

POPULATION STATUS OF DALL SHEEP IN THE NOATAK NATIONAL PRESERVE:
1985-1990 SURVEY RESULTS

INTRODUCTION

In 1983 a Preserve-wide sheep survey was conducted in the Noatak National Preserve and adjacent lands (Singer et. al. 1983).

The resulting data formed a baseline to which later population estimates have been compared. Research results from a study on the seasonal movements and foraging behavior of Dall Sheep conducted in 1983 and 1984 (Ayres 1986) was used to design a trend count area in the Baird Mts. This area was chosen due to the heavy pressure it receives from both sport and subsistence hunters. The Baird Mt. trend count area was surveyed by the cooperative efforts of NPS and ADF&G in 1985 through 1990. Budget constraints within both agencies prevented surveying the DeLong Mts and remainder of the management unit until 1987. This report is a summary of those findings.

Sheep harvest data for Game Management Unit 23 (the Unit includes the Noatak National Preserve) is available on a drainage basis as of 1981. Special acknowledgement is due to the ADF&G personnel who took time from their projects to assist with this survey.

PROJECT OBJECTIVES:

1. Monitor Dall sheep population trends (numbers and composition) in the Noatak National Preserve.
2. Determine the effect of observer/pilot bias on sightability and enumeration of sheep in the Noatak.
3. Investigate how various survey intensities and different pilot/observer teams influence sightability and enumeration of sheep.
4. Test the feasibility of using a stratified/high altitude sampling approach to assist in the allocation of survey effort.

METHODS

Survey

An aerial sheep survey of the Baird and DeLong Mts was conducted July 8-13, 1987. Four fixed-wing aircraft (3 Supercubs and Arctic Tern) with one observer each surveyed adjacent count units simultaneously. Four days and 55 hours of actual survey time was spent covering 1630 sq.mi in the DeLong Mts. Established count units were surveyed in the Baird Mts and Poktovik Mts (Fig. 1). In the DeLong Mts. and Wulik Peaks 40-60 sq.mi. units were delineated using natural boundaries. Count units were smaller than those used in 1983 to aid pilots in coordinating efforts and communicating locations

to others. A block of count units was initially assigned to each pilot/observer team to survey at an intensity of 2 min/sq mi. Only experienced pilots and observers were used. When observers in fixed-wing aircraft located bands of sheep exceeding 15 or in inaccessible locations a helicopter crew was notified and completed the classification from either the air or ground.

Annual surveys of a trend count area in the Baird Mts have been conducted since 1986 (in early July). Methodology follows that used in the 1987 Preserve survey. Fixed wing aircraft surveyed all areas with a survey effort of 2 min/sq mi.. The primary objective for this data was to obtain a minimum count as well as classification of legal and sublegal rams over 1/4 curl. Lamb ewe ratios and ewe/yearling ratios were obtained by observing sheep from the ground using binoculars or spotting scopes. Helicopter availability was limited and not always available at the time of the survey. In 1987 and 1988 observers recorded locations of large bands and complete composition data was obtained after the survey.

Multiple Counts

Multiple counts of the same unit were performed in three different count units. Three different observers and two different pilots recounted the Poktovik Mt. count unit using a standard survey effort.

Two count units in the DeLong Mts. were resurveyed at higher intensities than during the actual survey (2 vs 4 min/sq.mi.) by a second pilot/observer team.

Stratified Sampling

In the DeLong Mts. more area existed than was within our ability to survey. To test the usefulness of a stratified sampling technique a Cessna 206 with two observers and one recorder surveyed count units at .25 to 1 min/sq. mi. This was done for six units that were later surveyed at the standard 2 min/sq. mi and 6 unsurveyed units.

Harvest

Both sport and subsistence harvest of sheep occurs in the Preserve. Under current regulations a statewide harvest ticket is required, a permit registration for the fall hunt in the Baird Mts, and special reporting system for the subsistence hunt. A total of 30 sheep are allowed to be taken during the subsistence hunt. 10 rams of 7/8 curl or larger are permitted during the Baird Mt. fall hunt. It is assumed that 15 ewes and 15 rams will be taken during the subsistence hunt if less than 15 rams are harvested then the balance may be allocated to the fall hunt. No limit exists on the number of sheep that can be harvested north of the Noatak (DeLong Mts.). Fish and Game area biologist, David James, in 1986 calculated the "allowable" harvest of rams in the Baird mountains using 03% of the total number of sheep, minus lambs, and 02% of this number for ewes.

Although this was not used in the development of the current regulations it has been used as a guideline for biologists to assess the harvest impacts on the population using the survey data.

RESULTS AND DISCUSSION

Population Status:Baird Mountains

Trend data based on minimum counts (no estimate of error) of sheep in this area combined with lamb/ewe ratios suggests the female population has remained stable or possibly increased. Ram numbers and ratios have varied. Differences in Legal to sublegal ratios that have occurred from year to year may be related to the variation present in sightability, lack of natural boundaries for our count area (missed rams not in the count area), or actual changes in numbers (Table 1).

Results of the 1987 survey of 13 legal rams /100 ewes, 8 legal rams/total sheep are higher than was obtained in 1985 and 1986 and equal to that of 1983. The ratio of legal rams/total sheep is characteristic of other hunted populations (Singer et. al. 1983).

A total of 665 sheep were counted in a 592 sq.mi. area yielding a density of 1.12 sheep/sq.mi. This is similar to the density observed in 1983 by Singer of 1.1 sheep per sq mi. Densities estimates are quite subjective and heavily influenced by what the investigator considers to be sheep habitat and will be surveyed. The data presented here is for comparison to density estimates covering the same area.

Composition data collected from helicopter and ground crews was used to obtain more detailed data on lamb/ewe and yearling/ewe ratios. Composition data was obtained in this manner for 45% of the sheep counted in the Baird Mountains. A 19% increase was observed in the 1987 lamb/ewe ratio compared to that of 1986 (63 in 1987 vs 44 lambs/ewes in 1986). A 14% decrease occurred in the yearling/ewe ratio (23% in 1987 vs. 37% in 1986). Comparisons to other populations indicate that the yearling/ewe ratio is at the lower end of that considered necessary to maintain a stable population (Table 2). In order to determine what ratio is applicable to the Noatak Preserve further data is needed on lamb survival and survival rates for all age classes. The low yearling/ewe ratio in 1987 was explained by low lamb production in 1986.

DeLong Mountains

Based on a comparison of similar areas surveyed in 1983 and 1987 overall numbers of sheep decreased by 16% (351 in 1983, 294 in 1987) (Table 3). Part of this decrease may be attributed to the use of a helicopter for surveying in 1983 resulting in higher sightability.

A lower density of sheep was found in the DeLong Mts. compared to the Baird Mts. (DeLong - .45 sheep/sq mi, Baird - 1.12 sheep/sq mi.). Due to the small dispersed nature of small bands of sheep in this area ground composition counts were not successful. Because the helicopter did not do composition work on these smaller bands a representative number of sheep were not classified. Classification data obtained by survey planes suggest a healthy lamb crop was present in 1987 in the DeLong Mts. (50 lambs/100 ewes)

Legal rams comprised 20% of the total population in the DeLong Mts. in 1987. In 1983 they comprised 16%, still higher than found in the Baird Mts. from 1983-1987. This high a ratio is characteristic of other unhunted populations. Since the entire range was not surveyed it is possible that we missed a sector of the ewe population which would significantly affect this ratio. However, the high ram/total sheep ratio in 1983 supports the idea that a difference in population composition between sheep found in the Baird and DeLong Mts. exist.

Multiple Counts

Results from recounts of three count units are presented in Table 5. Data is inconclusive as to whether increasing survey intensity (almost doubling) over what is currently used (2 min/sq.mi.) results in increased sightability of sheep. In one sample more sheep were observed with increased survey effort and in the second, less. Three counts of the Poktovik Mts. count unit indicated the large variation that existed between observers regarding classification of sheep (Table 6). By comparing locations of sightings between observers it was possible to determine if groups had located the same or different bands. Each observer/pilot team located the same large bands however

locations of single rams and lone ewe and lambs differed between teams. This suggests that small groups and solo sheep are most likely to be missed during a single count and that increases in survey effort at some point does not compensate for this sightability bias.

This exercise demonstrated the importance of adequate observer orientation to the sizes of age classes at the time of the survey.

Lamb and yearling classifications contained the most discrepancies.

Observer related differences in classification, in addition to the difficulty of classifying large bands of sheep from the air, reinforces the importance of ground surveys to obtain accurate composition data for these age classes.

Stratification Flight

We attempted to test the hypothesis that a high altitude low intensity survey would consistently and accurately reflect different densities of sheep in the count units. We were not able to determine this due to a low density of sheep in all the units chosen (Table 4). Seventy percent of the sheep recorded by observers during the standard survey were also observed by those in the C-206 surveying at 1/4 to 1/2 the survey intensity.

The large margin of error obtained from this method would not be acceptable for management purposes but this technique may be useful for determining areas to be surveyed when a minimum count is the objective and knowledge of sheep distribution and movement patterns is lacking, and personnel, time and financial constraints exist.

Helicopter Use

It has been reported that the use of helicopters greatly increases

the sightability of sheep due to greater maneuverability and lower airspeed (Singer 1983). Our experience supported these findings when in rugged terrain (Delong Mts.). In these areas sheep tended to retreat to the most rugged terrain, usually cirque basins or steep rocky cliffs with caves, and remain in these areas as the helicopter approached. However a different behavioral scenario occurred in the Baird Mts where escape terrain is limited and of lower quality. In the open rolling terrain sheep tended to respond to the sound of the rotorcraft usually before they were sighted by observers. Sheep rarely retreated and remained in escape terrain as the helicopter approached but rather continued running often moving downslope crossing valleys and moving out of the count unit. Fixed wing aircraft appeared to be more effective in obtaining a minimum count in these areas.

SURVEY RECOMMENDATIONS

1. It is recommended that more time be spent orientating observers. Prior to the survey, one count unit (Poktovik Mts. perhaps) could be surveyed by all observer/pilot teams. This would serve both as a training exercise and allow project leaders to assess the variation between observers and make sure standard data collection methods are followed.
2. The use of a low intensity survey flight (C-206, 0.5 min/sq.mi.) around the trend count area prior to the survey, may be useful in determining if any large bands of sheep are present outside the count areas.
3. Monitor harvest pressure occurring in Delong Mts, especially if increases occur in restrictions for the sport harvest in the Baird Mt area.

RESEARCH RECOMMENDATIONS

1. Determine the importance of 7/8 curl rams in the rut and the effect of removal of older rams (7/8 and full curl) to breeding success and genealogical dynamics of various Dall sheep populations.
2. Support ADF&G's efforts to improve reporting for the subsistence harvest (regulation changes, IRA involvement, Village representatives, harvest calendars).

REFERENCES:

- Hoefs, M. and I. M. Cowan. 1979. Ecological investigation of a population of Dall sheep (*Ovis dalli dalli* Nelson). Syesis volume 12 suppl. 1. 81pp.
- Singer, F., D. Johnson, and R. Quimby. 1983. Dall sheep numbers

and distribution in the Noatak National Preserve, 1983. NPS
Natural Resources Survey and Inventory Report AR-83/0.

Table 1. Dall sheep population composition data from aerial surveys conducted in the Baird Mt trend count area.

Classification	1983	1985	1986	1987	1988
Legal Rams/100 Ewes*	13	6	11	13	7
Total Rams/100 Ewes*	23	11	24	16	28
Lambs/100 Ewes*	26	34	25	36	39
Total Sheep Counted	683	594	669	665	812
Sheep per sq. mile	1.1	1.0	1.1	1.1	1.5
* Includes yearlings and 1/4 rams					

Table 2. Dall sheep population composition data from aerial surveys conducted in the Delong Mts. (east of the Kugururok) in comparable areas.

Classification	1983	1987
Legal Rams/100 Ewes*	25	44
Total rams/100 Ewes*	48	68
Lambs/100 Ewes*	13	50
Total Sheep Counted	351	294
Sheep per sq. mile	0.52	0.45
Includes yearlings and 1/4 curl rams		

Table 3. Results of ground composition data on sheep in the Baird Mts. 1986 - 1988.

Classification	1986	1987	1988
Lamb/100 Ewes	44	63	60
Yrl/100 Ewes	37	23	35
# of Sheep Classified	159	301	224
% of Total Sheep Counted	24%	45%	28%

Table 4. Results of multiple counts of Dall sheep in the Poktovik Mts. count unit, Noatak National Preserve, 1987.

Observation	Observer/Pilot		
	Ayres/Kemp	Larson/James	Roney/Kemp
Survey Effort (min/sq. mile)	.86	1.3	1.1
Total Sheep	79	77	65
Lambs	18	18	1
Yearlings	16	-	18
Ewes	25	-	2
Unclassified	15	54	41
1/2-3/4 Curl Rams	4	4	2
7/8 + Rams	0	1	1

Table 5. Effects of different survey efforts on counting sheep.

Area: Effort min/mi ²	Count Unit 4		Count Unit 59		
	2.5	4.25	2.0	3.5	0.78
Classification					
Total Sheep	71	94	31	17	22
7/8+ Curl Rams	1	2	3	2	-
1/2-3/4 Curl Rams	15	16	3	0	-
Ewes	37	25	13	8	-
Yearlings	11	7	0	1	-
Lambs	6	13	12	7	-
Unclassified	1	31	-	1	22

Appendix A. Summary of Dall sheep harvest statistics for GMU 23,
1962-1985. R=rams, E=ewes, L=lambs, U=unknown.

	General Hunt			Winter Hunt								
	(Rams only)				Bairds		Delongs		Unknown		Total	
Year	Bairds	Delongs	Unk.	REL	U	REL	U	REL	U	Harvest		
1962	---	---	7	-	-	-	-	-	-	-	7	
1963	---	---	20	-	-	-	-	-	-	-	20	
1964	---	---	15	-	-	-	-	-	-	-	15	
1965	---	---	11	-	-	-	-	-	-	-	11	
1966	---	---	13	-	-	-	-	-	-	-	13	
1967	---	---	14	-	-	-	-	-	-	-	14	
1968	---	---	15	-	-	-	-	-	-	-	15	
1969	---	---	2	-	-	-	-	-	-	-	2	
1970	---	---	17	-	-	-	-	-	-	-	17	
1971	---	---	16	-	-	-	-	-	-	-	16	
1972(a)	---	---	26	-	-	-	-	-	-	-	26	
1973	---	---	13	-	-	-	-	-	-	-	13	
1974	---	---	19	-	-	-	-	-	-	-	19	
1975	---	---	17	-	-	-	-	-	-	-	17	
1976	---	---	22	-	-	-	-	-	-	-	22	
1977	---	---	34	-	-	-	-	-	-	-	34	
1978(b)	---	---	35	-	-	-	-	-	-	-	35	
1979	---	---	25	-	-	-	-	-	-	-	25	
1980(c)	---	---	16	-	-	-	-	-	-	-	16	
1981	3	10	--	-	-	-	-	-	-	-	13	
1982(d)	10	11	--	2	2	-	5	-	-	-	30	
1983	12	8	--	-	-	-	-	-	-	-	20	
1984	8	8	3	2	2	-	-	-	-	-	23	
1985	28	8	1	10	7	-	3	-	-	-	58	
1986	9	14	0	8	4	0	0	-	2	-	37	
1987	18	19	0	3	6	0	0	1	1	-	48	
1988(e)	17	20		2	1							

- a Marine Mammals Act
b Carter's Monumnet withdrawl and 7/8 curl regulation
c Alaska National Interest Lands Conservation Act
d Subsistence permit regulation
e Winter hunt ongoing

Appendix B. Calculation of "allowable" harvest of sheep in the Baird Mountains, Alaska in 1986. Estimated = Counted X 1.27 (27% correction factor)

	Estimated	Counted
Number of Sheep in Baird Mts.....	849	669
Minus lambs.....	716	564
Percentage of allowable harvest of rams.....	x .03	x .03
Rams allowable harvest.....	22	17
Number of Ewes.....	522	411
Percentage of allowable harvest.....	x.02	x.02
Ewes allowable harvest.....	10	8

Appendix C. Dall sheep age and sex composition data obtained from aerial surveys of the Baird Mts., Alaska, June 1983, July 1985 and July 1986. Survey areas have been adjusted to be comparable. No surveys were conducted in 1984.

Numbers of Sheep					
	1983	1985	1986	1987	1988
Legal rams (7/8 curl+)	63	18	47	50	35
Sublegal rams	111	33	98	65	101
Unclassified rams	2	55	0	15	1
Total rams	176	106	145	130	137
Lambs	125	99	105	143	187
Ewes *	475	287	416	392	484**
Unident.	0	23	4	0	0
Unclassified adults	0	79	0	0	6
Total Sheep	776	594	670	665	814

How data was obtained:	air	ground	air	ground	air	ground
Lambs/100 Ewes	26	-	34	54	24	44

*Ewes include yearlings and rams 1/4curl and under.

** Includes sheep classified as 1/4 curl

