

Harvest Year

1.) Marine Mammals Act of 1972

2.) Caribou Management withdrawal and 7/8 control regulation

3.) ANILCA

4.) Subsistence permit regulation

Fig. 2. Reported Mountain sheep harvest for the Noatak and Wulik-Kivalina drainages in Game Management Unit 23.

In 1982, the Alaska Board of Game passed a new regulation providing for subsistence taking of 50 sheep of either sex by residents west of the Noatak River.<sup>1</sup> Implications of the maximum allowable harvest on the low density Noatak herd has caused concern amongst game biologists (W. Heimer pers. comm. to Director, State of Alaska Game Division, dated January 13, 1983). Baseline survey information was badly needed on numbers and sex/age ratios for Dall sheep in areas affected by sport and subsistence harvests.

#### ACKNOWLEDGEMENTS

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#### METHODS

Eighteen count units were established on the basis of larger drainages and other significant breaks in escape terrain. NPS surveyed nine of the units in 1983 with a Jet Ranger II helicopter and three observers and ADF&G surveyed eight units with a PA-18 Super Cub and one observer. Count unit No. 1 was counted three times in 1982 by ADF&G.

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1 Alaska Hunting Regulations No. 24. One sheep, by registration permit. Open only to residents of GMU 23 who permanently reside north and west of the Noatak River. Aug. 1 to Apr. 30. All other residents/nonresidents one ram with 7/8 curl horn or larger. Aug. 10 to Sept. 20.

During the NPS helicopter surveys, the helicopter circled each count unit counter-clockwise thereby always placing two observers in the left side against the mountain slope. An elevation was flown that intercepted the majority of sheep (usually mid-slope). The right side observer covered lower slopes and across canyons and also recorded data. Sheep were classified as ewe, yearling, 2-year old ewe, lamb,  $\frac{1}{4}$  curl,  $\frac{1}{2}$  curl,  $\frac{3}{4}$  curl,  $\frac{7}{8}$  curl, and  $\frac{4}{4}$  curl. Small groups were counted and classified during 1 or 2 rapid passes, while larger groups of 20+ were classified with 15-45x spotting scopes from the ground. Rams with broomed horns were placed into the size class category achieved by their existing horns. Some  $\frac{1}{4}$  curl rams were undoubtedly classes as ewes.

The Super Cub surveys were similar except that the pilot searched for sheep, the observer searched and classified and classes included lambs, yearlings and "ewes" (= yearlings, ewes, young rams), less than  $\frac{7}{8}$  curl rams and  $\frac{7}{8}$  curl or greater, except for units 13 and 14 where all ram classifications were achieved by David James.

General habitat around most groups of sheep were recorded by the navigation/classifier (F. Singer) including approximate slope, elevation (from a map after survey), rock formation, topographic-moisture, and vegetation. Singer also recorded gross disturbance data on a sub-sample of sheep observed, including the initial reaction of the sheep, the longest distance moved during the reaction, and any subsequent reactions.

## RESULTS

### Sheep Numbers and Survey Effort

Helicopter survey time totalled 28 hours. These values do not include ferry time. ADF&G surveyed units 7, 8, 11, 12, 13, and 14, while NPS surveyed units 2, 3, 4, 5, 6, 15, 16, 17, and 18. Units 9 and 10 were not completed in 1983 but were flown in 1976 when no sheep were counted there. Unit 1, west of the boundaries of the Noatak National Preserve, was not surveyed in 1983, but ADF&G counted it three different times in 1982.

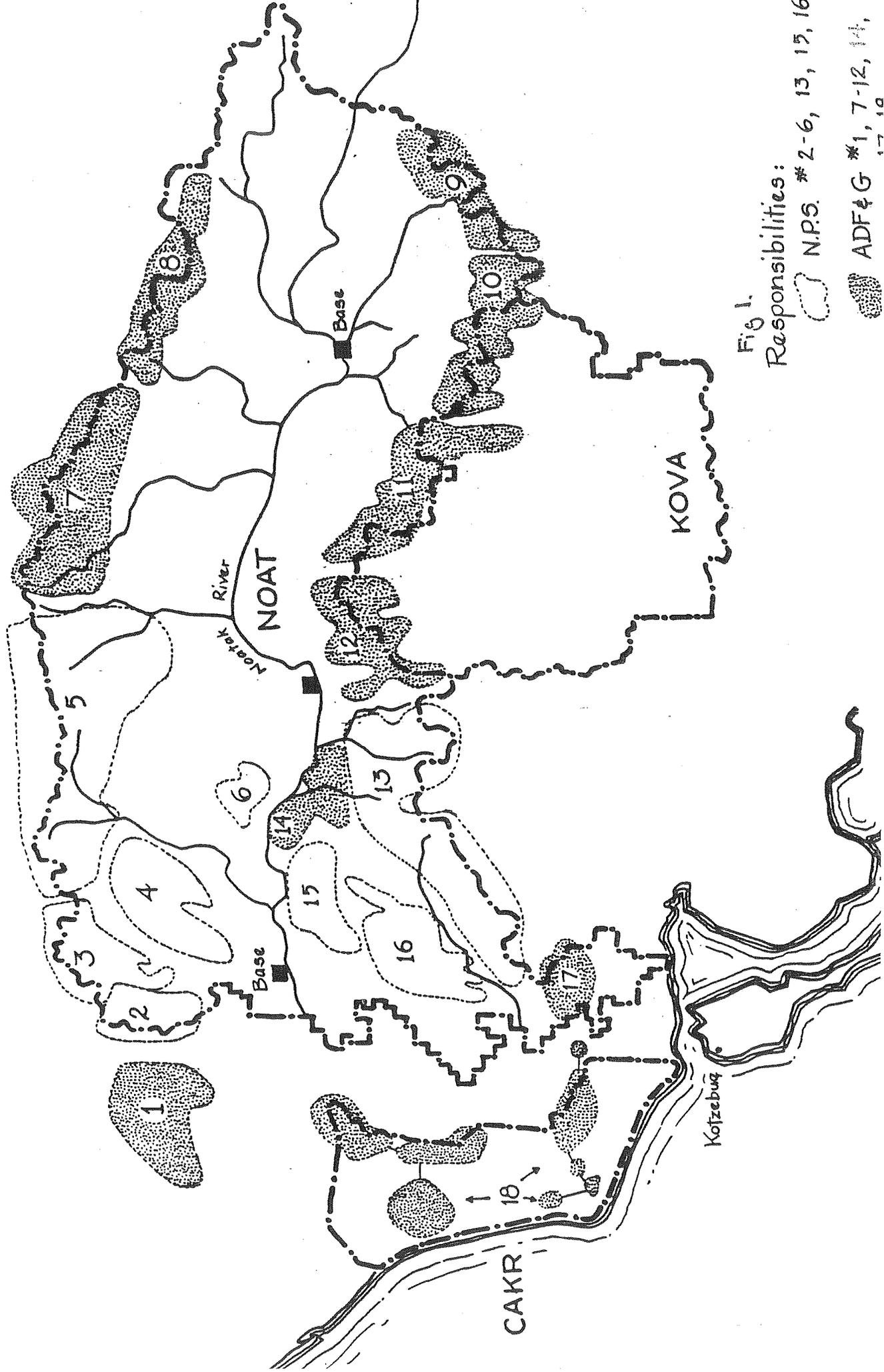


Fig. 1.  
Responsibilities:

- N.P.S. # 2-6, 13, 15, 16
- ADF&G # 1, 7-12, 14, 17, 18

Table 1. Trends in Dall sheep numbers in the lower Noatak drainage from 1976-81 to 1983.

Count Unit	Year of Last Count	Sheep in Last Count	1983 Count	Percent Change
1 + 2	1982	120	170s <sup>a/</sup>	+42
3	1977	34	54h	+59
4	1977	42	49h	+17
5	1977	214	311h	+45
6	1981	52	67h	+29
13	1978	56	18s	-32
15	1982	392	441s	+13
16	1978	60	79s	+32
TOTAL		970	1,189	+23

<sup>a/</sup> = Units 1 and 2 were counted in 1982.

s = Super Cub; h = helicopter. The 1977 counts were conducted with a helio-courier.

Table 2. Densities of Dall sheep in lower Noatak.

Sub Areas (Count Units)	Total Sheep	Square Miles	Sheep per mi <sup>2</sup>
Principal Southern Sheep (14, 15, 16)	520	835	0.6
Principal Northern Sheep (1,2,3,4,5)	629	1,422	0.4
Peripheral (5a,6,7,8,9,10,11,12,13)	538	2,030	0.3
Coastal (17, 18)	14	209	0.07
TOTAL	1,687	4,496	0.38

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A total of 1,556 sheep were counted in 1983 on lands under the jurisdiction of the National Park Service and when unit 1 is included, the total is 1,687 sheep.

Sheep counts in 1983 averaged 19% higher in 9 of the 10 count units previously surveyed by ADF&G from 1976-81 (see Table 1). Not including unit 1, we counted 779 sheep south of the Noatak River and 777 north. When the Wulik Peaks is included (unit 1), the count north of the river totals 908 (see Appendix I for raw counts of all 18 count units). The highest sheep density was in the principal southern population, followed by the principal northern population, the north-south peripheral population, and lastly, the coastal units (see Table 2).

#### Sex and Age Ratios

Detailed classifications were made in 13 survey units, and on 1,129 (82%) of the 1,532 sheep counted in 1983. Percent of sheep classified ranged from 43% in unit 6 to 100% in units 2-4. This is a lower rate of classification compared to that obtained in 4 other NPS administered areas in Alaska -- rates there ranged from 92-98% (Singer, in press.).

Lamb, yearling and 2-year ewe ratios north of the Noatak River were all nearly double those to the south (see Table 3).

Table 3. Sex and age ratios in the lower Noatak in 1983.

Area (Units)	Lambs	Yearlings	2-year Old Ewes <sup>a</sup>	Rams	Number Classified
North (1-8)	61	27	17	83	476
South (6-16)	34	17	11	83	707
Coastal (17, 18)	14	14	0	71	14
COMBINED	42	14	7	65	1,291

a - ability of the helicopter crew to differentiate 2-year old ewes has never been tested, however, the ability to identify yearlings was tested in 1981 in Denali National Park.

## Ram Characteristics

In Table 4 we present the number of rams seen in each count unit and also calculate four different statistics which we feel are potentially useful in comparing various blocks of sheep habitat. Comparing units, we find that 8 units had less than 0.25 sheep per mi<sup>2</sup> (units 3, 7, 11, 12, 13, 16, 17, 18), 3 units had ratios of rams per 100 females below 40 (units 2, 6, 15), 4 units had less than 30% legal rams (units 2, 11, 12, 14), and 6 units had less than 80% legal rams in the total count unit (units 2, 3, 6, 7, 11, 15). Two count units had 3 different low values (units 11 and 3), 5 units had 2 low values (units 6, 7, 12, 15, 2), and 5 other units had only 1 low value. The count units were originally randomly selected on the basis of the largest natural breaks in sheep escape terrain. Alternately high and low ram ratios were observed in 4 adjacent pairs of units (unit pairs 1-2, 15-16, 12-13, 17-18) suggesting unit designation may have been too small for these areas.

## Sheep Harvest

Sheep harvest statistics have been compiled for unit 23 since 1962 when hunters were first required by regulation to fill out and return a sheep hunter report (see Table 5). The reported take of sheep has been relatively consistent in unit 23, averaging 18 sheep per year. The Sport harvest peaked in 1977 and 1978 and has declined since then due to an increased horn size requirement in 179 and subsequently to federal land withdrawals which prohibited sport hunting in portions of unit 23.

The harvest reporting system for sheep and other species has its limitations in unit 23 and elsewhere. Initially, it took some time to acquaint the general hunting public with the system, and the reported harvest in 1982 is considered a minimum. In rural areas there have always been problems with distribution and availability of harvest tickets and hunting licences, although in recent years licences and reports have been available locally in most villages in unit 23. However, there is still a high turnover of village licence vendors, and at times licences and harvest tickets are not available. Game Division biologists frequently travel to villages prior to the fall hunting season to fill in these voids.

Table 4. Ram characteristics in 13 of 18 count units in which sheep were observed in the lower Noatak, 1983.

COUNT UNIT	NO. OF SHEEP	SQUARE MILES	SHEEP/MI <sup>2</sup>	NO. LEGAL RAMS	RAMS: 100 ♀	SPORTS-MANS' INDEX	LEGAL RAMS % OF ALL RAMS	LEGAL RAMS AS A % OF HERD
1 <sup>a</sup>	131	277	.47	1				
2	84	95	.88 <sup>b</sup>	1	4*	1	50	1*
3	54	324	.17 <sup>b</sup> *	4	88	1	27*	7*
4	49	169	.30	9	158	6	41	18
5	509	557	.91	63	81	11	46	12
6	67	109	.61	3	25*	3	33	4*
7	14	285	.05*	1	50	0.3	33	7*
11	3	277	.01*	0	50	0	0*	0*
12	50	272	.18*	4	122	1	18*	8
13	18	242	.07*	2	50	0.8	40	11
14	174	341	.51	14	78	4	23*	8
15	441	238	1.85	26	39*	11	31	6*
16	79	256	.21*	14	683	5	34	18
17	14	127	.11*	3	71	2	60	21
18 <sup>c</sup>	6	82	.07*					

a - Ram data not available.

b - The \* refers to comments in text on page .

c - 0 sheep were counted in Unit 18 in 1983, but 6 were seen by R. Quimby, ADF&G, Kotzebue in April of 1983. Perhaps the 6 were still there, but it is also possible that these are part of the 14 seen in Unit 17.

Table 5. Reported kill of Dall sheep in Game Management Unit 23, 1962-83.

<u>Year</u>	<u>No. of Rams</u>	<u>Year</u>	<u>No. of Rams</u>	<u>Year</u>	<u>No. of Rams</u>
1962 <sup>a</sup>	7	1972	26	1982 <sup>f</sup>	21 (30)
1963 <sup>b</sup>	20	1973	13	1983	16
1964 <sup>b</sup>	15	1974	19		
1965	11	1975	17		
1966	13	1976	22		
1967	14	1977 <sup>c</sup>	34		
1968	15	1978	35		
1969	2	1979 <sup>e</sup>	25		
1970	17	1980	16		
1971	16	1981	13		

a 1962 was the first year requiring sheep harvest reporting.

b The limit in 1963 and 1964 was 2 rams, 3/4 curl or larger.

c No reminder letters were sent out in 1977.

d The sheep season was shortened by 10 days, opening on August 10, 1974.

e The horn size requirement was increased from 3/4 curl to 7/8 curl.

f An additional 9 sheep were reported taken during the first winter of the special subsistence season.

The degree of acceptance of the system is variable from village to village, ranging from Kiana where most hunters purchase licences and are issued harvest tickets to Point Hope where 2 or 3 licences are sold per year in a community of several hundred.

For a variety of reasons, some harvest reports are not returned. Some people feel it is unnecessary to return the report if they did not catch a sheep. Some people cannot read English and cannot understand the harvest report system or the biological need for it. For a variety of reasons some individuals do not want to report their harvest. For example, certain elements in Alaskan society feel the government has no right to this information, and also, some avid sheep hunters who do not want to reveal their "hot spots" may not report or may report hunting a different area. However, the majority of hunters do want to comply and annually about 70% of the issued harvest tickets are returned. Therefore, reported harvest should always be considered a minimum except under the best of circumstances.

The historical harvest of sheep in unit 23 does not include sheep taken by local residents during the fall and winter, except in 1982. It is known that residents of Kivalina in the past have taken sheep from the Wulik and Kivalina drainages, residents of Kotzebue, Noatak, and Kiana have taken sheep south and east of the Noatak River, and residents of Ambler, Shungnak and Kobuk have taken sheep from upper Noatak River drainage and adjacent portions of the Kobuk River drainage which is presently within the Gates of the Arctic National Park (Uhl and Uhl 1977, 1979; U.S. Dept. Int. 1977).

The reported sheep harvest (1968-83) is given by areas of unit 23 in Table 6. From 1968-1979 the upper Noatak River drainage was consistently the most productive sport hunting area, accounting/or 51% of the reported sheep harvest. However, some hunter reports which listed only "Noatak River" were included in this area and some sheep taken in other portions of the Noatak River drainage were therefore included in the upper Noatak.

In December of 1978, President Carter placed most of the Noatak River drainage under Monument status, thereby closing it to sport hunting during

the fall of 1979 and 1980. Portions of the lower Noatak drainage including the Eli and Agashashok River drainages remained under BLM jurisdiction and were legally open to sport hunting in 1979 and 1980. Additionally, the drainages of the Wulik and Kivalina Rivers were legally open to sport hunting. In December of 1980, following passage of ANILCA, portions of the Noatak Drainage including the drainages of the Kelly, Kugururok and Nimiuktuk were reopened to legal sport hunting for the fall of 1981. The upper portion of the Noatak drainage and adjacent parts of the Kobuk drainage became part of the Gates of the Arctic National Park and continued to be closed to sport hunting but remained open to subsistence taking of sheep by residents of Anaktuvuk Pass. Residents of Ambler, Shungnak and Kobuk who had traditionally utilized the area were not given subsistence hunting privileges although they continued to utilize the area to take caribou, sheep, wolves, wolverine, and grizzly bears primarily during the winter months. Many residents of Ambler have close social and cultural ties with the people of Anaktuvuk Pass.

The closing and opening of areas during the 1979-1981 period caused confusion, bewilderment, and objection among sheep hunters. As previously indicated, during 1979-82 (see Table 6) people reported hunting the Upper Noatak area in spite of federal law or as a form of protest. The high reported harvest of sheep from the Wuluk and Kivalina Rivers in 1979 and 1980 (see Table 6) is thought to be due both to a shift in hunting pressure because of federal land closures and to inaccurate reporting of sheep taken from areas which were closed to sport hunting.

#### Habitat Characteristics

Habitat information was gathered on about  $\frac{1}{2}$  of the sheep observations in eight of the units (2-6, 15, 16, 17). We detected no differences in any of the habitat, soil and topographic values between areas. We recognize such differences might exist but our sample was very limited. The data are pooled for all units in Appendix III. We did, however, detect major differences in elevation (but not slope) between the three major ecological areas suggested, except that the Poktovoks' elevations more closely resembled the units south of the Noatak River (Table 7). These differences largely represent the major elevation differences in the three areas.

Table 6. Reported unit 23 sheep harvest by area, 1968-1983.

AREA	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Mulik and Kivalina River Drainages	3	0	1	1	0	2	1	0	0	2	1	8	8	0	0	2
Kelly, Kuguroruk and Nimiuktuk Drainages	1	0	1	0	3	3	5	4	8	9	8	1	3	7	9	4
Upper Noatak and Adjacent Kobuk Area	8	2	15	14	19	7	7	10	5	13	19	10	3	3	2	0
South of the Noatak Squirrel, Agashashok	1	0	0	1	4	1	4	1	6	5	5	5	1	3	19 <sup>2</sup>	10
Unit 23-No Specific Location Data	1	0	0	0	0	0	2	2	3	5	2	1	1	0	0	0
TOTALS	15	2	17	16	26	13	19	17	22	34	35	25	16	13	30	16 <sup>3</sup>

1 In the upper Noatak River drainage statistical area sheep reported taken from Noatak River were included in the total.

2 This includes 9 sheep of mixed sex and age taken during the winter of 1982-83 during the special subsistence season.

3 Preliminary harvest results.

Table 7. Elevation and slope for Dall sheep observations in the Noatak drainage, 1983.

GENERAL AREA	ELEVATION			SLOPE		
	N	$\bar{X} \pm$ S.D.	range	N	$\bar{X} \pm$ S.D.	range
Coastal	15	1096 $\pm$ 251	700-1600	15	21 $\pm$ 11	5-40
Eli-Poktovoks	32	1746 $\pm$ 393	1200-2500	6	20 $\pm$ 15	5-45
Northern	59	2101 $\pm$ 387	1200-2500	59	20 $\pm$ 15	5-45

#### Disturbance Behavior

Sheep in the areas north of the Noatak River reacted less to the helicopter survey than those in the Eli Unit (#15) and the Poktovoks (#6) (see Table 8). Sheep in the northern units moved about 2/3 as far as southern sheep during their first response mode, and their flight distance was only about  $\frac{1}{2}$  as far -- however, neither of these differences was significant (t-test, unpaired variated). Distances moved during the second response mode, however, were significantly less for the northern units (t-test). Secondary response was very mild (stand/stare) for 94% of the northern sheep, compared to 68% mild secondary response in the Eli/Poktovoks.

Table 8. Sheep response to helicopter survey in the lower Noatak, 1983.

	$\bar{X}$ (yards)	S.D.	Range	N
Flight Distance				
North	95	27	40-150	10
Eli-Poktovoks	183	122	30-1,000	7
Distance Moved 1 <sup>st</sup> Reaction				
North	71	47	10-400	22
Eli-Poktovoks	105	141	0-700	32
Distance Moved 2 <sup>nd</sup> Reaction				
North	3	11	0-40	14
Eli-Pokrovoks	65	120	0-700	19

Total distance moved exceeded .2 miles for 3 groups, all in the Eli Agi. Two of these contained radio-collared animals which had been pursued by the helicopter the previous week. A group of three ewes moved 1.6 miles total; however, it was our opinion that they had already initiated a long distance movement between escape terrain when the survey encountered them. They did, however, make the move faster -- they ran about 700 yards, then trotted about 1 mile, but stopped when they reached the 1st escape terrain, a scree covered hill. Phil Driver (pers. corres.) also feels sheep in the Eli are spooky -- he and a hunter watched a single ram run nearly two miles after it had spotted them walking.

## DISCUSSION

### The Usefulness of the Count Unit Designation

Count units were arbitrarily drawn on the basis of the largest breaks in sheep security habitat, e.g. larger drainages, extensive low lying terrain and valleys. No information was available on sheep movements between areas, however, the count data suggests there may be some mobility between four adjacent pairs of units (1-2, 15-16, 12-13, 17-18) and there may be some justification for pooling these units for future surveys. Ongoing radiotelemetry studies (L.A. Ayres, pers. corres.) do not presently suggest extensive movements between any of the count units (N=17 radio-collared sheep), and the size of the Noatak count units (except for Nos. 2, 17, 18) are very large and similar in size to count units used in other surveys (Singer, in press). We present the count units as the most practical sample unit given the terrain. The radiotelemetry studies should help define the size of a breeding unit or deme and indicate if count units encompass entire breeding units.

### Peripheral Sheep Populations

The lower Noatak sheep possess the lowest density of any population yet surveyed on National Park Service managed lands in Alaska (Table 9). The Noatak National Preserve has about 1/6 the sheep density of Denali (2.0 sheep/mi<sup>2</sup>), 1/5 the density of Wrangell-St. Elias (1.70 sheep/mi<sup>2</sup>), and 1/3

Table 9. Extreme ram and sheep density statistics in the Noatak National Preserve compared to other parts of Alaska.

AREA	COUNT UNIT(S)	SHEEP/ MI <sup>2</sup>	CORRESPONDING SPORTSMANS' INDICES <sup>a</sup>
<u>LOWEST VALUES:</u>			
Noatak	3,7,11-18	.01-.27	.3-6
Gates of the Arctic Park/Preserve	20	.3	5
Lake Clark Park/Pre- serve	1,2	.2	4
Wrangell-St. Elias Park/Preserve	24	.6	6
<u>HIGHEST VALUES:</u>			
Noatak	5	.91	11
	15	1.85	11
Gates of the Arctic Park/Preserve	4	3.1	6(40)
Lake Clark Park/Pre- serve	4	3.2	9(13)
Wrangell-St. Elias Park/Preserve	14	8.2	25(62)

( ) = Highest index Park-wide among all units.  
a = Number of rams per 100 mi<sup>2</sup>.

the densities of Lake Clark and Gates of the Arctic ( $0.98-1.07$  sheep/mi<sup>2</sup>).

Highest sheep densities in the lower Noatak are only  $1/3-2/3$  the highest densities from three other areas, while the lowest Noatak densities are only  $.02-.05$  the lowest densities from other areas. The lowest Lake Clark densities (units 1 and 2 -  $0.2$  sheep/mi<sup>2</sup>) are also on the peripheral of sheep range, in this case, the far western extreme of Dall sheep distribution in the Alaska Range and Alaska Peninsula.

The Noatak is intermediate to the other areas in terms of percent of legal rams (Table 10), but only Gates of the Arctic had a lower percent of full+ curl rams (Table 11). However, in terms of ram hunting potential (=Sportsman's Index), the Noatak is the lowest of all the areas, it has only  $1/5-1/4$  the potential of the best areas, and about  $1/2$  the potential of the other lowest areas (Lake Clark and Gates of the Arctic Park). These very low indices are primarily the consequence of low sheep density in the lower Noatak drainage.

#### Vulnerability of Sheep in the Igichuk Hills

Dall sheep first moved into the Igichuk Hills (count units 17 and 18) in 1971, and prior to that were reported only once (1 animal) during this century (Uhl and Uhl 1977). Possibly, this occupation/reoccupation of isolated habitat is another consequence of the increase in sheep numbers in the Noatak we suspect has occurred since the mid-1970's. Also, we received additional reports of sheep being observed in other areas where they had not been seen before, such as Chevron Hill, Tingmerkpuuk Mt., all along the Colville River, and Cape Thompson (P. Driver, J. Jacobson, J. Rood, J. Walker, pers. corres.).

Repopulation of Igichuk Hills by sheep might be slow. Sheep in the Igichuk Hills are separated from the closest nearest sheep by 48 km (30 miles) to the east, and 130 km (80 miles) to the northwest. Uhl and Uhl (1977) reported that sheep were seen every year in the western Igichuk hills (Cape Krusenstern National Monument) since 1971 and R. Quimby saw six there in April 1983. Either we overlooked these six or so animals or they

Table 10. Ram characteristics in the lower Noatak in 1983 compared to other areas in Alaska.

AREA	Sheep/ mi <sup>2</sup>	Rams: 100 ♀	Sports- mans' Index	Legal Rams % of Rams	Legal Rams % Herd	Trophy Rams/ 100 mi <sup>2</sup>
<u>HUNTED:</u>						
NOATAK <sup>a</sup>	0.46	56	4	36	9	
<u>LAKE CLARK PRESERVE</u>	0.98	50	8	29	7	1.5
<u>GATES OF THE ARCTIC PRESERVE</u>	2.07	70	18	20	16	1.7
<u>UNHUNTED:</u>						
<u>GATES OF THE ARCTIC PARK</u>	1.07	70	7	22	9	0.7
<u>DENALI PARK</u>	2.0	50	22	49	7	-----

<sup>a</sup> Excluding area of 3 units with no sheep seen in 1983.

Table 11. Percent of rams that achieve full curl status in the lower Noatak and other NPS areas.

Area	Percent of all rams that were full+ curl
Noatak:	
1) Northern less accessible	25
2) All other units	14
Gates of the Arctic <u>Park</u>	13
Denali <u>Park</u>	37
Lake Clark <u>Park/Preserve</u>	30
Wrangell-St. Elias <u>Park/Preserve</u>	30

had crossed the Noatak and were part of the 14 seen in the eastern hills. Whether the herd numbers 14 or 20, it is too small and isolated to be subjected to any harvest, particularly either sex harvest. Because of close proximity to towns [40 km (25 miles) to Kotzebue] and easy winter travel by snowmachine, harvests are possible and two sheep were taken in the 1982-83 season.

#### RECOMMENDATIONS

1. The Igichuk Hills should be closed to either sex hunting of Dall sheep.

#### LITERATURE CITED

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APPENDIX I. Raw counts of Dall sheep in the Noatak National Preserve in 1983. Unit 1 was counted in 1982, and Units 9 and 10 in 1976. Only partial classifications using a Super Cub were made in Units 1, 7, 11, 12, and parts of 5.

COUNT UNIT	EWE/YOUNG				RAMS						Un-class ♂		
	TOTAL SHEEP	lamb	yr.	2 yr. ♀	♀	Un-class ♀	TOTAL RAMS	yr.	1/4	1/2		3/4	7/8
2	84	24	-	5	57	2	2	4	1	1	1	1	3
3	54	10	7	2	17	15	2	1	5	5	5	1	3
4	49	7	4	7	14	22	0	1	6	6	6	5	4
5 <sup>c</sup>	311	58	23	7	96	103	1	14	12	12	25	22	29
6	67	11	2		16	9		1	2	2	3	1	2
7	0												
8	0												
13	18	2	1		10	5			2	2	1		2
14	174	35	-		78	61		13	15	15	19	10	4
15	441	74	29	18	218	85		21	19	19	17	12	14
16	79	4	6	3	24	42	1	8	9	9	10	7	7
17	14	1	1	0	7	5	1	1	1	1	1	1	2
18	0												
TOTAL	1,291	226	73	35	537	349	5	64	65	65	87	60	67
1	[131]												
5a,b	198	35		114	31			23			12		
7	14	4		7	3			2			1		
9	0												
10	0												
11	3	3		2	1			1			0		
12	50	10		18	22			18			4		
TOTAL	265	52		141	53			44			17		
	[396]												

1] Yearlings and 2-year old females not classified.



APPENDIX III. Number and percent of Dall sheep group observations in various habitat categories during the helicopter surveys by NPS, Noatak National Preserve, 1983.

Soil Development	Solid Rock assif	Outcrop Ledge	Boulders/ Rubble	Scree/ Talus	Soil
No.(%)	0	10(12)	3(4)	39(48)	29(36)

TOPOGRAPHIC/ MOISTURE:	Ridge/ Peak	Exposed/ Slope	Sheltered/ Slope	Draw	Valley	Cirque Basin
No. (%)	12(15)	53(65)	3(4)	10(12)	1(1)	2(2)

HABITAT:	Moss- lichen/ Bare Scree	Dryas/- Mat Cushion	Dryas/- Sedge Grass	Low Shrubs	Alluvium
No. (%)	7(12)	32(55)	14(24)	4(7)	1(2)