaires and check station data. Estimations of harvest levels since 1968 have been considerably refined by the use of a harvest ticket program. Cementum aging techniques combined with harvest ticket information and field composition counts have enabled some interpretation of the sex and age structure of the harvest and of the

population. Hunting pressure has been increasing in recent years due to increased numbers of resident and nonresident hunters, to improved access on new roads and to the use of all-terrain vehicles and snow machines which has allowed hunters to move to the animals, particularly in winter. Increased land use pressure and the proposed Trans-Alaska Pipeline route traversing the range of the Nelchina herd provide further impetus to the establishment of an intensive management effort on the Nelchina herd.

Studies reported here were initiated as a research job, but effective July 1, 1972 were changed to Survey and Inventory status to better reflect the type of work being conducted.

OBJECTIVES

To provide information for an annual status evaluation of the Nelchina caribou herd in terms of total numbers, productivity, mortality, sex and age structure and condition of the animals and their environment.

PROCEDURES

Population Estimate

To obtain an estimate of total numbers, a modification of a direct caribou count method was used whereby a population estimate is extrapolated from counts made on vertical aerial photographs of the postcalving concentrations of caribou. Extrapolations involved use of ratios obtained from sex and age composition counts made at the time of photography and also during the period of the rut in October. The postcalving composition data are used to compute the percentage of cows in the postcalving concentrations. Composition data obtained during the rut are used to estimate the true composition of the population, as the most random sex and age distribution occurs at that time. The October bull/cow, yearling/cow, and calf/cow ratios are then used to compute an estimate of the total population by extrapolation from the postcalving cow total.

Productivity

The natality rate was roughly estimated by determining the proportion of females with calves on the calving grounds. More definitive natality values are obtained from examination of female reproductive tracts.

Mortality

A. Natural mortality of adults (older than one year) was recorded as observed.

B. Natural mortality and hunter harvest of calves through the first year were determined by using the difference between natality rates and early spring calf-cow proportions when the calves of the previous year were approximately 12 months old.

C. Hunter harvest of adults was determined from returns of harvest tickets from hunters. The sex and age structure of the kill was determined from age data acquired from the teeth of collected hunter-killed specimens of known sex by cementum aging techniques.

D. Yearly increments to, or losses from, the total population were determined by subtracting total computed losses from the computed yearling addition to the population in the spring.

Sex and Age Structure

Sex and age structure of the population was computed by combining and analyzing information from sex and age composition counts taken in the early spring and during the rut with the sex and age structure of the harvest.

Condition of Animals

Condition of the animals was determined by field observations, collections, gross examination of hunter-killed specimens, and laboratory examination of specimen material.

Movements and Distribution

Seasonal movements and distribution patterns were recorded from periodic reconnaissance flights.

Field color marking of caribou was tested on November 2-3, 1972, using the aerial spray technique described by Simmons (1971). Calcocid scarlet 2RIL dye (available from American Cyanamid Co., Bound Brook, New Jersey, for \$1.82 per pound) in a water-alcohol solution was used in the proportion of 15 pounds dye:35 gallons water:20 gallons isopropyl alcohol. The alcohol served to prevent freezing of the solution during the operation.

Condition of Range

Information on the condition of the range was acquired on a long-term basis from field vegetation studies (Pegau, 1972). Patterns of caribou distribution as related to range vegetation types were determined from periodic reconnaissance flights.

FINDINGS

Population Estimate

A photo-extrapolation census of the Nelchina caribou was accomplished in 1972. An October population estimate of 8094 caribou was derived from this extrapolation. A description of the census operation follows.

Postcalving operation

Reconnaissance flights were conducted throughout the Nelchina range to determine distribution of animals preparatory to the photographic mission. As the calving season progressed into the postcalving period of aggregation, the frequency of flights was increased to a weekly schedule. Daily coverage of caribou concentration areas, involving photography and composition counts, was maintained during the period.

Caribou began arriving on the calving grounds in the vicinity of Clarence Lake and Kosina Creek about May 26. Observations suggested a delayed or extended calving period in 1972. On a May 28 flight approximately 2500 animals were seen, but only five newborn calves were noted. By mid-June aggregations of caribou were evident in the drainages of Kosina Creek and Fog Creek. By the end of June the caribou were considered to be suitably located and concentrated for census photography. Personnel and a helicopter were assembled at Clarence Lake and although weather conditions did not permit the use of the contracted photo plane, sex and age composition counts were conducted from July 1-4.

Table 1 presents the postcalving sex and age composition data. Of animals that were classified, 59.4 percent were females older than calves (N = 4249). Caribou were present in relatively small numbers in the Deadman Lake and Black Lake areas where classifications indicated lower calf:cow ratios and higher bull:cow ratios than in the major concentrations at Fog Creek.

In addition to obtaining sex and age counts, virtually all groups of caribou in the Fog Creek area were photographed with a 35mm. SLR camera or were counted and recorded from the helicopter. A strong effort was made to avoid duplication of animals photographed. The intent of this photography was 1) to determine if the method was feasible for censusing small populations, 2) to act as a comparison for data obtained by contracted aerial photo coverage, and 3) to provide a measure of insurance should the contracted photo coverage not be accomplished.

After development the 35mm. transparencies were found to have good resolution. Counts of caribou on the 35mm. transparencies (7794) combined with animals recorded but not photographed, and with animals classified in the Black Lake and Deadman Lake areas where photography was not attempted resulted in a postcalving estimate of 8342 caribou.

Weather conditions did not allow the use of the aerial photo aircraft (contracted from Air Photo Tech Inc. of Anchorage) until July 6. The distribution of postcalving concentrations of caribou on this date was much the same as in the preceding week. On July 6, the photo plane was called in but the mission was aborted due to pilot illness. On the following day the caribou began a movement which carried them 30 miles in four days to the headwaters of the Oshetna River. Weather conditions permitted a second attempt at aerial photography on July 12. This attempt was successful. The majority of animals in the general area of concentration were photographed. Peripheral groups of animals not photographed were counted from Super Cub aircraft.

Table 1. Nelchina caribou postcalving sex and age composition counts, 1972.

Area and Date	MM per* 100 FF	Calves per 100 FF		Calves N (%)		Cows* N (%)		Bulls* N (%)		Total
Deadman Lake July 1	165.9	12.3	17	(4.4)	138	(35.9)	229	(59.6)		384
Black Lake July 2	38.2	31.7	39	(18.7)	123	(58.9)	47	(22.5)		209
Fog Creek Valley July 3 and 4	21.3	40.4	914	(25.0)	2261	(61.8)	481	(13.2)		3656
Totals	30.0	38.5	970	(22.8)	2522	(59.4)	757	(17.8)		4249

*Excluding calves

A count of the caribou on the developed 9" X 9" black and white prints yielded 5681 caribou. Addition of 368 caribou counted from peripheral groups not photographed resulted in a second postcalving estimate of 6049 caribou.

The reduction in numbers represented by the difference in the two postcalving estimates probably reflects dispersal of animals during the movement from Fog Creek to the Oshetna River, and the loss of animals previously counted near Deadman Lake. Biologists flying reconnaissance surveys on July 10 and 11 did not locate any aggregations of caribou outside the area selected for photographic surveillance. Both estimates are considered minimum representations of the numbers of caribou in the respective areas. Since the estimate obtained from the 35mm. transparencies was larger, it was chosen as the more accurate overall postcalving population estimate.

Fall Composition Counts

Field sex and age classifications of caribou were conducted on October 7-8 in the vicinity of the Little Nelchina River and the Horn Mountains. Reconnaissance flights preparatory to the counts indicated the main concentrations of the Nelchina herd were in the count area and that adult bulls were represented in many caribou aggregations. Table 2 presents the 1972 composition data and includes data from 1971 for comparison. The sex and calf proportions show close similarity for the two years. The 1972 percentage of calves (18 percent) is below the average of 21.5 percent obtained from counts since 1955. Yearlings were classed with the adults. Comparison of Tables 1 and 2 reveals fairly similar sex and calf proportions for the postcalving and rut composition counts. The latter showed a decrease in the proportion of calves and a slight increase in the proportion of bulls.

Extrapolation and Final Estimate

The sex and age proportions obtained in October were applied to the postcalving estimate of 8342 to give a final October estimate of 8094 caribou. Calculations:

Postcalving estimate =	8342 X 59.4 percent cows =	4954 cows
October composition counts =	33.8 bulls:100 cows	
	29.6 calves:100 cows	
	4954 X 33.8 =	1674 bulls
	4954 X 29.6 =	1466 calves
		4954 cows
Total October population estimate		8094 caribou

This estimate was less than expected because the proportion of cows in the fall increased slightly over the proportion of cows in the postcalving counts rather than showing a decrease as would have occurred if the proportion of bulls had been larger in the fall than the value observed. These results may be due to sampling error or variance, or possibly to the combined effects of natural mortality of calves and hunting mortality of bulls, or to some other unknown reason. Calf:cow ratios

Table 2. Nelchina caribou fall sex and age composition counts, 1972.

Area and Date	MM per* 100 FF	Calves per 100 FF		Calves N (%)		Cows* N (%)		Bulls* N (%)		Total
Little Nelchina River - Old Man Lake October 7	37.5	28.8	169	(17.3)	587	(60.1)	220	(22.5)	976	
Horn Mountains October 8	31.4	30.1	262	(18.6)	870	(61.9)	273	(19.4)	1405	
Totals	33.8	29.6	431	(18.1)	1457	(61.2)	493	(20.7)	2381	
1971	33.7	30.2	652	(18.4)	2160	(61.0)	728	(20.6)	3540	

*Excluding calves

from the two counts suggest 23 percent mortality of calves from July to October. Although the harvest is believed to be less than 500 animals, the observed preponderance of males in the kill probably had some effect in reducing the proportion of bulls in the population.

Productivity

Postcalving composition counts (Table 1) indicated 38.5 calves per 100 cows, a figure within the range of values reported since 1957 (36 ca:100 cow - 65 ca:100 cows). The postcalving calf:cow ratio can only be used as an index to calf production because 1) calf mortality between birth and postcalving composition counts can vary from year to year and 2) yearling females may vary in degree of representation in the calving area from year to year and if included in the cow base for computations (as was the case in 1972) these nonproducing females can affect the indicated calf:cow ratio.

Studies were not conducted on the calving grounds to determine natality values, and the early hunting season closure precluded collection of female reproductive tracts for pregnancy rate determination. Data from Skoog (1968) indicated pregnancy rates of 0 percent for calves, 13 percent for yearlings, 61 percent for 2-year-olds and 89 percent for animals three years old and older, with an average pregnancy rate for all females older than calves of about 60 percent (n = 436). Prenatal losses have been considered minimal in the past and the average pregnancy value of 60 percent has been assumed to approximate actual natality rates.

Mortality

A. Natural mortality

Observations of natural mortality were uncommon. During October composition count flights, one adult female was found to have drowned after breaking through thin ice on a lake north of Slide Mountain. Numerous examples of broken ice on lakes were observed, attesting to the frequency that caribou were breaking through thin ice. Although only one dead caribou was found, it is probable that others died in a similar manner. Vern Porter, a resident of the area, reported secondhand a case of several caribou that were observed to have broken through ice on Lake Louise and were unable to climb out of the water. All animals were believed drowned, but only two floated long enough to be frozen in new ice.

During the postcalving and October composition counts, several crippled animals were observed. In July, three adults and two calves were observed limping. In October, a young male and an adult female were observed limping and a calf with a broken front leg and yearling with a probable broken rear leg were noted.

Few examples of predation by wolves were observed. Although 300 hours of flying were logged by observers on Nelchina and Mentasta caribou reconnaissance flights through the year, only three caribou kills ascribed to wolves were seen and only five packs totaling 36 wolves were observed.

The primary caribou winter concentration area near Eureka was flown intensively on several occasions and few signs of wolves were observed.

Reported or observed incidence of diseases or parasites was light. A female caribou killed by a hunter near Eureka on January 2, 1972 had pus pockets in its left rear leg. *Corynebacterium* sp. was isolated from the sample submitted to the Alaska State and Federal Laboratory at Palmer. No blood samples were collected in 1972 for Brucellosis analysis. No examples of retained placentas were seen during the calving period but the opportunities for such observation were limited.

B. Calf mortality

Estimation of the mortality of calves through the first year of life is based on the comparison between an assumed natality rate of 60 calves: 100 females older than calves, and calf:cow ratios obtained from composition counts in the spring. Table 3 presents data from the March 20-21, 1972 composition counts. Data from 1970 and 1971 are included for comparison. Table 4 suggests mortality of calves was relatively heavy through the entire period June 1, 1971 - April 1, 1972 with about 74 percent of the calves dying. Concurrent mortality on the cow base was not considered in this computation.

C. Harvest 1971-72

The IBM reported harvest for the 1971-72 season (August 10 - March 31) was 6857 caribou. Extrapolation of the kill to include animals taken by nonrespondents yielded a final estimate of 8125 caribou, the largest on record. In addition, the estimated total kill of 2006 reported for the Mentasta herd is believed to be composed primarily of Nelchina caribou because most of the harvest coded to the Mentasta herd occurred along the Nabesna Road where a major concentration of Nelchina caribou wintered in 1971-72.

Large kills in 1971-72 resulted from the availability of caribou near maintained road systems during most of the season and from snow conditions that were favorable for effective use of snow machines by hunters. Caribou became available in large numbers to hunters along the Lake Louise Road and Glenn Highway during October and November. For kills reported with date of kill, 55 percent occurred during these months. Fifty-eight percent of the reported Nelchina kill for the entire season occurred in the vicinity of Lake Louise, the Lake Louise Road and the nearby Glenn Highway. An additional 16 percent of the reported kill occurred in the Eureka area. As a portion of the herd migrated to the east they were available near Chistochina in November and along the Nabesna Road from December until the end of the season. For kills reported with date of kill and coded to the Mentasta herd, 90 percent occurred after October, with 23 percent occurring in November, and 31 percent in March. For the entire season, 73 percent of the reported kill coded to the Mentasta herd occurred in the vicinity of the Nabesna Road and the nearby Slana area. The Nelchina harvest chronology for 1971-72 is depicted in Fig. 1, that for the Mentasta herd in Fig. 2.

Table 3. Nelchina calf survival composition counts March 20-21, 1972.

Area and Date	MM per* 100 FF	Calves per 100 FF	Calves		Cows*		Bulls*		Total
			N	(%)	N	(%)	N	(%)	
Nabesna March 20	23.0	14.2	136	(10.4)	957	(72.9)	220	(16.8)	1313
Nabesna March 21	19.2	19.5	63	(14.1)	323	(72.1)	62	(13.8)	448
Total	22.0	15.5	199	(11.3)	1280	(72.7)	282	(16.0)	1761
1971	32.9	33.6	696	(20.2)	2069	(60.0)	681	(19.8)	3446
1970	21.9	29.2	654	(19.3)	2443	(66.2)	491	(14.5)	3388

*Excluding calves

Table 4. Estimated Nelchina caribou calf mortality June 1, 1971 - April 1, 1972.

Date	calf:cow ratio	% loss from previous ratio	% loss from June 1 base
June 1, 1971	60:100*	-	-
October 13-14, 1971	30.2:100	49.7	49.7
March 20-21, 1972	15.5:100	48.7	74.2

*Assumed, data from Skoog (1968).

Figure 1. Reported Harvest Chronology, Nelchina Caribou 1971-72. N=5290

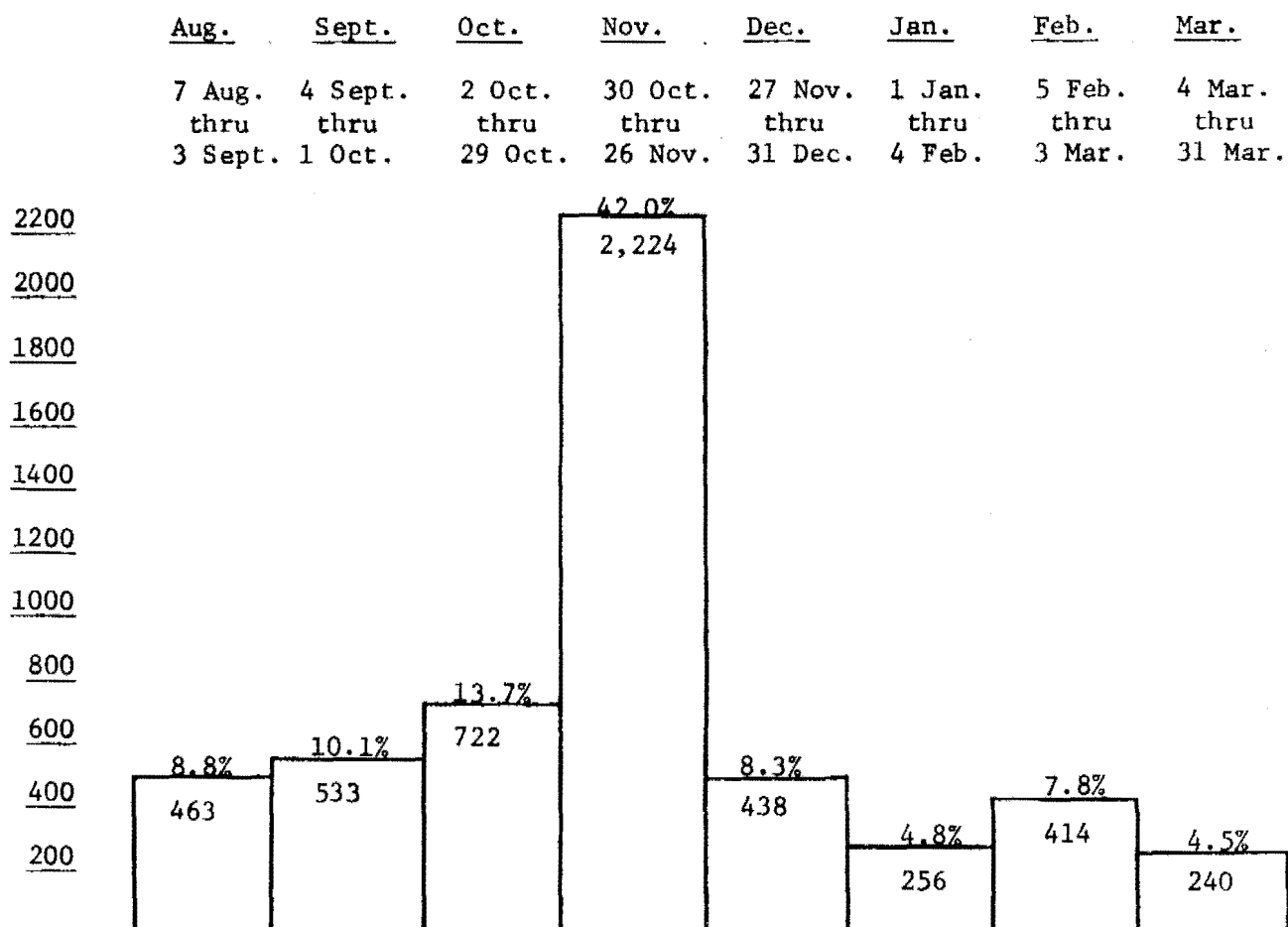


Figure 2. Reported Harvest Chronology, Mentasta Caribou 1971-72. N=1329

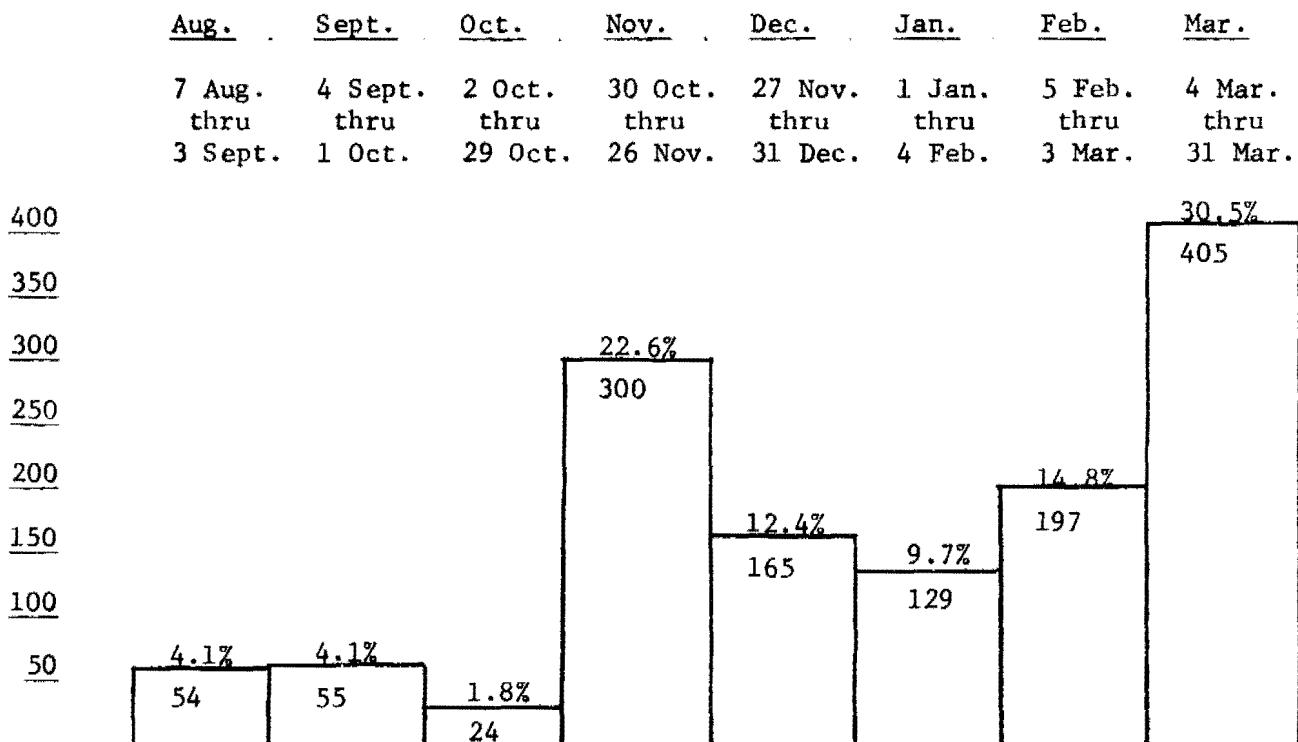


Table 5 compares reported Nelchina hunter success, residency and method of transport of successful hunters in 1971-72 with data since 1969. In 1971-72, 57 percent of 6967 reporting hunters were successful in taking at least one caribou, 85 percent of hunters reporting their residence were residents, and snow machines were the most used (37 percent) form of transport by successful hunters.

The reported sex composition of the Nelchina harvest was 46.6 percent males. The age structure of this harvest by sex, based on 885 tooth specimens of known sex is presented in Table 6.

Harvest 1972-73

Preliminary harvest estimates for the 1972 season place the harvest at below 500 animals. The final estimate based on computer returns will not be available until July, 1973. As a result of the 1972 Nelchina census the 1972 season was shortened to August 10 - September 20 in Units 11, 13 and 14 and the bag limit reduced to one per hunter. Season and bag limit restrictions had the effect of limiting success to fly-in hunters and to a relatively few hunters who used all-terrain vehicles in the Butte Creek area and Little Nelchina-Little Oshetna River area. Considerable effort expended in maintaining two roving hunter check vehicles yielded 98 tooth specimens of known sex for age determinations. The sex and age structure of this collection is presented in Table 7.

Following the close of the hunting season, caribou moved into the area adjacent to the Glenn Highway near Eureka in early October and remained there through the reporting period. It is suspected that some caribou were shot for bait by trappers and approximately five were shot illegally as of December 31, 1972, as reported by Terry Jordan, Fish and Wildlife Protection Officer, Glennallen.

Sex and Age Structure

Composition count data for the spring, summer and fall, 1972 counts and comparable data for the two previous years, where available, are presented in Tables 3, 1, and 2, respectively.

Spring calf survival counts were conducted on March 20-21, 1972 in the vicinity of the Nabesna Road. The percentage of calves (11.3) was down sharply from the figures for 1970 and 1971. A comparison of the March, 1972 males:females ratio with the October, 1972 value (Table 2) indicates bulls were under-represented in the spring count.

Postcalving composition counts conducted in July resulted in proportions of bulls and cows similar to those obtained later, in October. Postcalving counts from past years generally had small proportions of bulls (average about 5 percent). The figure of 18 percent males obtained in 1972 may have resulted from a more random representation of animals in 1972 than was normally the case, or it may have been the result of the methods employed in obtaining classifications.

Table 5. Reported Nelchina caribou hunter success, residency, and method of transportation of successful hunters, 1969-1971.

Year	Hunters Reporting	Success-ful Hunters	(%)	Reported Residency		Method of Transportation* Successful Hunters (Expressed as % of Total)							F
				Res. (%)	Nonres. (%)	A	H	B	M	S	O		
1971	6967	3931	(56.5)	3246 (84.7)	588 (15.3)	15.0	.4	2.0	.6	37.0	9.5	35.5	
1970	3710	2295	(61.9)	1708 (80.6)	411 (19.4)	27.6	.9	3.5	.5	34.5	12.8	20.2	
1969	5184	3109	(60.0)	2434 (82.8)	504 (17.2)	33.6	.5	4.4	1.2	26.4	10.4	23.4	

* A - Aircraft
H - Horse
B - Boat
M - Motorbike
S - Snowmachine
O - Off-road vehicle
F - Highway vehicle ("afoot")

Table 6. Sex and age sample of the harvest, 1971-72.

Age	Males		Females		Total	
	N	% of Total N = 349	N	% of Total N = 536	N	% of Total N = 885
0-1	50	14.3	42	7.8	92	10.4
1-2	32	9.2	27	5.0	59	6.7
2-3	60	17.2	74	13.8	134	15.1
3-4	106	30.4	75	14.0	181	20.5
4-5	36	10.3	66	12.3	102	11.5
5-6	21	6.0	35	6.5	56	6.3
6-7	15	4.3	32	6.0	47	5.3
7-8	5	1.4	27	5.0	32	3.6
8-9	10	2.9	31	5.8	41	4.6
9-10	5	1.4	37	6.9	42	4.7
10-11	3	.9	37	6.9	40	4.5
11-12	3	.9	21	3.9	24	2.7
12-13	2	.6	11	2.1	13	1.5
13-14	-		9	1.7	9	1.0
14-15	-		10	1.9	10	1.1
15-16	-		1	.2	1	.1
16-17	-					
17-18	1	.3	1	.2	2	.2
18-19						
Totals	349	100.1	536	100.0	885	99.8

Table 7. Sex and age sample of the harvest, 1972-73.

Age	Males		Females		Total	
	N	% of Total N = 79	N	% of Total N = 19	N	% of Total N = 98
0-1	2	2.5			2	2.0
1-2	4	5.1			4	4.1
2-3	8	10.1	8	42.1	16	16.3
3-4	23	29.1	3	15.8	26	26.5
4-5	24	30.4	3	15.8	27	27.6
5-6	13	16.5	4	21.1	17	17.3
6-7	4	5.1			4	4.1
7-8	1	1.3			1	1.0
8-9			1	5.3	1	1.0
9-10						
10-11						
11-12	1	1.3			1	1.0
12-13						
13-14						
14-15						
15-16						
16-17						
17-18						
18-19						
Totals	79	101.4	19	101.1	98	100.3

October composition counts were taken during the peak of the rut and the calf and sex proportions are probably representative of the population: 18.1 percent calves, 61.2 percent cows older than calves, and 20.7 percent bulls older than calves. These proportions are very similar to data obtained in the October, 1971 composition counts (Table 2). For both years, 25 percent of animals older than calves were males.

Data obtained in the October composition counts were examined to see if the observation platform or size of caribou groups classified affected the results.

Classification as to sex and age was accomplished from the ground with large groups of caribou (generally more than 30 animals, depending on terrain) or from the helicopter at low altitude on small groups of caribou. A 2 X 3 contingency table comparison of results from the two observation platforms indicated no significant difference ($p = .65$ $X^2 = 1.02$, 2 d.f.). The data from the two observation platforms were as follows:

Ground = 17.1 percent calves, 61.8 percent cows, 21.1 percent bulls.
n = 929.

Aerial = 18.7 percent calves, 60.8 percent cows, 20.5 percent bulls.
n = 1452.

The data were also tested to see if proportions of calves, cows, and bulls varied according to size of groups classified. Data were pooled for groups numbering 1-5, 6-10, 11-20, 21-50, 51-100, 101-200 and 200+ animals. A 3 X 7 contingency table indicated no significant differences in sex and age proportions between the various sized groups of caribou classified ($p = .35$ $X^2 = 13.62$ 12 d.f.).

The sample design did not allow for determination of the extent of spatial differences in sex and age proportions within the limits of the count area. I believe some spatial sex and age segregation was present in peripheral groups and especially in rear elements of the distribution which appeared to have larger proportions of bulls and cows without calves, and smaller proportions of calves.

Age structure of the adult portion of the population can be estimated using data from sexed and aged samples of the harvest. Although the 1971-72 hunting season provided the largest aged tooth sample (n = 885, Table 6) from the Nelchina area the representation of different ages is improved by pooling data from several years (at the cost of an averaging effect on the distribution of data). For example, if sexed and aged samples of the kill from 1968 through 1971 are combined, the distribution of ages by sex in Table 8 results. Among males, only the proportions of those animals three years old or older in the sample are believed to represent the true proportions in the population. This is true because hunters select for large antlered bulls over calves, yearlings, and two-year-old males. Among females, those animals two years old or older are probably accurately represented because hunters probably do not select differentially for age classes older than two years, but probably do

Table 8. Nelchina caribou age class distribution by sex from sex and age samples of the kill, 1968-1971.

Age	Males	Percent	Females	Percent
2	-	-	153	16.9
3	198	33.7	147	16.3
4	113	19.2	121	13.4
5	97	16.5	90	10.0
6-9	156	26.5	251	27.8
10+	24	4.1	141	15.6
Total	588	100.0	903	100.0

select against calf or yearling females. Although the sex ratios for the age classes represented in Table 6 are not known, examination of the relative proportion of each age class within sexes reveals the striking difference in age structure between the sexes. For example 69 percent of males older than two years are younger than six years whereas 57 percent of females older than one year (or 48 percent of females older than two years) are younger than six years. For animals ten years old or older, only 4 percent of males older than two years are in this category compared to 16 percent of females older than one year (or 19 percent of females older than two years).

Movements and Distribution

Movement patterns and seasonal distribution of Nelchina caribou during 1972 are depicted in Figs. 3 and 4.

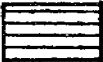
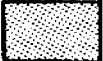


During the winter of 1971-72 Nelchina caribou were distributed in two major concentration areas and three minor areas. One large portion of the herd wintered in the vicinity of the Nabesna Road, extending from the Slana flats along the Copper River south and east to the Jacksina and Nabesna rivers and to Platinum Creek. As in 1969-70, this wintering area was used by both Nelchina and Mentasta caribou. A second major concentration wintered in the vicinity of Eureka and the Little Nelchina River. Smaller aggregations of caribou were located at the head of the Talkeetna River, in the Yanert Fork area east of McKinlev Park, and at the head of the East Fork of the Susitna River.

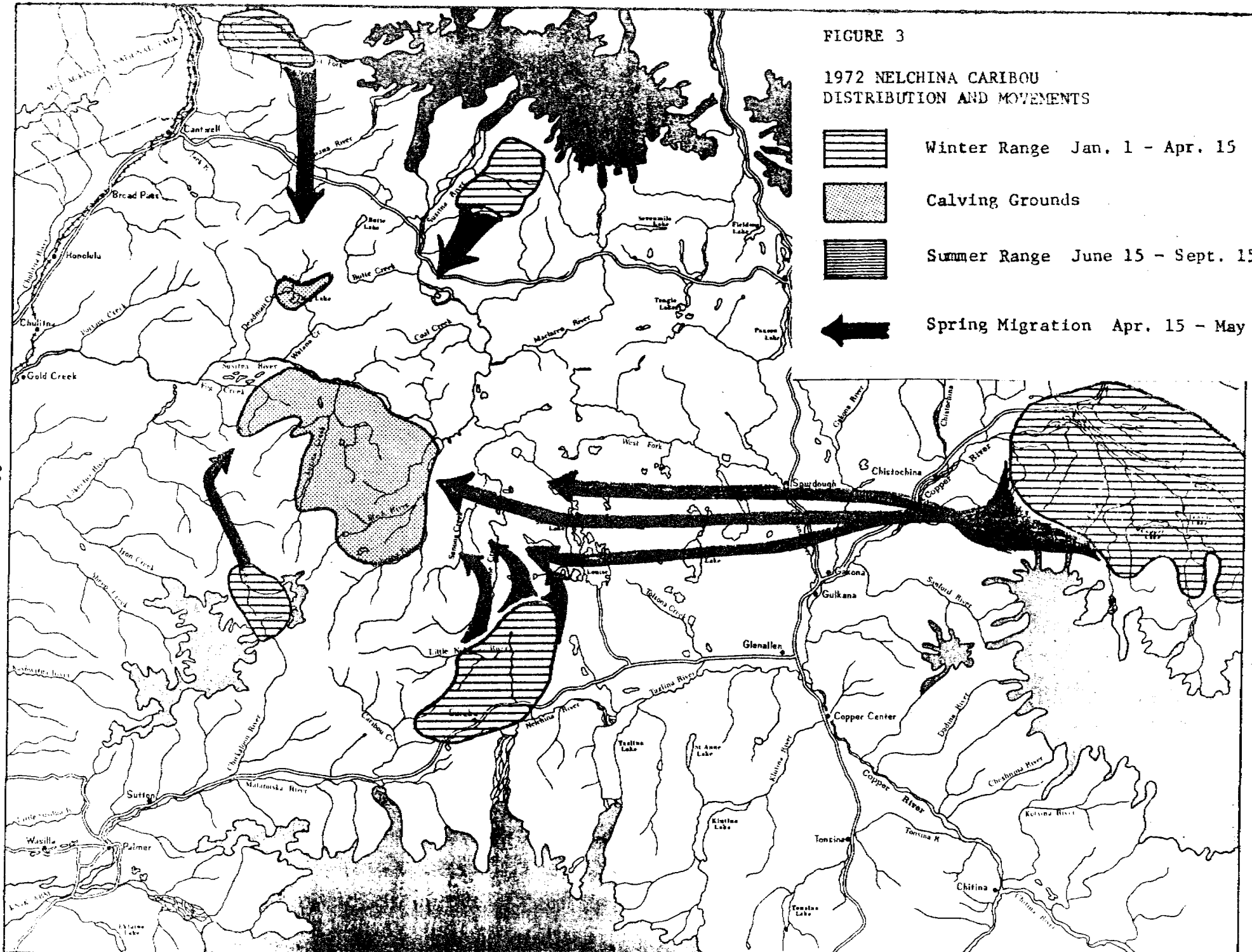
Snow accumulation during 1971-72 was the heaviest on record at the Weather Service Station at Gulkana. Deep snows lingered into late April and early May and were probably responsible for delaying spring caribou migrations until mid-May, also the latest on record. Caribou in the Nabesna area showed some westward trailing as early as March 30, but these animals did not migrate west until about May 10, reaching the Lake Louise area about May 22 and arriving on the calving grounds near Clarence Lake by May 26. Caribou occupied the Eureka wintering area until April, then gradually dispersed to the north and northwest in late April and early May. These animals arrived on the calving grounds with the Nabesna animals. Caribou from the Yanert Fork and the East Fork of the Susitna River are believed to have moved south and calved in the Butte Lake area primarily and to some extent in the Fog Creek-Watana Lake area. Caribou which wintered at the head of the Talkeetna River moved north along the Talkeetna River to calve along Fog Creek.

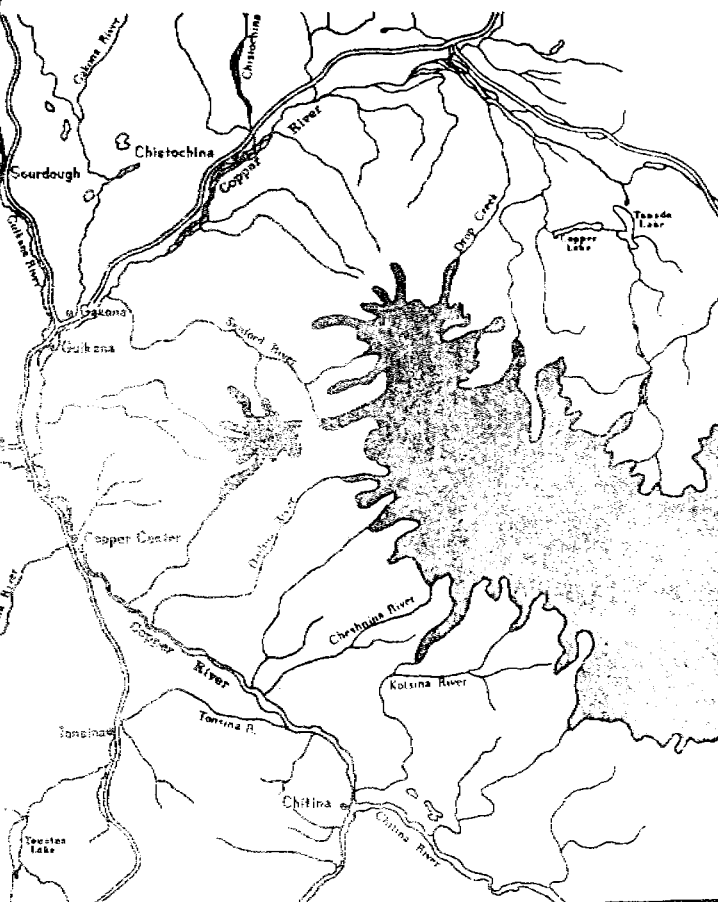
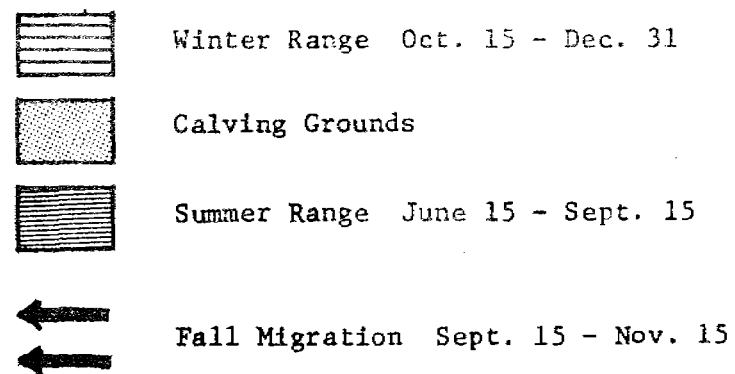
Postcalving concentrations occurred primarily along Fog Creek and Watana Lake with smaller aggregations near Black Lake and near Deadman Lake during late June and early July. In mid-July the major portion of the herd moved to the headwaters of the Oshetna River and then dispersed to summer range. During July, August and early September a slow northerly drift of widely dispersed small bands brought the herd to the highlands of the Jay Creek, Coal Creek and Watana Creek drainages. A few animals summered along the south slopes of the Alaska Range, principally in the Wells Creek-Susitna River area and a few moved south to summer at the head of the Talkeetna River.

FIGURE 3

1972 NELCHINA CARIBOU
DISTRIBUTION AND MOVEMENTS

-  Winter Range Jan. 1 - Apr. 15
-  Calving Grounds
-  Summer Range June 15 - Sept. 15
-  Spring Migration Apr. 15 - May 30



1972 NELCHINA CARIBOU
DISTRIBUTION AND MOVEMENTS

The fall migration started in late September with caribou aggregating for the rut and moving swiftly south to the Eureka area between the Horn Mountains and Old Man Lake. The majority of the herd remained in the Eureka area to winter. A smaller segment moved northeast across the Lake Louise flats into the Gakona River country northeast of Sourdough. Some widely scattered small groups remained in the Lake Louise flats to winter. By December 1972, small groups of caribou were again wintering in the Yanert Fork and upper Susitna River drainages, and at the head of the Talkeetna River.

The most important development in the distribution pattern of the Nelchina herd in 1972 was the absence of a movement to the Nabesna area to winter. This differs from the wintering pattern established by Nelchina caribou during the past decade.

Color Marking

Recent development of an aerial spraying technique for color marking big game (Simmons, 1971) and its application to caribou (Childs, 1972) prompted a small color-marking feasibility trial on Nelchina caribou. The advantages of recognizing specific animals and following their movements are obvious. Determining the extent of overlap of Nelchina and Mentasta caribou on winter ranges accessible to hunters is one example of management application of the technique.

Field operations took place November 2-3, 1972 near Eureka on the Glenn Highway. Approximately 43 caribou were color marked to a greater or lesser extent in seven sorties for an average of about six caribou per flight.

The location of the caribou was ideal. Animals were only five to ten minutes from the Tahnetta Airstrip and were situated above timberline on rolling hills near Table Mountain. This allowed low-level approach runs by the aircraft. Isopropyl alcohol was added to the dye-water solution (33.8 percent alcohol by weight) to prevent freezing in the 0°F. air temperature.

Total costs of materials, aircraft time and per diem averaged out to about \$15.00 per caribou marked. Limitations of the release mechanism permitted an "all or nothing" dumping operation. Future modification of the spray release should allow for several dumps per load of dye solution, substantially increasing the number of caribou marked per flight.

Of the 43 caribou marked, the majority showed color only on the neck and tail regions where white hair of the winter coat was dyed. Only six animals received sufficient amounts of dye to color the entire body.

Only two resightings of marked caribou were made by biologists on reconnaissance flights, both in the general vicinity where the animals were sprayed. One was sighted on January 2, 1973 approximately 15 miles north of Table Mountain. Another was sighted on February 9, 1973 about eight miles east of Table Mountain. Two additional marked caribou

showing a slight but identifiable coloration in the tail region were observed during composition counts on March 20-21, 1973, about 15 miles northeast of Table Mountain.

The number of resightings was disappointing. The color on those marked animals resighted suggested the color fades rapidly over time and that shorter term resightings would improve returns of information on movements. Further trials must await the acquisition of a spray tank with a modified release mechanism.

Condition of Range

No range vegetation studies were conducted during the year. Some collections of lichens were made along the Denali Highway and at Mesa Lake south of Nabesna.

Limited observations of range type utilization were made on periodic reconnaissance flights conducted throughout the year. In general, such observations followed the pattern already reported in former progress reports. The most salient observations were as follows:

1. Caribou wintering in the Eureka and Nabesna areas in early 1972 and near Eureka in late 1972 utilized vegetation in timbered areas as well as above timberline. Those in mountainous areas primarily utilized the lower slopes. The caribou in the upper drainages of the Talkeetna and East Fork of the Susitna rivers and those along the southern drainages of the Yanert Fork were all well above timberline utilizing the higher slopes as well as the lower.

2. Following the spring migration and until late September, almost all caribou were sighted above timberline. Range utilization was primarily of the shrub birch and sedge meadow types. Green vegetation was utilized as soon as it became available in mid-June. Generally the eastern and northwestern portions of the Nelchina Basin showed green vegetation the earliest and the western Talkeetna Mountains and higher altitude central portions of the Nelchina range became green the latest.

3. Alpine meadows and ridgetops were commonly used during late summer.

4. During the rut and fall migrations, caribou traveled through and utilized different range types before settling on their winter ranges. One conspicuous type of use noted and previously reported was extensive utilization of the lakeshore sedge type in the Lake Louise flats. Caribou used sedges along lakes and streams during October and November.

RECOMMENDATIONS

The procedures providing information for an annual status evaluation of the Nelchina caribou should be continued. Particular attention should be directed to standardizing the timing and methods of sex and age

composition counts, and to reducing sampling error. The current size of the population will necessitate a more careful consideration of allowable harvest levels. In this regard, determination of natural mortality levels, especially of predation by wolves is needed. Also, studies on the calving grounds may provide information on current natality rates and neonate calf mortality.

Range analysis studies are still awaiting the development of a usable and worthwhile program for determining utilization and condition and trend of the Nelchina range, within the constraints of available time, money and manpower.

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