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

SHEEP

Compiled and edited by
Barbara Townsend, Publications Technician
Vol. XVII, Part II
Project W-22-5, Job 6.0
August 1986

STATE OF ALASKA
Bill Sheffield, Governor

DEPARTMENT OF FISH AND GAME
Don W. Collinsworth, Commissioner

DIVISION OF GAME
W. Lewis Pamplin, Jr., Director
Robert A. Hinman, Deputy Director

Additional copies of this report, or reports on other species covered in this series may be obtained from:

Publications Technician
ADF&G, Game Division
P.O. Box 3-2000
Juneau, AK 99802
(907) 465-4190

CONTENTS


ARCTIC OCEAN
ALASKA
GAME MANAGEMENT UNITS
26
23
25
24
22
22
21
20
13
12
18
19
16
14
11
7
15
17
18
6
5
1
Juneau
9
4
3
10
GULF OF ALASKA
8
2
10
Aleutian Islands

STATEWIDE HARVEST AND POPULATION STATUS

Dall sheep populations in the state are generally stable or increasing, although variations exist between mountain ranges. Population levels vary from moderate to high.

Sheep hunting patterns were significantly affected in 1985-86 in those areas in which Tier II subsistence hunts were established, notably the Tok Management Area, Delta Controlled Use Area, and the western Brooks Range. Overall harvests, however, remained relatively stable. The following are reported harvests, by mountain range:

Range	Harvest
Chugach Mountains	109
Kenai Mountains	21
Alaska Range West	83
Talkeetna/Chulitna/Watana	105
Mentasta/Nutzotin/North Wrangell Mountains	188
Tok Management Area	38
Delta Controlled Use Area	40
Tanana Hills/White Mountains	10
Alaska Range East	102
Brooks Range East (including 26A)	179
Brooks Range West	49*

* Includes 12 subsistence-taken sheep.

Robert A. Hinman
Deputy Director

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 7 and 15

GEOGRAPHICAL DESCRIPTION: Kenai Mountains

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Composition

An increase in sheep population densities occurred on the Kenai Peninsula from 1979 to 1983 (Holdermann 1985). During this reporting period, population size declined as a result of suspected higher winter mortality among all age classes of sheep and poor recruitment of lambs.

Population Composition

Aerial surveys were completed in 3 of 12 count areas, and 197 sheep were classified. The sample included 12 legal rams, 53 sublegal rams, 4 unclassified rams, 105 ewes and yearlings, and 23 lambs. The percentage of legal rams (5.2%) has remained stable, while the percentage of sublegal rams (26.9%) is 2 times the 5-year average. The ratio of lambs:100 ewes and yearlings, which has been steadily increasing since 1979, dropped from 38:100 to 22:100.

Mortality

Twenty-one legal rams were reported taken during the 1985 season compared with the 5-year mean of 22. Harvest reports indicate that 162 hunters spent 632 days hunting sheep, and that their success rate was 13%. Reports also show that 71% (n = 15) of the harvest occurred prior to 1 September. Weather conditions, which are known to affect sheep hunting success, were generally cloudy with rain or snow in the Kenai Mountains during August.

Mean horn length of rams killed by hunters was 32 inches (range, 26 to 40 inches). Mean age of these rams was 6.7 years, with a range of 4 to 12 years. Four rams in the sample were 8 or more years of age. "Broomed" horns were reported in 3 rams that ranged from 6 to 12 years of age.

Management Summary and Recommendations

Analysis of composition data suggests that sheep populations in the Kenai Mountains reached a peak in abundance about 1968, declined sharply from 1969 to 1977 (primarily as the result of severe winters), then began increasing between 1979 and 1984. Survey data from the central and southern portions of the Kenai Mountains show that the 1985 lamb cohort was considerably smaller than that of the previous 5 years. The reduction in lamb recruitment probably resulted from mortality associated with deep late-winter snows and unusually cold spring temperatures.

Minimal composition and population data were collected this year; therefore, I recommend thorough surveys be conducted next year to document the current status of the population. Additionally, further consideration should be given to development of population trend areas within the traditional survey system, so relative changes in sheep density can be accurately assessed. This plan would involve a thorough review of historical count information and selection of contiguous, representative areas in each region of the sheep range. These representative areas would be given the highest survey priority.

Literature Cited

Holdermann, D. 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.

PREPARED BY:

Dave A. Holdermann
Game Biologist II

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 9, 16, 17, and 19

GEOGRAPHICAL DESCRIPTION: Alaska Range west of Denali National Park

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

The sheep population in the Alaska Range west of Denali National Park is estimated at 4,000 sheep. Overall, this population appears relatively stable.

Mortality

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

Only 137 sheep hunters reported hunting in the western Alaska Range during the 1985 season, a 25% decline from the number of hunters in 1984 and the lowest number of hunters in this area since 1972. Similarly, the harvest of 83 rams was 25% lower than during 1984. Hunter success was nearly identical both years, 60% in 1984 and 61% in 1985. Causes of the marked drop in hunting pressure are uncertain, but weekend weather during most of the season was stormy which limited access into the mountains. Most hunters used aircraft from Southcentral Alaska for transportation to hunting areas. Poor flying conditions, especially during weekends, may have prevented many Southcentral hunters from reaching principal hunting areas.

In the 2 most popular hunting areas, Windy Fork and Sheep Creek, hunting pressure reported during 1985 was about half of that reported in recent years. Hunting pressure was lower than normal in all areas except the Post and Styx River drainages where hunter use increased. Increased hunting pressure in the Post River drainage resulted from increased effort by guides. In the Styx River drainage the increase was due to more use by hunters from Southcentral Alaska.

Although hunter use and ram harvest were lower in 1985 than 1984, the percentage of success and residence of hunters were

similar to those of past years. Sixty-one percent of the hunters were residents and 39% were nonresidents. Residents took 46% of the sheep compared with 53% taken by nonresidents. Similar to figures for previous years, the success rate of nonresidents (85%) was considerably higher than for residents (45%). Among sheep taken during 1985, data on average horn size (34.7 inches) and age (8.4 years) varied little from data reported for 1984 in the western Alaska Range.

Management Summary and Recommendations

Sheep populations in the western Alaska Range are relatively stable but densities are low. During 1983 and 1984, hunting pressure appeared to be returning to levels recorded prior to settlement of the d-2 issue. In 1985, however, hunter numbers declined markedly. Despite changes in hunting pressure, the rate of success among hunters has changed little.

PREPARED BY:

Robert E. Pegau
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 11, 13, and 14

GEOGRAPHICAL DESCRIPTION: Chugach Mountains

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

The Chugach Mountains contain portions of 4 game management units (11 and 13) or subunits (14A and 14C) extending 350 miles from Anchorage north and east to the Yukon border. Approximately 40% of all sheep within the range are presently located within Subunit 14C, where extensive surveys were conducted in 1985.

Sheep surveys conducted within Subunit 14C indicate the population has declined 7% since the winter of 1984-85, probably as a result of heavy spring snow and late emergence of vegetation. Despite the decline, the population remains approximately 90% above numbers found in the late 1970's. A similar decline may have occurred within Subunit 14A because that area also experienced heavy spring snowfall; however, no surveys have been conducted to verify this assumption. The status of the sheep populations within Units 11 and 13 is unknown.

Population Composition

The population composition of sheep observed within Subunit 14C is 8.1% legal rams, 17.5% young rams, and 17.2% lambs. These data are similar to those of past years and indicate a young, growing population which should experience a substantial increase in the percentage of legal rams over the next 2-3 years. Composition data for the remainder of the Chugach Mountains were not collected in 1985.

Mortality

Four hundred and eight hunters killed 109 legal rams during the 1985 season, which is 7 more than the average kill from 1980 to 1984. Of those sheep taken in 1985, 3 were killed in Unit 11, 49 in Unit 13, 31 in Subunit 14A, and 26 in Subunit 14C. The

sheep from 14C were taken under a special permit hunt. Mean horn size was 34.6 inches, which is 0.1 inch less than the 1980-84 mean.

Management Summary and Recommendations

The sheep population within Subunit 14C remains at a high level, despite a 7% reduction from the winter of 1984-85. Because of minimal snowfall and mild temperatures during the winter (1985-86) it is likely that both the 14A and 14C populations will show substantial increases this year. More frequent surveys within the Unit 13 portion of the Chugach Mountains are necessary to better monitor the status of this heavily hunted population. Yearly trend counts in the Nelchina to Klutina Glacier area would accomplish this goal.

PREPARED BY:

David B. Harkness
Game Biologist III

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 12

GEOGRAPHICAL DESCRIPTION: Mentasta, Nutzotin, and northern Wrangell Mountains

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

Sheep numbers are believed to have increased after a notable decline during winter 1981-82. The population is now believed to be stable and contains approximately 12,000 sheep.

Mortality

Most sheep mortality is attributable to natural factors. Golden eagles, wolves, coyotes, wolverines, and grizzly bears have all been observed hunting sheep in the area. The number of sheep taken by these predators is unknown. Predation, however, is not believed to be causing any population problems.

Three hundred seventy-seven hunters reported hunting sheep in the area during fall 1985 compared with 354 in 1984 and 440 in 1983. Hunters took 188 rams in 1985, which represents a 50% success rate. After inception of the full-curl horn requirement during fall 1984, harvest initially declined from 208 in 1983 to 134 in 1984. Bad weather during the 1984 season probably contributed to the reduced harvest. The 1985 harvest of 188 rams by 377 hunters suggests harvest levels and hunting success have returned to normal levels.

Aircraft access was used by 112 (60%) of the successful hunters. Horses, the next most popular mode of access, were used by 19% of the successful hunters. Most successful hunters using horses were nonresidents on guided hunts.

Resident hunters took 114 rams, nonresidents harvested 71, and 3 hunters did not specify residency. Only 4 residents of Unit 12 reported taking sheep in this area during 1985. This may reflect local preference for the Tok Management Area (rather than Unit 12) for hunting.

Mean horn length in 1985 was 33.6 inches, essentially the same as in 1983 and 1984. Apparently the full-curl regulation has had no effect on the harvest in regard to mean horn size and age of sheep harvested in Unit 12. Of the 188 rams reported taken, 54 (29%) were broomed, a characteristic of older rams.

Management Summary and Recommendations

Implementation of the full-curl horn requirement in 1984 did not cause increases in mean horn length or mean age of rams harvested. These characteristics have remained constant since 1983 when 7/8-curl rams could be taken. Likewise, hunter success and overall harvest levels in 1985 were approximately the same as those in 1983, indicating the regulatory change had little effect on success or size of rams harvested. If hunter pressure increases in the future, the full-curl regulation should preserve the present quality of rams taken without reducing hunting opportunities. The primary management goal of providing the greatest opportunity to participate in hunting sheep is being met; hence, the present management scheme should be continued.

PREPARED BY:

David G. Kelleyhouse
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 12, 13, and 20

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

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

Approximately 2,000 sheep inhabit the Tok Management Area (TMA) and the population is believed to be stable. This sheep population is characterized by low density, but it contains rams capable of growing relatively large horns at a young age.

Population Composition

From observations at the Sheep Creek mineral lick during the last half of June 1985, productivity, recruitment, and survival of the 1984 lamb cohort were estimated. Lamb production was 57 lambs:100 ewes, yearling recruitment was 27 yearlings:100 ewes, and survival of the lamb cohort was 60%. Lamb survival was slightly higher than the previous 10-year average of 55%. Production of lambs during 1985 was 57:100 ewes which was also above the 10-year average of 50 lambs:100 ewes. Recruitment of 27 yearlings:100 ewes in 1985 was equal to the previous 10-year average. These data indicate the population did not change substantially during the reporting period.

Mortality

Natural mortality factors are responsible for most loss of sheep in the area. Golden eagles, wolves, coyotes, wolverines, and grizzly bears are likely to be responsible for most of the predation.

Hunting was formerly restricted by a drawing permit system to meet management goals of providing opportunities to harvest large rams and to provide aesthetically pleasing hunting conditions. However, in 1985, 120 Tier II subsistence hunting permits were issued. The hunting season opening was delayed 10 days to August 20, but the season closed 10 days later than

normal on September 30. Of the 120 permits issued, approximately one-third went to residents of Tok and Delta, one-third to residents of Anchorage and Fairbanks, and the remaining one-third to residents of other Alaskan communities.

Only 100 (83%) of the 120 permittees reported on their hunting activities. Of these, 38 reported taking rams, 46 hunted but were unsuccessful, and 16 did not hunt. At least 1 ram was taken illegally in the Robertson River drainage before the season opened. Hence, a minimum of 39 rams was taken in the TMA during the 1985 season.

Of the 38 legally taken rams, 21 (55%) were taken using aircraft for access, 11 (29%) using highway vehicle access, 3 (8%) with ORV's, 2 (5%) with horses, and 1 (3%) with a 3-wheeler. Of successful local hunters (24), 67% used aircraft for access.

Only 27 rams were harvested in 1984. Seven ewes were also taken in 1984. There was no registration permit hunt for ewe sheep in 1985 and no ewe sheep were known to be taken.

Management Summary and Recommendations

Until 1985, the TMA was managed to provide opportunities for taking large-horned, trophy Dall rams. In 1985, the registration permit hunt for ewes was canceled and the ram hunt designated a Tier II subsistence hunt. In prior years local subsistence opportunity for Dall sheep hunting was met by the late season ewe hunt. Nearby areas where permits are not required for hunting rams also serve to meet local needs.

Based upon personal interviews in the Tok area office, hunters receiving subsistence ram permits in 1985 expressed as much interest in taking large-horned rams as permittees in previous years. Although there was no provision for reporting horn length in 1985, rams inspected at the Tok office were mostly older mature rams, comparable to those taken in previous years.

Recommendations for the 1986 season depend largely upon legislative and Board of Game actions. However, the late-season registration ewe hunt could be resumed to provide for local subsistence sheep hunting after most other fall hunting seasons close. Ewe sheep can be reached inexpensively and taken at that time of year when meat can be preserved without refrigeration.

Ram hunting in the TMA is difficult and expensive because of rough terrain and poor access to early fall ram range in much of the area. Most of the sheep range in the Johnson and Robertson River drainages is accessible only by aircraft. Rams inhabiting the Johnson and Robertson Rivers, and the headwaters

of the Tok River drainages have not been an important subsistence resource for at least the past 12 years. Therefore, sport hunting opportunities under a permit system could be restored in those areas without seriously compromising local opportunity to hunt sheep.

PREPARED BY:

David G. Kelleyhouse
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 13 and 14

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

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Mortality

One hundred and five rams were reported killed by 314 hunters during the season. Of these rams, 47 (44.8%) were killed in Subunit 13A; 18 (17.1%) in Subunit 13E; 20 (19.0%) in Subunit 14A; 16 (15.2%) in Subunit 14B, and 4 (3.8%) in unreported areas. The number of rams killed increased 3.4% in comparison with the 1984 harvest of 101 and was the 3rd highest harvest on record. Hunter success (33.4%) was the 6th highest on record.

Management Summary and Recommendations

The number of sheep hunters who hunted in the Talkeetna Mountains and Chulitna/Watana Hills was the largest since 1971; 1985-86 was the 2nd year of increase following 6 years of decline. All of the increase was attributed to resident hunters.

No changes in seasons or bag limits are recommended.

PREPARED BY:

Jack C. Didrickson
Game Biologist III

Nicholas C. Steen
Game Biologist II

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 13 and 20

GEOGRAPHICAL DESCRIPTION: Delta Controlled Use Area

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

The Dall sheep population in the Delta Controlled Use Area (DCUA) is believed to be relatively stable and comprises approximately 1,500 animals. A population estimate was made in 1980. No additional population size data have been gathered since that time.

Mortality

Most sheep mortality in the DCUA is attributable to natural factors but the extent of predation is unknown. Annual harvests have ranged between 30 and 41 rams since 1978 when the permit system was instituted. During 1984 the harvest dropped somewhat because the full-curl regulation was enacted, but in 1985 the take increased to 40 rams. In 1985, 150 applications were received for the 150 available permits. The number of applications was very low in 1985 because of regulatory changes which limited applicants to qualified subsistence users. Of 150 permittees, 93 reported hunting and 40 harvested sheep, for a 42% success rate.

Subsistence user requirements favored local hunters during the 1985 season, and as a result the success rate among these hunters increased. Of the 40 hunters who reported taking a sheep, 38% resided in Game Management Unit 20D; this is nearly triple the previous local success rate. Confusion about application dates and eligibility criteria probably discouraged many casual sheep hunters in Subunit 20D from applying for the hunt.

Other mortality was not quantified. Aerial observation and reports from hunters suggest that most predation on sheep in the DCUA results from wolves in the 100-Mile Creek, upper Jarvis Creek, and upper Johnson River drainages.

Management Summary and Recommendations

Since 1970 the Dall sheep population in the DCUA has been managed to provide opportunities for sheep hunting under aesthetically pleasing conditions. This management objective was not being met in the mid- to late 1970's, but in 1980 a drawing permit hunt was established to achieve this goal. In 1985, implementation of the subsistence law favored local sheep hunters, and increases in hunter participation and harvest resulted. With the full-curl regulation in effect it is unlikely the increased pressure poses a threat to this population. It is uncertain if hunter use will continue to increase. If it does, more information about the DCUA Dall sheep resource will be required.

Priorities for the DCUA during the upcoming year should include obtaining production and recruitment rate data through age and sex composition counts at the Granite Creek, Pegmatite Creek, and Little Gold Creek mineral licks. Surveys should also be done to assess the size of the DCUA sheep population.

PREPARED BY:

David M. Johnson
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 20 and 25

GEOGRAPHICAL DESCRIPTION: Tanana Hills-White Mountains

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

Sheep in the Tanana Hills and White Mountains occur at low densities. Expansion of the numerous, small subpopulations is limited by discontinuous suitable habitat.

Surveys conducted during spring and summer 1982 suggest numbers are declining east of the Steese Highway, but populations west of the Steese appear stable. Comprehensive surveys have not been conducted since 1982; therefore, current trends are unknown.

Population Composition

No composition data were collected during 1985. A study of sheep distribution and habitat use relative to potential mineral developments was started in 1983. Presently, movements of 13 radio-collared sheep are being monitored as a part of a cooperative study by the Bureau of Land Management and the Alaska Department of Fish and Game. Six sheep are being monitored in the Lime Peak-Mount Prindle area, 2 in the Mount Victoria-Mount Schwatka area, and 5 in the drainage of the South Fork of Birch Creek. Results of the study will be analyzed during the next reporting period.

Mortality

Twenty-seven hunters reported killing 10 rams during the 1985 season in the Tanana Hills-White Mountains. During 1984, 42 hunters reported killing 10 rams.

Mean horn length during 1985 was 34.1 inches; the previous 5-year mean was 35.1 inches. Fluctuations in mean horn length are difficult to evaluate because of small sample sizes, and because part of the population is harvested under a 7/8-curl regulation and part under a full-curl regulation.

All reporting hunters were residents. Seventy-five percent of the successful hunters reported using airplanes for access. Only 27% of the unsuccessful hunters used airplanes.

In most of Subunits 20E and 20D, a drawing permit hunt was implemented in 1984; then in 1985, regulations changed to a Tier II subsistence permit hunt. Those changes reduced hunting effort in the eastern Tanana Hills and redistributed the harvest westward toward the White Mountains. During 1981-83, 87% of the harvest came from the Tanana Hills southeast of the Steese Highway. During 1985, however, 6 of the 10 rams taken were from the White Mountains northwest of the Steese.

Management Summary and Recommendations

Disjunct, low-density sheep subpopulations occur in the White Mountains and Tanana Hills. Discontinuous habitat with few travel corridors connecting suitable habitat limits population expansion and growth. Potential development of mineral deposits in the South Fork of Birch Creek, the headwaters of the Salcha and Chena Rivers, and the Mount Prindle-Lime Peak area represents a threat to the low-density sheep populations in the western and central Tanana Hills. Ongoing movement and habitat use studies will provide data to evaluate possible impacts. Habitat security must be an interagency priority in management of these populations.

The most recent survey data (1982) suggest sheep numbers are declining in the central and eastern portion of the Tanana Hills. Therefore, during 1986, survey efforts should focus on the Tanana Hills southeast of the Steese Highway.

Beginning in 1984, hunting opportunities were reduced in the eastern Tanana Hills through implementation of a drawing permit hunt, and in the White Mountains by raising the minimum legal horn size from 7/8 to full curl. Those changes could result in increased hunting effort in Subunit 25C, where a 7/8-curl regulation is in effect and no permit is required. To avoid concentrating hunting effort in that portion of the White Mountains-Tanana Hills sheep range, and to reduce confusion among hunters in the interpretation of minimum legal horn sizes, I recommend the minimum legal horn size in Subunit 25C be raised to full curl.

PREPARED BY:

Mark E. McNay
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

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 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

Sheep in the central Alaska Range occur at moderate to high densities in discrete subpopulations. Numbers declined during the early 1970's, were stable during the late 1970's, and have increased since 1980. Based on past aerial surveys and current extrapolations from observations of marked and unmarked sheep in the Dry Creek trend area, a minimum of 5,000 sheep are thought to inhabit the Alaska Range east of Denali Park, excluding the Delta and Tok Management Areas.

Population Composition

From observations at Dry Creek during the latter part of June 1985, lamb production was estimated at 40 lambs:100 ewes and yearling recruitment at 28 yearlings:100 ewes. During 1984, production and recruitment at Dry Creek were estimated to be 51 lambs:100 ewes and 28 yearlings:100 ewes, respectively. The causes of lowered production in 1985 are unexplained, but the exceptionally late green-up could have lowered ewe condition and, consequently, reduced neonate survival.

During July 1985, 929 sheep were classified from a helicopter in the Dry Creek trend area (Table 1). Lambs composed 16.6% of the sample, legal rams (full curl) 2.7%, 7/8-curl rams 6.2%, and other identifiable rams 14.7%.

Mortality

Most sheep mortality is attributable to natural factors. Mortality of ewes is usually estimated from marked ewe survival in the trend area. Weather interrupted gathering these data in 1985.

Hunters reported taking 102 rams during 1985. The 1984 harvest was 105, and the previous 5-year average was 108. Extrapolating the 1985 helicopter survey data to the estimated total population suggests hunters took approximately 75% of the legal rams during 1985. As in previous years, the greatest harvest occurred in the Wood River drainage (37%); the greatest hunting pressure was in the Nenana and Yanert River drainages (Table 2). Hunter success during 1985 was 35%, lower than that for 1984 (41%), and lower than the previous 5-year mean (45%). Weather was unfavorable during sheep hunting season, and recent establishment of the full-curl regulation was expected to reduce success and harvest in 1985.

Despite the change from a 7/8-curl regulation to a full-curl regulation beginning in 1984, neither a decrease in harvest nor a detectable increase in reported mean horn length has occurred. The mean horn length of 33.6 inches during 1985 was the smallest reported since 1978, but was not significantly smaller than the 1984 mean of 34.0 ($P > 0.10$). Reported horn lengths ranged from 27 to 41 inches during 1985.

As in the past, the highest success rate was experienced by hunters using horses for access (52%), but more sheep were taken by hunters using aircraft (54%). Transportation by horse is characteristic of guided hunters in the central Alaska Range, and guided hunters typically have a higher success rate than unguided hunters.

Comparison of yearling:100 ewe ratios with previous-year lamb:100 ewe ratios suggests 1st year mortality from 1980 to 1984 ranged from 38% to 71% ($\bar{x}$ = 53%). Survival from 1984 to 1985 was typical of this trend at 55%. Between late June and late July 1985, lamb mortality was approximately 9%. Because lamb:ewe ratios were derived from observations beginning in mid-June, 2 weeks after the peak of parturition, neonate mortality rates are unknown. As mentioned previously, the unusually late spring in 1985 may have affected lamb survival.

Management Summary and Recommendations

Sheep numbers in the central Alaska Range are stable or increasing. Lamb production during 1985 was adequate, but below the previous 5-year average. Mortality of lambs during their 1st year is high. However, with continued good initial production and with harvests restricted to full-curl rams, sheep numbers in the central Alaska Range should remain stable or increase slowly.

The central Alaska Range remains a popular hunting area despite the relatively low trophy potential. Under the current harvest strategy and hunting pressure, the objective of providing maximum hunting opportunity is being met. The ram classification

data indicate the number of legal rams available to hunters will increase during the next few years, hence no changes in seasons or bag limits are recommended.

Future land management practices could affect sheep numbers more than hunting does. Habitat protection should be a priority in management of central Alaska Range sheep.

PREPARED BY:

Mark E. McNay
Game Biologist III

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator

DALL SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT: 23

GEOGRAPHICAL DESCRIPTION: Western Brooks Range

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

Population Status and Trend

Survey data collected during July 1985 (Table 1) and June 1983 (Singer et al. 1983) provide a basis for estimating the number of sheep in the Baird Mountains in Unit 23. The number of sheep counted in 1985 was 594. The survey intensity was about 1 min/mi^2 within the 828 mi^2 survey area. In the Alaska Range, sheep survey intensities of 2-3 min/mi^2 have resulted in sightabilities of 65-85% (W. Heimer, pers. commun.). I arbitrarily chose a sightability correction factor of 85% for the Baird Mountains to minimize the possibility of overestimating the actual number of sheep. The estimated number of sheep in the 828 mi^2 survey area, based on the 85% correction factor, was 699.

An additional 730 mi^2 of peripheral habitat was surveyed in 1983 but not in 1985. Within this peripheral area, 90 sheep were counted in addition to the 683 sheep counted in the 828 mi^2 core area. Hence, 88% of the total sheep observed were in the core area in 1983. I assumed that the relative distribution was the same in 1985 as in 1983 and that an 88% correction factor was appropriate for the 1985 survey. Under these assumptions, the final extrapolated estimate was 794 sheep in the 1,558 mi^2 area of the Baird Mountains during July 1985.

The 1983 and 1985 data were also used to evaluate the trend of the Baird Mountains sheep population during the 2 intervening years. As was previously stated, in 1985 approximately 828 mi^2 were surveyed and 594 sheep were counted. In 1983, 683 sheep were counted in the same area at about the same survey intensity of 1 min/mi^2. However, 2 factors tended to complicate a comparison of the data. First, only fixed-wing aircraft were used in 1985, whereas both a helicopter and a fixed-wing aircraft were used for the 1983 survey. Second,

the 1985 survey was conducted in July and the 1983 survey was in June, which introduced the possibility of seasonal differences in movements and distribution. Although the decrease of 89 sheep from 1983 to 1985 suggests a decline of 13%, the uncertainties discussed above make this conclusion problematical.

Comparable data and estimates for the DeLong Mountain sheep population (Unit 23 and 26A) are not available for 1985. The last extensive surveys in that area were conducted in 1983 (east of Wulik River) and 1982 (Wulik Peaks), resulting in a combined, nonoverlapping total of 946 sheep. If an 85% correction is applied, the 1983 subjective estimate was 1,113 sheep.

As was discussed by Singer et al. (1983), the western Brooks Range sheep populations (i.e., Baird and DeLong Mountains) apparently underwent robust growth from 1977 to 1983. Although not conclusive, the 1985 data suggest that the growth of the sheep population has been greatly reduced or possibly even reversed.

Population Composition

Aerial surveys to determine sex and age composition were conducted in the Baird Mountains during July 1985 and March 1986 (Table 1). Table 1 also includes data from a 1983 survey which was the most comprehensive sheep survey ever conducted in the western Brooks Range. A ground survey was conducted in the Baird Mountains at Kilyaktalik Peaks during July 1985 to determine lamb:ewe and yearling:ewe ratios (Table 2). Less extensive aerial surveys were conducted in the DeLong Mountains during July 1985 and March 1986 (Table 3).

The Baird Mountains survey data do not demonstrate any unacceptably skewed age or sex ratios. Perhaps the most questionable figures are for the proportion of legal (<7/8 curl) rams. In 1983, 10% of the sheep older than lambs were legal rams. The lower 1985 figure of 4% could be interpreted as an outcome of substantially increased levels of hunting. However, the 4% figure may be an underestimate of the actual number of legal rams because a large proportion of rams (55 of 106) were not identified as legal or sublegal. The March 1986 data support this contention. In March, 7% of the sheep older than lambs were legal rams, even though 23 of the 78 rams seen were not identified as legal or sublegal. Additionally, hunters reported killing 28 legal rams in the Baird Mountains area after the July 1985 survey but before the March 1986 survey. Therefore, it seems reasonable to conclude that the July 1985 figure of 4% underestimated the actual number of legal rams.

Productivity and recruitment in the Baird Mountains were at acceptable levels. The lamb percentages were 16%, 17%, and 21% in June 1985, July 1985, and March 1986, respectively (Table 1). The lamb:100 ewe and yearling:100 ewe ratios were 54 and 30, respectively (Table 2), suggesting adequate recruitment.

The DeLong Mountain July 1985 survey was restricted to about 50 mi^2, and 107 sheep were counted (Table 3). The parameters of this small sample, such as 10% legal rams of all sheep older than lambs, and 25% lambs of total sheep, are indicative of a robust population. Since the sample is from a small area, however, the data should not be used to make inferences about the entire DeLong Mountains sheep population.

The purpose of the March 1986 survey in the DeLong Mountains was to determine if the Red Dog and Lik mine sites encompass important winter range for sheep. The data suggest no significant number of sheep occupy this area (Table 3). The sheep that were seen occurred in predictable areas; i.e., wind-blown slopes and ridges, usually of moderate to low elevations. Notably, the Lik mine site, where no sheep were seen, contained the highest and most snow-covered terrain. According to the results of the July 1985 survey, this same area supported about 2 sheep/mi^2 during summer.

Mortality

The reported harvest for the 1985 Unit 23 general hunt was 37 sheep (Table 4). The known harvest for the 1984-85 subsistence hunt was 4 sheep (2 rams, 2 ewes). The reported harvest for the 1985-86 subsistence hunt is currently 12 sheep (7 rams, 5 ewes) plus an additional 8 sheep (3 rams, 2 ewes, 3 unknown) unreported but confirmed. The subsistence season ends on 30 April, so the final harvest total will be reported in the 1986-87 S&I report.

Some characteristics of the general hunt harvest are as follows: Ten (18%) of 55 hunters were nonresidents. Nine (90%) of the 10 nonresidents were successful. Twenty-seven (61%) of 44 resident hunters each killed a ram. One successful hunter did not specify residency.

Twenty-eight legal rams were reported killed in the Baird Mountains portion of Unit 23. The remainder (9 rams) came from the Unit 23 portion of the DeLong Mountains. The harvest of 37 rams appears to be well within the sustained yield capability of the western Brooks Range sheep population, if evenly distributed. However, an annual harvest of 28 rams (30 if the 2 rams killed during the 1984-85 subsistence season are

included) from the Baird Mountains sub-population could result in the annual removal of all or most of the legal rams each year.

A conservative harvest regime is one in which the long-term effect of human hunting does not result in a continued skewing of sex and age composition of sheep. Hoefs (1984) suggests that maximum annual levels of harvest of legal rams should not exceed 2.5% of the population. Heimer (1982) likewise maintains that harvest levels of 3% for mature ewes should not be exceeded. Hoefs (1984) suggested a harvest guideline of 5% of the total population for either-sex hunts. We believe these guidelines are appropriate for Unit 23 subsistence and sport hunting seasons for sheep. Annual harvests, particularly from the Baird Mountains, need to be critically evaluated in the future to ensure these guidelines are not exceeded.

Management Summary and Recommendations

The age and sex composition of the Baird and DeLong Mountain sheep populations appeared to be within acceptable limits. The actual number of sheep counted during surveys and subsequent estimates of the actual number of sheep indicated little if any change from comparable figures obtained in 1983. Both the general and subsistence hunt harvest increased substantially and may indicate a trend of increasing hunting pressure. Hunting pressure should be monitored closely.

Sufficient knowledge has been gained, especially during the past 4 years in cooperation with the National Park Service, to establish trend count areas in the Baird and DeLong Mountains. Future annual surveys conducted in the trend count areas will greatly facilitate comparison and interpretation of data and increase the probability of being able to identify sheep population trends. If funding is available, the trend count surveys will begin in 1986.

Lamb:ewe and yearling:ewe ratios are important parameters to monitor, but cannot be reliably determined from the air. Hence, ground surveys should continue to be a high priority in addition to aerial surveys.

Literature Cited

Heimer, W. E. 1982. Interior sheep studies. Alaska Dep. Fish and Game, Fed. Aid in Wildl. Rest. Prog. Rep. Vol. VII. Proj. W-21-2. Job. 6.9R. Juneau. 21pp.

Hoefs, M. 1984. Population dynamics and horn growth characteristics of Dall sheep (Ovis dalli) and their relevance to management. In Olson, R., R. Hastings, and F. Geddes, eds. Northern Ecology and Resource Management. University of Alberta Press. 438pp.

Singer, F. J., D. Johnson, and R. Quimby. 1983. Dall sheep numbers and distribution in the Noatak National Preserve, 1983. Natl. Park Serv. Alaska Reg. Nat. Res. Survey and Inventory Rep. AR-83/0.

PREPARED BY:

David D. James
Game Biologist III

SUBMITTED BY:

Steven Machida
Survey-Inventory Coordinator

Table 1. Dall sheep sex and age composition data from aerial surveys of the Baird Mountains; June 1983, July 1985, and March 1986.

	Composition data		
	June 1983[a]	July 1985	March 1986
Legal rams[b]	63	18	24
Sublegal rams	111	33	31
Unclassified rams	2	55	23
Total rams	176	106	78
Ewes[c]	475	287	277
Unclassified adults	0	79	0
Lambs	125	99	97
Unidentified	0	23	0
Total sheep	776	594	452

	Age/sex ratios		
	June 1983[a]	July 1985	March 1986
Legal rams:100 ewes	13	6	9
Sublegal rams:100 ewes	23	11	11
Total rams:100 ewes	37	37	28
Lambs:100 ewes	26	34	35
Lamb % of total	16	17	21
Legal ram % of all sheep older than lambs	10	4	7
Legal ram % of all sheep	8	3	5
Legal ram % of all rams	36	17	31
Ram % of total sheep	23	18	17
Total sheep	776	594	452

[a] Area surveyed was larger in 1983 than in 1985 or 1986, see text.

[b] Rams 7/8 curl.

[c] Ewe classification also includes all yearlings and rams 1/4 curl or less.

Table 2. Dall sheep sex and age composition data obtained from ground surveys at Kilyaktalik Peaks, Baird Mountains, July 1985.

Number of sheep					
Lamb	Yearling	2-year female	Adult female	Unclassified female	Total male
41	23	6	76	2	59

Number of rams						
2-yr male	1/4 curl	1/2 curl	3/4 curl	7/8 curl	4/4 curl	Unclassified male
10	20	16	11	2	0	0

Table 3. Dall sheep sex and age composition data obtained from aerial surveys in the DeLong Mountains, July 1985 and March 1986.

	Composition Data	
	Wulik Peaks/ Lik Mine (July 1985)	Wulik Peaks/Lik & Red Dog Mines[a] (March 1985)
Legal rams	8	0
Sublegal rams	3	2
Unclassified rams	5	0
Total rams	16	2
Ewes	64	6
Unclassified adults	0	0
Lambs	27	0
Unidentified	0	0
Total	107	8

[a] Lik and Red Dog mine surveys were conducted to determine the presence or absence of sheep on winter range. Two rams and 2 ewes were seen 9 miles from Lik camp. Two pairs of ewes were seen 2 miles from Red Dog camp.

Table 4. Summary of Dall sheep harvest statistics for GMU 23, 1962-85; R = rams, E = ewes, L = lambs, and U = unknown.

	General hunt			Winter hunt												
	Baird Mts	Delong Mts		Baird Mts				DeLong Mts				Unknown				
Year	Rams only		Unknown	R	E	L	U	R	E	L	U	R	E	L	U	Total harvest (minimum)
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

Table 4. Continued.

Year	General hunt			Winter hunt												Total harvest (minimum)
	Baird Mts	Delong Mts		Baird Mts				DeLong Mts				Unknown				
	Rams only		Unknown	R	E	L	U	R	E	L	U	R	E	L	U	
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[e]	28	8	1	10	7	0	3	-	-	-	1	-	-	-	-	58

[a] Marine Mammals Protection Act.

[b] Carter's Monument withdrawal (Dec 1978); and 7/8 curl regulation.

[c] Alaska National Interest Lands Conservation Act (ANILCA) (Dec 1980).

[d] Subsistence permit regulation.

[e] Season ongoing; these are preliminary harvest figures.

Table 5. Calculation of a conservative allowable harvest of sheep in the Baird Mountains.

Assumption A	
Actual number of sheep counted in 1985 Baird Mt. survey	594
Number of lambs	-99
	495
Percentage of allowable harvest of rams	x .03
Rams, allowable harvest	15
Actual number of ewes counted in 1985 Baird Mt. survey	287
Percentage of allowable harvest of ewes	x .02
Ewes, allowable harvest	6
Assumption B	
Estimated number of sheep in Baird Mts	794
Estimated number of lambs	-135
	659
Percentage of allowable harvest of rams	x .03
Rams, allowable harvest	20
Estimated number of ewes in Baird Mts	382
Percentage of allowable harvest of ewes	x .02
Ewes, allowable harvest	8

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS: 24, 25, and 26

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

PERIOD COVERED: 1 July 1985-30 June 1986

Season and Bag Limit

See Hunting Regulations No. 26.

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 26C 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 near the Gates of the Arctic National Park western boundary, 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 trends throughout the eastern Brooks Range are apparently stable.

Mortality

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

During the 1985 fall season on the north side of the Brooks Range, 25 hunters took 19 rams in Subunit 26A, 92 hunters took 47 rams in Subunit 26B, and 126 hunters took 96 rams in Subunit 26C. Overall, both the number of hunters (241) and the harvest (162) were the highest ever recorded for Unit 26. Only a relatively small part of Unit 26 was closed to sport hunting by the creation of national monuments in 1979 and in 1981 by establishment of Gates of the Arctic National Park. The recent increase in sheep hunting pressure in Unit 26 may be attributed in part to displacement of hunters from the larger areas closed to hunting in Unit 24 and elsewhere, and to easier access into Subunit 26B along the Dalton Highway.

On the south side of the Brooks Range, little change in harvest effort or success was evident from last year. In 1985, 46 hunters took 17 rams. Harvest in Game Management Unit 25 was 11 rams less than during the 1984 season, but hunter effort was increased by 15 (48%) hunters. The success rate dropped from 57% to 31%. A lower success rate may be a result of some decrease in guided hunts in this area.

Mean ages and horn lengths for harvested rams in Subunits 26A, 26B, and 26C, respectively, were 8.4 years and 33.8 inches, 8.3 years and 34.6 inches, and 9.1 years and 33.4 inches. Hunter success, as indicated by harvest reports, was high (60-100%), except in the Atigun, Sagavanirktok, and Itkillik valleys where success ranged from 37% to 53%. Success in these drainages, which have recently received increased harvest pressure from hunters using the Dalton Highway, was close to the statewide mean. The average age (8 years) and horn size (33.0 inches) of harvested sheep were only marginally lower than unit-wide means. This condition existed in spite of doubled use of the Atigun valley, which is adjacent to the road (41 hunters in 1985 compared with 20 hunters in 1984), and the highest harvest ever recorded (15 rams).

In Unit 24, horn length averaged 35 inches and mean age of rams harvested was 8.9 years. In Unit 25, horn length averaged 35.3 inches and mean age of rams harvested was 9.3 years. Neither of these statistics indicates heavy harvest from these sheep populations.

Harvest data from the 2 registration permit hunts in Unit 26 are not yet available because the closing date for these hunts extends past the due date for this report.

Management Summary and Recommendations

Sheep populations in the eastern Brooks Range are probably stable. Hunting activity and harvest levels continue to fluctuate locally, but most of the mountain range is still relatively lightly hunted. The taking of only 7/8-curl or larger rams, together with an apparently low harvest, appears to pose little prospect of stressing these sheep populations in the immediate future. If hunting pressure along the highway increases much beyond current levels, the management goal of maintaining aesthetic hunting conditions may need to be reassessed, or actions may need to be taken to limit the number of hunters.

To date, subsistence harvest under the permit registration system has had no demonstrably negative effect on sheep populations. Population monitoring is insufficient to detect small changes in sheep numbers, and harvest data from these hunts are

inadequately reported. Sheep populations subject to these hunts should be monitored to ensure that local overharvest does not occur. Better harvest reporting should also be a priority.

PREPARED BY:

Kenneth R. Whitten
Game Biologist II

SUBMITTED BY:

Jerry D. McGowan
Survey-Inventory Coordinator