Alaska Department of Fish and Game
Division of Game
Federal Aid in Wildlife Restoration
Annual Report of Survey—Inventory Activities

# DALL SHEEP

Compiled and edited by
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Vol. XVIII, Part II
Project W-22-6, Job 6.0
November 1987

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DEPARTMENT OF FISH AND GAME
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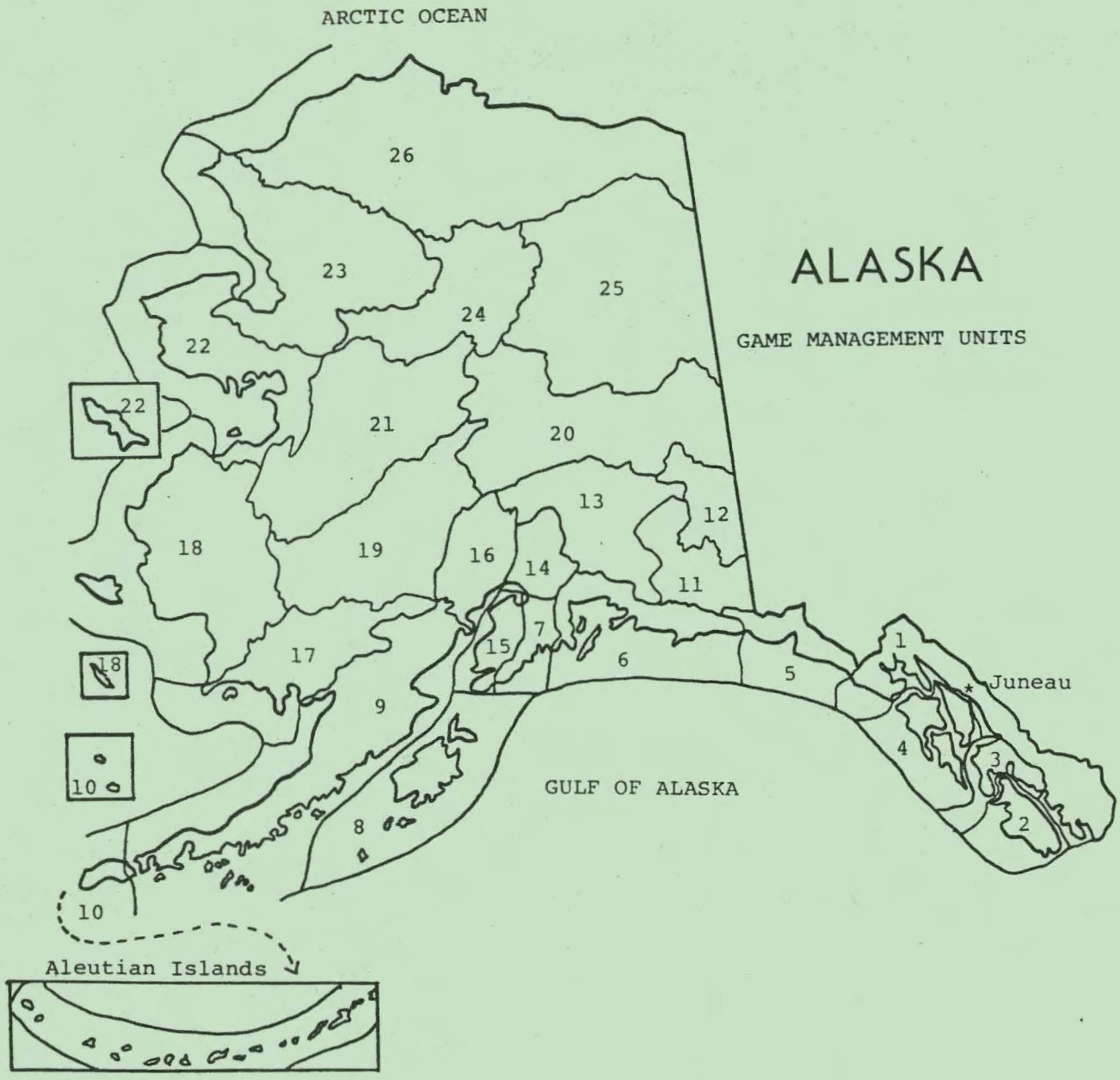
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## STATEWIDE HARVEST AND POPULATION STATUS

Dall sheep populations in the state are either stable or increasing. The mild winter of 1985-86, and previous recent years, have allowed for good survival of lambs, particularly in southcentral Alaska.

In 1985-86, 2,666 hunters took 1,122 sheep in Alaska. The highest number (229) came from the Brooks Range East, followed by Mentasta-Nutzotin-Northern Wrangells (231) and Chugach (158). The harvest in the Chugach Mountains (158) is the highest on record, while that in the Talkeetna Mountains-Chulitna/Watana Hills (118) equals the record harvest for that area. It is of interest to note that the harvest in Alaska Range East, now restricted to full-curl rams, was greater than in the 1980-83 period under 7/8-curl horn management.

The following table summarizes sheep harvest data in the state for 1985-86:

| Area | Harvest | Number of hunters | August horn length |
|---|---|---|---|
| Kenai Mountains | 25 | 160 | 33.4 |
| Chugach Mountains | 158 | 518 | 34.6 |
| Talkeetna Mountains-Chulitna/ Watana Hills | 118 | 372 | -- |
| Mentasta-Nutzotin-Northern Wrangell Mountains | 231 | 435 | 33.6 |
| Tok Management Area | 41 | 89 | 36.9 |
| Delta Controlled Use Area | 32 | 98 | 35.1 |
| Alaska Range West | 119 | 166 | 34.9 |
| Tanana Hills-White Mountains | 10 | 24 | 34.9 |
| Alaska Range East | 136 | 357 | 34.2 |
| Brooks Range East | 229 | 388 | 35.0 |
| Brooks Range East | 23 | 59 | -- |

Robert A. Hinman
Deputy Director

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 7 and 15

GEOGRAPHICAL DESCRIPTION: Kenai Mountains

PERIOD COVERED: 1 July 1986-30 June 1987

## Season and Bag Limit

See Hunting Regulations No. 27.

## Population Status and Trend

A brief account of the status of sheep populations in the Kenai Mountains was reviewed by Holdermann (1985, 1986).

## Population Composition

Aerial surveys were conducted in Subunit 15B between the Killey River and Tustumena Glacier (count area 856) and in Subunit 15C between Fox River and Sheep Creek (count area 858). In these 2 areas, 406 sheep were classified as follows: 16 legal rams, 80 sublegal rams, 225 ewes and yearlings, 71 lambs, and 14 unclassified. The number and percentage of legal rams (3.9%) in this population has remained low. However, the percentage of sublegal rams (19.7%) was relatively high as a result of high lamb recruitment during the early 1980's.

Aerial counts were also conducted on Surprise Mountain and Cooper Mountain (Subunit 15B and Unit 7, respectively). At Surprise Mountain, 80 sheep were classified as follows: 2 legal rams (2.5%), 19 sublegal rams (23.8%), 44 ewes and yearlings (55%), and 15 lambs (18.7%). Only 13 sheep were observed at Cooper Mountain: 1 sublegal ram, 7 ewes and yearlings, and 5 lambs.

## Mortality

No data from "nonhunting" or natural mortality were collected for Kenai Mountain sheep populations.

The number of sheep hunters who went afield and the number of legal rams killed annually have been relatively constant since 1982 (Table 1). Twenty-five legal rams were harvested in 1986 which is slightly higher than the 5-year mean harvest of 20

rams. In addition, 160 hunters spent 694 days hunting sheep for a success rate of 16%; the 5-year mean was 153 hunters with a success rate of 15% (Table 1). Most hunting pressure was focused in Unit 7 and Subunit 15B. Hunters in Subunit 15B were more successful in killing rams than were Unit 7 hunters (22% versus 14%). Transportation means used by all successful hunters were as follows: highway vehicle (36%), airplane (32%), boat (28%), unknown (4%).

Rams from the 1986 harvest had a mean age of 7.3 years (range 5-11 years), a mean horn length of 33.4 inches (range 30.0-38.3 inches), and a mean horn circumference of 13.4 inches (range 12.0-15.0 inches). Eleven of 25 rams (44% of the harvest) were between 8 and 11 years of age. In addition, 4 rams had "broomed" horns; the ages of these sheep ranged from 6-11 years.

Management Summary and Recommendations

Sheep survey data from the Kenai Mountains have many gaps and inconsistencies. Survey goals and methods should be reevaluated and standardized, so that accurate population assessments can be made in the future. A primary goal of the sheep management program should be to develop a population data base which accurately reflects changes in sex and age composition and relative abundance within "representative" areas over time, as well as changes between areas during the same time period.

To achieve this objective, I recommend that an "aggregate" sample area be established in each of the 2 GMU's in the Kenai Mountains. In Unit 7 the aggregate sample area should include Crescent Lake, Grant Lake, and Sheep Mountain (count areas 838, 839, and 843, respectively), and in Unit 15 the area should include the drainages bounded on the north by the Skilak River and on the south by Sheep Creek (count areas 855, 856, 857, and 858). These aggregate sample areas were selected because they contain some of the best sheep range in the Kenai Mountains and because some historical sheep population data already exist. Grouping 3 or more traditional count areas into a single larger sample unit reduces the chances of count variability from movements of sheep in or out of the sampling area, and the larger area will reduce sampling bias. Further, by knowing the surface area of each aggregate sample area, intensive aerial counts of sheep can be used to derive a "minimum" population density.

Aggregate sample areas should be given the highest priority for aerial surveys each year so the best short-term and long-term assessments of sheep populations can be made. To ensure continuity of historical population data, each count

area within an aggregate should be treated as a separate entity and surveyed independently in the usual manner. If possible, surveys of aggregate count areas should be completed in 1 day to minimize the bias from environmental conditions and sheep movements, and to lessen the chances of postponement due to inclement weather. To achieve these objectives, 2 well coordinated aircraft/observer crews should work simultaneously within an aggregate sample area. If surveys in aggregate count areas have been completed, other sample areas could be added as needed to help improve data accuracy. A single-engine, fixed wing aircraft such as the Piper PA-18 continues to be the most practical survey vehicle. Aerial composition surveys of sheep in the Kenai Mountains should be conducted in July and August, prior to the opening of the hunting season.

## Literature Cited

Holdermann, David A. 1985. Units 7 and 15 sheep survey-inventory progress report. Pages 26-28 in B. Townsend, ed. Annual report of survey-inventory activities. Part II. Sheep. Vol. XVI. Prog. Rep. Proj. W-22-4. Job 6.0. Juneau. 30pp.

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Table 1. Sheep harvests and hunting statistics in the Kenai Mountains (GMU's 7 and 15), 1982-1986.

| Year | GMU | No. hunters | No. hunter days | No. legal rams killed[a] | Percent success |
|---|---|---|---|---|---|
| 1982 | 7 | 43 | 183 | 5 | 12 |
| | 15 | 66 | 323 | 18 | 27 |
| | 7 & 15 | 109 | 506 | 23 | 21 |
| 1983 | 7 | 66 | 231 | 10 | 15 |
| | 15 | 91 | 430 | 15 | 16 |
| | 7 & 15 | 157 | 661 | 25 | 15 |
| 1984 | 7 | 88 | 265 | 10 | 11 |
| | 15 | 91 | 407 | 9 | 10 |
| | 7 & 15 | 179 | 672 | 19 | 11 |
| 1985 | 7 | 74 | 233 | 4 | 5 |
| | 15 | 88 | 399 | 17 | 19 |
| | 7 & 15 | 162 | 632 | 21 | 13 |
| 1986 | 7 | 88 | 377 | 12 | 14 |
| | 15 | 72 | 317 | 13 | 18 |
| | 7 & 15 | 160 | 694 | 25 | 16 |
| Totals | 7 | 359 | 1,289 | 41 | 11 |
| | 15 | 408 | 1,876 | 72 | 18 |
| | 7 & 15 | 767 | 3,165 | 113 | 15 |
| Mean | 7 | 72 | 258 | 8 | 11 |
| | 15 | 82 | 375 | 14 | 17 |
| | 7 & 15 | 153 | 633 | 23 | 15 |

[a] Legal ram = 7/8 curl.

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 11, 13D, 14A, and 14C

GEOGRAPHICAL DESCRIPTION: Chugach Mountains

PERIOD COVERED: 1 July 1986-30 June 1987

## Season and Bag Limit

See Hunting Regulations No. 27.

## Population Status and Trend

The Chugach Mountains contain portions of 4 Game Management Units and Subunits (11, 13D, 14A, 14C); this area extends 350 miles from Anchorage to the Yukon border. Approximately 42% of all sheep within this range are presently located within Subunit 14C while the remaining units and subunits (11, 14A and 13D) contain 8%, 16%, and 34%, respectively.

Extensive sheep surveys conducted within Subunit 14C in 1986 indicated the population had increased 21% since 1985, likely as a result of a mild winter and favorable snow conditions. The sheep population has now reached the highest level on record, 128% above numbers found in the late 1970's. A similar increase may have occurred within Subunit 14A because this area also experienced minimal snowfall, although no surveys were conducted to verify this assumption. The status of Unit 11 and 13 populations is presently unknown since no extensive surveys have been flown in these units since 1983.

## Population Composition

The composition of 2,063 sheep observed within Subunit 14C was 8.3% legal rams, 15.9% young rams, 17.3% lambs, and the remaining 57.9% were ewes, or unidentified. The 1986 count of legal rams was 25% above the 1985 tally (172 compared with 138) which is an indication that males in the large lamb crops of the early 1980's are reaching maturity. Numbers of legal rams should continue to increase, barring severe winters. Composition data from the remainder of the Chugach Mountains were not collected in 1986.

## Mortality

In the 1986 hunting season, 518 hunters killed 158 legal rams, the largest harvest on record and 52 more than the mean kill in 1981-85. Harvest was distributed as follows: 9 were killed in Unit 11, 86 in Unit 13, 32 in Subunit 14A, 30 in Subunit 14C, and 1 was unknown. Unit 13, with the largest harvest, had 25% more hunters who took 76% more sheep than in 1985. Mean horn length for the entire range was unchanged from 1985 (34.6 inches); however, in Subunit 13D horn length has declined approximately 2 inches in the past 5 years.

## Management Summary and Recommendations

The sheep population in Subunit 14C continues to increase at a high level, and the number of legal rams will probably increase substantially during the next several years. In contrast, Subunit 14A sheep population is thought to be stable or increasing only slightly. Because aerial surveys have not been conducted regularly in Subunit 13D, the status of that population is unknown. A significant increase in harvest in 1986, with no corresponding increase in hunting pressure, may indicate that the Subunit 13D population contains a greater number of legal rams than previously thought. However, a substantial decline in horn size since the early 1980's indicates that harvest levels may be significantly limiting survival of rams beyond 7/8 curl. Yearly trend counts in the area from Nelchina to Klutina Glaciers, coupled with surveys of the entire subunit every 3 years, are needed to accurately monitor the status of the Subunit 13D population.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 12

GEOGRAPHICAL DESCRIPTION: Mentasta, Nutzotin, and northern Wrangell Mountains

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

This area supports an estimated 12,000 sheep. The trend of the population is not known, but there have been no reports of noticeable increases or declines. No surveys were conducted during the reporting period. Winters have been mild since winter 1981-82, with extremely mild temperatures and light snowpack during winter 1986-87.

### Mortality

Most sheep mortality in this area is attributable to natural factors with hunting limited to full-curl rams only.

Four hundred thirty-five hunters reported hunting in Unit 12 during fall 1986 compared with 377 in 1985, 354 in 1984, and 440 in 1983. Of the 435 hunters reported afield in 1986, 231 reported taking a ram. This harvest compares with reported harvests of 188 in 1985, 134 in 1984, and 208 in 1983. A full-curl horn requirement was imposed in 1984. The harvest and hunting success experienced in 1986 indicate that this regulatory change did not affect harvest or hunting success. In fact, hunter success in 1986 (53%), after 3 years of the full-curl regulation, was higher than the 47% success rate experienced during fall 1983 with the 7/8-curl regulation.

Of the 231 successful sheep hunters reporting, 143 were residents, 71 were nonresidents, 3 did not specify residency, and 14 had no residence documentation overlays on file. Only 10 residents of Unit 12 reported taking sheep in this area. Aircraft were used by most successful hunters (159), followed by horses (40), highway vehicles (10), three-wheelers (5), off-road vehicles (4), and boats (2). Only the extreme

eastern end and south side of the Mentasta Mountains are accessible by road.

The mean horn length of rams taken in 1986 was 33.6 inches, essentially the same as in 1983, 1984, and 1985. This may indicate that sheep in Unit 12 were not being harvested at maximum levels prior to the full-curl regulation and that the regulation change from 7/8- to full-curl did not serve to increase mean horn size of rams harvested. Of the 231 rams harvested, hunters reported that 79 were broomed (34%) compared with 29% in 1985. Brooming is a characteristic of older, mature rams. Only 3 rams with horns 40 inches or longer were taken.

Management Summary and Recommendations

The management objective of providing maximum opportunity to participate in sheep hunting is being met in Unit 12. Because of implementation of the full-curl regulation in 1983, there seems to be little need for concern about overharvest of rams while meeting this objective in the future. Conflicts between guided, nonresident hunters and resident hunters using air taxi services have been reported. Such conflicts may be expected in the future with the present management objective. It is difficult for guides to provide a high-quality hunting experience in an area with a goal of maximum participation.

To gather data on sheep population composition, the Department should consider providing a supply of forms and classification instructions to guides and air taxi operators for their clients to use. If even a small percentage of hunters record their observations, it may be possible to obtain information on lamb and ram percentages in the populations.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 12, 13, and 20

GEOGRAPHICAL DESCRIPTION: Tok Management Area, Alaska Range east of the Johnson River

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

Approximately 2,000 sheep inhabited this area in 1980. No complete surveys have been conducted since that time to determine overall population trend; however, population size in the north-side trend area has been closely followed. The ewe population in this area fluctuated between 450 and 595 between 1980 and 1984. No data were gathered in 1986, and an aerial survey was not conducted in 1985. The population is thought to have increased slightly from 450 sheep in 1980. This sheep population is characterized by low density and by rams capable of growing relatively large horns at a young age. The area is managed to provide opportunities for hunters to take large-horned rams by keeping harvests low through a permit drawing system.

### Mortality

Because hunting of rams is restricted and hunting of ewes is now prohibited, sheep in the Tok Management Area (TMA) are affected most by natural mortality factors. Golden eagles, wolverines, wolves, and grizzly bears are all relatively common in the area and all have been observed taking or attempting to take sheep. Winter 1986-87 was extremely mild with warm temperatures and a light snowpack; survival over winter may have been high, but no data were gathered. In spite of mild winter weather in 1985-86, lamb production and yearling recruitment were below average in other portions of the Alaska Range. Similar poor production may have occurred in the TMA.

One hundred twenty permits were issued to hunters during the fall 1986 hunting season. The season did not open until 20 August, but closed on the traditional date of 20 September.

Still, permittees reported taking 41 rams. The 1985 harvest was reported to be 39 rams taken during the Tier II subsistence hunt.

Of the 120 permittees allowed to hunt in 1986, only 2 failed to report, 29 (25%) did not hunt, and of the 89 who did hunt, 46% were successful. Only 2 nonresidents hunted and both were successful. Two-thirds of the harvest occurred from 20 August to 6 September, early in the season. Weather was good during this period in 1986. Also, about 58% of the harvest occurred in the eastern drainages and 42% occurred in the western drainages of the Robertson River and the Johnson River, roughly reflecting sheep distribution throughout the area.

The mean horn length of rams harvested was 36.9 inches and the mean base circumference was 13.3 inches, comparable to past years. Seven (17%) of the 41 rams taken had horns 39 inches or larger, and 4 (10%) had horns 40 inches or larger. These figures indicate that the management goal of providing opportunities to take large-horned rams is being met at a harvest rate of approximately 2% of the total estimated population including lambs. One ram, with 45-inch horns, was the longest-horned ram reported taken since the area came under trophy management in 1974.

Management Summary and Recommendations

Based upon stable harvests of large rams, sheep management in the TMA continues to be successful in meeting the management objective. The TMA continues to be one of the most popular sheep hunting areas in the state, judging from the number of permit applications received in relation to available permits. This combination of limited hunter pressure and harvest restricted to mature, full-curl rams should be considered for other areas capable of producing large-horned rams at an early age to meet the demand for trophy sheep hunting opportunities. Furthermore, because the Board of Game has determined that there has been no customary and traditional use of sheep in the TMA by rural residents, no subsistence season was established and allocation of 10% of the permits to nonresident hunters should be reinstated. The TMA is the only population of Dall sheep in the world managed specifically for trophy quality and is widely recognized as such nationwide.

The lack of composition data may be correctable in the future. If all permittees were sent a sex-age composition form and instructions along with their permits, a general feeling for ram and lamb percentages in the population could be obtained. Making TMA sheep hunters active partners in management could well compensate for anticipated shortfalls in research and management funding for sheep surveys.

Lastly, the season should be extended to open on 10 August to align it with nearly all other areas as in the past.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 13A, 13B, 14A and 14B

GEOGRAPHICAL DESCRIPTION: Talkeetna Mountains and Chulitna/Watana Hills (TCW)

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

No composition surveys were conducted in the Talkeetna Mountains and Chulitna/Watana Hills during this reporting period.

Verbal reports from guides, air taxi operators, and sheep hunters indicate the sheep population in this area is increasing slowly.

### Population Composition

Incidental observations of sheep in Subunits 14A and 14B during goat surveys in June/July 1986 indicated a larger number of lambs. It appears that the sheep population is beginning to recover from the deep-snow winter of 1984-85, when winter mortality was relatively high.

### Mortality

During the hunting season, 118 rams were reported killed by 372 hunters. Of these rams, 43 (36.4%) were killed in Subunit 13A; 69 (58.5%) in Subunit 13E; 27 (22.9%) in Subunit 14A and 22 (18.6%) in Subunit 14B. The ram harvest in 1986 was 12.4% higher than in 1985 (105 killed), and it equaled the 1969 harvest which was the highest on record. Hunter success was 31%, declining 2.4% from the 1985 level of 33.4%.

### Management Summary and Recommendations

The number of sheep hunters who hunted in the Talkeetna Mountains and Chulitna/Watana Hills was the largest on record. Nineteen eighty-six was the 3rd consecutive year that hunting pressure has increased. Previously, hunting pressure declined

slowly in the 6-year period from 1978 through 1983. In 1986, resident hunters accounted for 77% of the increased hunting pressure.

No changes in seasons or bag limits are recommended.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 13B, 20A, and 20D

GEOGRAPHICAL DESCRIPTION: Delta Controlled Use Area

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

No surveys were conducted during the report period, but the population is believed to be stable or increasing slightly. The population was estimated at approximately 1,500 animals in 1980.

### Mortality

Hunting constituted the only documented mortality; mortality attributable to natural factors such as weather and predation is unknown. Reports from observers suggest that wolves are a significant mortality source in this population.

Interest in hunting the Delta Controlled Use Area (DCUA) sheep remains high. Two hundred thirteen people applied for 75 permits offered for "walk-in only" hunting, and 311 applicants applied for the same number of permits for the unrestricted access season. Thirty-two rams were harvested by 98 permit holders in 1986. An average of 32 rams has been harvested annually since permits were first required in 1978. The number of hunters participating in this hunt has increased since 1979.

Hunter effort data have been available since 1982 for this permit hunt, and average successful hunter effort has been declining since 1983. In 1984, 10% less effort was expended, 19% less in 1985, and 28% less in 1986. This suggests an increasing sheep population, a greater proportion of rams, increased hunter efficiency, or some other phenomenon related to hunting. Seasons in 1984 and 1985 were effectively shortened because of difficulties in administering the permit hunt.

Average horn size was 35.1 inches in 1986, a decline from 35.8 inches in 1984. Horn-size data were not collected in 1985. Average horn size has increased from a low of 31.2 inches in 1978.

Management Summary and Recommendations

The management emphasis in this area since 1970 has been to provide an aesthetically pleasing hunting opportunity. Hunter participation is restricted by permit, and most hunters report satisfaction with their hunting experience. The present management scheme presents a good opportunity to take large sheep with minimum competition from motorized hunters early in the season, and from hunters in general throughout the season.

To continue to provide this high-quality experience, and to maintain acceptable numbers of sheep, data on sheep population dynamics should be collected regularly.

During the 1987-88 regulatory year, sheep management priorities for the Delta Controlled Use Area should be as follows:

1. Begin collecting supplementary data on sheep population trends through voluntary expanded sheep hunter reports.

2. Collect population composition data at the Granite Creek, Little Gold Creek, and Pegmatite Creek mineral licks.

3. Continue to monitor changes in hunter effort. Begin developing a data set designed to determine if this trend is reflected in the dynamics of the sheep population.

4. When funds allow, the size of the population should be assessed by aerial survey.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 16, 17, and 19

GEOGRAPHICAL DESCRIPTION: Alaska Range west of Denali National Park

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

The sheep population in the Alaska Range, west of Denali National Park, is estimated at 4,000 individuals. An estimated 3,000 of these sheep are available to hunters; the remainder inhabit Lake Clark National Park. This population is believed to be relatively stable; however, no surveys were conducted during the reporting period.

### Mortality

Most sheep mortality is attributable to natural factors, and the amount of loss due to predators is unknown.

One hundred sixty-six hunters reported the harvest of 119 rams during the 1986 season, for a success rate of 72%. This harvest was 40% above the harvest of 83 rams reported last year, and was the highest reported harvest since 1978. Ram harvest since 1979 has averaged 88 rams for 157 hunters for a 56% success rate. Success in 1986 was the highest ever reported. For the 1986 season, nonresident success was 90% while resident hunters had a 57% success rate.

Reported horn size averaged 34.9 inches, and the average reported age was 8.7 years. According to horn-growth data from the Alaska Range West, a full-curl sheep should average about 34 inches and 8 years of age. If the population estimate of 3,000 huntable sheep is accurate, the reported harvest rate would be 4%. This harvest rate approaches the theoretical maximum sustainable harvest for mature rams. However, the average age of 8.7 years and average horn length equivalent to full-curl are well above the legal minimum standard of 7/8-curl, and estimated age at 7/8-curl (6.8 years), which indicates that the harvest is submaximal. The

age and size data of the harvest imply that the population estimate is probably too low.

Management goals for the Alaska Range West include the management of 75% of the sheep population for aesthetic hunting conditions; 25% are managed for viewing. These goals are apparently being met. Twenty-five percent of the sheep are managed exclusively for nonconsumptive use in Lake Clark National Park. Average horn length greater than expected at full-curl and mean age of rams reported harvested indicate trophy selection is good. Also, the record success rate indicates a relative abundance of rams per hunter.

Still, hunter effort has not been widely dispersed. Fifty hunters (31% of the total) used the Sheep Creek-Windy Fork area. The South Fork-Post River area was used by 32 hunters (19% of all hunters), and the Tonzona area supported 13% (21 hunters) of the rangewide total. The rest of the Alaska Range West was very lightly hunted in 1986. This hunter distribution was typical of those in the past several years. Most hunters (83%) used aircraft for access to their hunting area.

## Management Summary and Recommendations

Sheep populations in the western Alaska Range are believed to be relatively stable; densities are thought to be moderate to low. High hunter success, reported ram age, and long horn length relative to the minimum prescribed by regulation all indicate that hunter pressure is light. Current harvest levels are likely to be sustainable at the ages and horn size reported this year. Apparently, management goals are being attained. No specific recommendations are offered.

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# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 20 and 25

GEOGRAPHICAL DESCRIPTION: Tanana Hills-White Mountains

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

Aerial surveys were conducted in the Tanana Hills-White Mountains in 1970, 1977, 1982, and 1986. Total counts (not including lambs) indicate a substantial decline occurred in sheep numbers between 1970 and 1977 (from 215 to 104, respectively). In 1982, 122 sheep older than lambs were counted. During 1986, 191 sheep (not including lambs) were counted in the same survey area, suggesting numbers have increased during the past 4 years. The greater survey time expended may have contributed to higher counts in 1986 compared with 1982, but agreement between ground and aerial counts made during 1982 suggested aerial survey efficiency in the area surveyed that year was high. In addition, 7 of 8 marked sheep were seen during the aerial survey of 1986. I think it is likely the higher 1986 count reflects a population increase.

Continued long-term increase in sheep numbers in the Tanana Hills-White Mountains is not expected. Population size appears to be restricted by a limited amount of discontinuous alpine habitat. Surveys were not conducted in the Tanana Hills east of the Steese Highway in 1986.

### Population Composition

Population composition in the 1986 aerial survey suggests the population was more productive from 1982 to 1986 than before 1982 (Table 1). The number of legal rams remained essentially unchanged, but numbers of sublegal rams and "ewes" increased. Lamb production (49 lambs, or 37 lambs:100"ewes") was not spectacular in 1986. Still, lambs made up 20% of the 1986 sample, sublegal rams 18%, "ewes" 55%, and legal rams 7%. The 1986 ratio of sublegal to legal rams (2.5:1) was higher than during any of the previous surveys.

## Mortality

Most sheep mortality is attributable to natural factors; the extent of predation on sheep is unknown.

Hunters have taken 10 rams during each of the past 3 years. During that time, hunter numbers were 42 (1984), 27 (1985), and 24 (1986).

Mean reported horn length was 34.9 inches ($\underline{n}$ = 10, SD = 3.0) in 1986; the previous 5-year mean was 34.9 inches. Mean horn base was 13.5 inches in 1986 ($\underline{n}$ = 9, SD = 7.4), and mean reported age was 8.8 years (SD = 1.23).

Only 1 nonresident reported hunting during 1986. Airplanes were the most common method of transportation by successful hunters (6 of 10). Among unsuccessful hunters, 5 of 14 used airplanes for transportation.

Distribution of harvest and hunting pressure is given by subunit in Table 2. During 1986, half of the harvest and hunting pressure occurred in that portion of the Tanana Hills-White Mountains southeast of the Steese Highway.

## Management Summary and Recommendations

Surveys conducted during 1986 indicated sheep numbers have increased in the Tanana Hills-White Mountains northwest of the Steese Highway. Increased abundance of young rams suggests the harvest available from those low-density populations will improve for at least the next few years. Reported hunting pressure has been stable over the past 2 years, and harvests have remained constant.

Alpine sheep habitat is widely spaced and connected by few travel corridors that allow redistribution of subpopulations. The absence of large continuous areas of alpine habitat may prevent sheep densities from increasing substantially above their present level. Interest in developing mineral deposits in the western and central Tanana Hills presents a potential threat to sheep subpopulations in those areas. A cooperative study with the Bureau of Land Management monitoring sheep movements and habitat use will be used to evaluate potential impacts of development. Maintenance of existing habitat and connecting travel corridors will be a priority in the interagency management of Tanana Hills-White Mountains sheep.

A proposal was submitted to raise the minimum legal horn size from 7/8- to full-curl in GMU 25, except in GMU 25A. That regulation would make harvest more consistent throughout the Tanana Hills-White Mountains. Currently, sheep in the eastern

Tanana Hills are harvested under a full-curl regulation, while in the remainder of the Interior the legal definition is 7/8-curl.

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Table 1. Summary of aerial counts conducted in the western portion of the Tanana Hills-White Mountains, 1970-86.

| Year | Rams | | | "Ewes" | Non-lambs | Lambs | Total | Survey time (hrs) |
|---|---|---|---|---|---|---|---|---|
| | Legal[a] | Sublegal | Total | | | | | |
| 1970 | 19 | 25 | 44 | 171 | 215 | 70 | 285 | 5.9 |
| 1977 | 13 | 25 | 38 | 66 | 104 | 20 | 124 | 6.5 |
| 1982 | 15 | 30 | 45 | 77 | 122 | 10 | 132 | 9.6 |
| 1986 | 17 | 42 | 59 | 132 | 191 | 49 | 240 | 14.6 |

[a]legal = 7/8-curl

Table 2. Distribution of sheep harvest and hunting pressure in the Tanana Hills-White Mountains, 1986.

| Subunit | Legal horn size | Successful | Unsuccessful | Total |
|---|---|---|---|---|
| 20B | full-curl | 0 | 1 | 1 |
| 20D | full-curl | 1 | 0 | 1 |
| 20E | full-curl | 4 | 8 | 12 |
| 25C | 7/8-curl | 3 | 5 | 8 |
| 25D | 7/8-curl | 2 | 0 | 2 |
| Totals | | 10 | 14 | 24 |

# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 20A

GEOGRAPHICAL DESCRIPTION: Alaska Range east of Denali National Park excluding the Tok Management Area and the Delta Controlled Use Area

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

Approximately 5,000 sheep inhabit the Alaska Range east (ARE) of Denali National Park, excluding the Delta and Tok Management Areas. Aerial surveys over most of the ARE have not been conducted in recent years. Therefore, population estimate and trend are based on the Dry Creek study area, which is centrally located, and contains about a third of the total population of the ARE. Currently, numbers appear stable.

During 1986, only 65 of 95 marked ewes in the Dry Creek populations returned to the Dry Creek lick during the June observation period. Rather than reflecting overwinter mortality, Heimer (1987) hypothesized that the failure of some ewes to return to the lick was related to reduced lick drive. Unusually hot, dry weather occurred during mid- to late June, following a cool, dry spring. These weather events may have affected mineral content of forage and were thought to have decreased the physiological need for lick use by ewes.

### Population Composition

From 16 to 30 June, 1,450 ewes, lambs, and yearlings were classified at the Dry Creek mineral lick. Lamb:ewe ratios (33:100) and yearling:ewe ratios (22:100) were both below the previous 8-year means of 54 lambs:100 ewes and 27 yearlings:100 ewes. Late green-up and unfavorable lambing weather may have affected neonate survival.

Estimates of ram abundance were not available from the Dry Creek study area, and aerial surveys were not conducted during 1986. A sample of 929 sheep classified from a helicopter during July 1985 contained 2.7% full-curl rams, 6.2% 7/8-curl rams, and 14.7% other identifiable rams.

## Mortality

Most sheep mortality is attributable to natural factors; the extent of predation on sheep is unknown. During 1986, 357 hunters reported taking 136 rams. The 1985 harvest was 102 rams; the previous 5-year mean was 111 rams. Reported hunting pressure has increased in recent years (Table 1).

The 1986 harvest of 136 full-curl rams was 33% greater than the 1985 full-curl harvest, and 17% greater than the mean harvest of 7/8-curl rams from 1980 to 1983. The reported number of hunters was up 22% from the 1985 level of 292 hunters. Heimer and Watson (1986) documented increases in survival of young rams since 1979 and increased lamb and yearling ratios since 1977. Therefore, legal ram numbers have probably increased, contributing to high harvest and success.

The mean horn length reported for 1986 was 34.2 (SD = 2.44). This was slightly greater, but not significantly different statistically ($P > 0.10$), than the mean horn length of 34.0 inches or 33.6 inches reported during 1984 and 1985. Reported horn lengths ranged from 26 to 41 inches during 1986. Only 2 rams were reported with horn length of 40 inches or more and only 5 were reported with horn lengths of 38-40 inches.

Overall hunter success was 38% in 1986, resident success was 31%, and nonresident success was 73%. Residency was not specified by 22 hunters; 286 residents and 49 nonresidents reported. Highest success rates (61%) were experienced by guided hunters using horses for transportation, but most rams were taken by hunters using airplanes.

Comparison of yearlings:100 ewes ratios with previous-year lambs:100 ewes ratios yielded an estimated lamb survival of 55% between 30 June, 1985 and 30 June, 1986. This value was identical to that calculated during the same period for 1984-85. Neonatal mortality rates from birth to June 30 are unknown. The survival from late June to late June is typical for this area and is adequate for population maintenance.

## Management Summary and Recommendations

Sheep occur at moderate to high densities in the central Alaska Range and total numbers appear stable. With restriction of harvest to full-curl rams, and in the absence

of a substantial increase in ewe mortality, recruitment is adequate to sustain present population levels.

The full-curl regulation was implemented in 1984 to test the hypothesis that harvesting only full-curl and larger rams would not affect harvest level. The basis of this test is the hypothesis that presence of older rams reduces natural mortality among younger rams. By extension of this hypothesis, increased survivorship of young rams would eventually cause higher recruitment to the full-curl segment of the population which could then sustain higher harvests. Heimer and Watson (1986) reported that survival of rams from yearling age to age 6 years increased from 49% between 1972 and 1979, the period of intense 3/4-curl cropping in the ARE, to 85% survival to age 6 following the 7/8-curl regulation. Survival of rams in this age group since the full-curl regulation has not been measured.

It cannot be conclusively stated that the increased harvest reported for 1986 was a result of increased numbers of full-curl rams, but it appears likely. Harvest has been heavy in the ARE since the early 1970's. Only 3% of the sheep observed in last year's helicopter survey were full-curl rams in the Dry Creek study area. During 1985, approximately 75% of the standing stock of full-curl rams was harvested (McNay 1986). Therefore, most harvestable rams taken in 1986 were probably recently recruited to the full-curl age/size class.

Given the high exploitation rate of 1985, the increased harvest of 1986 is consistent with the increased yearling ratios and increased sublegal ram survival reported by Heimer and Watson (1986). Maintenance of high harvests during the next few years under existing regulations would provide further evidence of increased sublegal ram survival throughout the sublegal cohorts. In addition, broader surveys with emphasis on ram numbers and horn size class composition should allow greater confidence in the estimates of full-curl recruitment and exploitation. Under present conditions, the management goal, maximum opportunity to hunt, is being met, and the populations are healthy. No changes in seasons and bag limits are recommended.

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Table 1. Historical sheep harvest, hunter numbers, and percentage success in GMU 20A, 1980-86.

| Year | Harvest | Total hunters | % Success |
|---|---|---|---|
| 1980 | 88 | 214 | 41 |
| 1981 | 116 | 252 | 46 |
| 1982 | 112 | 189 | 59 |
| 1983 | 121 | 297 | 41 |
| 1984[a] | 105 | 255 | 41 |
| 1985 | 102 | 292 | 35 |
| 1986 | 136 | 357 | 38 |

[a] Legal ram 1984-86 = full-curl, 1979-83 = 7/8-curl.

DALL SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 23 and 26A

GEOGRAPHICAL DESCRIPTION: Western Brooks Range

PERIOD COVERED: 1 July 1986-30 June 1987

Season and Bag Limit

See Hunting Regulations No. 27.

Population Status and Trend

The Baird Mountain sheep population appears to be healthy and stable in size. Sex and age composition and sheep density data gathered from aerial survey information suggest continued well-being of the population for the immediate future.

No surveys of the DeLong Mountain sheep population were conducted during the reporting period. Environmental conditions affecting sheep population dynamics are roughly equivalent for the DeLong and Baird Mountains, and known hunting pressure is less in the Delongs than in the Bairds. It is unlikely, therefore, that the status of the DeLong population is markedly worse than that of the Baird population. However, lack of data makes a reliable evaluation impossible and emphasizes the need for surveys in 1987.

Population Composition

Sex and age composition data for a sample of 669 sheep in the Baird Mountains were obtained from aerial surveys conducted in late July 1986 (Table 1). The sex and age ratios and the number of sheep observed are comparable to data collected in 1983 and 1985 suggesting a stable trend in terms of numbers and composition (James 1986). During the 1985-86 fall (rams only) and winter (either sex) hunting seasons, the unexpectedly high harvest of 38 rams from the Baird Mountains resulted in widespread concern that the mature ram segment of the population had been overharvested. However, the results of surveys conducted in July 1986 (11 legal rams:100 ewes; 8% legal rams of all sheep older than lambs; and 7% legal rams of all sheep) are only 1-2% lower than the 1983 results,

suggesting little if any change. However, the question of whether this represents a slow but downward long-term trend remains unanswered.

During late July 1986, a ground survey was conducted at Kilyaktalik Peaks in the Baird Mountains and 159 sheep were enumerated (Table 2). The purpose of a ground survey is to obtain reliable lamb/ewe and yearling/ewe ratios not obtainable by aerial surveys. The results of 44 lambs:100 ewes and 37 yearlings:100 ewes indicate that natality and recruitment were good. During the previous year, the observed ratios were 50 lambs:100 ewes and 28 yearlings:100 ewes. This suggests slightly lower natality in 1986 compared with 1985, but stronger recruitment in 1986 due in part to the relatively large 1985 lamb crop. I do not know how accurately the Kilyaktalik Peaks data reflect the overall Baird Mountain population since the sample is small in size and was taken from a localized area. The ram:ewe ratios observed at Kilyaktalik probably do not reflect the ram:ewe ratios of all sheep in the Baird Mountains because only 9% of the sheep at Kilyaktalik Peaks were rams larger than 1/4 curl, whereas rams larger than 1/4 curl constituted 22% of the 669 sheep surveyed from the air.

The 1986 surveys allowed further evaluation of the feasibility of establishing 1 or 2 trend count areas in the Baird Mountains. I originally anticipated that each count area would be large enough to require only 4-5 hours of search time. Although the goal of establishing trend count areas appeared imminent last year (James 1986), the 1986 survey experience has forced me to conclude that each count area needs to be twice as large as originally planned to adequately assess population status. Larger trend count areas are necessary because sheep apparently exhibit extensive movements over relatively large areas. Future work, however, may identify smaller count areas that can provide a reliable index of the status of the Baird Mountain population.

Mortality

The reported harvest for the 1986 fall season was 23 rams. Nine rams were taken from the Baird Mountains and 14 from the DeLong Mountains (Table 3). Fifty-seven registration permits were issued for hunting in the Baird Mountains (Table 4). An emergency order closing the fall season in the Baird Mountains prior to the established closure date of September 20 was not necessary. The 9 sheep harvested from the Bairds was less than the fall quota of 21 set prior to the opening of the season.

The fall 1986 harvest was substantially lower than the 1985 fall harvest of 37, and within the range of 13-25 observed since the 7/8 curl regulation went into effect in 1979. Weather was extremely poor during the 1986 season and I believe that more sheep would have been killed had better weather prevailed. The 1985-86 either-sex subsistence sheep season is still in progress and no preliminary harvest figures are available. An estimate of harvest for the subsistence season will be included in next year's report.

The 1985-86 subsistence harvest remained unchanged from the 21 sheep (19 from the Bairds, 1 from the DeLongs, and 1 from Gates of the Arctic National Park) reported as preliminary in last year's report (James 1986). The overall known harvest for the 1985-86 fall and winter seasons is 48 from the Baird Mountains, including Gates of the Arctic National Park. The Baird harvest was unusually high in 1985-86 compared with past years, and was above the either-sex harvest guideline of 40 established during spring 1986.

## Management Summary and Recommendations

Annual surveys will continue to be a high priority in Unit 23. Extensive surveys in the DeLong Mountains were last conducted in 1983. Obtaining data from the DeLongs in 1987 will be a high priority.

The Baird Mountain permit system did not suffer from any insurmountable problems during its 1st year of operation. I recommend, therefore, that it be retained for at least 1 more year. In the meantime, simpler regulatory alternatives should be explored.

Cooperative efforts with the National Park Service (NPS) have enabled us to conduct a much more thorough sheep management program than would otherwise have been possible. The pooling of ADF&G and NPS resources has been and hopefully will continue to be extremely beneficial to sheep management in GMU 23.

## Literature Cited

James, D. D. 1986. Unit 23 Dall sheep survey-inventory progress report. Pages 20-29 in B. Townsend, ed. Annual report of survey-inventory activities. Part II. Sheep. Vol. XVII. Alaska Dep. of Fish and Game. Federal Aid in Wildlife Rest. Prog. Rep. Proj. W-22-5. Job 6.0. Juneau. 32pp.

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Table 1. Dall sheep sex and age composition data obtained from aerial surveys of the Baird Mountains (GMU 23), July 22-23, 1986.

| Sex/age class | Number/percent/ratios of sheep |
|---|---|
| Legal rams[a] | 47 |
| Sublegal rams | 98 |
| Total rams | 145 |
| Ewes[b] | 416 |
| Lambs | 105 |
| Unidentified | 3 |
| Total sheep | 669 |
| Legal rams:100 ewes | 11 |
| Sublegal rams:100 ewes | 24 |
| Total rams:100 ewes | 35 |
| Lambs:100 ewes | 25 |
| Lamb % of total | 16 |
| Legal rams % of all sheep older than lambs | 8 |
| Legal rams % of all sheep | 7 |
| Legal rams % of all rams | 32 |
| Ram % of total sheep | 22 |

[a] 7/8 curl or larger.

[b] Ewe classification also includes yearlings of both sexes and rams of 1/4 curl or less.

Table 2. Dall sheep sex and age composition data obtained from ground surveys at Kilyaktalik Peaks, GMU 23, July 30-31 and August 1, 1986.

| Sex/age class | Number/percent/ratios of sheep |
|---|---|
| Total sheep | 159 |
| Lamb | 31 |
| Yearling | 26 |
| Ewe | 70 |
| Unclassified ewe/yearling | 2 |
| Total rams | 30 |
| 1/4-curl ram | 16 |
| 1/2-curl ram | 6 |
| 3/4-curl ram | 4 |
| 7/8-curl ram | 3 |
| 4/4-curl ram | 1 |
| Lambs:100 ewes | 44 |
| Yearlings:100 ewes | 37 |
| Lamb % of total sheep | 19 |
| Yearling % of total sheep | 16 |
| 3/4-curl ram % of total rams | 13 |
| 7/8-curl ram % of total rams | 10 |
| 4/4-curl ram % of total rams | 3 |

Table 3. Reported sheep harvest for fall 1986, GMU 23[a].

| Location | Successful | Unsuccessful |
|---|---|---|
| Baird Mountains (permit system) | | |
| Resident of Unit 23 | 0 | 3 |
| Other resident | 4 | 8[b] |
| Nonresident | 5 | 4 |
| DeLong Mountains (harvest report system) | | |
| Resident of Unit 23 | 2 | 5 |
| Other resident | 5 | 14 |
| Nonresident | 7 | 3 |
| Total | 23 | 36 |

[a] Total harvest for 1986-87 regulatory year not yet available because of ongoing subsistence hunting season. Data will be reported in next year's report.

[b] Includes 1 individual who hunted unsuccessfully in both areas, and is tallied in both areas. Hence, the total of 36 instead of 37.

Table 4. Dall sheep hunting permits issued for fall 1986, Baird Mountains, GMU 23.

| Residency of hunter | Permits issued |
|---|---|
| Unit 23 resident, Kotzebue | 19 |
| Unit 23 resident, other | 1 |
| Nonlocal resident, urban | 20[a] |
| Nonlocal resident, rural | 8 |
| Nonresident | 9[b] |
| Total | 57[c,d] |

[a] One additional individual failed to pick up a permit but subsequently reported unsuccessful on a Sheep Harvest Report.

[b] Three additional individuals failed to pick up permits but subsequently reported successful hunts on Sheep Harvest Reports.

[c] Total should have been 61, counting 4 individuals who failed to pick up permits.

[d] Thirty-six individuals who picked up permits did not go hunting in the Baird Mountains.

# SHEEP

## SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 24, 25, and 26

GEOGRAPHICAL DESCRIPTION: Brooks Range east of Gates of the Arctic National Park

PERIOD COVERED: 1 July 1986-30 June 1987

### Season and Bag Limit

See Hunting Regulations No. 27.

### Population Status and Trend

On the north side of the Brooks Range, sheep numbers vary across Unit 26, with higher densities in Subunits 26B and C and relatively fewer sheep in Subunit 26A. Greatest concentrations of sheep are found in the Itkillik, Atigun, and Marsh Fork valleys in Subunit 26B, and in the Canning, Hulahula, and upper Kongakut valleys in Subunit 26C. Most of the sheep available to hunting in Subunit 26A are near the Nanushuk River and Shainin Lake in Gates of the Arctic National Preserve. On the south side of the Brooks Range, sheep exist at moderate densities eastward from the boundary of Gates of the Arctic National Park, but density declines progressively toward the east. Very few sheep are known to inhabit the south side of the Brooks Range east of the Sheenjek River.

### Population Composition

Composition counts were conducted by the U.S. Fish and Wildlife Service (USFWS) in a portion of Subunit 26C. Summaries of survey results are not yet available from USFWS.

### Mortality

Most sheep mortality is attributable to natural causes, but specific data are unavailable.

During the 1986 fall hunting season, 24 hunters took 18 rams in Subunit 26A, 81 hunters took 33 rams in Subunit 26B, and 137 hunters took 101 rams in Subunit 26C. In addition, 15 hunters took 12 rams along the boundary of Subunits 26B and C, but precise locations were uncertain. In all of Unit 26, both the number of hunters (257) and the harvest (164) were up

slightly from the previous year (241 hunters, 162 rams) and were the highest ever recorded for the unit. However, both the number of hunters and the harvests were down in that portion of Subunit 26B near the Dalton Highway. In 1986, 33 hunters took 6 rams (18% success) compared with 41 hunters taking 15 rams (37% success) in 1985. The 20% decrease in hunters along the road may be attributed to an economic downturn in Alaska or to increased enforcement of access restrictions, including a manned check station. Nevertheless, the 60% drop in harvest along the road was disproportionate to the decrease in hunters and may indicate a reduction in the number of legal rams available. Other factors, such as bad weather during hunting season, also lower success. Mean horn size (32.8 inches) and age (7.5 years) of rams taken along the Dalton Highway were lower than the means for the Brooks Range (35.0 inches and 9 years of age), but were similar to the 1985 averages along the Dalton Highway. This may also indicate that larger, older rams were less available along the road than elsewhere in the Brooks Range. Horn size and age in Unit 26 were similar the previous year (34.5 inches, 8.8 years).

On the south side of the Brooks Range, 45 hunters shot 17 rams in Unit 24 and 86 hunters took 48 rams in Unit 25. Mean horn length and ages were 34.9 inches and 8.4 years in Unit 24 and 35.7 inches and 9.2 years in Unit 25.

Compared with the previous year, both the number of hunters and the harvest in Unit 24 were essentially unchanged. The number of hunters in Unit 25 increased 18%, but harvest nearly doubled. Reasons for this large increase in harvest success are unknown. The comparatively high values for horn size and age in both units indicate that predominantly larger, older rams were taken, and suggest that hunting pressure is still light.

Local hunters from Kaktovik took about 20-25 sheep during the Subsistence Permit Hunt. Arctic Village residents took 3-5 sheep.

Management Summary and Recommendations

Sheep populations in the eastern Brooks Range do not appear to be declining. In much of Subunit 26C, populations are thought to be increasing, though good data are lacking. Harvest of 7/8-curl or larger rams throughout most of the area, along with generally low harvest rates, appears to have little effect on the population. Only along the Dalton Highway in Subunit 26B do heavy hunting and harvest pressure appear to be limiting the number of larger, older rams, and approaching the lower, legal limit. The management objective, aesthetically pleasing hunting conditions, may be compromised along the

Dalton Highway, but is being satisfactorily met in the rest of GMU's 24, 25 and 26.

Subsistence harvest of sheep as practiced from Kaktovik and Arctic Village has no apparent negative effect on sheep populations. Harvest levels near Arctic Village are insignificant, and sheep populations in the area most hunted by Kaktovik villagers are not declining.

No changes in season or bag limits are necessary at this time.

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