ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

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ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES

PART III. BISON, CARIBOU, MOUNTAIN GOATS,

MUSKOXEN AND SHEEP

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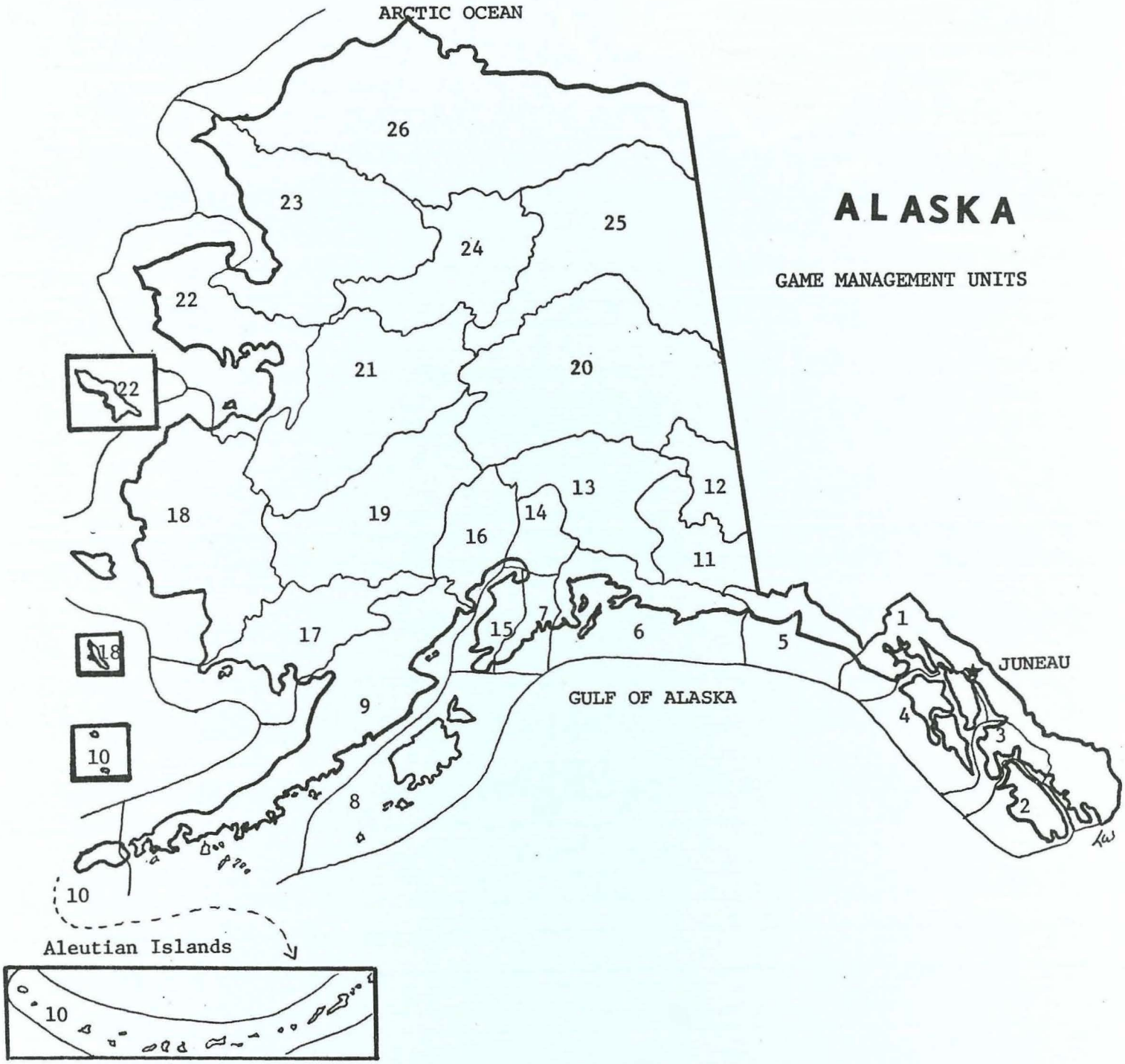
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STATEWIDE HARVESTS AND POPULATION STATUS

Bison

Seventy-four bison were harvested in 1979-80: 25 from the Delta herd, 15 from the Copper River herd, 4 from the Chitina herd, and 30 from the Farewell herd. All four herds appeared to be in healthy and productive condition, with good reproduction and survival.

Caribou

Statewide harvest figures are not available because of inadequate harvest monitoring methods or compliance in some areas. Numerically, largest harvests came from the Western Arctic (estimated 3,000 caribou), Alaska Peninsula (estimated 1,200) and Nelchina (630 caribou) Herds.

Outlook for caribou populations in the state is generally optimistic, particularly for the major herds. The Western Arctic (106,000) and Alaska Peninsula (about 25,000) Herds continue to increase, as do the smaller Delta (4,000) and Forty-mile (8-10,000) Herds. The Nelchina Herd, recently increasing, may have suffered a minor reversal. The Mulchatna Herd may be declining; present population is estimated at 7,500 caribou. Other small herds are either stable or declining. The status of the Porcupine herd is not reported here, but will be covered in a separate report.

Mountain Goat

Mountain goat populations are generally stable in Southeast Alaska Units, Unit 6, and Kodiak Island. Only on the Kenai Peninsula, Units 7 and 15, does there appear to be a downward trend.

Hunter harvests were generally at similar levels, or higher than recent years. Statewide harvest was 408 goats, with the major units being Unit 6 (133 goats), Units 7 and 15 (69 goats), and Unit 4 (59 goats).

Muskoxen

Reports are included for populations on Nunivak Island, Nelson Island, Seward Peninsula, and the Cape Thompson area.

The population on Nunivak was stable at about 600 muskoxen; Nelson Island contained about 167 muskoxen and trend was upward. At least 104 muskoxen were present on the Seward Peninsula in two primary herds. The Cape Thompson herd numbers 50-55 muskoxen. It appeared that all transplanted herds were established and increasing.

Hunting was allowed only on Nunivak, where 23 animals (12 males, 11 females) were taken.

Dall Sheep

Budget curtailments during 1979-80 resulted in few sheep surveys bing conducted, but most populations were thought to be stable.

Federal land withdrawals had a profound effect on hunter distribution and pressure. However, the anticipated increase in hunting pressure on lands not withdrawn did not occur. Overall, the number of hunters and harvest of sheep dropped. This decline was most noticeable in the Brooks Range and Wrangell Mountains, both areas of large Federal withdrawals. Statewide harvest was 933 sheep, with the areas of largest harvests being the Brooks Range (243 sheep), the Wrangell-Mentasta-Nutzotin Mountains (193 sheep) and the Chugach Mountains (120 sheep).

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GAME MANAGEMENT UNIT 11

CHITINA RIVER HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Sept. 1-Oct. 1	One bison every five regulatory years by permit only.

Population Status and Trend

The proposed management guidelines for the Chitina herd are to stabilize the herd at approximately 30 bison and maintain a few trophy class bulls. Population data indicate that we may be approaching the objectives outlined in the proposed guidelines.

Mortality

Five hunters participated in the 1979 Chitina bison hunt and four mature bulls were killed. One of these bulls had preliminary measurements large enough to qualify for entry into Records of Alaska Big Game. Harvest data for the Chitina River herd from 1976 through 1978 have been presented previously (Tobey 1980).

Eight permittees and eight alternates were selected by computer lottery for the Chitna River bison hunt. The permittees were instructed to pick up their permits at the Glennallen Fish and Game office. Because of the questionable legality of sport hunting in the Wrangell-St. Elias National Monument, few permittees chose to pick up their permits so permits were offered to the eight alternates.

Population Composition

Forty bison were seen in the 1979 aerial survey. Composition data from this count were: 22 cows and small bulls, 8 large bulls, 4 yearlings, and 6 calves.

Management Summary and Recommendations

The 1979 harvest of four large bulls reduces the known over-wintering population to 36 animals and also leaves a

minimum of four large bulls. Management objectives may need to be modified in the future if State management of bison is maintained in this Monument.

Literature Cited

Tobey R.W. 1980. Annual Report of Survey-Inventory Activities. Alaska Fed. Aid In Wildl. Rest. Proj. W-Y-X, Job. XX and X.

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BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

COPPER RIVER HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Sept. 21-Nov. 10	One bison every five regulatory years by permit only.

Population Status and Trend

Results of aerial surveys on bison indicate a stable Copper River herd. The calf crop of 23 is adequate to maintain the population and allow for future hunting.

Ninety-seven bison were counted in the 1979 aerial survey (74 adults and 23 calves). This is three animals more than observed in the 1978 count. Maximum numbers of bison observed in the Copper River herd in 1950 and from 1961 through 1978 have been published (Tobey 1980).

Mortality

Fifteen bison were killed during the 1979 hunting season. Historical kill data for the Copper River bison herd since 1964 were published by Tobey (1980).

A total of 96 hunters participated in this registration permit hunt. Data on hunter residency and transportation means used are shown in Appendix I.

Management Summary and Recommendations

The total number of hunters participating in the 1979 Copper River bison hunt was down by 20 percent. Local hunters from the Copper River Valley accounted for 47 percent of the hunters and took 33 percent of the bison. The season was closed on 22 October by emergency order after the desired harvest was attained. The harvest of 14 adults and one calf brings the known wintering adult population to 60 which is the proposed management objective for this herd.

Literature Cited

Tobey, R.W. 1980. Annual Report of Survey-Inventory Activities. Alaska Fed. Aid in Wildl. Rest. Proj. W-X-X, Job No. X, X and X

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APPENDIX I. Residence and transportation means used by all hunters during the 1979 Copper River bison hunts.

Residence	Number	Percent
Anchorage vicinity	41	43
Fairbanks vicinity	8	8
Copper River Valley	45	47
Other Locations	2	2

Transport Means*	Number	Percent
Aircraft	34	39
Boat	48	54
Horses	6	7
Unknown	8	

* Some hunters use more than one transportation means. Percentages are based on the total excluding the "unknown" category.

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BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 19

GEOGRAPHICAL DESCRIPTION: South Fork Kuskokwim River

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Oct. 1 - Mar. 31	One bison by registration permit only; See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The most current census data from the Farewell Herd were presented in the 1978-1979 Survey and Inventory Report. These data suggested that prior to the 1979 fall hunt the herd was comprised of approximately 123 bison. Age and sex composition data were not available for the Farewell Herd.

Mortality

The Farewell bison hunt opened October 1, 1979 and continued until October 13 when the quota of the 30 animals was taken. One hundred and eighteen hunters registered and participated in the hunt. The harvest was comprised of 20 adult bulls, 8 adult females, 1 male calf, and 1 female calf.

Among successful hunters, 12 were Fairbanks residents, 16 were from Anchorage, and 2 were from out of state. Of the 118 permits issued, Anchorage hunters accounted for 58, Fairbanks 42, McGrath 14, Aniak 1, Kotzebue 1, and non-resident hunters 2. The moose season in Unit 19C was open until October 10, and as a result bison permittees took 10-20 moose. Several McGrath residents expressed vigorous opposition to this overlap in moose and bison seasons.

Concern arose when over 30 different Super Cubs carrying bison hunters landed at Farewell during a 24-hour period. Although some crowding of hunters occurred, few problems developed during the course of the hunt. Therefore, the registration hunt was successful in that it provided an inexpensive means of achieving the desired reduction of the Farewell bison herd.

Management Summary and Recommendations

In the future a 30-day permit (drawing) hunt (September 1-30) is recommended. In years when permittees fail to take the desired number of bison the season should be extended under a registration system until that harvest is attained.

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BISON

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20A and 20D

GEOGRAPHICAL DESCRIPTION: Delta Junction

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Sept. 17 - Nov. 25	One bison by permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The fall 1979 (pre-hunt) population was approximately 309 bison. The herd remained in good physical condition throughout winter 1979-80. The spring 1980 population, estimated at 290 bison, was slightly higher than the spring 1979 estimate (275 bison). Sport hunting continued to be the primary factor controlling the size of the Delta herd.

Population Composition

Prior to the 1979 season, composition of the 309 bison comprising the Delta herd was as follows: 63 calves:100 cows, 68 bulls:100 cows, and 47 yearlings:100 cows. Composition counts were conducted in late November 1979 following the removal of 14 bulls, 10 cows, and 1 calf by hunters. Two hundred and eighty-four bison were classified accounting for approximately 95 percent of the estimated population. Herd composition during these ground counts was as follows: 101 adult cows, 62 adult bulls (61 bulls:100 cows), 26 yearling bulls, 26 yearling cows (51 yearlings:100 cows), and 69 calves (68 calves:100 cows). Calves comprised 24 percent of the herd.

Mortality

From 3,930 bison permit applicants, 25 hunters were randomly selected for the Delta hunts. During the 1979 season 25 bison (14 bulls, 10 cows, and 1 calf) were harvested (Table 1). There was no known wounding loss during the 1979 hunt.

Table 1. Known mortality within the Delta bison herd July 1979-March 1980.

	Bull		Cow				
	2-3yrs	Adult	2-4yrs	Adult	Calf	Unknown	Total
Hunting mortality	10	4	2	8	1		25
Wounding loss							0
Road kills	3		1	1			5
Other mortality	1			1	3	1	6
Total	14	4	3	10	4	1	36

Unlike past years, hunters were not accompanied by Department biologists. The 25 permittees were divided into 5 groups of 5 hunters each, and each group had a 2-week period in which to take a bison. Permit holders hunted an average 2.6 days before taking a bison.

Known mortality (other than hunting) totaled 11 bison; 3 cows, 4 bulls, 3 calves, and 1 of unknown sex. Five of these were road kills, 2 illegal kills, 1 non-highway accident, 1 drowning, and 2 of unknown cause.

Management Summary and Recommendations

The Delta herd appeared in good physical condition during spring 1980. Herd numbers were slightly higher than during spring 1979. It will be necessary to take 25 bison (15 bulls and 10 cows) during the 1980 season to maintain the stated management goal of 275-300 animals. To accomplish this harvest, a hunt should occur from mid-September through mid-November. The 1980 bison hunt should be directed toward young bulls (2-3 years old) and a random selection of females.

Beginning in June and continuing through August, a total of 950 pounds of salt was used to delay the movements of bison from bars along the Delta River to the Clearwater farming area. In past years bison had usually crossed the Delta River the first week of August and arrived in the farming area during the peak of grain harvest. Since the salting program was initiated, bison have generally remained away from the farming area until the last week of August. This program should continue through 1980.

The presence of farms within the range of the Delta bison herd has created conflicts. Agricultural practices have increased the amount of bison range and if a large amount of acreage were not planted or if fields were fenced the bison would face a food shortage. The Alaska legislature created the Delta Bison Range in spring 1979. Minimal funding in 1979 and 1980 allowed the Department to initiate Bison Range development. If properly funded, the Bison Range will allow the Department to stabilize the amount of available winter range, thereby reducing crop depredations in the future.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 7

KENAI PENINSULA HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Aug. 10 - Oct. 31	One caribou by permit only. 100 permits will be issued. See 5AAC 81.055 and separate permit hunt supplement

Population Status and Trend

Caribou counts conducted during fall, winter and spring suggest this herd maintained the 1974 post-hunting season population of 300 animals. I believe the habitat could support more caribou. However, a conservative approach to range stocking is being taken since the herd does not alternate between summer and winter ranges.

Population Composition

Funds available from the U.S. Forest Service allowed us to conduct a fall sex and age composition survey, routine monitoring of radio-collared caribou and a spring short yearling survey. The two surveys (Table I) suggest the Kenai Mountains Herd contains a normal sex and age composition and an adequate number of short yearlings to maintain the population at its present size. It is not known why the spring short yearling ratio was higher than the calf ratio obtained the previous fall. I suspect the inconsistency is more an artifact of sampling than an indicator of population trend.

Table I.

Date	Calves/ 100 cows	Short yearling/ 100 cows	Bulls/ 100 cows	Sample size
Oct. 19, 1979	24	--	44	173
April 19, 1980	--	34	56	156

Historical survey data have been reported by Spraker (1980).

Mortality

One hundred permit holders harvested 33 caribou during the 1979 fall season. The harvest was comprised of 17 (52%) males and 16 (48%) females. The hunter success rate was 48 percent and 30 percent of the permit holders did not hunt. Seventy percent of the successful hunters used highway vehicles, 21 percent used horses and 9 percent used aircraft to gain access to hunting.

Harvest data for the Kenai Mountains Herd from 1972 through 1978 has been published by Spraker (1980).

Management Summary and Recommendations

The harvest of 33 caribou during the 1979 season represents 11 percent of the estimated population of 300 animals. This harvest level appears to be light considering half the harvest was bulls.

Prior to 1975 natural mortality, as demonstrated by this herd's growth was low. Predation is now occurring due to increased wolf numbers although the extent of such predation has not been determined.

No changes in seasons or bag limits are recommended.

Literature Cited

Spraker, T. H. 1980. Caribou Survey-Inventory Progress Report. In R. A. Hinman (ed.). Annual Report of Survey-Inventory Activities. Alaska Fed. Aid in Wildl. Rest. Proj. W-17-11, Jobs No. 9.0, 3.0, 1.0, 16.0 and 22.0.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 9

ALASKA PENINSULA HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Subunits 9C, 9D and 9E	Aug. 10 - Mar. 31	Four antlered caribou provided that not more than one caribou may be taken from Aug. 10 - Oct. 31.

Population Status and Trend

Recent census data are not available, but routine reconnaissance indicates the Alaska Peninsula herd is continuing to increase in numbers. Calf production and survival appear high; harvest, predation and other losses are moderate. The portion of the herd ranging from the Naknek River to Port Moller is estimated at 15-20,000 caribou. The portion ranging from Port Moller to False Pass is estimated at 6500 to 7000 animals.

In response to increasing numbers, the caribou appear to have modified "traditional" patterns of movement and range use. These shifts have made it impossible to repeat the standard techniques of aerial photo census used in past years. Substantially more reconnaissance flying will be necessary to monitor the status of the herd.

Population Composition

No recent data were available.

Mortality

Relatively warm temperatures and a lack of snow during recent winters on the Alaska Peninsula have minimized natural mortality. Losses to predators occurred regularly, but did not appear excessive.

The major cause of mortality at this time appears to be hunting. During the 1979-80 season, 784 caribou were reported taken by 583 hunters. Because return rates

for caribou harvest reports are low, particularly in rural areas, the actual harvest was estimated to be closer to 1000 to 1250. The harvest was lower than reported the previous year and was probably due to the stormy weather in November through February which reduced hunter access. Approximately 80 percent of the animals harvested were males.

Combined mortality does not equal annual recruitment and the population is continuing to expand. However, recent shifts in range use patterns have increased the difficulty in monitoring mortality. Efforts should be made to obtain better estimates of total kill by hunters and causes and magnitude of natural losses.

Management Summary and Recommendations

Hunter success rates are exceptionally high on the Alaska Peninsula. Harvest reports indicate that 83.9 percent of reporting hunters took caribou, with 14.5 percent taking two or more animals. At present, both local meat hunters and non-resident recreational hunters can obtain all the caribou they need.

Although hunters could take either sex animals, males dominated the harvest. A large portion of these males were mature bulls taken by recreational or trophy hunters in the fall. Although the harvest does not appear to be affecting the herd growth, composition counts should be conducted, particularly in the northern areas, to assess the influence of current harvest patterns on the sex ratio. In the absence of more detailed data, adult sex ratio may serve as an indicator of population trend and/or harvest impact.

Efforts should be made to document new patterns of range use with particular emphasis on calving and post-calving aggregation areas. This information could be gathered using radio telemetry to monitor a sample of adult females and is essential if population estimates are to be made in the future.

Composition counts should be conducted in the fall to monitor adult sex ratio.

No changes in seasons or bag limits are recommended.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 9A, 9B, 16, 17 and 19

MULCHATNA CARIBOU HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Subunits 9A, 9B and Unit 17	Aug. 10 - Sept. 10 Dec. 1 - Feb. 28	Two caribou, provided that no more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Sept. 10
Unit 16	Aug. 10 - Oct. 31	One caribou
Subunits 19A and 19B	Aug. 10 - Mar. 31	Two caribou, provided that no more than one may be taken per day, nor may more than one caribou be taken from Aug. 10 - Oct. 31
Subunit 19C	Aug. 10 - Oct. 31	One caribou
Subunit 19D, that portion of 19D south and east of the Kuskokwim River	Aug. 10 - Sept. 30 Nov. 1 Jan. 31	One caribou
Remainder of 19D	Aug. 10 - Sept. 30	One caribou

Population Status and Trend

The number of caribou estimated from summer photo-censuses has declined steadily since 1974 when 13,079 were counted. Although a photo-census of the Mulchatna herd was not conducted during this reporting period, an estimated 5,000-6,000 caribou were observed on their calving grounds along the upper Mulchatna River between the Bonanza Hills and Turquoise Lake south to the Little Mulchatna River during May 31 and June 1, 1980 (Troyer, NPS, pers. comm.). The most recent census of the herd, conducted July 10, 1978, yielded a population estimate of 7,503.

Although a downward trend in the Mulchatna herd is indicated by the census figures, an apparent increase in the population along the northwestern edge of its range has been

reported (Shepherd, ADF&G, pers. comm.). The Mulchatna herd has apparently been expanding its range to the west for the past 5 years. The number of caribou utilizing the Upper Swift River and Hoholitna drainage has been increasing for the past 10 years. Small groups (100-200) have been reported as far west as the headwaters of the Kiseralik River in Unit 18.

Population Composition

Composition counts were not conducted during this reporting period. Shepherd (pers. comm.) reports good calf production and yearling survival in Unit 19. Calf:cows ratios obtained from composition counts conducted in June 1974, 1978 and 1979 were only fair, ranging from 31:100 in 1979 to 49:100 in 1978 (Appendix I).

Mortality

Harvest data on the Mulchatna herd have been collected since the 1977-78 season by the harvest ticket report system. The reported harvest for the 1979-80 season was 236 caribou (190 males, 43 females and 3 unknown sex, Appendix II). One hundred and one caribou were harvested in Unit 17, 79 in Unit 19, 34 in Unit 9 and 22 in Unit 16. Although the reported harvest was substantially lower than during the previous 2 years, the hunting pressure in the Mulchatna River drainage during the fall season appeared to be greater than ever before (Russell, ADF&G, pers. comm.). Reminder letters were not sent to hunters failing to report in 1979-80 which may account for this apparent discrepancy.

The proportion of caribou reported taken by nonresidents has steadily increased since the 1977-78 season. This may reflect either increased guiding and air taxi efforts in the Mulchatna drainage or increasing failure of local hunters to report their harvest.

Management Summary and Recommendations

Harvest ticket information collected since the 1977-78 season has been inadequate for evaluating the annual harvest of the Mulchatna herd. Sixty-six percent of the harvest reports issued statewide were not returned in 1979-80. In 1978-79 this figure was 63 percent. The majority of hunters from the local area were never issued caribou harvest tickets. Only 16 residents of the local area reported harvesting caribou in 1979-80. No harvest was reported from Lime Village, Nondalton, Kiliganek, New Stuyahok or Ekwok. Conversations with residents of these villages indicate that villagers are currently taking substantial numbers of caribou due to the increasing scarcity of moose.

Herd size, composition, productivity and range information is presently inadequate for management of the Mulchatna herd. The 1978 composition counts showed fewer calves were present in June than in October, indicating a faulty sampling technique or inadequate sample sizes. Censuses conducted between 1974 and 1978 indicate a decline in herd size. Steen (1980) mentioned emigration as a possible explanation for the apparent decline. While Shepherd's observations support this hypothesis, emigration of significant numbers of caribou to new range has not been documented.

A sex and age composition count should be conducted during fall 1980 to provide baseline data for management of the Mulchatna herd. A photo-census should be conducted during the 1981 post-calving aggregation period. A telemetry study should be initiated to determine the location of major groups during the photo-census period, seasonal movement patterns, range use and possible emigration. Calf survival counts should be done in the spring to determine herd recruitment. Harvest tickets should be explained and distributed to local residents and a follow-up survey of unreturned reports should be conducted.

Literature Cited

Steen, N. C. 1980. Caribou Survey-Inventory Progress Report. In R. A. Hinman (ed.) Annual Report of Survey-Inventory Activities. Alaska Fed. Aid In Wildl. Rest. Proj. W-17-11, p. 19-20.

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Appendix I. Composition counts revealing percent calves in cow, calf and yearling groups in the Mulchatna herd, 1974 through 1979.

Date	Cows and yearlings	Calves	Percent calves	Total caribou
6/5-6/79	364	167	31	531
10/27/78	324	209	65	533
6/18/78	554	274	49	828
10/16-17/74	972	339	35	1,311
6/19-20/74	1,795	688	38	2,483

Appendix II. Reported Mulchatna caribou harvest by sex, by residency of hunter and number killed by each hunter.

Year	Total Harvest	Males	Females	Unk.	Resident	Nonres.	Res. Unk.	Killed One	Killed Two	Killed Three	Killed Four
1979-80*	236	190	43	3	93	95	34	208	14	--	--
1978-79*	223	177	43	3	108	84	16	193	15	--	--
1977-78	473	286	168	19	273	112	11	325	66	4	1

* No reminder letters sent to hunters who failed to report.

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 10

ADAK ISLAND HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 - Mar. 31	Two caribou; season may be closed by emergency order.

Harvest and Hunting Pressure

Hunting on Adak Island is almost entirely limited to military and civilian personnel stationed there. The management goal is to maintain the herd at approximately 150 animals.

One hundred and thirty-one caribou were killed on Adak Island during the 1979-80 season. The sex composition of the sport harvest was 64 males, 58 females, and 9 sex unknown.

During December, access to hunting areas was limited by inclement weather. During that month the U.S. Navy tugboat used to transport caribou hunters was not in operation.

Composition and Productivity

On 13 October 1979, Mr. John Martin, USFWS Refuge Manager, conducted an aerial survey on Adak Island. A total of 276 caribou was counted. Although most of the island was surveyed, there may have been additional caribou not observed during the flight.

Management Summary and Conclusions

Seventy-three caribou were harvested prior to the 13 October aerial survey and 58 were taken after. Subtracting 58 caribou would leave an estimated minimum population of 218 caribou after the closure of the hunting season. Since it is difficult to obtain a total caribou count on Adak Island, it is reasonable to assume that the post-season population was approximately 250 animals.

Recommendations

A caribou sex and age composition count should be conducted on Adak Island during the peak of the rut.

An effort should be made to identify caribou calving areas and to determine if twinning is occurring.

To maintain the Adak caribou population at the desired level, approximately 175 animals should be removed during the 1980-81 hunting season. If the caribou are not adequately harvested by hunters, the surplus animals should be killed by USFWS and ADF&G personnel. The meat from collected caribou should be given to welfare agencies.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 10

UNIMAK ISLAND HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 - March 31 Four caribou

Population Status and Trend

The Unimak Island caribou herd was last censused in 1975. At that time the population was estimated at 3500 to 5000. In subsequent years the population declined due to emmigration across False Pass and natural mortality. At present the U.S. Fish and Wildlife Service estimates that there are 1000 to 1500 caribou on Unimak, but current, qualified data are not available on status or trend.

Population Composition

No data were available.

Mortality

Since harvest tickets are not required, data are not gathered on hunter kill of caribou on Unimak. This source of mortality is thought to be negligible due to the extremely high cost of transportation and limited access to the island. Major causes of mortality are probably brown bear and wolf predation, accidents, disease and other natural factors.

Management Summary and Recommendations

The difficulty in reaching Unimak due to inclement weather, and access restrictions imposed by the U.S. Fish and Wildlife Service minimize human harvest. Seasons and bag limits are of little importance in controlling exploitation. Continuation of liberal regulations will allow the few hunters who visit Unimak the greatest flexibility to use this resource.

No changes in season or bag limit are recommended.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

MENTASTA CARIBOU HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 - Sept. 30	One caribou by drawing permit only. 350 permits will be issued. See 5AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The population level of the Mentasta caribou herd appears to be stable. Population estimates for this herd have changed little over the past 10 years. The yearly fluctuations noted in census figures probably reflect count conditions and technique more than significant population changes.

Population Composition

A spring photo-census was conducted on June 30, 1979, and 1,834 caribou were counted. The 1978 census figure was 2,278 caribou (Tobey 1980). A sex and age composition count was conducted on July 2, 1979 along the upper Sanford River. A sample of 735 caribou was included in the composition count. The results were as follows:

Percent cows in sample	Percent bulls in sample	Percent calves in sample	Bulls/ 100 cows	Calves/ 100 cows
49	26	25	54	51

A fall composition count was not conducted in 1979.

Mortality

A total of 99 caribou were harvested by 184 permittees who reported hunting during 1979. This is 50 caribou fewer than the previous year's kill (Tobey 1980). Males comprised 65 percent of the harvest. The success rate was 54 percent and residents took 96 caribou and nonresidents took three.

Aircraft continues to be the most popular means of transportation and was utilized by 106 hunters. Highway and off-road vehicles were a distant second and third with 42 and 18 hunters reporting their use, respectively.

Management Summary and Recommendations

The Mentasta caribou herd appears to be relatively stable in regard to overall numbers. Calf production in 1979 was only slightly higher than in 1977 and 1978. Census figures fluctuate yearly, but an upward or downward trend is not apparent. The yearly variations in harvest probably reflect herd location and hunting effort more than population changes. Historically, harvests were higher when season were later and the caribou had migrated off the slopes of the Wrangells to the vicinity of the Nabesna road.

The Mentasta caribou hunt is very popular among the local residents of the Copper River Basin with 182 (52%) of the successful permittees living in the Valley. This popularity is expected to increase should National Monument status continue in the Wrangell Mountains. Under proposed federal regulations for the Monument, the Mentasta herd could be hunted for subsistence purposes by residents or others demonstrating a previous history of hunting on lands within the Monuments.

Current recommendations are to maintain harvest near the present 5 percent level and to continue the hunt on a permit basis.

Literature Cited

Tobey, Robert W. 1980. Caribou Survey-Inventory Progress Report. In R. A. Hinman (ed.) Annual Report of Survey-Inventory Activities. Alaska Fed. Aid in Wildl. Rest. Proj. W17-11, Jobs No. 9.0, 3.0, 1.0, 16.0 and 22.0.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 12

CHISANA HERD

PERIOD COVERED: July 1, 1979 June 30, 1980

Seasons and Bag Limit

Sept. 1 - Sept. 15	One bull caribou

Population Status and Trend

The Chisana caribou herd probably contains fewer than 1,000 animals, but available data are inadequate to accurately assess the size and trend of the population.

Population Composition

No surveys were conducted during fall 1979, however, an aerial survey of the upper Chisana River, and Solo, Flat, and Beaver Creek drainages was conducted from a Cessna 172 on 19 June 1980. Because this herd is essentially nonmigratory and is often dispersed over a large area, adequate sample sizes are difficult to obtain. Only 137 caribou were observed in eight widely separated bands. Calves were easily distinguished from the older animals, but yearlings and young bulls were indistinguishable from cows, so animals were classified as calves or older than calves. The 16 calves observed comprised 12 percent of the sample.

Mortality

Little is known about the impact of natural mortality on this herd, although grizzly bears and wolves occur throughout its range.

The hunting season during fall 1979 was the first time in recent years that only bulls could be taken in Unit 12. From the Chisana Herd, 26 bulls were taken during 1979 compared to 35 caribou of both sexes taken during 1978. The effect of nonreporting or false reporting resulting from the creation of the Wrangell-St. Elias National Monument is unknown.

Five bull caribou were taken elsewhere in Unit 12 in 1979, two from the Tok drainage (Macomb or Nelchina Herds), and three from the Nabesna Road area (Mentasta Herd).

Management Summary and Recommendations

Despite several attempts to obtain productivity and sex/age composition data from the Chisana Herd, acquisition of biological data from the herd has remained a relatively low priority on a statewide basis. Consequently, the size and status of this herd are unknown. Because of increasing interest in the herd, more money and manpower should be devoted to obtaining information on the Chisana Herd.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 and 14

NELCHINA CARIBOU HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limits

Aug. 20 - Sept. 20	One caribou by drawing permit only. 1300 permits will be issued. See 5AAC 81.055 and separate permit hunt supplement.

Population Trend and Status

The population level of the Nelchina caribou herd has been expanding since 1976. However, census data obtained this year indicate a possible reduction in herd size. Three counts were conducted in an attempt to census the herd while they were in post-calving aggregations. Poor weather and increased caribou movement between count units were factors necessitating repeated counts and may be responsible for the low numbers. The most favorable of three replicate counts was conducted on June 20 when 13,508 caribou were counted. This figure closely approximates the 1977 count of 14,000 and is 3,000 less than the 1978 figure of 16,800 (Eide 1980).

Composition and Productivity

A composition count was conducted by helicopter on July 3, 1979. A sample of 2,479 caribou was obtained. The observed ratio of 65.3 calves per 100 cows indicated good calf production. Results of this count were as follows:

Percent cows in sample	Percent bulls in sample	Percent calves in sample	Bulls/ 100 cows	Calves/ 100 cows
51.4	15.0	33.6	29.2	65.3

Mortality

A total of 630 caribou was reported harvested in 1979, 109 more than the 1978 harvest figure of 539. The hunter success rate was 65 percent, down from the 72 percent

reported in 1978 (Eide 1980). Five thousand six hundred applications were received for the 1300 permits. Caribou harvest data are as follows:

Males Harvested	Females Harvested	Unspecified sex	Hunters reported hunting	Resident harvest	Nonresident harvest
509 (81%)	90 (14%)	31 (5%)	972	585 (93.5%)	41 (6.5%)

Appendix I lists transportation methods used by Nelchina caribou hunters during 1979. The most utilized means of transportation was the off-road vehicle with aircraft and highway vehicles following in popularity.

Management Summary and Conclusions

The 1979 spring census suggests the Nelchina Caribou Herd failed to maintain its population expansion begun in 1976. The decline in total count numbers, however, may be attributed to census error. Spring composition counts indicated a good calf production. Therefore, reproductive failure was probably not responsible for the count decline. Unfortunately, data concerning fall survival rates are not available.

The Nelchina Caribou Herd represents an important and popular hunting resource to many different user groups. High numbers of permit applications, with the majority of the permittees reporting hunting, attests to this. The proximity of the Nelchina Herd to major population centers and its accessibility from the highway system will assure continued interest on the part of urban hunters. Despite pressure for increased hunting opportunity, the harvest should not be allowed to exceed the current 5 percent level at this time. The number of permits available should not be increased until census and composition data indicate resumed herd expansion.

Literature Cited

Eide, Sterling H. 1980. Caribou Survey-Inventory Progress Report. In R. A. Hinman (ed.) Annual Report of Survey-Inventory Activities. Alaska Fed. Aid in Wildl. Rest. Proj. W-17-11, Jobs No. 9.0, 3.0, 1.0, 16.0 and 22.0.

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APPENDIX I

Transportation Means Used by Nelchina Caribou Hunters in 1979

Transportation means	Successful hunters		Unsuccessful hunters		Total hunters	
	number	percent	number	percent	number	percent
Aircraft	230	36.7	38	12.1	268	28.4
Horse	22	3.5	7	2.2	29	3.0
Boat	37	5.9	22	7.0	59	6.2
Motorbike	18	2.9	14	4.4	32	3.4
Off-road vehicle	228	36.4	100	31.8	328	34.8
Highway vehicle	92	14.7	133	42.3	225	23.9

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 and 20C

MCKINLEY HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

That portion of Subunit 20C lying south of the Tanana River and west of the western boundary of Subunit 20A	No open season

Population Status and Trend

All data contained in this report were collected by National Park Service or University of Alaska personnel.

The McKinley Herd is estimated to contain 1,000-1,200 caribou. The population trend is uncertain, but recruitment has been poor since at least 1976 and changes in status of this herd have been difficult to detect.

Population Composition

Post-calving surveys conducted during the period 27 May-8 June 1979 revealed an average of 30 newborn calves per 100 cows (yearlings and older). A survey in late June 1979 revealed 22 calves per 100 cows. Composition surveys during the latter portion of July in which attempts were made to classify yearlings resulted in calf:cow and yearling:cow ratios of 24:100 and 28:100, respectively.

A fall survey conducted on 25 September revealed 33 calves: 100 cows (yearlings and older). Interpreting these data is complicated because the September calf:cow ratio was larger than earlier counts. Any or all of the counts may not have representatively sampled the herd. Errors could have been made in classifying animals as to age and sex classes in some or all of the surveys.

Mortality

Observations of wolves and bears killing or feeding on dead caribou suggest that predation may be an important factor

limiting growth of the McKinley Herd. Information on predation was obtained incidental to locating radio-collared caribou and through casual observation. Between 19 May and 2 June 1980 two calves were known to have been killed by grizzly bears and one calf was killed by wolves. In addition, a coyote was seen feeding on a caribou calf and two adult carcasses were fed upon by a grizzly bear and golden eagles.

Although the small number of functioning radios on adult females precludes any meaningful interpretation, it is interesting to note that only three of seven radio-collared cows produced viable offspring.

Management Summary and Recommendations

The current population estimate of 1,000-1,200 amimals in the McKinley Caribou Herd has remained unchanged since 1976 despite the fact that the herd is unhunted. Predation is likely retarding growth of the herd, and until this mortality factor is reduced the population is expected to remain low and possibly decline.

Federal land withdrawals involving extensions of the northern and southern Park boundaries have virtually eliminated the use of sport hunting to manage this herd. Nonconsumptive uses (viewing and photography) do not necessitate a highly productive population, so maintenance of a small group of caribou may be adequate for existing demands. However, there is some interest in having a larger herd that would allow nonconsumptive users to view large aggregations of caribou. Also, a larger herd could range more widely. If this occurs, some consumptive use may be provided outside Park boundaries.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 15

KENAI PENINSULA LOWLANDS HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

No open season

Population Status and Trend

The Kenai Lowlands herd presently numbers between 65 and 80 caribou and was established by transplant from the Nelchina caribou herd during 1965 and 1966. The range currently utilized by this herd is thought to be underutilized but the limits of their potential range are not known. These caribou have always been protected from hunting in an effort to establish a sizeable herd. Despite this, the herd increased very little during the past 4 years.

Population Composition

The Kenai Lowlands herd has been surveyed on a regular basis for the past 2 years. Results of three surveys are listed in Table I.

Table I.

Date	Calves/100 cows	Bulls/100 cows	Sample size
June 22, 1979	52	47	59
October 22, 1979	37	47	55
June 10, 1980	36	88	56

Data shown in Table I suggests the herd had a moderate calf-cow ratio and a high bull-cow ratio. Such composition ratios would be expected for an unhunted population.

Mortality

The only known cases of mortality are from accidental kills by automobiles, poaching and predation by wolves and local free-ranging dogs.

In May 1980, a tagged female caribou was killed near the town of Kenai by dogs. Tagging records revealed the caribou was 15 years old and was one of the individuals released near Watson Lake in 1966. She was carrying a normal fetus when killed.

Management Summary and Recommendations

The Kenai Lowlands herd, following a successful transplant, has slowly increased to a point where a limited harvest is possible. Surveys indicate the herd contains an adequate sex and age composition to allow for an annual harvest of five caribou.

A September 12 opening date is recommended for two reasons: (1) This herd provides a moderate amount of viewing from the Marathon Oil Road during April through September. A late hunt would minimize conflicts with roadside viewers since the herd would ordinarily be out of the area during hunting season; (2) A caribou season with a late opening would not be affected by transportation restriction which limit use of aircraft from September 1-10 in Subunit 15A.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 19 and 21

BEAVER MOUNTAIN, MULCHATNA, KUSKOKWIM MOUNTAINS AND ALASKA RANGE HERDS

PERIOD COVERED: July 1, 1979 June 30, 1980

Seasons and Bag Limits

Subunit 19A and 19B	Aug. 10	Mar. 31	Two caribou, provided that not more than one may be taken per day, nor may more than one caribou be taken from Aug. 10-Oct. 31.
Subunit 19C	Aug. 10	Oct. 31	One caribou
Subunit 19D, that portionof 19D south and east of the Kuskokwim River	Aug. 10 Nov. 1	Sept. 30 Jan. 30	One caribou
Remainder of 19D and Unit 21	Aug. 10	Sept. 30	One caribou

Population Status and Trend

Numbers in most caribou groups in Units 19 and 21 remain unchanged with the exception of the Beaver Mountains Herd. This herd has apparently declined to less than 1,000 animals, possibly as a result of predation and poor productivity.

Although data are lacking on the current size and trend of the Mulchatna Herd, the herd is apparently ranging farther west. Some caribou from this herd appear to be summering well into the Wood, Tulik, and upper Aniak and Kisaralik River drainages. Wintering groups were observed in portions of 19A during 1980.

Two observations of the Sunshine-Nixon Herd during winter 1979-80 indicated that the herd numbered at least 400, but population trend data are lacking.

Neither population size nor trend data are available for the groups located in the Kuskokwim Mountains and the north slope of the Alaska Range.

Population Composition

An aerial survey of the Beaver Mountains Herd on 29 May 1980 suggested much improved calf production (natality or survival) in this group. A survey in the western calving area revealed 190 cows and 94 calves. Because aerial counts of calves often underestimate calf numbers, over 50 percent of the cows may have had calves. Among 340 caribou classified, 28 percent were calves. This is the highest initial calf production or survival to late May that I have observed for this herd in the past 8 years.

Late fall observations of the Sunshine-Nixon Herd suggested higher calf survival than noted previously. Approximately 20 percent of the caribou observed from the air were calves.

I did not conduct composition counts of the Mulchatna and Alaska Range caribou during 1979-80.

Mortality

The total reported caribou harvest for Unit 19 during the 1979-80 season was 165. In addition, residents of Unit 19 harvested an estimated 75-100 caribou that were unreported.

The reported harvest in the Alaska Range was 61 caribou (53 bulls, 5 cows, and 3 of undetermined sex). During 1978-79, 98 caribou were taken in this area. All caribou taken in Subunits 19A and 19B were considered Mulchatna Herd animals. The reported kill for these Units was 104 caribou (99 bulls and 5 cows). Most of the estimated, unreported harvest (75-100) was taken from the Mulchatna Herd along the Stony River. This is the largest harvest on record for the Mulchatna Herd in Unit 19. While not alarming in relation to the total number of caribou in this herd, it reveals an ever-increasing trend to utilize these caribou during the fall months. The most popular access point to these caribou has been Whitefish Lake at the head of the Hoholitna River. Nearly all hunting in this area is by nonresident, unguided hunters flown in by Anchorage air taxi operators. Some caribou are taken on guided hunts and by unguided, local residents. Although access is good in portions of adjacent Unit 17, a restrictive fall season (10 August-10 September) has encouraged hunters to take advantage of the more liberal Unit 19 season. This causes a concentration of hunting pressure which is unnecessary and undesirable.

In Subunits 19A and 19B the caribou season extended through March, and in adjacent Unit 17 the season was open during December and February. Since very few caribou were taken

during these winter periods, late hunts were apparently of little interest to sport and subsistence hunters.

Management Summary and Recommendations

In relation to the number of caribou in the area, harvests in Units 19 and 21 were low. However, a trend of hunting effort being concentrated in one area utilized by the Mulchatna Herd is creating a problem of high hunter concentration. Uniformity in seasons between adjacent Units 17, 19A, and 19B may reduce this problem. Since little harvest occurred after the fall months, the winter seasons are of questionable value.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 20A and part of 20C

DELTA HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

No open season

Population Status and Trend

Between 1976 and 1979 the Delta Herd was considered stable or declining, but in fact the herd was rapidly increasing, probably as a result of the Department's wolf control program in Subunit 20A. Results of a photo-census conducted during June 1979 indicated that the Delta Herd contained approximately 4,000 animals (Davis and Preston 1980) and is, therefore, larger than previously estimated. The herd apparently grew rapidly from 1976 through 1979, and recruitment during this period was consistently underestimated. This accounts for the discrepancy in population estimates. Another photo-census was conducted during June 1980 to substantiate the results of the 1979 photo-census, but the results are not yet available.

Population Composition

Ground composition surveys conducted on 7 December 1979 revealed ratios of 65 calves:100 cows (27% of the herd) and 39 bulls:100 cows (11% of the herd). Because yearling caribou are difficult to identify during the fall, no attempt was made to classify them, unlike past years when animals believed to be yearlings were routinely classified as such. Comparison of body measurements and weights of adult and yearling caribou from the Delta Herd indicates considerable overlap. This suggests that yearling caribou in the Delta Herd cannot be reliably classified using conventional techniques based on differential morphology.

Some bulls were undoubtedly segregated from the herd by the time composition counts were made, therefore the bull/cow figures may not be representative of the actual herd composition.

Post-calving composition counts conducted on 14 June 1980 indicated 43 calves per 100 cows (27% of herd). Again no attempt was made to classify yearlings.

Mortality

Radio collars were placed on 25 caribou calves in January and March 1979 to assess mortality of this age class. Ten of the 11 originally collared female caribou were alive at the end of June 1980. The other radio-collared female could not be located, but it is not known whether this resulted from radio failure or mortality. The expandable radio collars placed on males worked poorly, with several collars being prematurely shed. Two of the collared males were killed by wolves and nine survived at least to yearling age. The fate of three males (whose collars were shed) is unknown.

Because the season was closed, human-caused mortality on the Delta Herd is low. Nevertheless, two poached caribou were located near Newman Creek in late May. Evidentaly the animals were illegally shot and left for bear bait. One instance of eagle predation on a newborn calf was documented near Molybdenum Ridge during late May.

Management Summary and Recommendations

The long-term management goal of restoring the Delta Herd to its former level of approximately 5,000 animals has almost been achieved. Limited bull hunting was authorized by the Board of Game for the fall 1980 season. If recruitment and subsequent herd growth continue as in recent years, further season liberalizations may be desirable.

Maintaining low predator densities through wolf control programs and liberal grizzly bear hunting seasons should be continued.

Literature Cited

Davis, J., and D. Preston. 1980. Calf mortality in the Delta Caribou Herd. Alaska Dept. Fish and Game, Fed. Aid Wildl. Rest. Prog. Rept. W-17-11, Job 3.26R.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20D

MACOMB HERD

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 - Sept. 30	One bull by permit only. 70 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The area west of the Glenn Highway, east of the Delta River, north of the Alaska Range, and south of the Tanana River was estimated to contain 700 to 800 caribou. The current population trend is unknown, but general observations and data from past years indicate a declining population.

Population Composition

Due to budget constraints, no sex or age composition counts were made during this reporting period.

Mortality

Continuation of a permit hunt allowing the taking of bulls only resulted in a harvest of 20 caribou. There were 218 applications for the 70 permits. Thirty-one (44%) of the permittees did not hunt the Macomb Herd. The 20 successful hunters constituted 29 percent of those issued permits and 51 percent of those who hunted. Nineteen hunters failed to voluntarily check out.

Management Summary and Recommendations

Long-term management recommendations for the Macomb Herd include maintaining a low harvest until production and survival show a marked increase. It appears that the bulls-only permit system is an excellent means to achieve this and yet allow some hunting. Similar to last year, no instances of shooting female caribou by mistake were noted. This suggests that the bulls-only hunt was successful and that this system may be a workable management technique for other caribou herds.

Wolf predation is suspected to be the main cause of the persistently low recruitment in the Macomb Caribou Herd. Wolf control in the area should be continued. Current sex and age composition and size of the herd should be determined.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20E

FORTYMILE HERD

PERIOD COVERED: July 1, 1979 June 30, 1980

Seasons and Bag Limits

Unit 20, except Subunits 20A, 20D, and that portion of 20C lying south of the Tanana River and west of the western boundary of Subunit 20A	Sept. 1 - Sept. 15	One caribou

Population Status and Trend

Observations from a photo-census of the Fortymile Caribou Herd in June 1980 suggested that the herd was considerably larger than indicated by the last census (1975). Although data from the 1980 photos have not been analyzed, observers conducting the census roughly estimated the population at 8,000 to 10,000 caribou. Estimates made during a period of intensive population monitoring (1973-75) ranged from 4,000 to 6,000.

Data indicate that between 1973 and 1980 the Fortymile Caribou Herd nearly doubled in size, but Department biologists are uncertain as to what accounts for this apparent increase. Three possible explanations are discussed: 1) immigration from the Porcupine or Nelchina Herds, 2) gross underestimation of numbers during the 1973-75 period, or 3) a change in recruitment or mortality rates allowing a herd increase.

Although portions of the Porcupine and Nelchina Herds have wintered near the range of the Fortymile Herd since 1975, few if any caribou are thought to have joined the Fortymile Herd. The only time during winter 1979-80 that significant numbers of the Nelchina Herd were close to the Fortymile caribou, surveillance was maintained. No evidence of ingress was detected. Similarly, there is no evidence to suggest ingress from the Porcupine Herd.

Discussions with persons involved in collection and evaluation of the 1973 and 1974 population data for the Fortymile Herd suggest that the estimate of 4,000-6,000 caribou was not grossly low. Hundreds of hours were spent flying throughout the range of the herd during 1973 and 1974 to determine the population size. Also, biologists were in constant contact with the herd from early spring to early winter 1973. These collective efforts produced reliable population estimates of 4,000-6,000 caribou.

The fall yearling recruitment data obtained between 1975 and 1980 from the Fortymile Herd suggest that recruitment was not sufficient to explain the apparent growth. It should be noted, however, that more recent studies have shown that these type surveys greatly underestimate yearling recruitment. Other caribou herds in Alaska have grown, through recruitment within the herd, fast enough to account for an increase from 4,000-6,000 in 1975 to 8,000-10,000 in 1980. The annual rates of increase necessary to account for the extreme range of estimates between 1975 and 1980 are 6 to 18 percent. Caribou can theoretically increase at an annual rate of 30 percent. The Delta Herd recently increased between 12 and 21 percent, and, similarly, the Western Arctic Herd increased 14 percent.

Population Composition

No composition surveys were conducted during fall 1979 because of fiscal constraints. However, a sex and age composition survey (Table 1) was made in conjunction with the photo-census conducted during June 1980.

Table 1. Sex and age composition of Fortymile Caribou Herd observed in post-calving area near Mt. Harper, 11 June 1980.

Bulls* per 100 cows	Yrlgs* per 100 cows	Calves per 100 cows	Yrlg % in herd	Calf % in herd	Cow % in herd	Bull % in herd	Herd sample size
24.6	9.6	40.8	5.5	23.3	57.1	14.1	2,400

* Yearlings and bulls were under-represented in the sample because of the sex/age segregation in post-calving aggregations.

Mortality

The primary source of natural mortality on this herd is believed to be predation by wolves and grizzly bears. Predation attempts by both were observed during

the course of spring surveys; wolf-killed caribou were observed during March wolf surveys as well. The annual natural mortality rate is unknown.

As a result of the short 1-15 September, bulls-only hunting season, only 9 bulls were reported taken. This is approximately 1/1000 of the population. Poaching probably did not exceed 15-20 caribou during the reporting period. Therefore, the impact of human-caused mortality on the Fortymile Herd was of minor significance.

Seasonal Concentrations and Movements

Extensive aerial reconnaissance revealed that few Fortymile caribou calved in the upper Birch Creek area in 1980. Most calved in the southern tributaries of the Seventymile River, from Glacier Mountain on the east to Mt. Sorenson on the west. Failure to locate significant numbers of cows and calves in upper Birch Creek during the previous two springs suggests that the Seventymile River drainage may have been used for calving during 1978 and 1979.

Most of the herd wintered within Alaska west of the Taylor Highway in the southern one-third of Subunit 20E. A few caribou were observed in the Ladue River and Dennison Fork drainages during March. The herd's movements to and from the Seventymile River carried them through a zone of potential asbestos mining activity in the Slate Creek drainage.

Management Summary and Recommendations

Although the 1980 census data are not fully analyzed, the Fortymile Caribou Herd may be roughly twice as large as previously believed. This clearly shows that more intensive monitoring of the herd is necessary.

Predation by grizzly bears and wolves is the most obvious source of natural mortality and is likely responsible for the herd not expanding more rapidly in response to available habitat and severe restriction of human harvest.

The observed shift in calving areas may have occurred as early as 1978. Historically this herd has shifted calving areas more than any other. Movement patterns kept most caribou away from existing roads, but carried them through an area of asbestos mining exploration which will likely be developed in the future. Any road to such development should, if allowed, should be located and regulated so as to alleviate adverse impacts during critical periods.

Carrying capacity of the Fortymile Herd's range is estimated at 50,000 caribou; currently, only 8,000-10,000 caribou are thought to comprise this herd. Wolf numbers should be

reduced in post-calving and wintering areas to allow the herd to increase rapidly and more quickly approach carrying capacity. When the herd has increased substantially, seasons and bag limits may be liberalized to allow for increased human harvests.

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Table 1. Summary of the 1979 - 1980 Western Arctic Caribou Permit Hunt.

	Estimated Population	Permits Issued	FALL Permits Returned	FALL Number Hunted	FALL Number Caribou Taken	SPRING Permits Returned	SPRING Number Hunted	SPRING Number Caribou Taken	TOTAL SPRING & FALL Number Hunted	TOTAL SPRING & FALL Number Hunted Successful	TOTAL SPRING & FALL Total Caribou Taken
GMU 23											
Ambler	186	94	64	54	50	65	32	37	66	61	87
Buckland	180	2	1	0	0	1	0	0	0	0	0
Deering	117	2	1	0	0	1	0	0	0	0	0
Kiana	311	143	118	88	75	119	37	32	96	83	107
Kivalina	245	4	4	3	2	2	1	0	3	2	2
Kobuk	62	22	20	19	12	17	7	11	19	12	23
Kotzebue	2526	374	268	163	98	116	38	42	177	113	140
Noatak	270	55	33	29	29	46	12	13	31	30	42
Point Hope	464	2	2	1	1	0	0	0	1	1	1
Noorvik	515	51	28	18	10	24	9	14	25	19	24
Selawik	536	79	43	20	9	56	30	39	40	32	48
Shungnak	217	36	22	13	13	21	13	19	17	17	32
Subtotal	5629	864	604	408	299	468	179	207	475	370	506
GMU 24											
Alatna	35	0	0	0	0	0	0	0	0	0	0
Allakaket	216	0	0	0	0	0	0	0	0	0	0
Bettles	69	43	35	13	5	43	8	5	19	10	10
Hughes	98	30	10	1	0	0	0	0	1	0	0
Huslia	216	0	0	0	0	0	0	0	0	0	0
Subtotal	634	73	45	14	5	43	8	5	20	10	10
GMU 26											
Anaktuvuk	173	39	25	20	15	23	12	16	23	17	31
Atkasook	112	1	1	1	1	0	0	0	1	1	1
Barrow	2715	351	193	113	78	96	23	21	121	84	99
Nuiqsut	182	1	0	0	0	0	0	0	0	0	0
Point Lay	94	0	0	0	0	0	0	0	0	0	0
Wainwright	429	13	6	6	2	4	2	5	8	4	7
Cape Lisburne	50	4	4	2	1	3	3	0	4	1	1
Subtotal	3755	409	229	142	97	126	40	42	157	107	139
Total GMU 23,24,26	10018	1346	878	564	401	637	227	254	652	487	655
Others in Alaska		522	404	206	113	127	30	39	227	136	152
Out of State		78	65	47	45	11	0	0	47	45	45
Grand Total		1946	1347	817	559	775	257	293	926	668	852

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 22, 23, 24, 26

WESTERN ARCTIC CARIBOU HERD (WAH)

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Unit 22, that portion draining into Norton Sound and the bering sea north of Cape Denbigh, Units 23, 24 and that portion of Unit 25 draining into the Yukon River from and including the drainage of the Tozitna River to and including the drainage of the Hodzana River, 26A and 26B	Aug. 10 - Oct. 15 Feb. 15 - Apr. 15	Three bulls by registration permit, provided that not more than one bull may be taken from Aug. 10-Oct. 15 (season will be closed by Emergency Order if the total harvest exceeds 5,000 bulls).

Population Status and Trend

The most recent detailed survey of the WAH was conducted in July 1978 (Davis et al. 1979) and employed the aerial photo-direct count extrapolation technique in which a population of 106,635 caribou was estimated. According to Davis (Davis and Valkenburg 1980) the WAH has been growing at a rate of 14 percent per year since 1976.

Population Composition and Distribution

Recruitment, based on a March and April survey of 10,382 caribou, was estimated to be 24 percent.

Distribution surveys were periodically flown from September 1979 to April 1980. The first movement of caribou across the Kobuk River occurred about September 5 with the majority of the migrating herd still in the upper Noatak moving south toward the Hunt and Redstone Rivers. On November 17 an estimated 1,000 caribou were migrating south and east across the mouth of the Noatak River and southward down the Baldwin Peninsula.

The WAH split into three nearly equal size groups and wintered in three disjunct areas, 1) along the north slope coast from Point Lay to the Colville River,

inland less than 50 miles, 2) in the central Brooks Range from the Itkillik River to Howards Pass and, 3) in GMU 23.

An estimated 1,000 caribou wintered between Cape Lisburne and the Noatak drainage. The majority of the Unit 23 wintering population, an estimated 20,000 to 40,000 caribou, were located within a crescent-shaped area bounded by the Ambler Lowlands, southward to include the upper Kobuk drainage between Ambler and Kobuk village, the upper Selawik drainage to Purcell Mountain, the Selawik Hills, the Buckland drainage east of the west fork of the Buckland River.

Mortality

The total harvest as recorded by return of permits was 852 bull caribou. Hunters from Unit 23 recorded a harvest of 506, Unit 24 - 10, Unit 26 - 139, other state residents - 152 and nonresident hunters took 45 caribou. Of the 1,946 permits issued 1,347 (69%) were returned after the fall season and 926 (48%) were returned after the spring season. Hunter success for all hunters was 72 percent, Unit 23 - 77 percent, Unit 24 - 50 percent, Unit 26 - 68 percent, other state residents - 59 percent and nonresidents - 95 percent.

The chronology of harvest was as follows: The combined chronology for all hunters revealed the highest period of take was between September 1 and September 30; Unit 23 hunters took the greatest number of caribou between September 6 to September 30 and a high take in the spring between April 1 and April 15. The reported take by Unit 24 hunters was too low to analyze. In Unit 26 hunting activity started in early August and peaked near the end of August with another high in the last week of the spring season (April 7 - 15). Other state residents took most of their caribou between August 15 and September 20. Nonresidents took most of their caribou in September. The three bull caribou bag limit was designed so a hunter could only take one bull in the fall and two in the spring with an option of taking three in the spring if no caribou were taken in the fall. The majority (531 of 668 successful hunters) took one caribou representing 62% of the total harvest, 90 hunters took two caribou (21% of the total harvest) and 46 hunters took 3 caribou (17% of the total harvest).

Special Buckland Area Season

The Board of Game approved a special caribou season in the Buckland area of GMU 23 to alleviate a reported food shortage by Buckland residents.

The Board's regulation stipulated that permits were to be available at Buckland from Department employees. The Board further stipulated that each permit would be valid for the taking of seven caribou of either sex between December 5, 1979 and February 14, 1980. The season was to be closed by Emergency Order when 210 caribou were taken.

Of the 97 caribou taken, 58 (60%) were females. The chronology of harvest was 16 caribou in December, 30 in January and 50 in the last 14 days of the season in February with 35 (36% of the total harvest) on the last 2 days of the season (February 13 and 14).

Mortality - Natural Mortality

See Davis and Valkenburg 1980.

Unsalvaged Caribou

While conducting spring composition counts a record was kept of the number of caribou found in the field and apparently unsalvaged. Within a radius of 15 miles of Ambler 40 hunter-killed caribou were left unsalvaged. The majority of the unsalvaged caribou were females. One winter hunting camp had the remains of 21 caribou of which four were unsalvaged; 20 of the 21 caribou were females.

If the Buckland village meat requirement were similar to other villages located in the area occupied by the WAH, the hypothetical harvest of caribou resulting from an areawide seven caribou bag limit season of either sex might be estimated accordingly: A harvest of 97 caribou seemingly provided sufficient sustenance for a community of 180 individuals (0.54 caribou per person). From the above information it could be calculated that the 10,018 people who reside in the area of the WAH would require a harvest of 5,409 caribou in order to satisfy their caribou meat needs.

I don't believe the 582 caribou reported harvested on permit hunt report forms represents the actual harvest, nor do I believe the harvest figure of 5,409 caribou obtained from hypothetically equating Buckland sustenance requirements to that of all peoples living within the area of the WAH. Considering factors such as available caribou adjoining villages, amount of enforcement, and the amount of hunting activity occurring during peak hunting periods, my best estimate for the total hunter take of caribou from the WAH would be a maximum harvest of 3,000 caribou.

Management Summary and Recommendations

The WAH has been increasing at a rate of 14 percent per year since 1976. The maximum estimated harvest of 3,000 caribou (2.3% of the herd) is well below the sustainable yield of the herd.

This harvest level is a result in part of the restrictive bag limits and regulations but more likely influenced to a greater degree because of subtle changes that have recently occurred in the lifestyles of the residents most dependent on the WAH. Their dependency on wildlife resources is reduced as their economy becomes more diverse (Native Land Claims Settlement Act, North Slope oil development, accelerated construction in rural villages as a result of the Molly Hootch case and new housing programs, job training and social programs). In addition there is more diversity available for their leisure time, i.e., satellite TV in many villages, more reliable and faster means of transportation, open gym facilities in conjunction with the new schools.

The problem of unsalvaged caribou is a continuing one that will probably only be solved through hunter peer pressure. Undoubtedly, it must come from those living in the same community for any effective enforcement.

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Davis, J., P. Valkenburg. 1980. Qualitative and Quantative Aspects of Natural Mortality of the Western Arctic Caribou Herd. Federal Aid Wildlife Restoration. Project W-17-11, Juneau.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1A

GEOGRAPHICAL DESCRIPTION: Southern Southeast Mainland

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Aug. 1 - Dec. 30 One Goat

Population Status and Trend

The goat population of Unit 1A, which was at a high level in the late 1960's, declined through the early 1970's and reached a low about 1975 or 1976. Since that time, goat numbers have generally been increasing. Only three of the survey areas were flown in 1979 and they indicated a drop from the 1978 surveys.

Population Composition

Three surveys were flown in the area between the Unuk River and Boca de Quadra in mid-September. A different observer was used for the first time since 1971 and the surveys were flown at slightly earlier times of the day than in past years. All three survey areas showed a decrease in goats seen per hour averaging 27 percent. Past survey results for the four main survey areas are presented in Appendix I. The kids per 100 adults increased somewhat from 1978 in the Wilson River to Boca de Qaudra area but decreased in the Chickamin River area. Some possibility exists that the new observer had trouble separating kids from yearlings.

In general, the population appeared to be in good condition following the low years of 1975-76. Winter 1978-79 was fairly severe and a drop in the kid:adult ratio, compared to past years, was expected.

Mortality

Goat harvest ticket returns for the 1979 season showed 39 hunters took 29 goats in Unit 1A. There were problems of noncompliance with the harvest report program, but the data should be comparable with past years' data collected by the same procedure. Table 1 compares past years' data on hunter success and harvest

with that of 1979. The harvest increased over 1978 by 26 percent but still remained far below the 60 goats reported taken in 1973. Hunter success, however, showed a large increase from a 5-year average of 33 percent to 74 percent in 1979. Good weather conditions during the hunting season undoubtedly were responsible for much of the increase in success. The harvest in subunit 1A amounted to 28 percent of the total Unit 1 harvest, about the same as the last 2 years.

Table 1. Goat Harvest and Hunter Success, GMU 1A, 1972 - 1979.

	Goat Harvest				Hunters Taking	Percent Harvest By	Number Successful	Total #	Percent Hunter
Season	MM	FF	Unk	Total	2 Goats	Non-Res.	Hunters	Hunters	Success
1972	23	23	2	48	6	-	42	117	36
1973	36	20	4	60	10	22	50	133	38
1974	26	19	2	47	10	13	37	109	34
1975	8	0	-	17	0*	24	17	93	18
1976	10	5	-	15	0*	0	15	55	27
1977	19	16	2	37	0*	14	37	80	46
1978	10	13	0	23	0*	0	23	55	42
1979	19	10	0	29	0*	Unk.	29	39	74

*Bag Limit reduced from 2 to 1 in 1975.

Chronology of the harvest changed this year and was more evenly distributed through the season. Five goats were taken in August, 7 in September, 6 in October, 10 in November and 1 in December. The sex ratio of the harvest for August, September and October was even but for November and December, it changed to 91 percent males.

Successful hunters spent 2.3 days hunting while the 10 unsuccessful hunters averaged 3.6 days. Seventy-six percent of the successful hunters flew to their hunting areas while only 40 percent of the unsuccessful hunters used airplanes. Essentially all of the remaining hunters traveled by boat.

Ten of the goats were taken in the general area between Yes Bay and Eagle Lake while 17 came from the area between the Unuk River and Smeaton Bay.

Management Sumary and Recommendations

The hunting kill has continued to be fairly light over the past 5 years compared to that of the 1972-74 period and amounted to a very small percentage of the overall Unit 1A goat population.

The reported kill under the harvest ticket program has been well below the actual harvest and this in part led to the Board of Game establishing registration hunts for goats in all Southeast Alaska. This system, which requires permits to be returned, should provide more accurate harvest data.

Surveys should be maintained, and comparability between years kept by either utilizing the same observer and survey procedure, or by careful instruction of any new observers.

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APPENDIX I. Mountain Goat - Subunit 1A - Ketchikan Area.

Goat Composition Surveys, Subunit 1A, 1968 through 1979.

Area K-4 (Wilson Arm to Boca de Quadra)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1968	Sept. 17	193	73	...	265	37	80 Min.	199
1971	Sept. 15	155	56	9	220	36	70 Min.	189
1973	Aug. 16	90	13	...	103	14	65 Min.	95
1974	Aug. 27	26*	8*	...	34*	31	36 Min.*	57
1975	Aug. 12	15	3	...	18	20	47 Min.	23
1976	Sept. 1	18	7	...	25	39	57 Min.	26
1977	Sept. 6	39	19	...	58	49	56 Min.	62
1978	Sept. 9	65	19	...	84	29	51 Min.	99
1979	Sept. 18	44	16	...	60	36	65 Min.	55**

Area K-5 (Marten Arm to Portland Canal)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1968	Sept. 18	298	73	...	371	24	115 Min.	194
1971	Sept. 16	133	34	1	168	26	83 Min.	121
1973	Aug. 20	59	22	...	81	37	85 Min.	57
1974	Sept. 21	24	6	...	30	25	74 Min.	24
1975	Aug. 13	21	7	1	29	33	87 Min.	20
	Sept. 11	40	17	...	57	43	78 Min.	44
1976	Sept. 7	40	7	...	47	18	99 Min.	29
1977	Aug. 31	83	41	...	124	49	101 Min.	74
1978	Sept. 8	97	34	...	131	35	90 Min.	87
1979	...	...	...	...	...	...	.. ...	..

* Incomplete Survey
** Different Observer than Normal

APPENDIX I. (Continued). Mountain Goat - Subunit 1A - Ketchikan Area

Goat Composition Surveys, Subunit 1A, 1968 through 1978.

Area K-9 (Klahini River to Chickamin River)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adutls	Survey Time	Goats/ Hour
1975	August 28	52	11	0	63	21	79 Min.	48
1976	Sept. 10	73	20	0	93	27	92 Min.	61
1977	Sept. 1	104	44	0	148	42	122 Min.	73
1978	Sept. 5	121	37	0	158	31	93 Min.	102
1979	Sept. 20	99	23	0	122	23	98 Min.	75**

Area K-10 (Chickamin River to Walker Cove)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1975	Sept. 10	74	31	0	105	42	65 Min.	97
1976	Sept. 9	65	20	0	85	31	59 Min.	86
1977	Sept. 2	111	55	0	168	49	86 Min.	117
1978	Sept. 6	12	36	0	157	30	76 Min.	124
1979	Sept. 21	95	23	0	118	24	64 Min.	111**

* Incomplete Survey

** Different Observer than normal.

MOUNTAIN GOAT

SURVEY-INVENTORY REPORT

GAME MANAGEMENT UNIT 1C

GEOGRAPHICAL DESCRIPTION: Mainland of Southeastern Alaska from Cape Fanshaw to the Latitude of Eldred Rock.

PERIOD COVERED: July 1, 1979 to June 30, 1980

Seasons and Bag Limits

Unit 1C, that portion draining into Lynn Canal, Stephens Passage and Taku Inlet between Antler River and Taku Glacier.	Oct. 1 - Nov. 30*	One goat
Remainder of Unit 1C	Aug. 1 - Nov. 30	One goat

* An emergency order closed the area between the Mendenhall Glacier and River and the Herbert Glacier and River effective October 24, 1979.

Population Status and Trend

Surveys conducted in 1979 were not comparable to those conducted in 1978. Available information indicated goat populations were relatively stable throughout Unit 1C with improvements reported in a few areas.

Population Composition

Aerial surveys were flown in portions of Unit 1C in August 1978. A total of 73 mountain goats was observed including 15 kids. The kid:adult ratio was 26:100. Since survey conditions were below optimum, particularly during surveys in the Eagle River - Annex area, numbers of goats observed were probably low. Goat studies in the Eagle - Mendenhall area indicated there were 50 to 75 goats in the area, whereas only six goats were counted during the annual fall survey.

Mortality

Based on hunter harvest reports, the 1979 goat harvest in Unit 1C was 38 animals, 21 males and 17 females. In

1978, the reported harvest was 35 goats and in 1977, 30 goats (Table 1).

Although hunter pressure declined from 80 hunters in 1978 to 65 in 1979, hunter success was 59 percent, an increase of 34 percent from the previous year.

Harvests were reported in three areas in Unit 1C in 1979, Berners Bay to Taku River, Taku River to Cape Fanshaw, and the Chilkat Range. Hunting pressure and harvest levels were about the same in the first two areas with 30 hunters taking 16 goats and 33 hunters taking 20 goats, respectively. In the Chilkat Range, two hunters took two goats. While the Taku River - Cape Fanshaw area harvest remained nearly equal to 1978, the harvest in the Berners Bay - Taku River area increased from 12 goats in 1978 to 16 in 1979. In the latter area, 67 percent of the hunting effort was off the Juneau road system and the remainder from water or air access points.

Chronology of the harvest indicated 7 goats were taken in August, 3 in September, 13 in October, and 15 in November. The majority of the harvest in the Berners Bay - Taku River area was taken in October (81%), while in the Taku River - Cape Fanshaw area, 60 percent was taken in November. The two goats taken in the Chilkat Range were both killed in September .

The number of days hunted per goat in 1979 was 4.2 compared to 6.5 in 1978.

Table I. Unit 1C Goat Harvest Statistics for 1972 - 1979 as Derived from Hunter Report Cards.

	Chronology of Harvest								Sex Composition				No. of	Hunter
Year	A	S	O	N	D	J	Unk	Tot	M	F	Unk	%Male	Hunters	Success
1972	18	10	7	6	4	16	5	70	36	34	0	51.4	149	40.3
1973	30	32	11	21	17	NA	1	112	56	56	0	50.0	177	52.2
1974	19	18	7	15	30	NA	5	94	40	51	3	42.6	159	44.0
1975	7	8	20	15	13	NA	5	68	42	25	1	61.8	138	49.3
1976	2	0	12	5	16	NA	6	41	13	28	0	31.7	107	38.3
1977	8	0*	8*	8*	3*	NA	3	30	19	9	2	63.3	72	41.6
1978	3	3	6	17	NA	NA	6	35	24	11	0	68.6	70	43.8
1979	7	3	13	15	NA	NA	0	38	21	17	0	55.3	65	58.5

* Revised from figures reported in Survey-Inventory Report 1978, Table II.

Management Summary and Recommendations

The 1979 harvest data for Unit 1C suggested a decline in hunting pressure of 27 percent and an increase in harvest of 9 percent from 1978. Seasons were reduced in 1973 by dropping January, in 1975 by dropping August, September and December in the Antler River to Taku Glacier area and in 1978 by dropping December Unit-wide (Note: this change was erroneously reported as beginning in 1977 in the 1978 S & I Report). This, in addition to a bag limit change from two to one goats in 1975, significantly lowered hunting pressure and harvest levels. While hunting pressure had steadily declined since 1973, harvest levels were lower than previous years, but have been relatively stable ranging from 30 to 41 goats since 1976. Between 1972 and 1975, the harvest ranged from 68 to 112 goats.

On October 24, 1979, the regular hunting season was closed 5 weeks early in the Herbert Glacier and River to Mendenhall Glacier and River area to prevent exceeding the desired harvest level (10% of the estimated population size). Easy access to the area near the population center of Juneau and current research indicating the goats in this area form a discrete population (thus vulnerable to over harvesting), were the basic concerns prompting the closure. Current means of monitoring goat harvests are not adequate to control harvests at desired levels. To help with this problem, the Board of Game, during their Spring 1980 meeting, adopted goat permit hunts statewide. Registration permit hunts for Southeast should greatly improve the timeliness of reporting kills and provide the means to control harvest levels. Goat harvest tickets and report cards were subsequently dropped.

With adoption of registration permit hunts, no season or bag limit changes are recommended at this time.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1D

GEOGRAPHICAL DESCRIPTION: Mainland of Southeastern Alaska North of the Latitude of Eldred Rock

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Unit 1D, that portion lying east of Taiya Inlet and River between Chilkoot Trail and White Pass and Yukon Railroad.	No Open Season	
Unit 1D, that portion lying north of the Katzehin River and east of the Haines Highway.	Sept. 15 - Nov. 30	One goat
Remainder of Unit 1D	Aug. 1 - Dec. 31	One goat

Population Status and Trend

No data were collected.

Population Composition

No data were collected.

Mortality

Hunter report data indicated that in Unit 1D in 1979, 22 goats (14 males and 8 females) were taken, an increase of five goats from 1978 (Table I). Forty hunters hunted for a success rate of 55 percent. Eighty-two percent of the harvest in Unit 1D occurred in the area north of the Katzehin River and east of the Haines Highway. Sixty-seven percent of the goats taken in this area were killed in November. Chronology of the harvest for the unit was August - 1, September - 1, October - 6, and November - 14.

Table I. Unit 1D Goat Harvest Statistics for 1972-1979 Seasons Derived From Hunter Report Cards.

Year	Chronology of Harvest								Sex Composition				No. of Hunters	Hunter Success
	A	S	O	N	D	J	Unk	Tot	M	F	Unk	%Male		
1972	8	13	3	4	4	4	7	43	24	16	3	60.0	102	33.3
1973	25	27	13	6	14	NA	3	88	45	40	3	52.9	109	62.4
1974	26	8	7	2	10	NA	0	53	26	27	0	49.6	90	52.2
1975	13	4	10	7	0	NA	1	35	22	12	1	64.7	77	45.5
1976	2	1	8	1	0	NA	5	17	8	9	0	47.0	65	26.1
1977	6	1	9	7	0	NA	2	25	15	9	1	62.5	69	36.2
1978	2	1	6	4	0	NA	4	17	7	10	0	41.2	52	32.7
1979	1	1	6	14	0	NA	0	22	18	4	0	81.8	40	55.0

Management Summary and Recommendations

The reduction of seasons and bag limits since 1973 appears to have lowered goat harvest levels in Unit 1D. The annual harvest since 1975 has averaged 23 goats, which is 65 percent below the previous 3-year average of 61 goats. Increased hunting pressure is expected in Unit 1D while other big game populations are low. Therefore, controlled harvests at desired levels will be necessary. Current means of monitoring goat harvests are not adequate to control harvests at desired levels. To help with this problem, the Board of Game, during their spring 1980 meeting, adopted goat permit hunts statewide. Registration hunts for Southeast Alaska should greatly improve the timeliness of reporting kills and provide the means to control harvest levels. Goat harvest tickets and report cards were subsequently dropped.

The Board of Game also adopted an open season for the Chilkoot Trail to White Pass and Yukon Railroad area. This area has been closed to goat hunting since 1975.

With the adoption of registration permit hunts, no season or bag limit changes are recommended at this time.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 4

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof and Chichagof Islands

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Aug. 1-Dec. 31	One goat by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The Baranof Island mountain goat population appears to occupy all suitable goat habitat on the island. No appreciable change in the total population has been evident for at least the past 10 or more years. Surveys in recent years have generally shown higher counts, but the higher counts are most likely a reflection of more accurate surveys than population increases. The high number of kids observed in the 1977 survey and an increase in the total number of goats seen on subsequent surveys indicate a modest population increase following the very mild winter of 1976-77.

Periodic goat sightings are reported for Chichagof Island. A longtime brown bear guide reported sighting 15 goats on a mountain above Stag Bay on the west side of Chichagof Island during spring 1978. Attempts to confirm the presence of goats there have been unsuccessful.

Population Composition

During an aerial survey of the northern portion of the Baranof Island goat range in September (using a Hughes 500 helicopter), 397 goats, the highest number ever observed, were counted. The kid:adult ratio was 23.7 kids:100 adults.

Kid to adult ratios in Alaska generally range from 10:100 to 50:100 with a statewide average of about 24:100. In Unit 4 the ratio has consistently been 24:100 except for 1977 when it was 37.7:100. Such

consistency in productivity indicates the Unit 4 goat herd is probably static, the range fully stocked, and hunting is not a controlling factor.

Probably an equal number of goats occupy the southern portion of Baranof Island. They are only lightly hunted so are of a lesser priority to survey.

Mortality

Data were available only for hunting mortality. Hunting in Unit 4 is under a registration permit system. In 1979, 253 permits were issued and all but six returned. Harvests have been 40 goats or fewer per year but in 1979 it increased to 59, an increase of 50 percent. There was a corresponding increase in hunting pressure, with 151 permittees actually hunting in 1979 as opposed to 93 in 1978 (Appendix I).

Persons participating in the Unit 4 hunt typically have been residents of Sitka-Mt. Edgecumbe and 1979 was no exception. Eighty-eight percent of the permittees were from Sitka-Mt. Edgecumbe, with resident Alaskans from elsewhere in the State making up 9 percent of the hunters. The remaining 4 percent were nonresidents. Sitka-Mt. Edgecumbe hunters took 48 (81%) goats, other Alaska residents took 7 (12%), and nonresidents took 4(7%).

Transportation for goat hunting in Unit 4 was by aircraft, boat, or foot. Sixty-three persons flew in to the hunting areas and took 28 goats. The remaining 88 hunters took 31 goats.

Traditionally, the majority of the Unit 4 goat harvest comes from the northern portion of Baranof Island, north of the Vodopad River. In 1979, 56 (95%) of the harvest came from that area. Nineteen animals were taken by hunters who flew in to one alpine lake. Difficult access precludes hunting over most of the southern portion of the range.

Chronologically, 25 (42%) goats were taken in August, 18 (31%) in September, 9 (15%) in October, 6 (10%) in November, and 1 (2%) in December. This is a change from previous years when all but one or two animals were taken during the first 2 months of the season.

Ages, based on horn annuli, were determined for 38 (21 males and 17 females) of the goats taken in 1979. Both sexes averaged 5.5 years of age. The average age of the animals in the 1978 harvest was 3.5 years. It is not known why there would be a 2-year increase in the average age of the goats in the harvest in 1979.

Perhaps neither sample was adequate to accurately reflect the true age structure of the Unit 4 goat herd. The samples should be unbiased, however, as most hunters are normally non-selective and shoot the first goat they can.

Management Summary and Recommendations

Present knowledge of the Baranof Island goat population indicates that current regulations are adequate for responsible management of the herd. No changes in season or bag limit are recommended.

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Appendix I. Mountain goat survey and harvest data, 1954-1979, Game Management unit 4.

	Survey Data						Harvest Data				
Date	Total Goats	Goats/ Hour	Number Kids	Number Adults	Kids/100 Adults	Data Source (Aircraft Type)	Total Kill	Males	Females	Total Number Hunters	Data Source
1923	18 goats introduced										
1937	41					Alaska Game Commission					
1954	263	--	41	222	18,5	USF&WS (------)	----------				
9/1/1960	116	38.4	26	90	28.9	Merriam-ADF&G (------)	ZERO DATA				
9/11/1961	118	--	20	98	20.4	Merriam-ADF&G (------)	----------				
9/3/1970*	154	--	15	139	10,8	Courtright-ADF&G (Helio Courier	16			48	Hunter Interview
9/29/1970	121	--	13	108	12.0	Courtright-ADF&G (Helio Courier)				75	Hunter Interview
1971	--	--	--	--	--	--	20				
1972	--	--	--	--	--	--	10	5	5	50	Harvest Ticket
9/12-13/1973	253	36.0	50	203	24.6	Johnson-ADF&G (Piper PA-18)	24	11	13	45	Harvest Ticket
1974	--	--	--	--	--	--	10	7	3	39	Harvest Ticket
8/24-25/1976**	242	62.0	47	195	24.1	Johnson-ADF&G (Piper PA-18)	28	18	10	107	Harvest Ticket Regist. Permit
1977	541	73.1	148	393	37.7	Johnson-ADF&G (Hughes 500 Helicopter)	40	22	18	101	Regist. Permit
1978	--	--	--	--	--	--	32	17	14 (1 Unk)	93	Regist. Permit
1979***	397	79.4	76	321	23.7	Johnson-ADF&G (Hughes 500 Helicopter)	59	30	27 (2 Unk)	151	Regist. Permit

*Incomplete coverage.
**North of Vodopad River only.
***North of Medvejie Lake-Baranof River only.

PREPARED BY: Loyal Johnson, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5

GEOGRAPHICAL DESCRIPTION: Gulf of Alaska, Yakutat Bay

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 1 - Dec. 31	One goat

Population Status and Trend

There were not enough new data available to allow an accurate comparative assessment of the goat populations in Unit 5, although they were assumed to be stable.

Population Composition

Only a partial survey of the Game Management Unit was completed. On August 23, an aerial survey of the eastern end of the Brabazon Range in Subunit 5A was conducted using a Hiller 12E Helicopter. The survey began near Gateway Knob on the Alsek River and ended on the northwest shore of Akwe Lake. Survey conditions were fair, with high broken clouds but there was substantial glare from the snow banks and light colored rocks. No survey was conducted in Subunit 5B.

Including a group of 45 goats (32 adults, 13 kids) observed south of Italio Lake during the return flight to Yakutat, a total of 84 goats (64 adults, 20 kids) was observed. Although this total was slightly lower than in previous years (Appendix I), it cannot be effectively compared because only a portion of the standard survey area was examined. Based on the animals observed, production appeared to be stable with a kid:adult ratio of 31.2:100.

Mortality

Voluntary hunter report returns and known harvest for the 1979 season (36.8% statewide response) showed that 27 hunters killed 19 goats (13 males, 6 females) for a success rate of 70.4 percent. Compared to the 1978 goat season, this was an increase in harvest of 90 percent and an increase in the success rate by 24.9

percent. Despite the apparent increases in harvest and success rates, it is difficult to evaluate the results because reminder letters were not sent out to harvest ticket holders as they had been in previous years. This increased the hunter success ratio because unsuccessful hunters seem to be less likely to return their hunter reports than are successful hunters.

Although difficult to accurately assess, because of the voluntary return report system, goat hunting pressure in GMU 5 seems to be increasing and a few small local populations are heavily hunted and are very susceptible to over harvest.

No mortality other than hunting has been documented although wolves have been observed in close proximity to goat in the Chaix Hills region of Icy Bay and are suspected to prey on them.

Management Summary and Recommendations

Goat populations in Unit 5 appear to be stable but hunting pressure appears to be increasing and the 1979 harvest exceeded the average for the previous 7 years by 38.5 percent (Appendix II). Given the above information and the changing land status related to the d-2 land settlement, it is advisable to change from a voluntary hunter report system to a special registration system. This would provide more accurate and timely information about localized harvest as well as data about the age structure of the population (when horn sealing is required).

Future aerial surveys should include a complete helicopter survey to obtain base data about the population followed up by periodic spot checks of specific trend areas by helicopter as a monitoring method. No changes in season or bag limit are recommended at this time.

PREPARED BY:

Ronald E. Ball
Game Biologist II

SUBMITTED BY:

Nathan P. Johnson
Regional Research/
Management Coordinator

APPENDIX II. Mountain goat harvest for 1972-1979, Unit 5.

Year	Harvest				No. Hunters Taking Two Goats	Total No. Hunters Reporting	Percent Hunter Success	Percent Ticket Response
	Males	Females	Unk.	Total				
72-73	19	13	1	33	3	55	54.4	73.4
73-74	10	3	-	13	3	32	31.3	71.7
74-75	14	5	-	19	4	19	78.9	69.9
75-76	5	3	-	8	-	22	36.4	72.5
76-77	4	3	-	7	-	22	32.0	70.8
77-78	4	2	-	6	-	17	35.0	71.8
78-79	2	8	-	10	-	22	45.5	66.0
79-80	13	6	-	19	-	27	70.4	36.8

Prepared by: Ronald E. Ball, Game Biologist II

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 6

GEOGRAPHICAL DESCRIPTION: Prince William Sound - North Gulf Coast

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

1 Aug.-31 Dec. One goat

Population Status and Trend

The mountain goat population in Unit 6 appears to be stable. Good populations of goats are found from Valdez Arm to Icy Bay except in the Copper River to Bering Glacier area where isolated goat herds have remained small for several years.

Population Composition

A survey flown on 25 August 1979, revealed 310 goats between Cordova and Sheep River. Nineteen percent of the goats observed were kids.

Mortality

Two hundred and twelve hunters reported harvesting 133 animals: 91 males, 41 females, and 1 of unknown sex. Hunter success was 63 percent and the kill was evenly divided between resident and nonresident hunters.

The Rude River to Columbia Glacier portion of Unit 6 was hunted the heaviest (79 hunters) and produced the largest kill (47 goats). The southwest tip of Prince William Sound was also hunted heavily with a relatively large harvest (Appendix I).

Chronology of the harvest was typical. Eighty-five percent of the harvest occurred in August, September, and October.

Management Summary and Recommendations

The goat harvest and composition of kill are considered average. The number of hunters was down slightly, 212 compared to the average of 249. Resident hunter success was only 50 percent compared to the average of 67 percent.

Analysis of the available data indicates the current hunting pressure and harvest level is not adversely affecting Unit 6 goat populations.

PREPARED BY:

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Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

APPENDIX I

Unit 6

Mountain Goat Hunting Pressure by Subunit and Class of Hunters, 1979

Unit/ Subunit	Area	Successful Hunters	Unsuccess-ful Hunters	Total Hunters	Percent Success
6-01	East of Suckling Hills to Icy Bay	18	3	21	85.7
6-02	Bering Lake - Burg Lake Area	12	3	15	80.0
6-03	Suckling Hills	3	0	3	100.0
6-04	Ragged Mountain	5	0	5	100.0
6-05*	Goat Mountain	-	-	-	-
6-06	Rude River to Copper River	9	10	19	47.4
6-07	Valdez Arm to Rude River	24	11	35	68.6
6-08	Valdez Area	23	21	44	52.3
6-09	Port Wells to Columbia Glacier	6	2	8	75.0
6-10	Unit 6 - Unknown	8	9	17	47.1
6-11	Whittier - Port Wells	2	1	3	66.7
6-12	Kings Bay to Cape Fairfield	20	9	29	69.0
6-13	Prince William Sound - Unknown	3	10	13	23.1
Unit 6 Totals		133	79	212	62.7

* Not open to hunting.

Prepared by: Julius Reynolds, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 7 AND 15

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Unit 7, that portion south and east of Ellsworth Glacier and the stream flowing from Ellsworth Glacier into Day Harbor and that portion south and west of Bear Glacier.	10 Aug.-31 Dec.	One goat by permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 7, that portion west of a line along Sixmile Creek from its mouth near Hope to the Seward Highway, along the Seward Highway to Ptarmigan Creek; north of a straight line from Ptarmigan Creek bridge to Porcupine Island in Kenai Lake, then a straight line from Porcupine Island to the head of Upper Russian Lake; east of the Russian River from Upper Russian Lake to the Kenai River and north of the Kenai River from the confluence of Russian River to the Unit 15 boundary.	No open season	
Remainder of Unit 7 and Unit 15.	10 Sept.-31 Oct.	One goat by permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

Surveys conducted since 1968 indicated a downward trend in goat numbers, particularly where goat and Dall sheep distribution overlap. Seasons and bag limits were subsequently reduced and areas east of Seward in Unit 7, and north of Bradley Lake in Unit 15 have shown an increase in numbers in recent years.

Population Composition

Aerial surveys were flown in selected goat permit areas during 1979 and 357 goats (273 adults and 84 kids) were observed (Appendix I). The kid:adult ratio was 31 kids:100 adults.

Mortality

Sixty-nine goats were killed on the Kenai Peninsula during 1979 (Appendix II). Four hundred and fifty-five registration permits were issued and 201 permittees reported not hunting.

Composition of the harvest was 34 males (51%), 33 females (49%) and 2 goats of undetermined sex (3%). Aircraft and highway vehicles were the most popular means of transportation (36% and 34%, respectively) and boats were the next most popular choice (27%). The use of horses, motor bikes and off-road vehicles collectively amounted to 2.5 percent of the total.

Historical harvest data have been published by Spraker 1979 and Cornelius 1980.

Management Summary and Recommendations

The registration permit system for goats on the Kenai was initiated to enable the Department to limit harvests in each permit area. However, unlimited numbers of hunters have been free to choose the area they wish to hunt and hunting pressure has been undirected. As a result, popular areas have received excessive hunting pressure and harvests while other areas have been virtually untouched.

Permits should be issued by a drawing, on an individual area basis, and restricted in number.

Surveys should be flown in areas which have not been surveyed in recent years to assess population trends.

Literature Cited

Spraker, T. H. 1979. Mountain goat survey-inventory progress report. In R. A. Hinman, ed. Annual report of survey-inventory activities, Volume lX. Fed. Aid. Wildl. Rest. Rep. Alaska Dept. of Fish and Game, Juneau. 123pp.

Cornelius, D. A. 1980. Mountain goat survey-inventory progress report. In R. A. Hinman, ed. Annual report of survey-inventory activities. Fed. Aid. Wildl. Rest. Rep. Alaska Dept. of Fish and Game, Juneau.

PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Results of goat surveys in selected permit areas on the Kenai Peninsula, 1979.

Permit area	Goats observed			Kids/100 adults
	Adults	Kids	Total	
7-3	23	7	30	30
7-5	10	2	12	20
7-6	19	2	21	11
15-2	60	19	79	32
15-3	7	3	10	43
15-5	23	10	33	43
15-6	28	7	35	25
15-7	39	14	53	36
15-11*	32	13	45	41
15-12	32	7	39	22

*Partial count, west arm only.

Prepared By: Ted H. Spraker, Game Biologist III

Appendix II. Harvest summary for registration goat hunts on the Kenai Peninsula by permit area for 1979.

Permit area	Goats killed	Total number permits issued	Number did not hunt	Percent successful[1/]
7-7	7	45	18	26
7-9	6	81	38	14
7-10	0	6	1	0
7-12	3	19	8	27
7-14	5	19	7	42
7-15	9	26	9	53
7-16	8	57	30	30
7-17	0	8	3	0
7-18	0	5	1	0
7-19	4	18	6	33
7-20	0	0	-	0
7-21	2	9	4	40
7-22	0	17	9	0
7-23	0	5	2	0
15-2	4	13	7	67
15-5	4	16	7	44
15-6	2	19	10	22
15-7	4	20	6	29
15-8	3	20	4	19
15-9	3	14	8	50
15-10	3	10	5	60
15-11	2	28	18	20
Total	69	455	201	

1/ Calculated by: $\frac{\text{Total \# permits issued - \# did not hunt}}{\text{number successful}} \times 100 = \text{percent successful}$

Prepared By: Ted H. Spraker, Game Biologist III
Steven Machida, Game Biologist II

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Sept. 1-Oct. 30	One goat, up to 15 goats by drawing permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The Unit 8 goat population is stable with annual hunting mortality less than the observed recruitment of yearlings.

Population Composition

Goat composition counts were conducted in August by observers on foot and by aircraft in the Crown Mountain and Hidden Basin-Terror Lake areas (Appendix 1). Ninety-four adults (73%), 30 kids (23%) and five unclassified animals (4%) were counted. The total number of goats (129) and the ratio of 32 kids:100 adults compares closely with the previous year's total (133) and the ratio of 33 kids:100 adults.

Goats were more difficult to approach on foot in 1979 than during previous years, making classification difficult. Only six yearlings were observed among 87 goats counted from the ground. Twenty kids were counted during 1978 in the same areas. Considering the fact that most goats were not classified in 1979, conclusions regarding survival of young are not possible.

Spring composition counts were conducted from a fixed-wing aircraft on 18 March 1980 and from a helicopter on 26 and 27 March 1980 in the Terror Bay, Kizhuyak Bay and western Ugak Bay drainages. Results of these surveys are summarized below:

Adults	Kids	Total
87 (81%)	20 (19%)	107

All goats observed appeared to be alert and in good condition.

The March counts were compared with the August-September counts for an estimate of kid survival. Although aerial coverage was more thorough during the March surveys, the same groups of goats are believed to have been counted during both surveys. A comparison of the March and August classified counts is shown below:

	Adults	%	Kids	%	Total
August 1979	94	76%	30	24%	124
March 1980	87	81%	20	19%	107

If it is assumed that the same groups of goats were seen during both surveys, survival of kids to March was only 67 percent. Although numerous potential biases are obvious, this is the best estimate of kid survival available for goats in Unit 8.

Mortality

Twenty-two permits for goat hunting were issued. Eleven goats (6 males, 4 females and 1 unknown sex) were killed by 17 permittees who reported hunting. The six males ranged from 2 to 5 years old. The four females included two 4-year-olds and two 3-year-olds.

Distribution of the harvest was as follows:

Hunt no.	No. males	No. females	No. unknown	Total
871	1	--	--	1
872	1	3	--	4
873	3	1	1	5
874	1	--	--	1

Management Summary and Recommendations

Goat mortality from hunting was well below the observed recruitment of 9-10 month-old young. Eleven goats were reported harvested. Twenty kids were observed during the late March aerial composition counts.

A total of 90 goats was observed within the boundaries of Hunt No. 872-Crown Mountain-Wild Creek area. One group of 39 goats was observed on the east slope of

Crown Mountain near the border with Hunt No. 871-Wild Creek. It is recommended that this part of the eastern slope of Crown Mountain be included in Hunt No. 871. The group of goats observed in this area is believed to range on the east side of Wild Creek during most of the year and the boundary change would coincide with their range.

Occasional reports from local pilots indicate the distribution of goats on Kodiak Island continues to increase. A complete aerial survey of potential goat habitat should be conducted to document the extent of those movements.

Literature Cited

Smith, R. B. 1980. Sheep survey-inventory progress report. In R. A. Hinman, (ed). Fed Aid Wildl. Rest. Rep. Alaska Dept. Fish and Game, Juneau.

PREPARED BY:

Roger B. Smith
Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix 1

Goat Composition Counts in Selected Areas of Kodiak Island, Unit 8

Hunt Area	Survey Date/ Method	Male Adult	Female Adult	Female w/Kid	Female 2+yr.	Unknown Sex 2+ yr.	Kid	Yearling	Unclassified Adults	Unclassified Age Unknown	Total
872	8/21,22/79 Foot	3(6%)	7(14%)	12(23%)	2(4%)	---	12(23%)	3(6%)	7(14%)	5(10%)	51
872	8/21/79 Aircraft	---	---	---	---	---	10(26%)	---	29(74%)	---	39
873	8/30/79 Foot	2(6%)	---	8(22%)	---	1(3%)	8(22%)	3(8%)	14(39%)	---	36
Closed Area (Sharatin Mtn.)	9/7/79 Aircraft	---	---	---	---	---	---	---	3	---	3

PREPARED BY: Roger B. Smith, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

GEOGRAPHICAL DESCRIPTION: South side of Wrangell Mountains and eastern portion of Chugach Mountains

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

Sept.1-Dec. 31 One goat

Population Status and Trend

Trend counts and hunter reports indicate a stable goat population. However population fluctuations are expected since Unit 11 represents the northernmost portion of mountain goat range in Alaska.

Population Composition

Fifty-three goats were counted during the 1979 survey of the MacColl Ridge trend count area. The count included 10 kids and 43 adult goats and yielded an age composition of 23 kids:100 adults. The number of goats counted was identical to the number counted in 1977, and represents the highest population counts to date (Tobey 1980).

Mortality

Ten male and eight female goats were killed during the hunting season. Harvest ticket returns indicated 22 individuals hunted goats, yielding a hunter success rate of 82 percent. Nonresident hunters killed four goats.

Management Summary and Recommendations

Hunting pressure and harvest figures for 1979 show a decline over previous seasons. This decline is attributed to the incorporation of Unit 11 into the Wrangell-St. Elias National Monument. Federal regulations prohibit sport hunting in the new national monument. Subsistence hunting, however, by local residents is allowed under monument regulations provided aircraft are not used.

Goat numbers appeared to be stable within their selected habitat. Goat distribution tends to be

pocketed within areas of favorable habitat and is not as widespread as expected. Past harvest reports indicated hunting pressure was widely distributed with no one area overhunted. In the future, however, potential for localized overharvest is great, since Federal regulations prevent the use of aircraft for subsistence hunting. Populations close to access points will receive more hunting pressure by subsistence hunters under the current Federal regulations.

Surveys should be conducted to monitor the status of goat populations accessible to subsistence hunters.

Literature Cited

Tobey, R. W. 1980. Sheep survey-inventory progress report. In R. A. Hinman, (ed.). Annual report of survey-inventory activities, Fed. Aid Wildl. Rest. Rep. Alaska Dept. of Fish and Game, Juneau.

PREPARED BY:

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SUBMITTED BY:

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 AND 14

GEOGRAPHICAL DESCRIPTION: Nelchina Area and Upper Cook Inlet

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limits

Unit 13 Nelchina	No open season	
Subunit 14A north River	No open season of the Matanuska	
Remainder of 14C	21 Sept.-15 Nov.	One goat by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Subunit 14B	10 Aug. -15 Nov.	One goat
Subunit 14C Park	No open season within Chugach State	
Remainder of 14C	5 Sept.-15 Nov.	One goat by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The status of goat populations in Units 13 and 14 is relatively unknown. Excluding a portion of Subunit 14C no surveys to determine the status of goats have been conducted since 1976. Goat mortality due to hunting is considered light, since the major portion of these areas are either closed to goat hunting or so remote that they receive little hunting pressure.

Population Composition

Forty goats, including 14 kids, were observed during aerial surveys conducted in August within a portion of

Subunit 14C. No additional composition data were obtained.

Mortality

Ten goats, seven males and three females, were killed in Unit 14 during 1979. Of these goats, one was reported taken from Subunit 14A, none from Subunit 14B and nine from Subunit 14C. The mean age of the seven males was 4.6 years and of the three females was 5.0 years. Of the nine goats taken in 14C, eight came from the Lake George-Hunter Creek area. A total of 124 persons hunted goats for a success rate of 8.1 percent.

Management Summary and Recommendations

Goat hunting has not been permitted within Unit 13 or within Subunit 14A north of the Matanuska River since 1978. The remaining area of Subunit 14A which is open to hunting has a small goat population which inhabits extremely precipitious terrain and consequently is very difficult to hunt. Subunit 14B also has a small population of goats which receives little hunting pressure. Subunit 14C has a moderate number of goats on lands outside Chugach State Park where hunting is permitted. All park lands are closed to goat hunting. Beginning in fall 1980, all goat hunting will be by drawing permit. A total of 50 permits will be issued.

The status of the goat populations in Units 13 and 14 should be determined. I recommend that goat surveys similar to those conducted in 1976 be conducted next year.

PREPARED BY:

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SUBMITTED BY:

James B. Faro
Regional Management Coordinator

MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 18

GEOGRAPHICAL DESCRIPTION: Lower Yukon - Kuskokwim Delta

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Unit 18, Nunivak Island	Aug. 1 - Sept. 20	5 bulls and 30 cows by permit only. See 5 AAC 81.055 and separate permit hunt supplement.
	Feb. 15 - March 15	5 bulls and 10 cows by permit only.* See 5 AAC 81.055 and separate permit hunt supplement.

*Additional permits will be issued for any muskoxen not harvested under fall permits.

Population Status and Trend

Nunivak Island:

Since the introduction of 31 muskoxen on Nunivak Island during the summers of 1935 and 1936, the population has grown to its present day level of approximately 600 animals. Surveys conducted during the past 5 years have shown that the number of animals (except for the drop between 1977 and 1978) has remained relatively stable (Table 1). Calf production during the past 10 years has averaged 15 percent annually; however, this figure has risen to 20 percent during the past 2 years. Hunting pressure and transplants have significantly changed the herd composition. In 1976, the ratio of adult bulls (those 4 years and older) to adult cows (those 2 years and older) was 1:1. A survey conducted in spring 1980 indicated a sex ratio of one adult bull to six adult cows.

Table 1. Sex and age composition of muskoxen observed during spring surveys on Nunivak Island from 1976 through 1980.

Year	4+ years ♂	4+ years ♀	3 years ♂	3 years ♀	2 years ♂	2 years ♀	Yearling	Unclassified	Total
1976	175	89	51	64	37	27	71	40	554
1977	164	144	41	72	32	44	100	53	650
1978	94	142	34	88	19	19	92	11	491
1979	82	160	12	43	35	38	114	45	529
1980	63	215	34	42	64	54	121	9	601

Nelson Island:

Six surveys (five aerial and one ground) have been conducted on Nelson Island since 23 muskoxen were transplanted there during the springs of 1967 and 1968. Population estimates have risen from 63 animals in July 1975 to 167 animals in February 1980. During this same period, calf production has averaged 17 percent annually.

Sex composition of the herd is presently unknown as no ground surveys have been conducted since April 1977, and aerial surveys have, so far, not been useful in determining sex composition.

Population Composition

Nunivak Island:

Two surveys took place during the reporting period. The main objectives of these surveys were to obtain: 1) population estimates and, 2) an estimate of calf production. During the latter part of August 1979, an aerial survey was conducted using a Cessna 185 with four observers. The flight route followed major drainages along the coast and east-west transects were flown to complete the interior portion of the island. Visibility was unrestricted during the 13 hour survey.

Results from the August survey are summarized as follows:

# of Herds	Total # Animals	4+♂	4+♀	Yearlings	Calves	Unclassified
83	495	10	13	5	101	366

Of the 495 animals observed, 366 (73.9%) were not classified. Although it was felt that fairly complete coverage of the Island was achieved, the total count of 495 was somewhat less than the ground survey count of 529 animals the previous spring (1979); indicating that a number of muskoxen were probably missed.

A ground survey of the muskoxen on the island was conducted during the first 2 weeks of March 1980 by three people on snow machines. Weather conditions were basically good; however, numerous days of snow and fog hampered the survey. It is believed that the results of this survey represented a complete count of the muskox population. The following data were obtained during the spring survey:

# of Herds	# of Animals	4+ years ♂	4+ years ♀	3 years ♂	3 years ♀	2 years ♂	2 years ♀	Yearlings	Unclassified
47	601	63*	215	33	42	64	54	121	9

*Includes 8 males known to be 4 years old.

A total of 601 muskoxen was observed in 47 different herds throughout the island. Of these, only nine (1.5%) of the animals were unclassified, suggesting that a ground census is more accurate because of the time observers can spend viewing individual herds. The number of yearlings in the population was similar to that observed for calves in the summer (1979) survey indicating that winter mortality had not been a major factor through mid-March. However, generally poor range conditions and observations of many yearlings in a weakened state suggests that some losses may have occurred later in the spring. Although no surveys have been conducted to confirm this, Mekoryuk residents reported seeing 11 dead muskoxen (sex and age unknown) on the island during the months of June and July.

Nelson Island:

An aerial survey was conducted during the latter part of February 1980 using a Cessna 185. As on the Nunivak Island surveys, the main objectives of the Nelson Island surveys were to obtain: 1) population estimates, and 2) an estimate of calf production.

Weather conditions during the survey were generally good, although a small amount of ice fog enshrouded part of Ugchirnak and Killinupak Mountains.

A minimum of 167 animals was observed in 10 herds ranging in size from seven to approximately 67 animals.

A total of 29 yearlings was counted during the flight; however, it is probably a minimum number as yearlings were found to be very hard to distinguish once the herds came together. An attempt to aerially photograph the herds proved to be unsuccessful because the animals would congregate into a tight group as soon as they heard the aircraft approaching. It is possible that a greater degree of success may have been achieved if the photos were taken at a higher elevation.

Mortality

Nunivak Island:

A total of 52 applications (62% nonresidents) was received from hunters who wished to participate in the fall bull muskox hunt. All five permittees, which were randomly selected by computer, were successful (Table 2). Three of these hunters hunted with the aid of a registered guide and assistance from Mekoryuk residents. The remaining two hunters hunted on their own. As in the past, no interest was shown in hunting cows.

Table 2. Summary of Nunivak Island muskoxen hunts for reporting period 1979.

Time	# of Applicants			# of Permits Issued			# of Successful Hunters	
	Res.	N/Res.	Total	Res.	N/Res.	Total	♂	♀
Fall 1979-Bull	20	32	52	2	3	5	5	
Spring 1980-Bull	37	73	110	2	3	5	5	
Spring 1980-Cow	1	11	12	1	11	12	2*	11
Total muskoxen harvested during the reporting period							12	11

*Illegally taken animals

A total of 110 applications (66% nonresidents) was received from hunters wishing to participate in the spring hunt for bulls. Two of the original five applicants selected decided not to hunt and the first three alternates were contacted before two were found who did wish to hunt. The spring hunt also produced an interest in hunting female muskoxen, with 12 permits (11 nonresidents, 1 resident) being obtained by hunters. The total harvest of muskoxen during the spring hunt was seven bulls and 11 cows (Table 2). Two of the bulls harvested during the spring hunt were not legally taken animals; one, a 2-year-old, was killed by

a bullet which passed through a cow and into the bull; the other, a 3-year-old, was shot and killed by a hunter with a cow permit. All of the hunters hunted with the aid of a registered guide and residents from the village of Mekoryuk. Snowmobiles and sleds were used exclusively as transportation in all of the hunts. Meat from the animals harvested was brought back to the village of Mekoryuk. All but two of the hunters elected to leave their meat in the village where it was divided among the residents.

Eleven calves-of-the-year (9 females, 2 males) were removed from the island during the latter part of April by Fish and Wildlife personnel. Nine of these animals were sent to the San Francisco zoo and the other two animals were sent to the Anchorage zoo.

Nelson Island:

Known mortality of muskoxen on Nelson Island for the reporting period was one male, shot by a young Bethel resident.

Management Summary and Recommendations

Nunivak Island:

Excluding calves-of-the-year and any natural mortality which may have occurred since this spring's survey, there are presently an estimated 600 muskoxen on Nunivak Island. The ratio of adult bulls to adult cows is 1:6. Calf production has averaged percent 15 annually during the past years; 10 however, this average has risen to 20 percent during the past 2 years (Table 1). Past range studies indicated that the island could support 500 muskoxen during a normal winter. However, forage availability and range carrying capacity are strongly influenced by snowfall and mid-winter thaws which can cause ice layering on the snow and ground. Taking the above into consideration, the maximum carrying capacity of Nunivak was set by biologists at 400 adult animals.

Thirty-four muskoxen (14 bulls and 20 cows) were removed from the herd during the reporting period through controlled fall and spring hunts and gifts to zoos. The past year was the first in which any real interest in harvesting cows developed, and can probably be attributed to the fact that only 10 adult bulls were made available to hunters. As previously stated, natural mortality may have been high during spring 1980, but no surveys have been conducted to substantiate this.

In the past, measures have been taken to reduce herd size by the removal of bulls; however, this method of herd reduction has not been very successful. Attempts should be made to remove more females from the herds on the island in order that herd size and sex ratio might be reduced. This could be accomplished in a number of ways. 1) Cooperative transplant efforts should continue with the U. S. Fish and Wildlife Service. A program of this type would assist in reducing the total number of animals, as well as developing and increasing other existing herds within the state. 2) A reduction of the current cow muskoxen tag fee for residents might possibly encourage further hunting by local villagers and other residents. 3) Another alternative might be that of a controlled hunt by state and or federal personnel.

A range study should also be initiated during the coming years in order that an updated range carrying capacity might be established.

Because the muskoxen of Nunivak, as well as Nelson Island, are confined to areas where natural predators are absent and winter habitat is limited, these populations must be intensively managed to maintain the herds in balance with the available habitat.

Nelson Island:

Since their introduction during the springs of 1967 and 1968, muskoxen on Nelson Island have done remarkably well. The population on the island is estimated at 167 animals and presently exceeds the estimated carrying capacity of 100 to 150 animals.

A ground survey needs to be implemented in the spring in order to obtain accurate sex composition. Sometime in the near future, a survey of habitat and range conditions should be conducted to determine if over-grazing is occurring and if the estimated carrying capacity of 100 to 150 animals is still valid. Because of its present growth rate, the muskox herd on Nelson Island now requires a population management program which will be regulated through hunting and possibly the transplanting of animals.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 22

GEOGRAPHICAL DESCRIPTION: Seward Peninsula

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

No open season.

Population Status and Trend

In 1970, the Department transplanted 36 muskoxen from Nunivak Island to an area near Feather River in Unit 22. The transplant was only marginally successful because most of the animals were yearlings, and there were no natural barriers to restrain their movements. Consequently, a number of the new arrivals scattered widely throughout the Seward Peninsula. Harassment from interested spectators on snow machines also contributed to dispersal. After moving over 100 miles in 2 years, two small groups became established in the York Mountains on the western end of the Seward Peninsula. Since then both herds have established separate home ranges. One group's range is northwest of Brevig Mission and was designated the Black Mountain herd after the terrain feature with which they are most commonly associated. The other group was called the Nuluk herd, named after the river in the area they frequented. During the last few years each herd has grown slowly as mature cows have reached breeding age.

Population Composition

In the last 5 years the Black Mountain herd has shown the strongest fidelity to a specific geographical area, and has usually remained together as a cohesive group moving from summer to winter range. Their predictable home range makes it possible to locate the herd most times they are searched for. The herd was classified from the ground in late June by University of Alaska personnel and determined to contain a minimum of 43 animals as follows:

4+ Years		3 Years		2 Years				
♂	♀	♂	♀	♂	♀	Yearlings	Calves	Total
3	11	2	1	1	2	12	11	43

When comparing cow/calf ratios it is obvious that productivity was excellent (11 calves per 14 breeding females). The previous year there were 34 animals classified from the Black Mountain herd of which 12 were calves of the year. Since there were 12 yearlings in the 1980 June survey, it appeared that all the 1979 calves survived to the age of one year.

This was the first year that the Nuluk herd was sighted with any degree of regularity. In the past they exhibited a preference for a 400-square mile area of marshy plains and tundra foothills between Ear Mountain and the drainage of the Pinguk River. In such a vast area, it was difficult to locate a small group of animals when they were seemingly always on the move. It was speculated that the Nuluk herd often fractured into several small groups during the course of the year (a behaviorial trait contrary to that exhibited by the Black Mountain herd at this time of year). On March 12, four separate groups were sighted on their winter range. Composition was estimated to be 14 adults and 2 yearlings in one group; 21 adults and 6 yearlings in another; and two groups of adult bulls each containing 5 and 3 animals, respectively. In the March survey there was a total of 51 muskoxen that could be considered to be part of the Nuluk herd.

On May 23, this area was surveyed again, and three separate groups were located. However, most of the higher terrain was enshrouded in fog, and undoubtedly one, or more, group seen earlier was missed.

The largest aggregation was estimated to contain at least 35 animals of which 10 were calves of the year. When the 1980 calf production is included, the Nuluk "herd" was known to contain at least 61 animals. When the Black Mountain and Nuluk muskoxen are combined together, it can be assumed there are at least 104 adults and subadults in the two herds.

During the year the public reported numerous sightings of muskoxen at scattered locations throughout Unit 22. Following are some of the verified reports.

August 15, 1979: A lone muskox (bull?) was spotted 37 miles east of Nome.

August 23, 1979: A mature bull was observed 8 miles east of Nome traveling along the beach toward the city. Upon reaching the city limits it turned north, and then eventually moved off to the northwest.

August 30, 1979: A lone bull was seen on the Snake River 10 miles northwest of Nome (likely the same animal in the previous observation).

October 3, 1979: A lone muskox was seen 40 miles west of Nome on the Feather River.

October 9, 1979: A lone muskox was observed standing on a sand bar on the Kuzitrin River 60 miles northeast of Nome.

May 25, 1980: Three muskoxen were observed feeding near the Tisuk River 50 miles west of Nome. One bull was seen in the general vicinity 6 weeks later.

From these reports it is apparent that a few muskoxen, probably adult bulls, had a tendency to wander widely. Since all of these "strays" were sighted considerable distances from the nearest established herd, it was not likely that they returned to the parent group. Adult animals that wandered away from the nucleus herd during the summer foraging period probably contributed significantly to herd attrition.

Mortality

There were no known muskox mortalities during the report period. However, there were a number of single muskoxen scattered in remote locations throughout the peninsula and it was possible that one or more may have been killed by grizzlies or wolves. Comparing the numerical increase in herd size from year to year, it appeared natural mortality in the two established herds was very low. Natural straying was probably the single largest "mortality" factor.

Management Summary and Recommendations

The Seward Peninsula herd(s) did not grow in numbers as fast as anticipated when first transplanted. During the last 2 years, however, aerial and ground surveys have revealed an encouraging trend. Two separate herds appear to have established separate and distinct geographical home ranges. Calf production and survival has been excellent in both groups. Approximately 90% (or more) of breeding age females were producing a calf annually, and in the Black Mountain herd it was documented that every calf survived to the age of 1 year. If this trend continues, the herd(s) should double in number in 3 to 4 years. This is assuming they receive maximum protection from human harassment and human- induced mortality. A number of mature bulls regularly wandered off from the nucleus herd, apparently never to return. In addition, small groups of bulls tend to segregate but remain near the nucleus herd. It is not likely that any of the single bulls contribute reproductively to the herd, and some of the other bull groups may be excess to herd needs. If the

two establishing herds continue to grow at the present rate, a limited hunting season for bulls may be warranted. Further herd growth and emigration should be monitored closely.

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MUSKOXEN

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

PERIOD COVERED: July 1, 1979 - June 30, 1980

Season and Bag Limit

No open season

Population Composition

On March 18, 1980 an aerial survey was conducted between the Noatak drainage and Cape Lisburne. The objective of this particular survey was to describe the caribou distribution and thus the search effort for muskoxen was compromised. At Cape Thompson, 8 miles west of Chariot, seven muskoxen including two calves were observed. On Iviangik Mountain near Sigrikpak Creek 23 muskoxen were observed with no calves, and on the southeastern slope of Iviangik Mountain 20 muskoxen were observed of which one was a calf. The total number of muskoxen observed near Point Hope was 50 muskoxen including three calves from spring 1979. It is believed that a band of 5 muskoxen is present in the Mulgrave Hills between the Noatak and Wulik drainages.

Mortality

No information was available.

Management Summary and Recommendations

More intensive aerial surveys should be conducted for that area between the Noatak drainage and Cape Lisburne. Sex and age composition counts are nearly impossible to accomplish by using only aerial observations. Ground observations of muskoxen should be conducted in March or April on the Point Hope herds in order to more accurately determine the sex and age composition.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 7 AND 15

GEOGRAPHICAL DESCRIPTION: Kenai Mountains

PERIOD COVERED: 1 July 1979 - 30 June 1980

Season and Bag Limit

Aug. 1 -Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

Data are insufficient to establish a sheep population trend for the entire Kenai Mountains. However, aerial sheep surveys were conducted in Unit 15 and results were compared to counts from the previous year. Comparison of these data indicate a stable population.

Population Composition

Five hundred and fifty-one sheep were counted during aerial surveys in Unit 15. The sample included 132 rams (24%), 44 legal rams (8%), 77 lambs (14%) and 342 ewes and unidentified sheep (62%).

Mortality

The minimum legal size for sheep was increased from 3/4 curl to 7/8 curl for the 1979 hunting season. In Units 7 and 15 there were 32 rams reported killed a decrease from the previous year kill of 51 sheep. The change in the legal minimum horn size may be the reason for the decrease in harvest. Additionally, hunter participation was less compared to that of previous years.

Management Summary and Recommendations

Hunting pressure and harvests have both shown a downward trend since 1967. More restrictive regulations, limited access on Federally controlled lands and the assumption that Kenai Mountain rams are generally small have contributed to this reduced pressure. However, by restricting hunter access on Federal land, overcrowding has occurred in areas such as Twin Lake and Green Lake, resulting in low quality hunting. To reduce overcrowding a cooperative approach to reopen access points should be addressed by the Department and U.S. Fish and Wildlife Service.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 11, 12, AND 13

GEOGRAPHICAL DESCRIPTION: Wrangell-Mentasta-Nutzotin Mountains

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

Because of limited funds and the uncertainties of Federal land classifications, no sheep surveys were conducted during this reporting period. The 1978 Wrangell Mountain Sheep S&I Report contains the last available composition data.

When last surveyed in summer 1978, selected sheep populations were either stable or increasing. Lamb production in recent years has remained relatively high, ranging from 16 to 27 percent lambs in the herd.

Population Composition

No surveys were conducted during the reporting period. When last surveyed in summer 1978 certain subpopulations exhibited a low proportion of older rams due to concentrated hunting pressure. The Wiki Peak, southern Noyes Mountain, and MacColl Ridge areas had fewer legal rams than in previous years. The new 7/8-curl regulation should serve to prevent biologically significant reductions in numbers of adult rams in the future, although increased hunting pressure will serve to remove most rams exceeding this minimum horn size in many accessible areas.

Mortality

Wolf surveys conducted during March 1980 revealed from 12 to 14 packs along the north side of the Mentasta and Nutzotin Mountains. Intensive tracking indicated that many and perhaps all of these packs depend upon sheep at certain times of the year. Grizzlies, wolverines, and golden eagles are present throughout the area. Predation does not appear to be a problem at this time as the sheep range is well stocked and the sheep population productive.

The harvest of mature rams in 1979 declined significantly in this prime sheep range as a result of Federal land withdrawals under the Antiquities Act. The Federal land withdrawal may have significantly decreased the accuracy and subsequently the compatibility of the harvest data. Harvest ticket returns indicate that 350 hunters killed 193 rams during the fall 1979 season for a hunter success of 55 percent. During 1978, 787 hunters took 388 rams for a hunter success of 49 percent. The greatest decrease in hunter pressure and harvest occurred in Unit 11 where only 34 rams were reported taken in 1979 compared to an average annual harvest of about 150 rams during recent years; this decrease was undoubtedly caused by compliance with monument regulations. As expected, increases in both hunting pressure and harvest were experienced north of the monument. Appendix I summarizes hunter harvest, pressure, and residency by area. Average horn length was 34.2 inches. This is not comparable to mean horn sizes for previous years because of the 7/8 curl regulation in effect for the 1979 season.

Drainages or areas supporting the greatest harvests were the Chisana (19), Snag and Cottonwood Creeks (18), Wiki Peak, Horsefeld (16), Nabesna (13), and Stuver, Lick, and Angler Creeks (10). Guided, nonresident hunters took the majority of sheep in all of these areas except the Nabesna River and Stuver Creek areas. Most successful sheep hunters used either aircraft or horses for transport (54 and 28%, respectively).

Management Summary and Recommendations

Sheep populations in this area vary from moderate to low densities and appear rather uniformly productive. Some populations appear to have increased since 1970. The proportion of mature rams has decreased in certain heavily hunted areas. As a result of Federal land withdrawals, future harvests will be concentrated in the Mentasta and Nutzotin Mountains. Consequently, more intensive monitoring of production, survival, and harvest statistics will be necessary to detect and correct problems with the sheep populations. It may be necessary to consider other approaches to obtain accurate harvest information depending on the long-term public reaction to the National Park status affecting most of the sheep range and possible legislative action modifying the effect of the Federal land action.

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APPENDIX I. Distribution of harvest, hunter success, and residency of sheep hunters in the Mentasta, Nutzotin, and Wrangell Mountains, 1979.

	Mentastas and North Nutzotins	Wrangells and South Nutzotins	Total Both Areas
Percent Hunter Success	57	53	55
Total Successful Hunters	114	79	193
Total Hunters	201	149	350
Percent Success Among Residents	40	41	41
Successful Residents	49	45	94
Total Residents	121	110	231
Percent Success Among Nonresidents	81	92	85
Successful Nonresidents	61	34	95
Total Nonresidents	75	37	112
Percent Nonresidents Among Known Residency Hunters	38	25	33
Total Nonresidents	75	37	112
Total Residents and Nonresidents	196	147	343
Percent of Sheep Killed by Nonresidents*	55	43	50
Nonresident Kill	61	34	95
Total Resident & Nonresident Kill	110	79	189

* Figures exclude successful hunters (4) who did not specify residency.

SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 11, 13 AND 14

GEOGRAPHICAL DESCRIPTION: Chugach Mountains

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Units 11, 13, 14A	Aug. 10-Sept. 20	One ram with 7/8 curl horn or larger
Unit 14C	Sept. 6-Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

Operational funds were not sufficient to allow sheep surveys in areas other than Subunit 14C. Sheep surveys conducted in Subunit 14C during 6 of the previous 12 years indicate a stable population of approximately 1,000 sheep. Classification counts taken within the Unit 13 portion of the range from 1969 through 1978 also indicate a relatively stable sheep population. Some concern, however, has been expressed by hunters regarding the status of the sheep population in Subunit 14A. Several hunters indicated they have not observed as many sheep as in previous years. Sheep surveys have not been flown in this area since 1974.

Population Composition

Classification of 903 sheep observed in Subunit 14C was as follows: 85 legal rams, 143 young rams (approximately 2-5 years of age), 161 lambs, and 514 ewes and yearling rams. Sheep composition data from previous years were presented by Harkness (1980).

Mortality

One hundred and twenty mature rams were taken during the 1979 hunting season, a figure nearly identical to the previous 6-year mean of 123 sheep. Of those taken in 1979, 43 were killed in Subunit 14C, 17 in Subunit 14A, and 60 in Unit 13. No rams were reported taken from Unit 11, the portion of the range entirely within

the Wrangell-St. Elias National Monument which was closed to sheep hunting by Federal regulation.

Mean ram horn size was 35.5 inches, an increase of 1.7 inches over the mean size recorded in 1978. This increase was a clear reflection of the new 7/8 curl horn regulation. Four hundred and thirty-one persons hunted sheep throughout the season, a 4 percent decline from 1978. Sheep harvest data and hunting pressure from the Chugach Mountains since 1970 have been published (Harkness 1980).

Management Summary and Recommendations

Sheep surveys within five established Chugach Mountain trend count areas should be flown annually. Extensive surveys of the entire range should be undertaken at least every 3 years. These surveys are necessary to adequately monitor changes in the sheep population size and composition.

In response to hunting closures within recently established National Monuments, a significant increase in hunting pressure was anticipated within the Chugach Mountains. In Subunit 14C, pressure increased by 33 percent, but in Unit 13 and Subunit 14A it declined by 19 percent. Overall, pressure declined slightly. This decline will most likely be short lived. In future years competition among hunters will likely increase to the point where the quality of sheep hunting is affected. A proposal to place all Chugach Mountain sheep hunting under special permit should then be presented to the Board of Game.

Literature Cited

Harkness, D. B. 1980. Sheep Survey-Inventory Progress Report. In R.A. Hinman (Ed.). Annual Report of Survey-Inventory Activities. Alaska Fed. Aid in Wildl. Rest. Proj. W-17-11. Jobs 2.0, 13.0, 8.0, 6.0 and 22.0.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 12, 13, AND 20

GEOGRAPHICAL DESCRIPTION: The Tok Management Area (The Tok Management Area includes that portion of the Alaska Range bounded on the east by the Glenn Highway, on the north by the Alaska Highway, and on the west by the Johnson Glacier-Johnson River).

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 Sept. 20	One ram with full-curl horn or larger by permit only. 120 permits will be issued (see permit hunt supplement).
Sept. 10 - Oct. 30	One ewe by registration permit only; 30 ewe sheep may be taken (see permit hunt supplement).

Population Status and Trend

Sheep in the Tok Management Area (TMA) are at a relatively low density compared to sheep populations in the central portion of the Alaska Range. Overall, the population is stable, but certain subpopulations subject to concentrated ewe shooting may have been reduced. This remains to be proved by aerial survey. The TMA sheep population is estimated to range from 1,400 to 1,800 animals.

Population Composition

No aerial composition surveys were conducted during the reporting period due to limited funding, but

composition counts at the Sheep Creek mineral lick were conducted during late June and July (Table 1).

Table 1. Calculated productivity and survival of Dall sheep lambs based upon ground observations in the TMA, 1979.

Area	Lambs:100 Ewes	Yearlings:100 Ewes	Sample Size
Sheep Creek (mineral lick)	63	25	465

While lamb production and initial survival apparently increased slightly from 1978 to 1979 (57 and 63 lambs per 100 ewes, respectively), survival of the 1978 cohort to 1 year of age was relatively poor at 25 yearlings per 100 ewes. During 1978, 35 yearlings per 100 ewes were observed. While snow conditions on sheep winter ranges during winter 1978-79 remain unknown, snow accumulations at lower elevations were much higher than normal and February temperatures unseasonably low. If comparably adverse conditions occurred on the TMA, this could explain the poor recruitment.

Mortality

A total of 95 ewe permits was issued in 1979, a decrease of 47 percent from the 179 permits issued in 1978. The decrease was the result of a later season opening in 1979 designed to reduce hunting pressure. Despite the later opening, the ewe season was closed by commissioner's announcement on September 27 after 29 ewes had been taken. Ewe harvests were concentrated in the Dry Tok and Sheep Creek drainages.

One hundred and twenty ram permits were issued for the TMA in 1979, but, unlike previous years, no alternate permits were issued. Of the 107 hunters who have submitted check-out questionnaires, 86 (80%) actually hunted. The total harvest from these hunters was 35 full-curl rams. This represented a 41 percent rate of hunter success, but true success rate will probably change when the remaining 13 permit holders report their activities. Over 20 percent of the permit holders (28) failed to complete check-out questionnaires following the hunt. Three rams with horns exceeding 40 inches in total length were taken.

Because the season is closed when the quota is reached, the 1979 ewe harvest did not change appreciably from previous years. The harvest of 35 rams, however, represented a welcomed 31 percent decrease in take from the previous year and was within the range of desired

annual harvest (30-35 rams). Hunter success did not vary significantly from that of the previous year, but the proportion of hunters actually participating in the hunt declined appreciably. This was due in part to the decision not to issue permits to alternates.

Based upon a population estimate of 1,500 sheep, total man-caused mortality accounted for approximately 4 percent of the population. No sheep mortality resulted from research activities in 1979.

Wolves and grizzly bears are relatively abundant in this area. They are the most likely causes of mortality in addition to hunting.

Management Summary and Recommendations

The TMA sheep population experienced high lamb production and intial survival during 1979, but recruitment of the 1978 cohort was lower than expected. The harvest of full-curl rams decreased to the desired level and the ewe harvest approached the quota of 30. The primary management objective of the TMA is to provide trophy sheep hunting. This objective is being met as 9 percent of the rams harvested exceeded 40 inches in horn length.

Although the harvest quota of 30 ewes annually is conservative, concentrated harvests in two or three small areas may be contributing to localized subpopulation declines. Aerial surveys, comparable to surveys conducted in 1974, are needed to assess the status of subpopulations in the heavily hunted areas.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 AND 14

GEOGRAPHICAL DESCRIPTION: Talkeetna Mountains

PERIOD COVERED: July 1, 1979-June 30, 1980

Season and Bag Limit

Units 13, 14A and 14B	Aug. 10-Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

The numbers of sheep within the Talkeetna Mountain range have remained relatively stable over the past 10 years. Harvest levels have mostly been a function of the number of legal rams available during a particular season.

Population Composition

No data were available.

Mortality

Two hundred and sixty-nine hunters reported harvesting 65 rams (Appendix I). Of the rams harvested, 75 percent were taken in Unit 13, 14 percent in Subunit 14A, and 11 percent in Subunit 14B (Appendix II). The total number of hunters reporting declined (12.8%) from the previous year and the sheep kill was the third lowest since 1970.

Management Summary and Recommendations

The minimum legal size for sheep was increased from 3/4 curl to 7/8 curl for the 1979 hunting season. This change in the legal minimum horn size could be the reason for the decreased harvest.

In December 1978 extensive areas of Alaska were declared National Parks by the Secretary of the Interior. This land withdrawal closed extensive areas of sheep range to sport hunting. Due to this withdrawal, a substantial increase in hunting pressure was expected, however, this did not occur in the Talkeetna Mountains.

The sheep populations in Subunits 14A and 14B have not been surveyed since 1974. These areas should be surveyed to determine the current status of sheep populations.

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Appendix I. Reported harvest of dall sheep rams, numbers of hunters and success of hunters for the Talkeetna Mountain Range, 1970-1979, as derived from harvest reports.

	All Hunters			Residents			Non-residents		
Year	Harv.*	Hunt.*	Succ.*	Harv.	Hunt.	Succ.	Harv.	Hunt.	Succ.
1970	99	268	37%	45	175	26%	43	62	69%
1971	85	240	35%	39	178	22%	44	59	75%
1972	81	304	27%	41	227	18%	34	61	56%
1973	61	277	22%	39	232	17%	21	31	68%
1974	114	312	37%	83	259	32%	26	40	65%
1975	109	281	39%	75	231	32%	30	40	75%
1976	77	300	26%	55	267	21%	20	29	69%
1977**	55	203	27%	40	182	22%	14	17	82%
1978	77	304	25%	56	256	22%	19	38	50%
1979	65	269	24%	37	225	16%	27	37	73%

* Harv. = Harvest; Hunt. = Hunter; Succ. = Successful.
** No reminder letters were sent to sheep hunters.

Appendix II. Reported harvest of dall sheep rams from Game Management Units within the Talkeetna Mountain Range, 1970-1978.

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
Unit 13	91	71	64	52	93	95	58	49	71	49
Subunit 14A						9	11	5	3	9
Subunit 14B	5	3	7	3	8	5	11	7	3	7

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 AND 20

GEOGRAPHICAL DESCRIPTION: Delta Management Area (The Delta Management Area includes the drainages of the Delta River from McGinnis Creek south to Castner Glacier and the drainages of the Tanana River flowing into its south bank from the Delta River upstream to the west bank of the Johnson River.)

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger by permit only (see permit hunt supplement)

Population Status and Trend

The Delta Management Area (DMA) sheep population consists of approximately 1,500 animals. Although the population is generally healthy and productive, numbers did not increase.

Population Composition

Composition counts of sheep utilizing the Granite Creek and Little Gold Creek mineral licks were made during July 1979. Composition counts of the Granite Creek lick date back to 1972 and at Little Gold Creek to 1974. There was no count conducted on Pegmatite Creek in 1979.

Lamb production in the DMA varied from 75 lambs per 100 ewes at Granite Creek to 56 lambs per 100 ewes at Little Gold Creek. Average production for the two licks was 68 lambs per 100 ewes. Mean yearling recruitment resulting from the 1978 lamb cohort (32 lambs per 100 ewes) was 30 yearlings per 100 ewes. This unusually high survival may be a result of sampling error, extremely mild winter weather, or absence of predators. The total number of sheep classified was 663.

Mortality

Sixty permits were issued for both the August 10-25 walk-in season and the open-access season (August 26-September 20). This system continued to maintain harvest and hunting pressure at desired levels. In addition, minimum legal horn size was increased from 3/4 to 7/8 curl.

The 1979 harvest totaled 39 rams, and the average horn size of sheep killed was 34.6 inches. This was a dramatic increase over the average horn length of 31.2 inches for sheep killed during the 1978 season. The marked increase reflected the change from a 3/4 to 7/8 curl as the minimum legal horn size. Walk-in hunters took 18 rams (average horn size 34.3 inches) and 21 rams (average horn size 34.8 inches) were taken during the unrestricted season. The success rate among permittees was 33 percent. If, as in 1978 and 1979, harvests remain below the 10-year average, horn size should continue to increase to levels recorded for the late 1960's.

Analysis of the permit returns for the 1979 season showed that only 20 percent of the hunter effort and 23 percent of the kill occurred in the more inaccessible portions of the DMA, such as the headwaters of the Johnson and Gerstle Rivers. The easily accessible areas of the Granite Mountains and the mountains near the Richardson Highway and Isabel Pass supported the bulk of the effort (80%) and harvest (77%). Only 5 percent of the harvest during the walk-in season occurred in the less accessible eastern portion of the DMA, while 18 percent of the take during the unrestricted access season came from this area.

Management Summary and Recommendations

The split season permit system initiated during 1978 maintained harvest and hunting pressure at desired levels. The harvest nearly equaled the calculated number of sheep entering the 7/8-curl cohort.

The limited entry concept was well received by those with permits while those not receiving permits resisted the scheme. If increasing horn size and uncrowded hunting conditions are desirable, the current permit system approach should continue. The population is healthy and productive but does not seem to be increasing. Before increasing human utilization by allowing the harvest of females, mortality factors presently stabilizing the population should be identified and controlled.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 19

GEOGRAPHICAL DESCRIPTION: Alaska Range West of Mt. McKinley Park

PERIOD COVERED July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

No surveys or field work were conducted in the Alaska Range west of McKinley Park during the past reporting period. Observations from guides and others suggest good lamb production and some increases in legal ram numbers.

Population Composition

No data on composition were gathered during the reporting period.

Mortality

Hunters took 85 rams from Unit 19 in 1979. Nonresidents took 47 rams (55%); the remainder was taken by residents. Harvest in the western Alaska Range was down from past record highs of 1976-77 by about 65 percent, and hunter effort was lower by 50 percent. The decrease in hunters was not anticipated. It was expected that hunter pressure would increase because of Federal regulations prohibiting hunting in many areas occupied by sheep. The decrease in hunter pressure and the increase in legal horn size from 3/4 curl to 7/8 curl probably combined to reduce the take of rams.

Management Summary and Recommendations

Populations appear to be stable, and initial production during 1979 was reported to be good. Hunter pressure declined, and the 7/8 curl regulation acted in concert with this decline to lower the harvest of rams.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20

GEOGRAPHICAL DESCRIPTION: Alaska Range east of McKinley Park, except the Tok and Delta Management Areas

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

Sheep density within this area is high and the population appears to be increasing. Initial production was above normal and mortality from all sources showed no significant changes from recent years.

An aerial survey conducted in the Dry Creek study area during July 1979 indicated that the sheep population within the study area had increased since the last survey (1975). The sheep population on the study area was estimated at 350 in 1975. Results of the 1979 survey suggested an increase to 410 sheep. During the period 1976-79 generally favorable conditions resulted in high lamb production and subsequent yearling survival.

Population Composition

Composition and productivity data obtained at several mineral licks in the eastern Alaska Range during June and July 1979 revealed that initial lamb production was 65 lambs per 100 ewes, and that recruitment was 19 yearlings per 100 ewes.

Mortality

Information derived from harvest tickets indicated that 86 sheep were harvested during the 1979 season. The average harvest in recent years has been 110 animals.

Mean horn length of sheep taken during 1979 was 34.9 inches, an increase from the 1975-1978 average of 32.5 inches. The increased average horn size, decreased

harvest, and reduced hunter success resulted from the increase in minimum legal horn size from 3/4 to 7/8 curl. This portion of the Alaska Range does not produce fast-growing, large-horned sheep, and the number of sheep with horns 7/8 curl or greater is relatively low.

Other sheep harvest statistics are presented below:

Reported No. Hunters	Percent Success	% Hunters		% Harvest		% Success	
		Res.	Nonres.	Res.	Nonres.	Res.	Nonres.
226	38	81	15	66	29	31	78

Although hunters utilizing horses for transportation experienced the highest success ratio, those using aircraft harvested the most sheep. Statistics involving transportation are presented below:

Transportation	Successful Hunters	Unsuccessful Hunters
Aircraft	46	67
Horse	24	6
Off-road vehicle	4	18
Highway vehicle	11	32

The Wood River drainage again produced the largest harvest as shown below:

Drainage	Number Successful Hunters	Number Unsuccessful Hunters	Total Hunters	Percent Success	Mean Horn Size (inches)
Yanert	14	18	32	44	36.6
Healy	13	66	79	16	35.0
Totatlanika	3	4	7	43	37.2
Tatlanika	3	4	7	43	32.2
Wood	37	11	48	77	34.5
Dry Creek	5	5	10	50	34.4
W. Fork Little Delta	7	7	14	50	34.5
E. Fork Little Delta	4	13	17	24	34.9
Delta Creek	0	12	12	0	-

Successful hunts averaged 3.5 days in length.

Management Summary

The central Alaska Range continues to be a popular hunting locale for resident sheep hunters despite the absence of significant numbers of large-horned rams. Compared with other sheep hunting areas in the state, hunting success is average.

Although the overall sheep population is large, most ewes from this portion of the Alaska Range experience alternate year reproduction, and therefore recruitment of rams into the population is relatively low. It is unlikely that this population can sustain a significantly larger ram harvest without a corresponding increase in the rate of production and subsequent recruitment.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20

GEOGRAPHICAL DESCRIPTION: Tanana Hills and White Mountains

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Aug. 10 - Sept. 20	One ram with 7/8 curl horn or larger

Population Status and Trend

Sheep populations in the Tanana Hills occur discontinuously throughout suitable range from the White Mountains to Glacier Mountain and densities are low. Because surveys were not conducted during the reporting period, data regarding population trends are unavailable. Populations are believed to be essentially stable.

Population Composition

No data were obtained during the reporting period.

Mortality

According to harvest ticket data, six sheep were harvested during the 1979 hunting season, which approximated the average for the past several years. Harvests and hunting pressure have varied considerably since about 1967 but have stabilized during the past 4 or 5 years. Harvest statistics for the 1979 hunting season are summarized below:

			Mean	% Hunters		% Harvest		% Success	
Harvest	Hunters	Percent Success	Horn Size	Res.	Nonres.	Res.	Nonres.	Res.	Nonres.
6	17	35	37.0	100	0	100	0	35	0

Additionally, one ram was reported harvested from the southwest Ogilvie Mountains east of the Nation River in Unit 25. Only one individual reported hunting in this area during 1979.

Management Summary and Recommendations

Sheep populations in the Tanana Hills are disjunct and of low overall density. Hunting pressure is low and is almost entirely by residents. Most sheep habitat lies within the Yukon-Charley National Monument where sport hunting is prohibited or within the Yukon Flats National Monument. Sport hunting is allowed in the latter area. Access to sheep populations is difficult and harvests are not expected to increase significantly in the future.

Little is known about sheep populations occurring in the southwest Ogilvie Mountains. Surveys indicate that densities in Alaska are low but increase markedly in Canada where habitat is more suitable. Hunting pressure and harvests have been very low in the past. It is doubtful that this situation will change in the future.

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SHEEP

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 24, 25 and 26

GEOGRAPHICAL DESCRIPTION: Brooks Range

PERIOD COVERED: July 1, 1979 - June 30, 1980

Seasons and Bag Limits

Unit 23	Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger
Units 25 and 26C those portions within the National Wildlife Range	Aug. 1	Sept. 20	One ram with 7/8 curl horn or larger only (see permit hunt supplement)
Remainder of Unit 25 and 26C	Aug. 10	Sept. 20	One ram with 7/8 curl horn or larger
Unit 26C	Oct. 1	Apr. 30	Three sheep by permit only (see permit hunt supplement)

Population Status and Trend

Sheep populations on the south side of the Brooks Range vary in density. In Unit 25 and central portions of Unit 24 numbers are low. Western portions of Unit 24 support moderate sheep numbers, while high numbers exist in eastern Unit 24. These sheep populations are thought to be stable, but few data have been gathered in the last 6 years. A survey of sheep abundance in the Arctic National Wildlife Range was conducted in 1979 by the Fish and Wildlife Service. Complete data are not yet available.

Population Composition

No data were obtained during the reporting period.

Mortality

During 1979, 328 hunters reported taking 227 rams in the Brooks Range. The number of hunters reporting was down about 30 percent from the mean of the 2 previous years. This decrease is probably attributable to Federal regulations that closed hunting in virtually all of the Brooks Range west of the pipeline corridor. Hunters in the Arctic National Wildlife Range (Unit 26A) took 103 of the 227 sheep harvested in the Brooks Range. On the Arctic National Wildlife Range the kill was evenly distributed between the early hunt (hunt 1140 from August 1 through August 15) and the late hunt period (hunt 1141 from August 16 through September 20). The total number of hunters participating in the Arctic National Wildlife Range hunt was 183, and they enjoyed a 56 percent success rate. The harvest reported from Unit 23 was 25 rams taken by 40 hunters.

In addition to sport harvest during the regular season, a late subsistence hunt (October 1-April 30) was allowed in Unit 26A. Hunters, primarily from the village of Kaktovik, were allowed a quota of 50 sheep with a bag limit of three per permit. These hunters reported taking 16 sheep, all in November. Localized areas near a traditional camp site at Old Woman Creek showed lower numbers of adult sheep in 1979 than in 1976 when a comparable survey was flown. It is not certain whether these reductions are a result of hunting. It is possible that migration patterns influenced by mineral licks in the upper Hulahula River resulted in differing distributions during the two surveys.

Management Summary and Recommendations

Sheep throughout the Brooks Range are at apparently stable densities. Sport hunting has no effect on lamb production, and at the level practiced in the Brooks Range has little impact on total sheep numbers. The impact of ewe hunting on the population has not been documented, but efforts should be made to determine the trends for populations where either-sex hunting is practiced. Movement patterns of sheep in the Hulahula drainage should also be studied.

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