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INTERIOR SHEEP STUDIES

by
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Volume IV
Project Progress Report
Federal Aid in Wildlife Restoration
Project W-17-10, Jobs 6.9R, 6.11R and 6.13R

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JOB PROGRESS REPORT (RESEARCH)

State: Alaska

Cooperator: Wayne E. Heimer

Project No.: W-17-10 Project Title: Big Game Investigations

Job No.: 6.9R Job Title: Dynamics of Selected
Sheep Populations

Job No.: 6.11R Job Title: Seasonal Utilization
of Dall Sheep Range

Job No.: 6.13R Job Title: Dall Sheep Responses
to Human Activities

Period Covered: July 1, 1977 through June 30, 1978

SUMMARY

Comparative studies continued between a dense, low quality sheep population in Dry Creek and a high quality, less dense, more productive population on Sheep Creek near the Robertson River. Data were gathered on population dynamics, seasonal availability of range, gross body composition and food habits.

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BACKGROUND

The introduction and background of this study have been given in detail in earlier reports. The most recent report is that by Heimer (1977).

OBJECTIVES

To determine initial lamb production, yearling recruitment, survival and reproductive frequency in the low quality, Dry Creek sheep population and these same variables plus age structure in the high quality, Sheep Creek population.

To gather comparable information about seasonal availability of ranges to high and low quality sheep populations.

To determine Dall Sheep population responses to predator reduction programs and human activities associated with mineral development.

PROCEDURES

Procedures have been discussed in detail by Heimer (1977). However, Job 6.13, Dall Sheep Responses to Human Activities, was new this year. Procedures for this job were to collect information on population productivity and yearling survival from an experimental population (subjected to intense human activity such as mineral exploration, development and wolf control, as well as heavy hunting pressure) and an undisturbed control population. The experimental area for this study is between Dry Creek and the West Fork of the Little Delta River, an area where recent population history is known and movements are well understood. The

control area is in Mount McKinley National Park where aerial disturbance is slight, hunting is not allowed and where there is some data on population history. Data were collected using conventional classification counts from the ground.

FINDINGS

Dynamics of Selected Sheep Populations

Production of lambs in Dry Creek during 1977 was 58 lambs per 100 ewes, which is unusually high. This probably resulted from the successive mild winters of 1975-76 and 1976-77 as well as warm, dry weather during the lambing period. This high production resulted in an increased estimate of population size of 1400 total sheep in the Dry Creek study area during early summer 1977. Table 1 shows these results and past population history.

Production of lambs in Sheep Creek was 52 lambs per 100 ewes, which is similar to that in several previous years. Table 2 gives the 1977 data for Sheep Creek. During 1977 sheep were classified subsequent to a trapping effort. Four ewes were collared, and one of these was shot by a hunter during the ewe season in Yerrick Creek. Another was sighted from an aircraft on 10 November. She was seen about 1.6 km southeast of the Mount Neuberger summit. The collar was identified as "Blue O."

Age data were collected from ewes taken during the ewe hunt in the Tok Management Area, an area influenced by the Sheep Creek mineral lick. These data were used in conjunction with ages of collected sheep to compute a mean age of 67 months (n=37) for adult sheep from this high quality area. The mean age of all adult sheep collected in Dry Creek since 1972 is 86 months (n=26).

Assessment of Sheep Populations Occupying Designated Wintering Areas

No further data were gathered on this job during the past segment. I still assume that the number of sheep on winter range in the Dry Creek study unit is 350, and that on the Robertson River winter study unit is 450 (Heimer 1977).

Seasonal Availability of Dall Sheep Range

The winter of 1977-78 was unusually mild in Dry Creek. Low snow accumulation resulted in winter range densities of about four sheep per square kilometer during mid-April. This is the lowest winter range density ever recorded for Dry Creek. Table 3 shows the recorded available winter range on the Dry Creek study unit and the density of sheep based on the best available population estimates for these seasonal ranges. No data were gathered from the Sheep Creek study area during this segment. The extent of wintering areas for any discrete population in Sheep Creek is not yet known.

Table 1. Productivity, survival and estimated number of Dall sheep influenced by the Dry Creek mineral lick from 1970 through 1977.

Year	Lambs per 100 ewes	Yearlings per 100 ewes	% of lambs surviving 1st winter	Estimated population
1968*	63	13		
1969*	64	31	49	--
1970*	55	31	48	1500
1971*	50	51	93	
1972	15	16	32	1473
1973	38	11	73	1315
1974	28	25	66	1270
1975	28	23	82	1150
1976	36	16	57	1240
1977	58	17	47	1400

*Data gathered at mineral lick using observation schedules not described in procedures (see Heimer 1975).

Table 2. Productivity, survival and sample size of Dall sheep classified at the Sheep Creek mineral lick from 1974 through 1977.

Year	Lambs per 100 ewes	Yearlings per 100 ewes	% of lambs surviving 1st winter	Sample size
1974	56	21		116
1975	43	37	66	273
1976	35	26	60	257
1977	52	18	51	593

Table 3. Winter range area, sheep population and density of sheep for the Dry Creek winter study unit.

Date	Estimated sheep population	Area of snowfree winter range	Density of sheep per km ²
16 April 1976	350*	62km ²	6
18 April 1977	350*	81km ²	4
16 April 1978	350*	88km ²	4

*The last available estimate is 350. The population has increased since this number was observed but no subsequent survey of this area has been done since 1975.

Dall Sheep Condition and Nutritional Profile

Data gathered during this past year are summarized in Tables 4 through 11. Further analyses of body visceral condition, forage quality and fetal lamb carcass composition are in progress and will be necessary before meaningful analyses can be performed.

Dall Sheep Responses to Human Activities

Production and survival of sheep in the experimental population exposed to mineral development and hunting are given in Table 1. These activities are so widespread that the only control population available is in McKinley Park. I realize that this population may not be directly comparable to the Dry Creek area because of habitat differences and the absence of predator control. However, McKinley Park will be used because a more suitable "control" population is not available. Data for production and survival in McKinley Park are given in Table 12.

RECOMMENDATIONS

No management recommendations based on results of this study are available at this time.

LITERATURE CITED

Heimer, W. E. 1975. Interior sheep studies. Fed. Aid in Wildl. Rest. Annu. Proj. Prog. Rep. W-17-7, Jobs 6.9R, 6.10R and 6.11R.

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Table 4. Late winter composition (% volume) of rumen contents by plant group for ewes collected in Dry Creek.

Acc. no. and age	Date collected	Grass & sedge leaves & stems	Base parts of unk. origin	Woody stems (or green leaves & stems)	Willow & dryas leaves	Lichen & moss
3559 4 yr	5/5/72	87%	--	(1%) Sax	12%	--
3578 4 yr	3/20/72	97%	--	(1%) Vacc	1%	1% lichen
3579 7 yr	5/5/72	94%	--	(1%)	5%	--
3580 7 yr	5/5/72	95%	--	trace	5%	--
3581 1 yr	5/4/72	94%	--	--	6%	trace
3893 8 yr	4/7/73	58%	--	(39%) Vacc	3%	--
3894 2 yr	4/7/73	70%	--	(20%) Vacc-Led	9%	--
3895 7 yr	4/7/73	42%	--	(17%) Vacc	25%	trace
3896 8 yr	4/7/73	91%	--	(9%)	--	--
3897 5 yr	4/7/73	89%	--	(5%)	5%	1% lichen
4384 6 yr	5/25/76	73%	--	18%	9%	trace
4385 10 yr	5/25/76	99%	--	--	trace	trace
4386 5 yr	5/25/76	93%	--	--	4%	4%
4387 5 yr	5/25/76	85%	--	8%	8%	trace
4388 7 yr	5/25/76	93%	--	7%	trace	trace
4741 1 yr	4/18/77	69%	trace	(29%) Sax	3%	trace
4742 1 yr	4/18/77	51%	trace	(44%) Sax+Vacc	1%	4%
4743 6 yr	4/18/77	36%	5%	(49%) Willow	8%	4%
4744 6 yr	4/18/77	62%	8%	(15%) Sax+Wilo	15%	trace
4745 11 yr	4/18/77	78%	--	(14%) Willow	8%	trace
4746 6 yr	4/18/77	79%	--	(10%) Sax	5%	6% all moss
		$\bar{x} = 78\%$	$\bar{x} = 1\%$	$\bar{x} = 14\%$	$\bar{x} = 6\%$	$\bar{x} = 2\%$

Table 5. Late winter composition (% volume) of rumen contents by plant group for ewes collected near the Robertson River.

Acc. no. and age	Date collected	Grass & sedge leaves & stems	Base parts of unk. origin	Woody stems (or green leaves & stems)	Willow & dryas leaves	Lichen & moss	
4762	11 mo	4/21/77	64%	18%	(7%) Vacc	7%	3%
4763	8 yr	4/21/77	24%	52%	(3%) Vacc	10%	10%
4764	3 yr	4/21/77	39%	27%	(2%)	16%	16% most lichen
4765	2 yr	4/21/77	37%	37%	(8%) Vacc	10%	8% some fungi
4766	8 yr	4/21/77	36%	36%	(7%) Vacc	7%	14% much fungi
4767	8 yr	4/21/77	47%	23%	(9%) Vacc	11%	9%
4768	6 yr	4/21/77	23%	50%	(6%)	9%	12% all lichen
		$\bar{x} = 39\%$	$\bar{x} = 35\%$	$\bar{x} = 6\%$	$\bar{x} = 10\%$	$\bar{x} = 11\%$ most lichen & fungi	

Table 6. Early winter composition (% volume) of rumen contents by plant group for ewes collected in Dry Creek.

Acc. no. and age	Date collected	Grass & sedge leaves & stems	Base parts of unk. origin	Woody stems (or green leaves & stems)	Willow & dryas leaves	Lichen & moss
4565 1.5 yr	10/29/76	68%	--	(26%) Vacc	4%	2%
4566 14 yr	10/29/76	78%	--	(17%) Vacc	3%	2%
4567 7 yr	10/29/76	52%	--	(21%) Vacc	5%	22% all moss
4568 7 yr	10/29/76	60%	--	(30%) Vacc	4%	6%
3868 3 yr	11/17/72	96%	--	(1%) Vacc	1%	trace moss
F1d2 6 yr	11/17/72	97%	--	(1%) Vacc	1%	1% lichen
3870 5 yr	11/18/72	94%	--	(4%) Ledum	1%	1%
F1d5 5 yr	11/19/72	99%	--	trace	trace	trace
F1d6 0.5 yr	11/19/72	99%	--	trace	trace	--
		<u>x</u> = 83%	<u>x</u> = 0%	<u>x</u> = 11%	<u>x</u> = 2%	<u>x</u> = 4%
						mostly moss

Table 7. Early winter composition (% volume) of rumen contents by plant group for ewes collected near the Robertson River.

Acc. no. and age	Date collected	Grass & sedge leaves & stems	Base parts of unk. origin	Woody stems (or green leaves & stems)	Willow & dryas leaves	Lichen & moss	
4593	0.5 yr	11/19/76	48%	24%	8%	6%	13%
4594	3 yr	11/19/76	58%	25%	8%	3%	5% most moss
4595	0.5 yr	11/19/76	57%	trace	2%	29%	12%
4596	6 yr	11/19/76	44%	38%	3%	4%	11%
4597	8 yr	11/19/76	50%	27%	13%	1%	9% all lichen
4598	5 yr	11/19/76	74%	12%	3%	3%	8%
4599	8 yr	11/19/76	63%	16%	3%	6%	13%
4600	3 yr	11/19/76	50%	22%	10%	3%	15%
4601	8 yr	11/19/76	56%	21%	18%	4%	2%
		<u>x</u> = 53%	<u>x</u> = 21%	<u>x</u> = 8%	<u>x</u> = 7%	<u>x</u> = 10%	

Table 8. Early winter body composition of ewes collected from Dry Creek during 1975 and 1976.

No.	Date	Age	Weight	1/2 Carcass weight	Total bone weight	% Bone*	Carcass			Viscera weight	Pregnant?	Fetus weight
							% fat	% H ² O	% protein			
4331	10/28	11 yr	62.3kg	21.4kg	4.4kg	7.3	10.3	70.6	9.8	9.2kg	n/a	n/a
4332	10/28	7 yr	55.9kg	20.0kg	4.0kg	7.2	14.5	65.5	10.0	8.2kg	n/a	n/a
4333	10/29	8 yr	61.4kg	20.5kg	4.4kg	7.2	13.7	65.4	10.2	9.6kg	n/a	n/a lact
4334	10/30	9 yr	53.2kg	16.4kg	4.6kg	8.7	7.3	68.3	10.4	8.6kg	n/a	n/a lact
All the above taken during 1975												
4565	10/29	19 mo	42.7kg	16.4kg	3.88kg	9.1	13.05	65.5	9.57	5.23kg	n/a	n/a
4566	10/29	14 yr	66.36kg	25.45kg	3.42kg	5.15	12.97	72.02	8.29	9.32kg	n/a	n/a lact
4567	10/29	7 yr	55.68kg	21.82kg	3.88kg	6.97	14.89	58.8	8.52	7.50kg	n/a	n/a
4568	10/29	7 yr	68.64kg	25.45kg	5.00kg	7.28	13.44	67.07	9.67	10.00kg	n/a	n/a
All these taken during 1976												

*Percent bone of total body weight.

Table 9. Early winter body composition of ewes collected from the Robertson River in 1976.

No.	Date	Age	Weight	1/2 Carcass weight	Total bone weight	% Bone*	Carcass			Viscera weight	Pregnant?	Fetus weight
							% fat	% H ² O	% protein			
4593	11/19	6 mo	27.73kg	9.55kg	1.72kg	6.20	7.85	72.98	7.85	2.50kg	n/a	--
4594	11/19	3 yr	54.55kg	19.32kg	3.60kg	6.60	13.04	65.63	11.08	5.45kg	n/a	--
4595	11/19	6 mo	30.91kg	10.45kg	1.82kg	5.89	11.67	70.14	9.47	2.73kg	n/a	--
4596	11/19	6 yr	53.64kg	17.95kg	3.78kg	7.05	8.58	68.97	11.92	5.91kg	n/a	--
4597	11/19	8 yr	63.64kg	22.27kg	4.50kg	7.07	10.96	69.82	9.12	5.45kg	n/a	--
4598	11/19	5 yr	56.82kg	20.68kg	3.88kg	6.83	11.65	69.05	9.91	6.14kg	n/a	--
4599	11/19	8 yr	65.45kg	24.55kg	4.34kg	6.73	10.96	69.90	10.31	6.36kg	n/a	--
4600	11/19	3 yr	54.55kg	19.55kg	3.62kg	6.64	14.37	66.04	9.14	5.91kg	n/a	--
4601	11/19	8 yr	53.64kg	18.64kg	3.72kg	6.93	11.21	67.70	11.11	6.82kg	n/a	--

*Percent bone of total body weight.

Table 10. Late winter body composition of ewes collected from Dry Creek during 1976 and 1977.

No.	Date	Age	Weight	1/2 Carcass weight	Total bone weight	% Bone*	Carcass			Viscera weight	Pregnant?	Fetus weight
							% fat	% H ² O	% protein			
4384	5/25	6 yr	51.36kg	14.55kg	2.82kg	5.47	5.85	75.54	9.91	7.73kg	yes	3.64kg
4385	5/25	10 yr	42.27kg	13.64kg	2.08kg	7.62	3.30	78.37	10.70	5.91kg	no-lact	n/a
4386	5/25	5 yr	42.27kg	14.09kg	2.48kg	5.87	6.16	72.36	12.93	5.91kg	no-lact	n/a
4387	5/25	5 yr	42.73kg**	14.55kg	1.90kg	4.45	5.98	76.84	10.65	5.91kg**	no	n/a
4388	5/25	7 yr	41.36kg	13.18kg	2.54kg	6.14	2.43	79.82	8.12	5.45kg	no-lact	n/a
All the above taken in 1976.												
4741	4/18	10 mo	30.45kg	10.00kg	1.80kg	5.91	3.40	76.70	10.90	2.51kg	no	n/a
4742	4/18	10 mo	32.27kg	11.36kg	2.20kg	6.82	8.10	71.13	11.09	3.41kg	no	n/a
4743	4/18	6 yr	51.82kg	16.82kg	3.98kg	7.68	10.05	68.19	9.93	7.39kg	yes	3.11kg
4744	4/18	6 yr	49.10kg	15.91kg	3.12kg	6.33	8.50	71.64	10.39	8.76kg	yes	2.24kg
4745	4/18	11 yr	48.18kg	15.91kg	1.73kg	7.18	6.91	71.53	11.25	8.20kg	no-not lact	n/a
4746	4/18	7 yr	53.18kg	16.82kg	3.20kg	6.02	7.53	71.22	11.99	9.75kg	yes	2.35kg
All these taken in 1977.												

*Percent bone of total body weight.

**Estimated total weight (rumen and contents lost in fall from helicopter; weight of both assumed to equal 7.27kg).

Table 11. Late winter body composition of ewes collected from the Robertson River during 1977.

No.	Date	Age	Weight	1/2 Carcass weight	Total bone weight	% Bone*	Carcass			Viscera weight	Pregnant?	Fetus weight
							% fat	% H ² O	% protein			
4762	4/21	10 mo	20.45kg	6.82kg	1.94kg	4.60	5.43	76.54	11.14	2.76kg	n/a	--
4763	4/21	8 yr	49.55kg	15.91kg	3.21kg	6.48	7.86	72.20	9.81	9.13kg	yes	3.55kg
4764	4/21	3 yr	51.36kg	17.27kg	3.76kg	7.32	11.58	68.73	8.80	9.02kg	yes	2.81kg
4765	4/21	2 yr	45.00kg	13.64kg	3.24kg	7.20	8.80	68.40	10.92	8.35kg	yes	2.95kg
4766	4/21	8 yr	53.64kg	18.18kg	3.24kg	6.04	6.16	75.36	9.57	11.35kg	yes	3.91kg
4767	4/21	8 yr	50.00kg	17.73kg	3.46kg	6.92	8.57	70.84	10.83	8.95kg	yes	2.79kg
4768	4/21	6 yr	44.09kg	14.55kg	3.28kg	7.44	6.39	72.58	9.76	7.23kg	yes	1.65kg

*Percent bone of total body weight.

Table 12. Dall sheep production and survival in Mount McKinley National Park.

Year	Lambs per 100 ewes	Yearlings per 100 ewes	% of lambs surviving 1st winter	Sample size
1974	30	32	--	137
1975	31	19	63	114
1976	33	13	42	339
1977	50	20	61	323