WORK PLAN SEGMENT REPORT
FEDERAL AID IN WILDLIFE RESTORATION

STATE:	Alaska		
PROJECT NO.:	W-6-R-5	TITLE:	Alaska Wildlife Investigations
WORK PLAN:	E	TITLE:	Sheep Investigations
JOB NO.:	1	TITLE:	Population and Distribution Studies
	2	TITLE:	Range Studies
	3	TITLE:	Disease and Parasite Studies
	4	TITLE:	Species Biology and Behavior Studies

PERIOD COVERED: July 1, 1963 to June 30, 1964

ABSTRACT

Eight aerial surveys were conducted during this reporting period. These flights required about 35 hours of counting time and gave a total of 4,199 sheep. The percentage of legal rams found was from 7.3 to 12.9 percent.

Fecal pellet analysis has revealed the presence of a number of parasites previously unknown in Alaskan sheep. Six species of roundworms including three kinds of lungworms (Protostrongylus, Muellarius, and Dictyocaulus) and three kinds of stomach and intestinal worms (Trichuris and two trichostrogylids) have been recorded. Coccidie (probably three species) were found in pellets from all of the major sheep ranges. A small sample of 28 jaws from hunter kills including 13 showing abnormalities of which 5 involved moderate to severe necrosis.

An ewe collected near Anaktuvuk Pass was afflicted by some kind of non-sarcoptic mange and her lamb was a brucellosis reactor. A lamb which evidently starved to death in the Dry Creek study area showed lesions which grossly resembled those of contagious ecthyma.

The rut seemed to be about the same time and duration as that reported previously, although most of the sheep were located in a less accessible area probably due to the presence of a band of wolves in the area.

The lamb crop was somewhat lower than that observed in previous years, but the survival of the 1963 lamb crop to the yearling age was normal.

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OBJECTIVES

To determine the distribution and relative abundance of sheep on a statewide basis and to relate it to accessibility and hunting pressure received.

To make an ecological survey of selected, representative sheep ranges in Alaska to determine the dominant plant communities and the environmental factors affecting them.

To determine the sheep utilization of plant communities and individual species during different seasons and in different areas.

To determine the condition of the sheep range and any past, present, or future trends in the range conditions.

To determine the effects of different densities of sheep populations on the range conditions and to work out range indices that will indicate optimum number of sheep for a given range.

To compare sheep ranges throughout the State.

To obtain information on occurrence and incidence of diseases and parasites, and influences on sheep populations.

To obtain information regarding life-history and behavior, and to determine and evaluate influencing factors.

TECHNIQUES

No work was accomplished on Job No. 2, as the range ecologist position was vacant during this reporting period.

Aerial surveys were conducted in several of the sheep ranges utilizing a PA-18 "Super Cub" during July and August of 1963. Sheep observed were classified as legal rams (horns 3/4 curl or larger), young rams, ewes, lambs, yearlings, and unidentified.

Since it is not possible to make extensive collections of sheep, it was necessary to attempt to obtain a maximum amount of information from hunter kills and fecal pellets. Collection and processing of specimens was accomplished as follows:

1. Hunter-killed animals: Prior to the 1963 hunting season, the general hunting public, guides, and all other interested parties, were contacted via news releases, posters in sporting goods establishments, and each field office. In addition, a form letter was sent to all guides. All sheep hunters were requested to take a sample of pellets and the jaws from their kill and forward these to their nearest game office. A kit of collecting supplies was provided each hunter.

2. Independent field work: A field trip was made to a relatively heavily populated sheep range in the Wrangell Mountains to collect pellet samples and to closely observe ewes and lambs for evidence of diseased or weak animals. Only fresh unweathered pellet samples were collected. Because of field duties on other projects, it was not possible to visit additional areas during the season.

Soil samples from a mineral lick in the Dry Creek study area were collected by the project leader for helminthological analysis.

3. Laboratory Analyses: A sugar flotation-centrafugation technique was developed by modifying existing methods for the examination of pellet samples for helminth larvae and ova and protozoan cysts. The technique when employed under controlled conditions, appeared to yield a high degree of relative accuracy and recovered about 70% of the parasitic forms present in pellets. Because of the variation in the production of ova, larvae, etc., during different periods of time, pellet analysis will only yield approximate, quantitative information. It is primarily useful in determining the quality and order of magnitude of parasitic infections when relatively small numbers of pellet samples are collected at random.

Field observations were made to determine the timing and duration of the rut and the behavior of sheep during this period.

Observations were made just after the lambing season to collect data as to the magnitude of the lamb crop, and yearling counts were made to determine survival.

FINDINGS

Current Abundance and Distribution

Aerial Surveys

Thirty-five hours of aerial surveys conducted in eight different areas of Alaska during this reporting period resulted in a total count of 4,199 sheep. These counts

do not give actual total numbers of sheep in each area, but represent a minimum figure in each instance, and they give an indication of relative abundance between areas.

The first area counted was Delta Creek, Gerstle River, Jarvis Creek, and Johnson River, on July 2-3, 1963. The total found in this area was 697 animals. (The composition for all counts is given in Table 1.) Delta Creek had 138, the Girstle 27, Jarvis Creek 323, and Johnson River 209. This is a heavily hunted area, since it is possible to get into on foot, and the percentage of legal rams as compared to other areas indicates this.

On July 9, the Tonzona River was flown and 140 animals found. This is a rather remote somewhat isolated group of sheep, and one that is little hunted.

In talks with bush pilots and hunters from the Eagle area, reports have been received of saddle back, or fannan sheep occurring in the region of the Totondak River across from Eagle, Alaska. This area was flown July 11, and 68 animals were found, some of which appeared to have definite patches of brown on their backs. This coloration could be from the reddish soil found in the area, however. This area is probably seldom hunted.

On July 21 and July 27, the area containing Wildlake, the Upper Koyukuk River, the Middle Fork, and the Hammond River, was counted and contained a minimum of 228 sheep. Hunting pressure is quite heavy around Wildlake, but light on the other three regions.

On July 27, the John River, the Hunts Fork, and Chandler Lake was flown. This area contained 779 sheep. The John River contained 226, the Hunts Fork 89, and Chandler Lake 464. This is the area of the Brooks Range receiving the most hunting pressure.

On August 2-9, the south slopes of the Wrangell Mountains from Mount Drum to the Canadian border was flown, and 1,210 sheep were counted. This is the area that produces the largest trophies and has produced the greatest percentage of the trophies listed in Boone and Crockett Club records on the Dall sheep. Since it does produce the largest sheep, it receives heavy hunting pressure.

On August 13-14, the Altna River and the Upper Noatak River were counted, and 152 sheep counted. The Alatna had 39 sheep, and the Noatak 113. These regions have some hunting pressure, but more pertinent to this count was the somewhat inclement weather.

On September 10-12, and 13, three regions of the Kenai Peninsula were flown, and 925 sheep were counted. This is a heavily hunted area, and the percentage of legal rams indicates this. The three regions were as follows: from Seward to Portage east of the railroad, from Homer to Tustumenia Lake west of the divide, and from Tustumenia Lake to Turnagain Arm on the west slopes.

It is interesting to note that the area sustaining the heaviest hunting pressure, the south slopes of the Wrangell Mountains, contains the largest percentage of legal rams.

Disease and Parasite Studies

I. Pellet Analysis

In spite of the expenditure of considerable time and money on soliciting specimens from sheep hunters and guides, the return was particularly disappointing. Only twenty four pellet samples, most unaccompanied by jaws, were turned in. The fact that even some department personnel failed to collect specimens from their kills, suggests that sheep hunters simply don't want to be bothered even to the extent of carrying an extra pound or spending an extra few minutes while dressing out their animals. This is in sharp contrast to other states (e.g. Montana, Arizona) where a very high percentage of successful hunters make more extensive specimen collections. A concerted effort will be made in the future to overcome hunter resistance in this regard.

The results of the pellet analysis are given in Table 2. Pellets collected in the Chitina River area in July and during the year on the Dry Creek range were made by project personnel. The remaining 24 samples were provided by hunters. The various parasitic forms found are individually discussed below.

A. Coccidia

It is readily apparent that coccidia are found in sheep in all of the major sheep ranges in Alaska. At present there appear to be at least three species, but these have not yet been positively identified. There are at least eleven accepted species of Eimeria which occur in North American sheep frequently in mixed infections of two or three species. Some of these forms are known pathogens in domestic sheep where the disease is serious primarily in feedlot lambs. None of the infections observed were of pathogenic intensity. However, acute coccidiosis may be present before oocysts appear in the feces.

B. Cestodes

Anoplocephalid cestodes are undoubtedly more widely distributed, if not more common, in Alaskan sheep. Wyominia tetoni has been reported from Yukon Dall sheep and no doubt is present in Alaska. This cestode is unusual in its habit of living in its adult form in the bile ducts of the host. As in other cestodes of the Anoplocephalidae, it no doubt utilizes minute, free-living oribatid mites as an intermediate host. Russian workers have reported fatalities in heavy infections of anoplocephalids in domestic lambs in which infection rates are usually quite high in most areas.

C. Nematodes

Relatively little has been reported in the literature on the nematode parasites of Alaskan wild sheep. Only one lungworm species has been recorded and its exact identity is unknown. The present study had demonstrated five unreported forms, at least two of which may be significant pathogens.

1. Trichuris

The sheep whipworm, Trichuris ovis, which inhabits the large intestine and caecum has worldwide distribution. Although adult specimens are not available for identification, no doubt the Alaskan sheep form is the above species. Even in heavy infections in domestics, symptoms are not severe although emaciation may occur. The infections observed in this study were relatively mild.

2. Trichostrongylids

Even though adult specimens are not available, it is readily evident that at least two species of trichostrongylids are present. Two larval forms are easily distinguished. The shorttailed form appears similar to that of species of Trichostrongylus which are known to occur in sheep elsewhere. This helminth is common on all of the sheep ranges included in this study. Some of the infections observed were likely of pathogenic intensity. The long-tailed larval form was infrequently observed and then only in small numbers. It resembles larvae of Oesophagostomum or possible Nematodirus. Whether or not this form ever occurs at high incidences or intensities is unknown, but not unlikely. It is essential that adult specimens of these species be obtained for definitive identification. Trichostongylid roundworms are well known bad actors to modern stockmen.

3. Lungworms

An unidentified species of the genus Protostrongylus was reported by Murie (1942) in sheep of McKinley Park. Two additional forms were recognized during the present study. A few adult specimens of Dictyocaulus were recovered from a lamb which died on the Dry Creek study area and larvae of either Cystocaulus or Muellarius have been recognized in a few fecal pellets from this and other areas. Lungworms, especially Protostrongylus, are no doubt common parasites of wild sheep throughout their range in Alaska. It is likely that as elsewhere they are associated with natural mortality, particularly in crowded areas.

II. Pathology

A limited amount of information is available on hunter-killed animals. Unfortunately only 28 sets of jaws were turned in by hunters. The data on these, is presented in Table 3. Only five sets of jaws were judged to exhibit moderate or severe necrosis involving loss of teeth, protruding teeth, and swelling and erosion of the mandibles. Two of these jaw specimens were accompanied by pellet samples and in both instances pellet analysis indicated mild infections of coccidia or trichostrongylid roundworms. However, it seems likely that a large series of jaw-pellet specimens will demonstrate a correlation between intensity of infection and extent of jaw necrosis. The limited series of specimens available do not permit meaningful analysis.

During field activities on the caribou project near Anaktuvuk Pass last April, an ewe sheep was observed that appeared to be mangy. Accordingly, the ewe and her lamb were collected and various specimens were taken. Microscopic examination failed to reveal the presence of mites and the specimen was referred to the USDA diagnostic laboratory, Ames, Iowa, for further study. Further information is not yet available. Surprisingly, the lamb, but not the ewe, was serologically positive (1:40) for brucellosis. In addition, a mild infection of an anoplocephalid cestode, probably Moniezia, was observed in the lamb.

A lamb found dead in the Dry Creek study area during December, 1963, showed lesions on its lips which were grossly characteristic of contagious ecthyma, a viral disease widely found in domestic sheep. The condition can significantly interfere with feeding in domestic sheep leading to severe loss of weight. Secondary infections can result in mortality. The lungs and heart of this animal were also brought in, but appeared normal, except for lack of cardiac fat and a few specimens of the lungworm, Dictyocaulus, previously unknown in Alaskan sheep. It was also noted that intra-orbital fat was lacking. It appears that the lamb starved to death as a consequence of the oral lesions which probably interfered with feeding. Specimens of the lip lesions have been sent to the USDA diagnostic laboratory for further study.

Species Biology and Behavior Studies

The rutting period

We were not able to observe the behavior of sheep during the rutting period this season to the extent we have before, since the largest group of sheep were located in the Slide Creek area and were not close enough for good observation; however, the few sheep remaining in the breaks along Dry Creek were kept under observation. The peak of the rut appeared to be during the third week in November, and all rutting activities were over by December 8.

The difference in location of sheep during this time may have been due to the presence of a pack of wolves in the Dry Creek area. We observed fresh wolf signs almost every day, and were visited on two occasions, once at the Newman Creek cabin, and again at the Lower Dry Creek cabin. On both occasions, the animals seemed quite bold.

One difference in the behavior of rams not previously observed and described, was noted on November 13. Two large rams, both full curl rams, battled almost constantly for 1 hour and 30 minutes. During this period, they butted heads again and again until tired, then rested and butted heads again. In one 15 minute period, they clashed 12 times, some of the clashes being but 45 seconds apart. During this fight, one ram was knocked down twice and appeared to be stunned, but jumped up and continued. This is but one observation of this prolonged struggle out of many butting contests observed, and is believed to be an exceptional contest.

Productivity

Lambing and Lamb Survival

Observations were not made this year of the progression of lambing, but counts were made on June 13 and 14 to determine the ratio of ewes to lambs at that date and to determine the ewe to yearling ratio.

The total counted during the two days gave 192 ewes, 74 lambs, and 79 yearlings. This is 38 lambs per 100 ewes and 41 yearlings per 100 ewes.

units 7, 5, 19, 20 ... one for each unit

Table 1. Aerial sheep counts made from July 2, 1963 to September 13, 1963.

Area	Legal Rams	Young Rams	Ewes	Lambs	Unid.	Total No.	Flying Time	# Sheep Per hour
Delta Creek, Gerstle River Jarvis Creek, Johnson River	66	147	276	128	80	697	4.4	151
% of Total	9.4	21.1	39.6	18.2	11.7			
Tonzona River	12	27	66	32	3	140	.9	155
% of Total	8.5	19.3	47.1	22.9	2.2			
Totondak River, Nation River, Kondak River	5	11	22	8	22	68	4.1	14
% of Total	7.3	16.1	32.4	11.8	32.4			
Wildlake, Upper Koyukuk River, Middle Fork, Hammond	21	22	98	37	50	228	2.7	85
% of Total	9.2	9.4	42.9	16.2	22.3			
The John River, the Hunts Fork, Chandler Lake	91	99	335	172	82	779	5.6	139
% of Total	11.7	12.7	43.0	22.1	10.5			
South Slopes of Wrangell Mountains from Mt. Drum to Canadial Border	157	195	493	234	131	1210	7.0	173
Alatna River and Headwaters Noatak River	12	16	45	16	63	152	2.8	54
% of Total	7.9	10.5	29.6	10.5	41.5			
Kenai Peninsula	81	144	355	131	214	925	7.3	126
% of Total	8.7	15.6	38.4	14.1	23.2			
TOTALS	445	661	1690	758	545	4199		
% of Totals	10.4	15.6	40.2	18.4	15.4	100		

1963-64

Table 2. Incidence of parasitic organisms in organisms in Dall Dheep Fecal pellets

Locality	Date	Sample Size	Parasite* Coccidia intensity	%	Cestode ova intensity	%	Trichuris ova intensity	%	trichostrongylid larvae Short-tailed intensity	%	trichostrongylid larvae long-tailed intensity	%	lungworm larvae intensity	%
Wrangell Mtns.														
Chitina R.	7/63	83	4-60	5	-	-	2-258	18.5	6-1250	85	2-8	7.2	6-502	64
Chitina R.	9/63	2	0-237	50	-	-	-	-	0-150	50	-	-	0-350	50
Other areas	Fall'63	8	7-72	50	0-50	12.5	-	-	1-146	62	-	-	0-96	12
Chuqach Mtns	Fall'63	5	12-14	40	-	-	-	-	0-2	20	-	-	-	-
Talkeetna Mtns	Fall'63	2	0-16	50	-	-	-	-	0-26	50	-	-	-	-
Alaska Range, Dry Creek	1963	19	0-94	5	-	-	4-8	15	4-368	42	0-2	5	2-830	63
Brooks Range	Fall'63	5	0-8	20	-	-	1-3	40	6-14	60	-	-	9-12	40
Kenai Mtns.	Fall'63	2	0-10	50	-	-	-	-	0-1	50	-	-	-	-

*See Test for discussion of individual parasite categories. Intensity values are the ranges of the relative numbers of individual organisms recovered under standard conditions from 1.0 gram dry weight of fecal pellets.

Table 3. Incidence of jaw disorders in hunter-killed sheep, 1963

Locality	Sample Size	Incidence of Abnormalities										
		Abnormal Specimens		Missing Teeth		Protruding Teeth		Mandibular Necrosis				
		Age (yrs)	No.	Range	Incidence	Range	Incidence	Swollen mandibles	No. with visible lesions	Extent of necrosis: Slight	Moderate	Severe
Wrangell Mtns.	11	7-9	5	1-4	2/11	1-4	2/11	3	3	2	1	-
Chugach Mtns.	6	-	2	2	2/6	1-4	2/6	2	2	1	1	-
Alaska Range	4	?-10	3	-	-	-	-	3	2	3	-	-
Talkeetna Mtns.	2	-	0	-	-	-	-	-	-	-	-	-
Kenai Mtns.	1	-	1	2	1/1	-	-	1	1	-	1	-
Unknown	4	-	2	2-4	2/4	3-4	2/4	2	2	-	1	1
Total	28	-	13	1-4	7/28	1-4	6/28	11/28	10/28	6	4	1

It would seem that lamb production for the spring of 1964 was lower than for the past two years. The peak of production would have been somewhat higher than the ratio found on this count, judging from previous years, but the remaining ratio at this time for the past two years, 1962 and 1963 respectively, was 49 lambs per 100 ewes and 53 lambs per 100 ewes.

The survival to the yearling age was almost the same as for the past two years, 41 yearlings per 100 ewes. In 1962, it was 41 yearlings per 100 ewes, and in 1963, it was 40 yearlings per 100 ewes.

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