1980-81

ALASKA DEPARTMENT OF FISH AND GAME
JUNEAU, ALASKA

STATE OF ALASKA
Jay S. Hammond, Governor

DEPARTMENT OF FISH AND GAME
Ronald O. Skoog, Commissioner

DIVISION OF GAME
Ronald J. Somerville, Director

ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES

PART II. CARIBOU, MOOSE, AND MOUNTAIN GOATS

EDITED AND COMPILED BY

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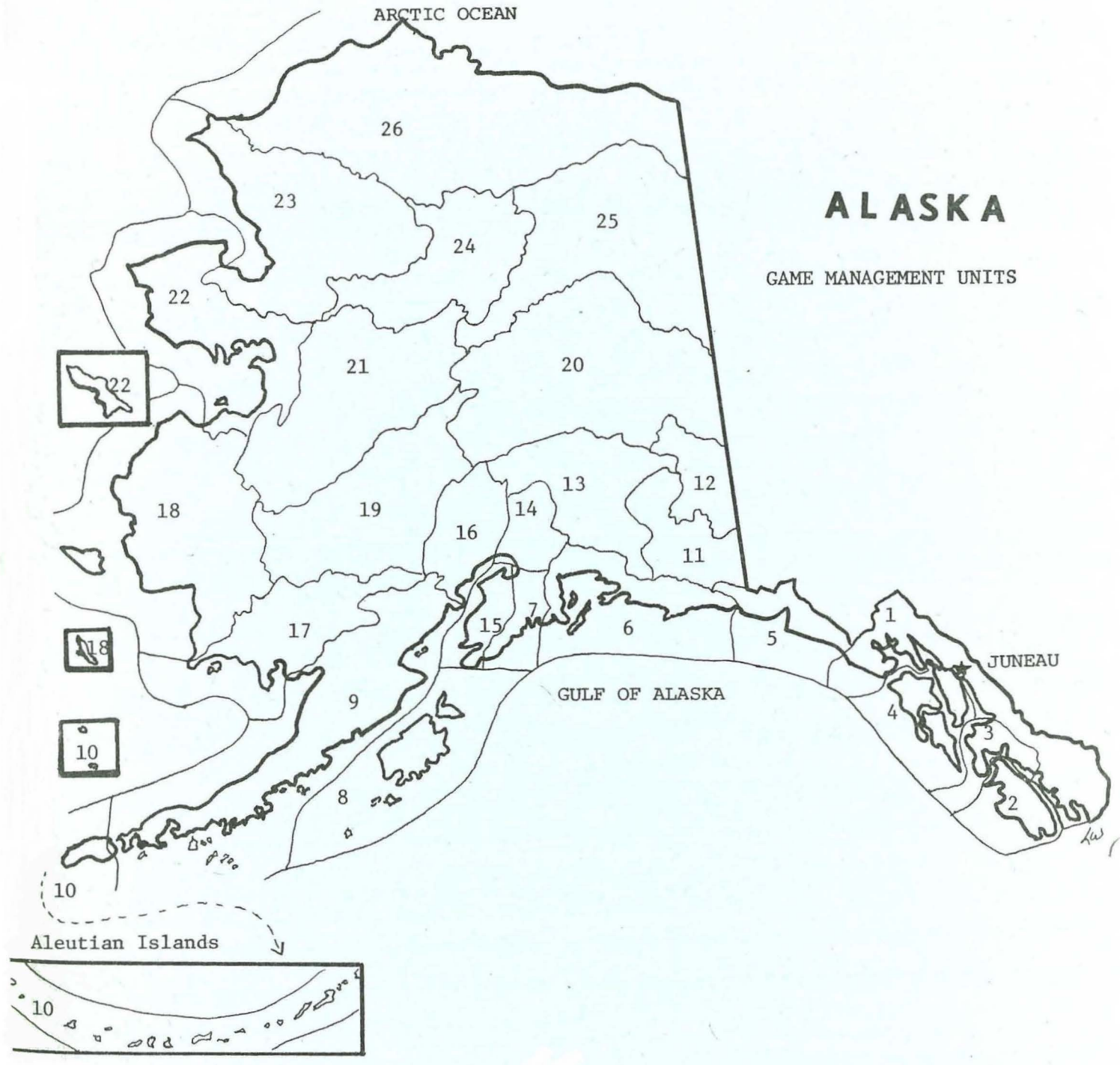
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Statewide Harvests and Population Status

Caribou

Statewide harvest figures are not available of inadequate harvest monitoring methods. Numerically, largest harvests came from the Western Arctic (3,000 estimated) Alaska Peninsula (1,500-2,000), Porcupine (875-1,200) and Mulchatna (500-800) herds. The only accurate harvest figures from a major caribou herd (621 caribou) come from the Nelchina herd. Statewide harvest probably exceeded 8,000.

Generally, the status of caribou is the most favorable we have seen for years. All major herds appear to be increasing (Alaska Peninsula, Mulchatna, Nelchina, Delta, Fortymile, WAH, CAH) or stable at high levels (Porcupine). Interestingly, all minor herds appear to be either stable or declining.

Herd	Harvest	Population Status	Pop. Trend
Kenai Mts.	21	250	Stable
Alaska Peninsula	1,500-2,000	22,000-25,000	Steadily increasing
Mulchatna	500-800	18,600	Increasing
Unimak	?	?	?
Adak	129	300	Increasing
Mentasta	144	2,621	Stable
Chisana	13	1,000(-)	Stable
Nelchina	621	18,737	Increasing
Kenai Lowlands	0	65	Stable
Denali	0	1,200-1,500	Stable
Beaver Mts.	9	?	?
Delta	104	4-5,000	Increasing
Macomb	12	800-1,000	Stable to declining
Fortymile	30-60	9-11,000	Increasing
Porcupine	875-1,200	110,000	Stable or increasing
Western Arctic	3,000	140,000	Increasing rapidly
Central Arctic	50-100	5,900-7,000	Increasing slowly

Moose

Continuation of the recent trend toward very mild winters should have enhanced recovery of moose populations, but increases were noticeable in only a few units. Unit 22 has continued high density and is still increasing; Unit 13 moose are increasing slowly; moose in Unit 6A and 6B are increasing, and Unit 20A continues to increase at a rapid rate. Elsewhere, populations are stable or declining, apparently reflecting a decline in habitat or continued excessive predation.

Reported harvest was approximately 4,500 moose, but reported harvest is far below actual hunter kill in many of the rural areas of the State. Major units include Unit 16 (600 moose), Unit 13 (557), Unit 19 (369), Unit 22 (275-300), Unit 15 (407), Unit 20 (508), and Unit 14 (493).

Mountain Goat

Mountain goat populations in southeastern Alaska (GMU 1, 4, 5) are slowly but steadily increasing, although still not back to the high levels of the early 1970's. The increasing trend reflects the series of mild winters. Goats on Kodiak also continue to increase and extend their range. Elsewhere goat populations are stable except on the northern fringes of their range in Units 7, 15 and 14 where they may be declining.

Goat harvests were generally stable, with the highest kill coming from Unit 6 (120 goats), followed by Unit 1A (60), and Unit 4 (49). The registration permit system provided improved monitoring and control of the harvest.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 7

KENAI PENINSULA MOUNTAIN HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 10 - Oct. 31	One caribou by permit only. 100 permits will be issued.

Population Status and Trend

Results of fall and winter caribou surveys suggested that the post-hunting population of the Kenai Mountains herd was 250 animals. The herd grew rapidly during the early 70's, but surveys conducted since 1974 indicate the herd has stabilized.

Population Composition

Sex and age composition surveys have been conducted by the Department of Fish and Game during years when funds were available and when weather conditions were suitable. Results of those surveys are presented in Appendix I.

Two hundred and twenty-seven caribou were counted on October 31, 1980, the highest number of animals located since 1976, when 252 caribou were counted. The adult sex ratio appeared normal for a hunted population. A moderately low calf ratio suggested that the population may be able to only compensate for annual losses and, therefore, is not increasing.

Mortality

Three hundred and ninety-one applicants applied for 100 caribou hunting permits for the 1980 season. Twenty-one caribou were harvested representing the lowest harvest during the past 5 years. The 1980 harvest was comprised of 13 (62%) males and 8 (38%) females, and hunter success was 34 percent with 38 percent of the permit holders not hunting. Seventy-one percent (15) of the successful hunters used highway vehicles, 24 percent (5) used horses, and 5 percent (1) used aircraft to gain access to hunting areas.

Harvest data for the Kenai Mountains herd from 1976 through 1980 are shown in Appendix II.

Management Summary and Recommendations

The Kenai Mountains herd grew rapidly during the early 70's, but appears to be stable at the present time. Why the herd has stabilized is not known. Wolf numbers have increased throughout the herd's range and wolf predation is apparently increasing. Additionally, winter range reconnaissance surveys suggested that available winter range is limited by snow conditions.

No changes in season or bag limits were recommended.

PREPARED BY:

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Appendix I. Sex and age composition data for caribou in Unit 7, 1976 to 1980.

Date	Total Bulls Per 100 Cows	Yrlg. Per 100 Cows	Calves Per 100 Cows	Yrlg. % In Herd (N_1)	Calf % In Herd (N_2)	Cow % In Herd (N_3)	Bull % In Herd (N_4)	Sample Size (Sum of N)
2/25/76	No composition data							252
3/8/77	No composition data							140
10/28/78[a]	-	-	-	- -	14.6 (26)	- -	- -	178
6/22/79[a]	-	-	-	- -	23.2 (29)	- -	- -	125
10/19/79[b]	43.7	-	24.3	- -	14.5 (25)	25.5 (103)	26.0 (45)	173
4/19/80[b]	56.5	34.0	-	18.0 (29)	- -	52.5 (85)	29.6 (48)	162
10/31/80[b]	36.1	-	34.6	- -	20.3 (46)	58.6 (133)	21.1 (48)	227

[a] Survey conducted from PA-18-150 (Super Cub).
[b] Survey conducted from Bell 206B Jet Ranger (Helicopter).

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Appendix II. Hunting seasons, dates, number of permits issued, number of applications received, caribou harvest by sex and hunter success in Game Management Unit 7.

Year	Season	Permits Issued	Number of Applications Received	Harvest MM	Harvest FF	Total	Percent Successful[3]
1976-77	Aug.10-Mar.31[1]	457[2]	-	22	27	49	33
1977	Aug.10-Oct.31	100	236	11	15	26	44
1978	Aug.10-Oct.31	100	212	19	11	30	41
1979	Aug.10-Oct.31	100	354	17	16	33	48
1980	Aug.10-Oct.31	100	391	13	8	21	34

1 Closed by emergency order 8/29/76.
2 Unlimited permits.
3 Based on the number of hunters who actually hunted.

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Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 9

ALASKA PENINSULA HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limits

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

* Caribou harvest ticket required

Population Status and Trend

Census results and general observations indicate that the northern segment of the Alaska Peninsula caribou herd has been steadily increasing over the past 5 to 10 years (Appendix I). This time frame corresponds to a period of mild winters, moderate hunting pressure and excellent calf production. No impending change in trend is evident.

Nevertheless, the continuing deterioration of "traditional" movement patterns and increasing use of new range may indicate that this population is reaching the limits of the area's carrying capacity. During early 1980, a report was received that a major post-calving concentration of several thousand animals was seen on the Pacific slopes north of the Aniakchak River. Previous sightings on the eastern side of the Aleutian mountains were of much smaller groups. During the mid-winter period in February 1981, several hundred to a few thousand caribou moved north of Big Creek approaching the south shore of Naknek Lake and tracks of one group of about 20 were observed north of the Naknek River along Pike Ridge.

The southern portion of this herd increased from about 3,000 in 1975 to 6-7,000 in 1980; more recent data are lacking. The greater rate of increase in this subpopulation may reflect lighter hunting pressure south of Port Moller and/or immigration of animals from Unimak Island.

The current total population on the Peninsula is estimated at 22-25,000 caribou. This number meets or exceeds the level suggested by Skoog (1968) as the maximum sustainable herd size for this area. Careful monitoring of this herd should be continued to ascertain if and when numbers begin to stabilize or decline.

Population Composition

Composition data are limited to the northern segment of the herd; logistic costs and adverse weather have prevented counts south of Port Moller since 1975. Appendix I reveals that the bull:cow ratio declined significantly between 1970 and 1975 apparently as a result of heavy fall hunting pressure on mature bulls. From 1973 to 1975, hunters could take three bulls in the fall. Beginning in 1976, regulatory changes reduced the fall bag limit to one caribou and directed late season hunting toward cows. Over the following 5 years, the bull:cow ratio increased to the current level of 52.8:100.

Throughout this period, calf:cow ratios and calf percentage in the herd have been high and gradually increasing (Appendix I). These statistics reflect the productive nature of the herd and support the belief that the population is increasing.

Mortality

Weather-induced mortality has been minimal over the past 5 years. Wolf and bear predation have been minor, but general observations indicate that wolf populations or activity are increasing in some areas. Mild weather since 1976 has hampered wolf hunting and trapping and two packs, totaling 25 wolves, were seen or reported in caribou wintering areas between King Salmon and Ugashik in 1980-81. Predator-prey relationships may be changing due to dynamics in the wolf, caribou and moose populations. Close monitoring of wolf predation should be initiated on the Alaska peninsula.

Human harvests of caribou from this herd over the past 5 to 10 years are difficult to estimate due to inconsistency in harvest ticket requirements and low compliance with harvest report stipulations by rural villagers. Reported harvests have varied from 663 to 949, but the actual kill has probably been closer to 1,500-2,000 per year (Appendix II). The influence of weather conditions on access has been a primary factor in controlling numbers taken by hunters. The increases in bull:cow ratio and total population since 1975 indicates that this harvest level is not adversely affecting the population.

Management Summary and Conclusions

All efforts to conduct photo-censuses of the Alaska Peninsula caribou herd from 1976 to 1980 were unsuccessful due to an inability to locate post-calving concentrations. In October 1980, 20 adult female caribou were radio-collared to facilitate location of post calving groups in 1981. This effort proved valuable as it led to the discovery of 16,600 caribou between King Salmon and Port Moller in June 1981. Although the necessary composition counts could not be made to apply the aerial photo-direct count extrapolation to come up with a total population estimate, having a known minimum population of over

16,000 confirms that this herd has been increasing since 1976. Radio telemetry was essential in gathering this information and the use of radios should be encouraged in managing other widely scattered caribou herds.

Hunter success on the Alaska Peninsula has been exceptionally high for the past 5 to 10 years. The open nature of the country, widely distributed and increasing caribou population, and abundance of lakes, pumice patches and bush airstrips make the area relatively easy to hunt. Recreational and trophy hunters take the majority of the harvest in August through October which accounts for the predominance of males in the kill. Adverse weather from November to February limits access and harvest during this period. Most mid-winter kills occur in close proximity to villages. Late season hunting is primarily limited to local residents who hunt as the caribou migrate south toward the calving grounds.

Under existing regulations, all of the various user groups are able to satisfy their demands on the resource without any obvious affect on the caribou population other than reducing the rate of increase. The recovery of the bull:cow ratio from the low values in the mid 1970's eliminates the need for the antler requirement in the bag limit. Dropping this stipulation would facilitate late season hunting and simplify enforcement.

Although no management problems have been evident with this population in recent years, the herd should be closely monitored over the next few years. Experience in the Nelchina and Northwest Arctic areas shows how quickly and drastically trends can change in caribou populations. The potentials for increases in wolf predation or for range-related decreases in calf production or viability are real and must be considered in long-term decision making in managing this herd.

Recommendations

Delete the requirement that caribou be antlered. No other changes in seasons or bag limits were recommended.

Literature Cited

Skoog, R. O. 1968. Ecology of the caribou (*Rangifer tarandus*) in Alaska. Ph.D. Thesis. Univ. Calif. Berkeley. 698 pp.

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SUBMITTED BY:

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Survey-Inventory Coordinator

Appendix I. Summary of available population statistics for the northern segment of the Alaskan Peninsula herd.

Year	Season	Bull:Cow Ratio	Calf:Cow Ratio	Calf % in Herd	Population Estimate
1970	Fall	48.3:100	46.1:100	22.9	....
1975	Fall	33.0:100	44.6:100	25.1	10,340*
1976	Spring	....	....	....	11,368+
1978	Fall	48.3:100	55.2:100	25.0	....
1980	Fall	52.8:100	56.5:100	27.0	....
1981	Spring	....	....	27.8	16,600+

* Aerial photo-direct count extrapolation; total herd.
+ Spring aerial photo; may underestimate bull segment.

Prepared by: Christian A. Smith, Game Biologist III.

Appendix II. Summary of harvest information for Alaskan Peninsula caribou herd, 1975-1980.

Year	Reported Harvest	Estimated Total Harvest	From the Reported Harvest % Males	From the Reported Harvest % Nonresidents
1975	N/A	1800-2000	61.8%	...
1976	N/A	1000-1500	....	...
1977	949	1500-2000	81.4	19.2
1978	663	1200-1500	78.3	25.4
1979	784	1000-1250	81.6	31.2
1980	900	1500-2000	77.0	23.4

* Based on limited check station data.

Prepared by: Christian A. Smith, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

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

MULCHATNA CARIBOU HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limits

Units 9A, 9B & 17	Aug. 10-Sept. 10; Dec. 1-Feb. 28*	2 caribou
Units 16 & 19C	Aug. 10-Oct. 31	1 caribou
Units 19A & 19B	Aug. 10-Mar. 31	2 caribou
Unit 19D, SE of Kuskokwim River	Aug. 10-Sept. 30; Nov. 11-Jan. 31*	1 caribou
Remainder of Unit 19D	Aug. 10-Sept. 30	1 caribou

* Bag limits were split between fall and winter seasons, generally allowing a full limit during the winter season but only one caribou in the fall.

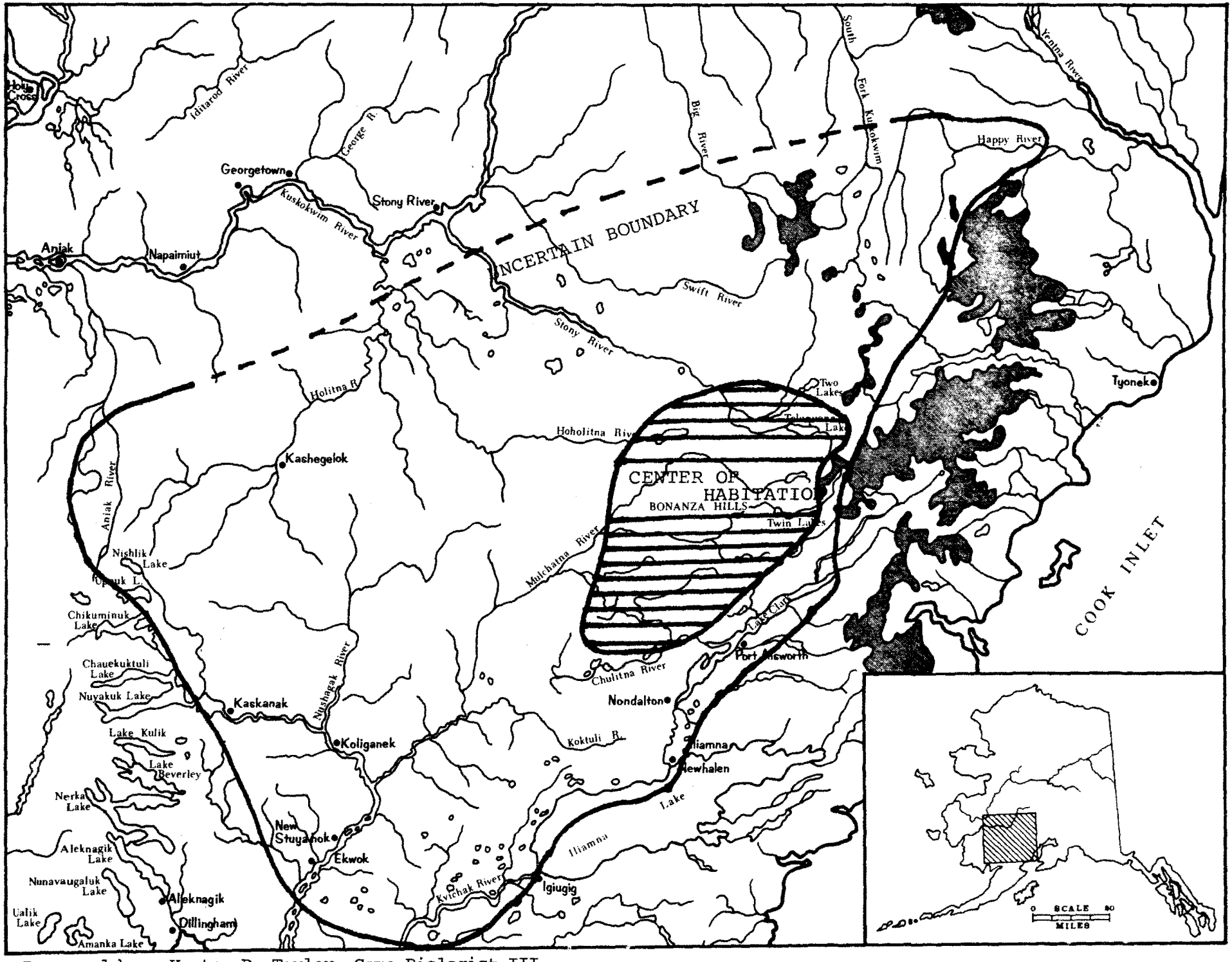
Caribou seasons for the Mulchatna herd from 1959 through the mid 1970's were liberal. Season lengths ranged from several months to no closed season, and big limits were 3-5 caribou.

Population Status and Trend

The Mulchatna caribou herd presently ranges an area encompassing portions of four game management units (9, 16, 17, and 19). The center of habitation for the primary herd is the Bonanza Hills area west of Turquoise Lake, south of Whitefish Lake and north of the Chilikadrotna River (Fig. 1). Several peripheral groups appear to be autonomous from the main herd. A group of 80-120 is located near Etolin Point. Rainy Pass has an estimated 200-400 caribou that are believed to remain in that vicinity all year. Approximately 200 caribou were reported in 1979 and 1980 along the headwaters of the Kisaralik River. The largest peripheral group (450-600 caribou) lives along the northwest shore of Lake Iliamna in the Stukyahok and Koktuli River drainages.

There is little information pertinent to the status and trend of the Mulchatna herd prior to 1973. After an exhaustive search of the literature, Skoog (1968) hypothesized that in the 1830's "A

FIGURE 1. Present Known Range and Center of Habitation of the Mulchatna Caribou Herd.



Prepared by: Kenton P. Taylor, Game Biologist III

large caribou population occurred along the Bering Sea coast from Bristol Bay to Norton Sound." Records indicate that this herd ranged north to the Innoko River and the Taylor Mountains, that it reached peak numbers in the 1860's and that it began declining in the 1870's. Migrations of large numbers of caribou across the Lower Kuskokwim and Yukon Rivers ceased in the 1880's, and, except for the relatively small migrations recorded in 1966 and 1972 across the Kvichak River, have not recurred since.

Caribou numbers began increasing again in the Mulchatna area in the early 1930's (Ak. Game Comm. Repts., 1930-39) then apparently remained relatively stable throughout that decade. There were indications that the herd began declining in the late 1930's but no substantive information was collected between 1940 and 1950 to support this.

Surveys of the Mulchatna area were first flown in 1949 when the population was estimated at 1,000 caribou (Bos 1974 in unpubl. ADF&G files). The population increased to approximately 5,000 by 1965 (Skoog, 1968). An estimated 6,030 caribou were observed on a survey in June 1973, but it was not until June 1974 that a major effort was made to accurately census this herd. A total of 13,079 caribou was counted at that time and provided a basis for an October estimate of 14,231 caribou.

In 1976, another photo-census was conducted and a total of 9,097 caribou were counted. This count was never extrapolated to a fall population estimate because no October sex and age composition counts were flown to determine the percentage of males in the herd. The herd was again photo-censused in 1978 and 6,340 caribou were counted. Extrapolation after the fall composition count produced an estimate of 7,503 caribou in the herd. Counting conditions during the 1978 photo-census were poor, as caribou groups appeared to be dispersing; therefore, it is likely that a substantial portion of the herd was missed during that census.

Twenty radio collars were put on caribou in the Mulchatna herd during late March and early April 1981 to assist in locating major groups prior to the spring photo-census and composition count. The 1981 photo-census was conducted on June 30, and 18,599 caribou were counted.

In summary, it appears as though the Mulchatna herd is subject to great fluctuations in population size and that it probably reaches it peak every 30 to 50 years. It is presently increasing.

Population Composition

Sex and age composition counts have been conducted intermittently in the Mulchatna herd since 1974 (Appendix II). All counts except June 1979 were made from a Bell 206B helicopter.

The most recent fall composition counts were accomplished on October 29, 1980 in the Whitefish Lake area of Unit 19. A sample of 2,250 caribou revealed ratios of 31.3 males:100 females and 57.1 calves:100 females. October counts indicated a definite decline in the male segment of the herd, probably due to the increased sport hunting in the 1970's. The calf segment, however, has been steadily increasing and indicates this herd is presently very productive and is probably expanding in numbers.

Mortality

Harvest data on the Mulchatna herd prior to 1970 are sparse. Between 1970 and 1977, only gross estimates of the annual kill were made. Since regulatory year 1977-78, caribou harvest reports have been mandatory for all game management units encompassing the range of the Mulchatna herd. A survey of the subsistence harvest in 1974 showed 414 caribou taken by local villagers, and it would not be unreasonable to assume comparable harvest levels during preceding years. Estimates of 100 to 350 caribou, taken annually by local villagers from 1970 to 1974, are probably low. In 1974-75, the sport hunting pressure increased greatly in response to a severe decline in the Nelchina herd. The Mulchatna was also the only herd in Southcentral Alaska exempt from the "no hunting the same day as airborne" regulation for the period 1974-75 through 1976-77. The annual kill declined in 1977-78 when the "no hunting the same day as airborne" regulation was implemented and bag limits reduced in Unit 17 and portions of Unit 19 (Appendix I). Approximately 500-800 caribou were harvested in 1977-78, and the harvest has remained at that level through 1980-81.

Harvest report data, available since 1977-78, have never been representative of the total kill. The reminder letter, sent to all hunters who failed to report, was dropped from the harvest report system in 1978-79. Only 36.6 percent of the reports were returned that year. During the same regulatory year, an asterisk identifying game management units for which a caribou harvest ticket was required was inadvertently left out of the hunting regulations for Unit 17. This misprint remained through regulatory year 1980-81. In 1980-81, a total of 320 harvest reports indicated 210 males, 30 females and 5 unknown sex were taken from the Mulchatna herd. Of these, 117 were reported taken from Unit 19, 89 from Unit 17, 27 from Unit 9, and 12 from Unit 16. Resident hunters were responsible for 55.4 percent of the kill. Of 243 successful hunters, less than 10 percent reported taking caribou during the winter season.

Harvest reports probably do not accurately represent the proportions of each sex in the harvest or the actual harvest chronology. Sport hunters, who tend to take a larger percentage of males than females, are more inclined to return harvest reports than are area residents. Most sport hunting effort occurs in August and September. Local residents generally take more females than males because female caribou are considered more palatable during winter months.

Management Summary and Recommendations

Photo-censuses and sex and age composition counts, conducted in 1974, 1976, and 1978, provided a basis for estimation of the Mulchatna caribou population. As estimates from 1974 to 1978 declined, management of the herd became increasingly more conservative. Seasons were shortened and bag limits were reduced in all game management units encompassing the Mulchatna range.

Photo-census accuracy is primarily dependent upon finding all major post-calving cow/calf aggregations in the herd. Finding all major aggregations, while flying preliminary surveys of the area, is not always possible as is evidenced by the difference in the 1978 and 1981 photo-census results. A total of 18,599 caribou was found in the 1981 census with the aid of radio transmitters used to locate major groups. During the photo-census 3 years previously, using standard survey techniques to locate major groups, 6,340 caribou were found. A discrepancy of this magnitude cannot be explained entirely by herd growth. Apparently, a substantial number of caribou were missed during the 1978 and possibly the 1976 censuses. A cooperative study has been undertaken with the National Park Service to determine seasonal movements and major use areas of the Mulchatna herd. Greater knowledge of the behavior of this herd should result in more accurate censuses.

Available harvest information is insufficient to accurately determine effects of hunting season and bag limit alternatives on the population. Over two-thirds of the harvest reports issued statewide are not returned. Many local hunters are never issued harvest tickets and their kill remains unreported.

All major villages in Unit 17 were visited in 1980 to issue harvest tickets and sell hunting licenses to area residents. Efforts in this direction will be expanded in 1981 to include the Lake Clarke area villages. Jaws will be collected during the 1981-82 season to provide a means for estimating the age structure of the harvest.

Photo-censuses, combined with sex and age composition counts during the post-calving and again in the fall, for at least 3 consecutive years are necessary to accurately assess the status of the Mulchatna herd. Calf survival counts should be made each spring to determine herd recruitment.

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Skoog, R. O. 1968. Ecology of the Caribou (Ranger tarandus granti) in Alaska, University of California, Berkeley, Ph.D. Thesis, 699p.

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APPENDIX I. Hunting seasons and bag limits for the Mulchatna Caribou Herd from regulatory year 1975-76 through 1980-81.

YEAR	UNITS	SEASON DATES	BAG LIMITS
1975-76	9 & 17	7/1-6/30	3 caribou
	16	8/10-3/31	3 caribou
	19	8/10-3/31	5 caribou
1976-77	9	8/10-10-15; 12/1-3/31*	3 antlered caribou
	16	8/10-3/31	3 caribou
	17	8/10-3/31	3 caribou
	19, N. of Kuskokwim River	8/10-9/30	1 caribou
	19, remainder	8/10-3/31	2 caribou
1977-78	9	8/10-3/31	4 antlered caribou
	16	8/10-3/31	3 caribou
	17	8/10-3/31	2 caribou
	19A & 19B	8/10-3/31	2 caribou
	19C	8/20-10/31	1 caribou
	19D	8/10-9/30	1 caribou
1978-79	9A, 9B & 17	8/10-9/10; 1/1-2/28*	2 caribou
	16	8/10-10/31	1 caribou
	19A & 19B	8/10-3/31	2 caribou
	19C	8/20-10/31	1 caribou
	19D, SE of Kuskokwim River	8/10-9/30; 11/1-1/31*	1 caribou
	19D, remainder	8/10-9/30	1 caribou
1979-80 and 1980-81	9A, 9B & 17	8/10-9/10; 12/1-2/28*	2 caribou
	16 & 19C	8/10-10/31	1 caribou
	19A & 19B	8/10-3/31	2 caribou
	19D, SE of Kuskokwim River	8/10-9/30; 11/1-1/31*	1 caribou
	19D, remainder	8/10-9/30	1 caribou

* Bag limits were split between fall and winter seasons, generally allowing a full limit during the winter season but only one caribou in the fall.

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APPENDIX II. Sex and age composition counts of the Mulchatna caribou herd conducted during post-calving and fall, 1974 through 1981.

DATE	MALES PER 100 FEMALES	CALVES PER 100 FEMALES	CALF % IN HERD	FEMALE % IN HERD	MALE % IN HERD	TOTAL SAMPLE
6/19 & 20 1974	3.60	38.3	22.0	57.3	20.7	3,130
10/16 & 17 1974	55.0	34.9	18.4	52.7	29.0	1,846
6/18 1978	32.1	49.5	27.2	55.1	17.7	1,006
10/27 1978	50.3	64.5	27.6	42.7	21.5	758
6/5 & 6 1979	-	45.9	31.5	-	-	531
10/29 1980	31.3	57.1	30.0	52.4	17.6	2,250
7/1 1981	26.4	51.9	29.1	56.1	14.8	3,324

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 10

ADAK ISLAND HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

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

Population Status and Trend

United States Fish and Wildlife Service and U. S. Navy personnel stationed on Adak Island have flown the following caribou reconnaissance surveys:

Date Flown	Type Aircraft	Survey Crew	Survey Conditions	Number of Caribou Observed
9/16/76	UH-46-D	U.S. Navy & U.S.F.& W.S.	Fair	223
10/19/77	Cessna-172	U.S.F.& W.S.	Good	214
10/10/78	Gruman Goose	U.S.F.& W.S.	Excellent	233
10/13/79	Cessna-172	U.S.F.& W.S.	Fair	276
1/24/80	Cessna-172	U.S.F.& W.S.	Poor	125
12/1/80	Cessna-172	U.S.F.& W.S.	Fair	297

These reconnaissance surveys indicated that the herd has increased to approximately 300 caribou. According to the unpublished updated (November, 1980) Adak Island Caribou Management Plan, the herd should be maintained at a pre-calving population of approximately 150 caribou. The herd should remain at that level until it is demonstrated that a larger population can be regulated below carrying capacity by available hunting pressure.

Population Composition

No data were available.

Mortality

Due to the Naval security restrictions on Adak, the high cost of air fare to the island, and the lack of access to hunting areas, hunting on Adak Island has been limited to military and civilian personnel stationed there.

The caribou harvest for the past 5 years was as follows:

1976-77	106
1977-78	67
1978-79	74
1979-80	131
1980-81	129
	507 = 101.4, 5 yr. ave.

Hunting was encouraged during the 1976-77 season by the Adak Naval officer in command. However, during the 1977-78 and 1978-79 seasons, hunting was restricted by a different Naval commanding officer. The Navy command changed again and with additional support by U.S.F.&.W.S. personnel stationed on Adak, the 1979-80 and 1980-81 seasons led to increased hunting pressure and harvest.

Management Summary and Recommendations

The Adak Island caribou herd presently shows an annual increment exceeding the annual kill. Continuation of inadequate harvests could lead to a population explosion and subsequent population die-off exhibited by reindeer on St. Matthew Island in the 1960's (Klein 1968).

To maintain the Adak caribou population at the desired level, approximately 175 animals should be removed during the 1981-82 hunting season; however, this will probably not be accomplished under current hunting regulations. Extending the season and increasing the bag limit may be the most practical solution for future management of the herd.

Adak has a human population of approximately 3,500, but conditions under which they can hunt caribou are limiting. Most military and civilian personnel stationed there serve 1-year tours and are ineligible for resident big game licenses and choose not to hunt. The caribou herd has been accessible primarily by boat as the majority of the herd remains on the opposite side of the island; 15 miles from the base. Hunters have relied on the Navy tugboat for transportation to the herd as weather and sea conditions deteriorate by late August or September, thus precluding the use of smaller privately owned boats. The availability of the tugboat is also dependent upon

the policies of the Naval commander who is usually replaced every 2 years. To compensate for these hunter limitations a more liberal season and bag limit is recommended.

If caribou are not adequately harvested by hunters, the surplus animals could be killed by ADF&G and USF&WS personnel. However, state law mandates the meat from any edible big game animals harvested in this manner be salvaged and given to welfare agencies, which would require shipping the meat to the mainland. This alternative is unacceptable because of the poor accessibility to the caribou, the lack of facilities to process the meat, and the prohibitive costs for transportation.

USF&WS personnel on Adak have submitted a study plan to gather harvest information, conduct census and sex and age composition counts, and carry out analysis of the range. The primary objectives of the study were to develop baseline information on herd productivity and develop an estimate of range carrying capacity (B. Reiswig, pers. commu.).

Based on all available information, the following recommendations are made:

1. Change to a no closed season, three caribou limit.

2. Encourage USF&WS personnel to conduct the planned study on the Adak caribou population, with emphasis on the following:

    a. Obtain accurate harvest data by sex and age.

    b. Conduct post-calving census and sex and age composition counts.

    c. Conduct a fall sex and age composition count.

    d. Conduct a range study to include the use of range plots.

Literature Cited

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGMENT UNIT 10

UNIMAK ISLAND HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 10 - March 31 Four caribou

Population Status and Trend

No data were available.

Population Composition

No data were available.

Mortality

As harvest tickets are not required, no data were gathered on the take of caribou on Unimak Island by hunters. This source of mortality is thought to be negligible, due to the extremely high cost and limited nature of access to the island. Major causes of mortality are brown bear and wolf predation, accidents, disease, and other natural factors.

Management Summary and Conclusions

The difficulty in reaching Unimak due to inclement weather, and access restrictions imposed by U. S. Fish and Wildlife Service minimize human utilization of caribou. 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.

Recommendations

No changes in season or bag limit were recommended.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

MENTASTA CARIBOU HERD

PERIOD COVERED: July 1, 1976 - June 30, 1981

Season and Bag Limits

Aug. 10 - Sept. 30	One caribou
Aug. 10 - Sept. 30	One caribou by permit only

Population Status and Trend

The numbers of Mentasta caribou counted during June and early July have fluctuated since 1976 (Appendix I). Most of that fluctuation was attributed to difficulties in locating all segments of the herd, rather than to actual fluctuations in numbers. In addition, counts were done by different observers under different weather conditions. Considering these variables, I believe the herd continues to show a pattern of little or no growth.

Composition and Productivity

The management objective for the Mentasta herd is to maintain a post-hunting ratio of at least 35 bulls:100 cows. In July 1979, the bull:cow ratio was 54:100 and in October 1980, it was 46:100. These ratios suggest the management objectives are being met; however, additional counts are necessary to verify that assumption.

Mortality

The number of Mentasta caribou killed each year is shown in Appendix II. Also, the extent of hunter participation and rate of success are given. The harvest objective is an annual kill not to exceed 5 percent of the total herd. I believe this objective has been met in each of the last 4 years.

Airplanes were the primary means of transport. In 1979, 58 percent of all hunters and 87.5 percent of the successful hunters used aircraft for access. In 1980, these values were 63 percent and 75.5 percent, respectively. During these years, 97 percent of the successful hunters were Alaska residents.

Management Summary and Recommendations

It is difficult to locate all segments of the Mentasta caribou herd prior to census. For this reason, three caribou were radio-collared (April 1981) as an aid in locating some segments of the herd. When the herd was counted in June 1981, the three radio-collared caribou were located in widely separated groups. Results of that census (2,621 animals) were comparable to the highest count (2,778 animals) taken in 1978. It is likely that radio-collaring additional caribou would further aid in locating isolated groups and may substantially reduce the variability between annual counts.

High calf mortality has been suspected as the cause of the apparent herd stabilization. A calf mortality study is, therefore, recommended. This study would include comparing the extent of decline in the cow:calf ratio after calving with the ratio determined during the fall and following spring.

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Appendix I. Summary of Mentasta caribou census and composition counts for 1976-1981.

	Census Count 1/			Composition Counts 2/	
Year	Census Count	Date of Count	Calves in Total (%)	Calves/100 Cows (spring)	Calves/100 Cows (fall)
1976	1,572	14 June	30	--	--
1977	2,262	27 June	18	--	--
1978	2,778	8 July	22	--	--
1979	1,834	30 June	25	51	--
1980	2,369	23 June	--	Poor count	42
1981	2,621	18 June	--	32 (544) 3/	--

1/ Census counts are done from fixed-wing airplanes. The observer counts all the caribou seen.

2/ Composition counts are done from a helicopter. A sample of the herd is aged and sexed according to genital characteristics, and ratios are figured from the sample.

3/ Sample size.

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Appendix II. Summary of Mentasta caribou harvest, 1976-1980.

Year	Total Harvest	Number of Hunters	Hunter Success (%)	Males in Harvest	
				n	(%)
1976	236 (no permits)	422 1/	56	175	(76)
1977	52 (150 permits)	93	56	39	(75)
1978	149 (350 permits)	217	69	113	(76)
1979	99 (350 permits)	184	54	64	(65)
1980	144 (350 permits)	225	64	83	(58)

1/ Does not include hunters who failed to return harvest tickets.

PREPARED BY: Patricia Martin
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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 12

CHISANA HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 1 - Sept. 15 One bull

Population Status and Trend

The Chisana Herd probably contains fewer than 1,000 caribou. During an extensive aerial survey of the Beaver Creek area during October 1980, 582 caribou were observed. The population trend cannot be determined from available data, but distribution of the herd has not changed during the past 3 years. This may suggest a stable population.

Population Composition

During early October 1980, 582 caribou in 51 aggregations were observed from a PA-18 Super Cub. Calves (84) comprised 14 percent of the sample, and mature bulls with white capes and large antlers (71) were 12.2 percent. In this sample, 73 percent were cows, yearlings, and young bulls.

On June 21, 1981, during a post-calving survey, 426 caribou were classified, again using a PA-18 Super Cub. Caribou were distributed over a greater area than during October 1980. Calves (66) comprised 15 percent of the sample, and 9 percent were recognizable bulls (37). In addition, 76 percent (323) were cows, yearlings, and young bulls.

Mortality

Seven grizzly bears were observed during the June 1981 survey. In October 1980, a local guide noticed a pack of 18 wolves within the herd's range. Natural mortality factors such as predation by bears and wolves are believed to be the most important sources of mortality for the Chisana Herd.

During 1980, 13 bulls were reported taken by hunters, compared to 26 bulls during 1979 and 35 caribou of both sexes during 1978.

The total reported harvest of bull caribou in Unit 12 during 1980 was 26; overall hunter success was 38 percent. Sixty-eight hunters reported hunting in Unit 12 during the 1980 season.

Twenty-three hunters reported hunting caribou in the Chisana-White River area, and 57 percent were successful. Of the 13 successful hunters, 7 were residents, 5 were nonresidents, and 1 did not specify residency. Seven successful hunters used horses, and six used airplanes for access.

Elsewhere in Unit 12, 33 hunters reported hunting bull caribou from the Mentasta Herd, and 11 (33%) were successful. Among successful hunters, 4 used aircraft, 3 each used off-road and highway vehicles, and 1 used a horse. Twelve other hunters reported hunting caribou outside the ranges of either the Chisana or Mentasta Caribou Herds. Two of the 12 were successful.

Management Summary and Recommendations

Efforts to determine the status of the Chisana Herd should continue. This herd has not been observed to aggregate sufficiently after calving to permit accurate population estimates. Based upon the recommendation of one long-time Chisana resident, a March survey is planned. With a more extensive data base, the potential exists for a slightly greater harvest from this herd.

With caribou from the Mentasta, Nelchina, Macomb, and Fortymile Herds also seasonally inhabiting portions of Unit 12, potential certainly exists for a larger harvest in portions of Unit 12. The caribou season in that portion of Unit 12 north of the Tanana River should be changed to coincide with the split season 10 August-20 September, and 1 December-28 February in adjacent Subunit 20E. A sizable segment of the expanding Fortymile Herd would be available to hunters during the late season.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 and 14 (except 14C)

NELCHINA CARIBOU HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Aug. 20 - Sept. 20	One caribou by drawing permit only. 1,300 permits will be issued.

Population Status and Trend

A summary of the population estimates for the Nelchina Caribou Herd since 1976 is shown in Appendix I. These estimates are derived from data collected during census counts and composition surveys of post-calving groups, harvest results, and October composition surveys as described by Davis et al. 1976. Fixed-wing aircraft (Piper Supercub) with one observer using a hand-held 35mm camera were used for all census counts, while helicopters were used for composition surveys.

A review of the population data for the period covered in this report indicates an increase in herd size. A yearly increase was evident for all counts except in 1979. The 1979 census was considered a minimum value since great difficulty was experienced in conducting the census due to poor weather conditions and animal movement. This count may indicate a slow-down in herd expansion, due to increased winter mortality resulting from prolonged periods of deep snow pack in 1978-79.

Composition and Productivity

Appendix II gives sex and age data for the Nelchina caribou herd since 1976. All composition data are obtained immediately after the summer census of the post-calving groups and in early October during the rut. All classification was done from a helicopter (Bell-Jet Ranger).

Analysis of the data indicates good productivity and a change in herd composition. Calf production for the Nelchina herd was high, with a 5-year average calf production of 55.2 calves:100 cows. The percentage of bulls in the herd also increased. The current ratio of 62 bulls: 100 cows is high for a hunted herd and well above the 35 bulls:100 cows minimum management guideline (Draft Proposal Alaska Wildlife Management Plans, 1976).

Mortality

Harvest data are presented in Appendix III. The caribou harvest in 1976 was restricted by emergency closure of the season after only 5 days, when it was evident the harvest would exceed the 5 percent management goal (Eide 1978). Harvests have been limited since 1977 by allowing permit hunting only, with permittees selected by random drawing. The number of permits issued is set yearly to allow a maximum harvest of 5 percent of the herd. After the initial harvest cutback in 1977, a gradual expansion of permit numbers has continued. Hunter interest has been tremendous, with permit applications greatly exceeding available permits.

Several figures from the harvest data are noteworthy. The success rate for permittees that hunted averages 65.5 percent. The harvest composition has averaged 79 percent bulls. The number of nonresident hunters declined to approximately 7 percent under the permit system due to competition with residents for permits.

Transportation data (Appendix IV) indicate most successful hunters have utilized aircraft (37% average) or off-road vehicles (39% average). The percentage of successful hunters using a highway vehicle and hunting on foot close to roads has increased from 7 to 18 percent since 1976.

Natural mortality combined with hunter harvest has been low enough to allow herd expansion. With the exception of 1978-79, winters have been relatively mild; thus calf survival has been good. A composition count done in April 1981 showed 30 calves: 100 cows, indicating survival to 11 months of approximately 43 percent. The post-calving ratio in June 1980 was 56 calves:100 cows.

Management Summary and Conclusions

The Nelchina caribou herd is currently increasing. The permit system has kept hunter kill low enough to allow continued growth. Hunter success has in-creased under the permit system, but overall hunter participation has been restricted well below the existing demand.

The herd size and composition should be monitored annually. The harvest should be maintained at 5 percent until the herd reaches 20,000 adults. Harvests should then equal the annual increment to prevent overpopulation.

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Eide, S. H. 1978. Annual Report of Survey-Inventory Activities. Part II. In R. A. Hinman, (ed)., Alaska Aid in Wildl. Rest. Proj. W-17-9, Job Nos. 3, 4, 5, 17 and 22.

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Appendix I. Nelchina caribou herd population estimates, 1976-1980.

Area	No. caribou in post-calving census	Post-calving cow base	No. females* in harvest	No. females* after harvest	Fall Composition Count No. calves	No. bulls	Fall population estimate**
1976	8, 832	5,193	214	4,979	1,439	1,663	8,081
1977	14,000	7,588	79	7,509	3,559	2,868	13,936
1978	16,800	9,979	113	9,866	4,868	4,429	18,981
1979	13,508	6,843	90	6,853	No Fall Composition Data		
1980	17,305	9,293	117	9,176	3,881	5,680	18,737

* Females greater than one year of age.
** Davis et. al., 1976.

Prepared by: Robert Tobey, Game Biologist III

Appendix II. Nelchina caribou sex and age composition data, 1976-1980.

Year	Summer Calves/100 females *	(%)	Fall Calves/100 females *	(%)	Fall Bulls/100 females	(%)
1976	47	(27)	29	(18)	33	(21)
1977	60	(32)	47	(26)	38	(21)
1978	50	(30)	48	(25)	45	(23)
1979	65	(34)	--	--	--	--
1980	56	(30)	42	(21)	62	(30)

* Females greater than one year of age.

Prepared by: Robert Tobey, Game Biologist III

Appendix III. Reported Unit 13 caribou harvest by sex, residency of hunter, and success ratios 1976-1980.

Year	Total reported harvest	Number permits applied	Number permits issued	Number reported hunters	Percent success	Male harvest No.	(%)	Female harvest No.	(%)	Unk sex harvest No.	Resident harvest No.	(%)	Nonresident harvest No.	(%)
1976	776	---	---	1,807	43	560	(74)	201	(26)	15	642	(85)	117	(15)
1977	360	1,383	750	580	62	275	(78)	77	(22)	8	--	--	--	--
1978	539	2,775	1,000	747	72	416	(79)	111	(21)	12	510	(95)	25	(4)
1979	630	5,600	1,300	972	65	509	(85)	90	(15)	31	585	(93.5)	41	(6.5)
1980	621	6,841	1,300	982	63	453	(80)	117	(20)	51	578	(93.4)	41	(6.6)

Prepared by: Robert Tobey, Game Biologist III

Appendix IV. Transportation means reported by successful Unit 13 caribou hunters, 1976-1980.

Year	Aircraft No.	(%)	Horse No.	(%)	Boat No.	(%)	Motorbike No.	(%)	Snowmachine No.	(%)	Off-Road Vehicle No.	(%)	Highway Vehicle No.	(%)	None Reported No.	(%)	Total
1976	344	(44)	21	(3)	40	(5)	4	(1)	0	(0)	295	(38)	58	(7)	14	(2)	776
1977	113	(32)	5	(1)	19	(5)	3	(1)	0	(0)	178	(50)	41	(11)	1	(4)	360
1978	190	(35)	8	(2)	31	(6)	12	(2)	0	(0)	222	(41)	76	(14)	0	(0)	539
1979	230	(37)	22	(4)	37	(6)	18	(3)	0	(0)	228	(36)	92	(15)	3	(1)	630
1980	245	(40)	13	(2)	44	(7)	14	(2)	0	(0)	188	(31)	110	(18)	7	(1)	621

Prepared by: Robert Tobey, Game Biologist III

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 13E and 20C

DENALI HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Unit 20C, that portion lying south of the Tanana River and west of the Nenana River	No open season

Population Status and Trend

National Park Service personnel indicated that the Denali Caribou Herd has stabilized at a low level of 1,200 to 1,500. Caribou numbers observed in post-calving aggregations remained low (700 to 800 animals), and the calf composition of these groups in 1980 varied little from the previous year.

Population Composition

Two surveys of the Denali Herd were conducted during the post-calving period. Results of aerial surveys by Park Service personnel in late June revealed 20 calves/100 cows (n = 564). Since this survey failed to differentiate between yearlings and adults, the level of initial calf production was difficult to determine. A more representative index of productivity is indicated from a survey by Game Division personnel in late May which revealed 49 calves/100 cows (n = 75). A relatively high rate of pregnancy apparently existed because 95 percent of the cows classified had well-developed udders.

Mortality

Data regarding mortality on this herd were not collected. However, wolf densities of 1 wolf/30-50 mi^2 probably exist in that area within the original McKinley National Park boundary. The status of the wolf population within recent extensions of the Park is unknown; it is suspected that additions on the north and west encompass ranges of additional wolf packs. Wolf and grizzly bear predation is probably high enough to impede growth of moose and caribou populations within the Park.

Management Summary and Recommendations

The population estimate for the Denali Herd has remained unchanged for the past 9 years despite the restrictive or closed

hunting seasons. Predation is likely the major factor preventing an increase of the Denali Herd.

Because sport hunting is not allowed in national parks, the size of the Denali Herd is adequate to meet current, nonconsumptive public needs. However, in the event subsistence hunting privileges are granted to residents of Cantwell, Minchumina, Nikolai, and Telida, a larger herd will be more desirable.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 15

KENAI PENINSULA LOWLANDS HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

No open season

Population Status and Trend

The Kenai Lowlands Caribou Herd was established through transplants by the Department of Fish and Game in the mid-60's. The herd, which currently numbers about 65 animals, occupies approximately 72 square miles of summer and winter range north and east of the city of Kenai. The size of the herd has not increased during the past few years. The amount of caribou range available to this herd, however, could limit expansion. Predation of young calves (less than 30 days old) by free-ranging dogs and wild carnivores is suspected of limiting annual recruitment.

Population Composition

The Kenai Lowlands Herd has been surveyed on a regular basis since 1979 (Appendix I). These data suggest the herd maintains a high bull:cow ratio which is expected in an unexploited population. The low calf:cow ratios may be due to predation.

Mortality

The only known causes of mortality are road kills, poaching, and predation by wolves, coyotes and free-ranging dogs. The first sport harvest of this herd is scheduled for fall 1981.

Management Summary and Recommendations

Following a successful transplant, the Kenai Lowlands Caribou Herd has increased to a level which will support a limited sport harvest. Accordingly, the Alaska Board of Game will allow a limited harvest of five bulls between September 11 and October 15, 1981.

A management objective of maintaining a breeding ratio of 25 bulls:100 cows has been established by the Department. It is felt that this ratio is adequate for reproduction and can be maintained with a limited bulls-only harvest. Sex and age

composition of the herd will be reviewed annually to determine the feasibility of future hunts.

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Appendix I. Sex and age composition data for the Kenai Lowlands caribou herd in Game Management Unit 15(A) from 1977 to 1981.

Date	Total Bulls Per 100 Cows	% Bulls (N)	Calves per 100 Cows	% Calves (N)	% Cows (N)	Sample Size (Sum of N)
6/28/77[a]	-	-	-	23(8)	-	32
6/22/79[a]	-	-	-	25(15)	-	59
10/22/79[b]	47	-	37	-	-	55
6/10/80[c]	80	37(20)	36	17(9)	46(25)	54
10/27/80[c]	48	27(15)	29	16(9)	56(31)	55
6/10/81[c]	41	25(15)	22	13(8)	61(37)	60

[a] Incomplete data from incidental observations.
[b] Survey conducted from PA-18-150 (Super Cub).
[c] Survey conducted from Bell 206-B Ranger (helicopter).

PREPARED BY: David Holdermann
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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 19 and 21

BEAVER MOUNTAINS, MULCHATNA, KUSKOKWIM MOUNTAINS, AND ALASKA RANGE HERDS

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Subunits 19A & 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 portion of 19D south and east of the Kuskokwim River	Aug. 10 - Sept. 30 Nov. 1 - Jan. 30	
Remainder of 19D and Unit 21	Aug. 10 - Sept. 30	

Population Status and Trend

Region II staff conducted a census of the Mulchatna Caribou Herd in 1981 and will report the results. No population data were collected on the other herds.

Mortality

Total reported caribou harvest for Unit 19 during the 1980-81 season was 235. During the 1979-80 season, reported harvest amounted to 165 caribou. Although an estimate of unreported harvest is unavailable for the 1980-81 season, unreported harvest in Unit 19 amounted to 75-100 caribou during the 1979-80 season. Reported harvest in Unit 21 totaled nine caribou, all taken in the Beaver Mountains.

Reported harvest in Subunits 19A and 19B (assumed to be from the Mulchatna Herd) was 158 caribou (150 bulls and 8 cows). During 1979-80, 104 caribou were taken from this area, which previously

was the largest reported harvest for the Mulchatna Herd in Unit 19. Reported harvest from Subunits 19C and 19D was assumed to be from the Rainy Pass-Farewell Herd and totaled 69 caribou (64 bulls and 5 cows). During 1979-80, harvest from this area totaled 61 caribou.

The reported caribou harvest for Units 19 and 21 was 244 during the 1980-81 season. The number of hunters using various modes of travel was as follows: 204 aircraft; 16 snowmachines; 6 boats; 6 off-road vehicles; 3 horses; and 1 motorbike. In eight instances, transportation was unspecified.

Management Summary and Recommendations

In relation to the total number of caribou previously reported in Units 19 and 21, harvests were low. However, harvest has been increasing and will likely continue to increase which points to the need for reliable data on herd delineation, sex and age composition, and population trend for all herds in Units 19 and 21.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 20A and part of 20C

DELTA HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 1 - Sept. 30	One bull by drawing permit. 200 permits will be issued.

Population Status and Trend

The Delta Caribou Herd is increasing and probably contains 4,000-5,000 animals. A June 1980 photo-census indicated the herd contained a minimum 4,000 animals. Results are not yet available from a June 1981 photo-census.

Population Composition

During sex and age composition counts conducted on 15 October and 3 November 1980, 49 calves/100 cows (21% of herd), and 85 bulls/100 cows (36% of herd) were classified (n = 1,369). These data suggest high calf survival and an excellent bull:cow ratio. The bull:cow ratio is similar to the 1978 ratio of 75 bulls:100 cows (n = 725). The bull:cow ratio obtained in December 1979 (39:100) was probably not representative because the survey was conducted after many bulls had become segregated.

Post-calving counts on 17 June 1980 revealed 33.5 calves:100 cows (21% of herd), somewhat less than last year's ratio of 43 calves:100 cows.

Mortality

Twenty-five calf caribou equipped with radio collars during 1979 were monitored from 1979 through 1981 to assess mortality rates. Wolves were responsible for two calf deaths during 1979, and a grizzly bear apparently killed another in 1980. A wolf apparently also killed 1 of 20 caribou that were radio-collared early in 1981.

The first hunting season since 1974 was held for Delta caribou during fall 1980. Two hundred permittees were selected by lottery for the 1-30 September season, and 104 male caribou were harvested.

The largest harvest occurred in the Little Delta River vicinity where 41 caribou were taken. Harvests of 14 and 10 caribou were recorded for the Ferry-Healy and Dry Creek areas, respectively.

Since the range of the Delta Herd is remote with difficult access, aircraft was the most common transportation. Harvest data are summarized in Appendix I.

Management Summary and Recommendations

The long-term goal of restoring the Delta Herd to its former level of 4,000 to 5,000 animals has apparently been achieved. If this population level is confirmed by a photo-census in 1981, the 1982 hunting season should be liberalized further.

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Regional Management Coordinator

Appendix I. Delta Caribou Herd Harvest Summary, 1980.

Number permit applicants	-	640
Number permits issued	-	201
Number successful hunters	-	104
Number unsuccessful hunters	-	21
Did not hunt	-	35
Did not report	-	41

Transportation mode for successful hunters:

Mode	Number
Aircraft	80
Horse	11
Motorbike	2
Offroad vehicle	10
Highway vehicle	1

Harvest by area:

Area	Number
Yanert River	6
Ferry-Healy	14
Totatlanika River	7
Gold King	6
Wood River	8
Little Delta River	41
Dry Creek	10
Delta Creek	4
Delta River	1
Unknown	2

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20D

MACOMB HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Unit 20D that portion lying south of the Tanana River	Aug. 10 - Sept. 30	One bull by drawing permit only. 70 permits will be issued.

Population Status and Trend

The Macomb Caribou Herd is believed to be stable or slowly declining. This herd apparently does not aggregate enough after calving to allow accurate census with the aerial photography technique. The herd was estimated to number 800-1,000 in the mid-1970's, but no recent estimates have been made.

Population Composition

During an October 1980 composition count, 306 caribou were classified. Tracks of other groups led to a cloud-covered area, suggesting that more could have been classified under better conditions.

Composition of the sample was as follows:

	Bulls/ 100 Cows	Yrlgs/ 100 Cows	Calves/ 100 Cows	% Yrlgs	% Calves	% Cows	% Bulls	Sample Size
1980	43	10	13	6	8	60	26	306
Avg*	42	12	20	7	14	57	24	310

*1974-1980

Population composition data were not collected in 1979.

To asssess potential for a photo-census, a reconnaissance of the Macomb Herd's range in mid-June revealed 227 caribou. Thirty-six (19%) were calves. In other herds with good calf production and survival, calves often comprise 25-30 percent of groups seen in mid-June.

Mortality

The only quantified mortality for the Macomb Herd is sport hunting. In 1980, there were 170 applications for the 70 permits. Twelve bulls were harvested by 42 hunters. The most popular access method was by foot, followed by horses. Most of the Macomb Herd is found within the Macomb Plateau Controlled Use Area, which limits hunting access to nonmechanized means except for float planes on Fish Lake.

The low percentage of calves in the fall population suggests summer mortality; however, initial production is unknown. Grizzly bears are relatively abundant on Macomb Plateau and may be responsible for a large part of summer losses. The reason for the below average calf percentage in 1980 is unknown.

Management Summary and Recommendations

In view of the data presented above, the present level of harvest does not appear excessive. I recommend the current season and bag limit be continued until better data or different conditions dictate change.

The three major unknowns regarding the status of this herd are: what is the population size and trend, is initial calf production normal, and what is the natural mortality rate? The photo-census technique does not appear suitable for population assessment of this herd. Therefore, the Macomb Herd should be monitored by aerial counts during late October or spring in which as many caribou as possible are located and classified.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20E and portions of 20B and 20C

FORTYMILE HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 1 - Sept. 15 One bull

Population Status and Trend

The Fortymile Herd was estimated to contain 9,000 to 11,000 caribou in June 1980 based on a 1980 photo-census/composition survey. Another spring photo-census/composition count was conducted during June 1981. While that photo-census has yet to be interpreted, an estimated 9,000 to 10,000 caribou (primarily cows and calves) were present in the post-calving aggregations, suggesting that the herd probably numbers over 12,000.

Population Composition

On 14 and 15 October 1980, 982 caribou were classified from a Hughes 500D helicopter in the area at the West Fork of the Dennison Fork--a tributary to the Fortymile River (Table 1).

Table 1. Sex and age composition of the Fortymile Caribou Herd, 1980.

Bulls/ 100 Cows	Bull % in Herd	Calves/ 100 Cows	Calf % in Herd	Cow % in Herd	Herd Sample Size
108.8	40.3	61.2	22.6	37.1	982

No attempt was made to classify yearlings, since previous attempts to identify yearlings produced inaccurate estimates. The calf:cow ratio obtained in June 1980 from post-calving aggregations was only 41 calves:100 cows, considerably less than the 61 calves:100 cows obtained in October 1980. The June count perhaps has the largest error due to several inherent difficulties in distinguishing young bulls from adult cows in June (e.g., molting patterns and antler growth). Because all samples were obtained in the same general area, they were probably not representative of the total herd. However, the same could be true of the fall count. The bull:cow ratio obtained is also questionable. If the composition of the Fortymile Herd is

similar to other lightly hunted caribou herds, a bull:cow ratio of 50-80:100 is probably more realistic than the observed ratio of 109:100.

A sex and age composition survey made of post-calving aggregations near Mt. Harper in conjunction with the June 1981 photo-census attempt revealed the following information (Table 2).

Table 2. Sex and age composition of the Fortymile Caribou Herd, 1981.

	Bulls/ 100 Cows	Bull % in Herd	Calves/ 100 Cows	Calf % in Herd	Yrlgs/ 100 Cows	Yrlg % in Herd	Cow % in Herd	Herd Sample Size
*	23	7.0	34.6	24.0	-	-	69	2,108
**	48	23.0	24.0	11.6	34	16.6	48	848

* Jennings, Kelleyhouse (no effort made to classify yearlings)
** Jennings, Davis

Seasonal Concentrations and Movements

Fall movements were similar during 1979 and 1980 migrations. After moving south to the Mt. Harper vicinity, the herd traveled easterly across the southern portion of the Mosquito Flats to the Mt. Fairplay area. The herd wintered along the low ridges between the Tanana and Fortymile drainages, with some animals (including a radio-collared cow) wintering to the north in the Slate Creek-North Fork area. The herd apparently once again calved in the Seventymile River drainage during May 1981 based upon movement patterns onto the post-calving grounds on Mt. Harper in early June 1981.

Mortality

A short 1-15 September hunting season with a bag limit of one bull resulted in a harvest of 10 bulls. The illegal take was estimated at 20-50 caribou. Natural factors, primarily wolf and bear predation, are believed responsible for most herd mortality.

Management Summary and Recommendations

Because the herd is continuing to increase, a longer season is scheduled for 1981. Harvests should be kept small until the herd numbers 20,000; however, hunting for bulls should be liberalized as the herd grows as long as recruitment is sufficient to not depress the bull:cow ratio.

Mineral exploration and development activities in the Mt. Harper and Slate Creek areas should be closely monitored and regulated to minimize impacts upon this herd. Increased cooperation with

the Bureau of Land Management and Doyon Ltd. will be required to assure that the future habitat needs of the Fortymile Herd are met.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 22, 23, 24, 25, 26

WESTERN ARCTIC CARIBOU (WAH)

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limit

Unit 22, that portion draining into Norton Sound and the Bering Sea north of Cape Denbigh; Unit 23, that portion south of the Selawik River; Unit 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.	Aug. 10-Oct. 15 Dec. 1-Apr. 15	Three bulls
Unit 23, that portion north of the Selawik River; 26A and 26B	Aug 10-Oct 15 Feb. 15-Apr. 15	

Population Status and Trend

The most recent photo-census of the western Arctic Caribou Herd (WAH) was conducted in July 1980. The estimated population size was approximately 140,000 caribou (actual extrapolation was 139,629). This total consisted of caribou counted in photographs, of post-calving aggregations, caribou counted peripheral to aggregations but not photographed, and caribou counted along transects and in quadrats throughout the range of the herd. According to James Davis (biologist responsible for WAH surveys since 1975) the quality of the 1980 census was lower than the 1978 census (extrapolation was 106,635 caribou), which he considered the best census since 1975. Davis's estimates that the WAH has been increasing at 14 percent per year from 1975 through 1980.

Population Composition and Distribution

Composition counts were made in July 1980, November 1980, and June 1981. The mean herd composition observed in July 1980 was 49.4 percent cows, 9.0 percent bulls, 8.5 percent yearlings, and 33.1 percent calves from a sample size of 17,802 caribou. The

mean herd composition observed in November 1980 was 42.5 percent cows, 22.4 percent bulls, 12.8 percent yearlings, and 22.3 percent calves from a sample size of 3,187 caribou. The age composition observed in June 1981 was 82 calves per 100 cows from a sample 2,222 caribou.

To best calculate the number of bulls, cows, yearlings, and calves in the herd, the November 1980 composition data were used with the July 1980 estimated total of 140,000 caribou. We assumed no mortality occurred between July and November.

140,000	x .425	=	59,500 cows
140,000	x .224	=	31,360 bulls
140,000	x .128	=	17,920 yearlings
140,000	x .223	=	31,220 calves
	Total		140,000 caribou 1980

Comparable calculations for the last photo-census in 1978 was as follows:

105,000	x .450	=	47,250 cows
105,000	x .225	=	23,625 bulls
105,000	x .105	=	11,025 yearlings
105,000	x .220	=	23,100 calves
	Total		105,000 caribou 1978

Caribou moved across the Kobuk River in large numbers as early as September 1, 1980. The migration of caribou through the Noatak to the Kobuk drainage was completed by September 9. Lorenz Schuerch, long time resident of Kiana, stated this was the earliest migration he could remember. An early snow fall on the North Slope and upper Noatak drainage in late August may have initiated this early movement.

The WAH wintered in three disjunct areas. Approximately +30,000 caribou wintered north of 70° N. latitude between Point Lay and the Colville River Delta. Approximately +10,000 caribou wintered in the Central Brooks range from the headwaters of the Kivalina drainage to the headwaters of the Noatak and extending into the Nigu drainages. At least 65,000 and perhaps 100,000 caribou wintered within a crescent shaped area bounded by the Ambler Lowlands, southward to the Kobuk drainage between Ambler and Kobuk villages, the upper Selawik drainage from Selawik village to Purcell Mountain, the Selawik Hills (highest concentration area), and the Buckland drainage east of the west fork of the Buckland River.

Mortality

The reported harvest of caribou for 1980-81 was 458 (GMU's 22, 23, 24, 25, 26), and the reported harvest by residents of most communities within the range of the herd is shown on Table 1. The actual harvest was probably similar to that in 1979-80 which was estimated to be approximately 3,000. This figure was based

on several indirect determinations which were explained in the 1979-80 S&I report (Johnson 1981).

Harvest tickets were required in 1980-81 for the first time. Various permit systems have been used since 1976, including a registration permit system in 1979-80. Registration permits normally result in a greater degree of compliance with harvest reporting requirements than the more commonly used harvest tickets. This is especially true if the permit system is supported by enforcement of the regulation requiring return of the the permit. The requirement to return permits was never enforced for the WAH. Therefore, it is unknown if the change from a permit to a harvest ticket reporting system resulted in a decrease in harvest information. Comparisons between the degree of compliance with harvest reporting requirements in 1979-80 and 1980-81 are confounded by several factors. For example, in 1979-80 roughly three times as much effort was made to obtain harvest data compared to 1980-81. Regardless of which system is used, harvest reporting is very poor.

Management Summary and Recommendations

The WAH has been increasing at a rate of 14 percent per year since 1975. The estimated harvest of 3,000 caribou (2.1 % of the herd) is well below the sustainable yield of the herd. Management of goals for the WAH should be reviewed and harvest levels necessary to stabilize the herd between upper and lower limits should be determined. Appropriate hunting regulations should then be proposed. This requires accurate estimates of population size, recruitment, and mortality rates.

Historical fluctuations of the WAH have not been adequately explained. Research to quantify sources of natural mortality is currently being conducted, and needs to be expanded to better determine predation rates.

Harvest by humans, while low, needs to be more accurately monitored. Mortality due to adverse environmental conditions has not been adequately researched. Factors such as snow accumulation, early and late snow cover, minimum temperature, timing of spring breakup, and inclement weather during calving could affect natural mortality rates.

Literature Cited

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Table 1. Summary of the 1979-80 reported caribou harvest by residents of selected communities in northern and northwestern Alaska.

	Estimated Human Population	Overlays Issued	Harvest Reports Returned	Percent Reports Returned	Hunted	Hunted Successfully	Total Caribou Taken
GMU 23							
Ambler	217	56	30	54	23	23	54
Buckland	172	5	1	-	1	1	1
Deering	100	10	1	-	0	0	0
Kiana	314	114	70	61	53	46	92
Kivalina	208	1	0	-	0	0	0
Kobuk	60	12	8	-	8	8	21
Kotzebue	2,431	342	84	25	56	46	103
Noatak	261	35	20	57	11	9	13
Point Hope	464	3	1	-	1	0	0
Noorvik	527	35	22	63	13	11	30
Selawik	527	31	16	52	13	13	30
Shungnak	182	14	6	43	6	6	14
Subtotal	5,457	658	259	39	185	163	358
GMU 24							
Alatna	35	0	0	-	0	0	0
Allakaket	216	2	1	-	1	0	0
Behles	69	43	33	77	6	4	7
Hughes	98	20	6	-	0	0	0

Table 1. Summary of the 1979-80 reported caribou harvest by residents of selected communities in northern and northwestern Alaska.

	Estimated Human Population	Overlays Issued	Harvest Reports Returned	Percent Reports Returned	Hunted	Hunted Successfully	Total Caribou Taken
GMU 16							
Anaktuvuk Pass	173	20	6	-	6	6	12
Atkasook	112	0	0	-	0	0	0
Barrow	2,715	135	76	56	41	33	65
Nuiqsut	182	2	0	-	0	0	0
Point Lay	94	1	0	-	0	0	0
Wainwright	429	7	0	-	0	0	0
Cape Lisburne	50	No Data for 1980-81					
Subtotal	3,805	165	82	50	47	39	77
TOTAL	9,896	888	381	43	239	206	442

CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 25* (except for that portion draining into the Yukon River from and including the Tozitna River to and including the drainage of the Hodzana River) and Unit 26C*

PORCUPINE HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

July 1 - Mar. 31	Five caribou; provided that not more than 2 caribou may be transported from these units per regulatory year.

* Caribou harvest ticket required

Population Status and Trend

The Porcupine Caribou Herd remained stable at approximately 100,000 animals during most of the 1970's. An aerial photo-census of the herd in 1979 resulted in a minimum estimate of 110,000 caribou. This recent estimate, together with high initial calf production, apparently good overwinter survival, and low hunting mortality, all indicate that the herd may be increasing.

Population Composition

Sex and age composition data collected during the past 10 years has differed markedly between years--much more than expected from normal biological variability. For instance, estimates of the adult sex ratio during the rut have ranged from 78 bulls:100 cows to 32 bulls:100 cows. It was assumed in the past that all sex and age classes homogeneously mixed throughout the herd during the rut. In recent years, it has become apparent that even though homogeneity is greatest during the rut, it is still quite variable between years and areas. In addition, accuracy of composition data has been frequently compromised by small sample size or by using unweighted counts from isolated segments of the herd. During the 1979 census, composition counts were weighted according to the size of the group sampled, and an adult sex ratio of 40 bulls:100 cows was observed. This ratio was considered low for a lightly exploited herd, indicating that weighting of data did not necessarily produce accurate results.

In 1980, herd distribution was determined before composition counts were begun, so all portions of the herd could be sampled and weighted accordingly. Unusual, but fortunate, circumstances made this task very easy. In early July virtually the entire herd, including the bulls normally found in Canada at that time of year, was gathered between the lower Kongakut and Egaksrak Rivers. On the evening of 4 July, six two-man observation crews classified 9,046 of about 110,000 caribou in this aggregation. Observers were well distributed near the front of the movement and were able to sample the herd as it passed. While the proportion of the entire aggregation sampled by each team was not determined, we assumed that the combined counts were a representative cross-section (Table 1).

In October 1980, most of the herd was concentrated near the Dempster Highway in the Yukon Territory (D. Russell, pers. commu.). Canadian biologists conducted composition counts in mid-October and believed that their results were representative of the portion of the herd distributed in Canada. Composition counts of the portion of the herd wintering in Alaska were conducted in late October in the mountains west and southwest of Arctic Village. The combined estimate of total numbers observed during sampling was similar to the estimated total herd size, indicating that most of the herd was sampled. Composition estimates obtained in Alaska and in the Yukon were in close agreement (Table 1). The major discrepancy between summer and fall composition counts was in the proportion of yearlings observed.

Some loss of calves between summer and fall would be expected (see Table 1), but the apparent decline in yearlings from 11 to 8 percent of the herd was likely due to increased difficulty in distinguishing yearlings from adults in fall. Incorrectly identifying yearlings as adults would also have the effect of reducing the recorded calf:cow ratio. Perhaps most important is that the adult sex ratio of approximately 60 bulls:100 cows was observed during summer and fall counts; both of which were considered good counts. This ratio falls in the range expected for an unexploited or lightly hunted herd.

Mortality

During the 1980-81 regulatory year, all persons hunting the Porcupine Herd in Alaska were required to have caribou harvest tickets. In the past, only those hunters transporting Porcupine Herd caribou out of the Unit of take were required to file a special Arctic Caribou harvest ticket. This harvest ticket program gave some indication of the take by sport hunters, but neglected subsistence harvest by local hunters. However, the 1980-81 harvest ticket program was intended to provide data on both sport and subsistence take. Unfortunately, it did not for several reasons. Kaktovik residents did not receive harvest tickets until after the season was well underway. However, there and elsewhere, local villagers still failed to use tickets even after they became available.

Table 1. Composition of the Porcupine Caribou Herd, 1980.

Date	Bulls/ 100 Cows	Yrlg./ 100 Cows	Calves/ 100 Cows	Yrlg. % N_1 = in herd (^{1})	Calf % N_2 = in herd (^{2})	Cow % N_3 = in herd (^{3})	Bull % N_4 = in herd (^{4})	Sample size sum of N_1 thru N_4
7/4	59	29	66	11 (1027)	26 (2349)	39 (3572)	23 (2098)	9,046
10/10-14	60	19	57	8 (819)	24 (2504)	42 (4374)	26 (2642)	10,339[1]
10/24-25	61	19	45	8 (294)	20 (714)	45 (1572)	27 (952)	3,532[2]
Weighted mean (Oct. only)	60	19	55	8 (8002)	23 (23418)	43 (42746)	26 (25834)	100,000[3]

[1] Representive of about 80,000 caribou in Yukon Territory

[2] Representive of about 20,000 caribou in Alaska

[3] Rounded estimate of herd size, probably 10,000-20,000 fewer than actual population

Harvest ticket returns from local and out-of-unit hunters indicated that only 49 persons hunted the Porcupine Herd. Of these, 42 were successful, taking a total of 110 caribou. These figures far underestimate the actual harvest of the herd, but the subtotals for out-of-unit hunters may be comparable to the transport ticket returns of previous years. Harvest ticket results are summarized in Table 2. The harvest of 74 caribou by out-of-unit hunters in Unit 25 was higher than the average number of 37 reported from transport tickets for the previous 4 years, and the take of four caribou in Subunit 26C was lower than the 4-year mean of 13. The relatively high harvest in Unit 25 reflects a greater availability of caribou there. The low take in Subunit 26C was probably a result of bad weather during August and September, which prevented access across the Brooks Range for most sport hunters.

Subsistence Section personnel and USFWS biologists provided data on the harvest by local residents. Caribou were moderately available to local users in Subunit 26C, and the take was approximately 100 (S. Pedersen, pers. commu.). Many of these caribou were taken from the Sadlerochit Mountains in winter and may actually have been from the Central Arctic Herd. Caribou were readily available during fall, winter, and spring in much of Unit 25. The estimated harvest by Unit 25 residents was 800-1,030 caribou (R. Caulfield, pers. commu.).

The total harvest from the Porcupine Herd in Alaska was probably between 875 and 1,200 caribou. This includes 875-1,100 taken by all hunters in Unit 25; in addition, the estimated harvest of 100 caribou in Unit 26C may also have come from the Porcupine Herd. Even with a substantial unreported and/or underestimated kill the total should still be below 1,500. The take in Canada was about 700 in Yukon Territory plus some others in the Northwest Territories (R. Farnell, Yukon Wildlife Branch, pers. commu.). Thus, the combined U.S./Canadian harvest of the Porcupine Herd was no more than 2,500 caribou, or less than 3 percent of the herd.

Management Summary and Recommendations

The Porcupine Herd apparently remained stable during most of the 1970's and was generally estimated to number about 100,000 with confidence intervals extended to over 130,000. In 1979 a minimum estimate for the herd was 110,000, and the herd may have been increasing. During the 1979 census, 40 bulls:100 cows were counted. This ratio was considered low and probably not accurate. The adult sex ratio was more confidently estimated in 1980 at about 60 bulls:100 cows.

Table 2. 1980-1981 Harvest of the Porcupine Caribou Herd reported from harvest ticket returns.

	Game Management Unit 25			Game Management Unit 26C		
Hunter Residency	Number Hunting	Number Successful	Harvest	Number Hunting	Number Successful	Harvest
Local	5	4	9	8	7	23
Out-of-Unit	34	29	74	2	1	4
Total	39	33	83	10	8	27

Since at least 1978, yearling recruitment into the herd has been good, and harvest has remained low. The herd is presumably increasing. A census planned for July 1981 was canceled because of premature dispersal of the herd back into Canada. The census has been rescheduled for 1982.

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CARIBOU

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 26B

CENTRAL ARCTIC HERD

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 10 - Oct. 15	Three bulls*
Feb. 15 - Apr. 15	

* Caribou harvest ticket required.

Population Status and Trend

Prior to the early 1970's, little was known about the caribou using the Central Arctic Slope of Alaska. Discovery and subsequent development of petroleum reserves at Prudhoe Bay focused much attention on possible disruption of caribou migrations through the oil field and across the Trans-Alaska Pipeline (TAP). The Department has supported intensive studies of caribou in the Central Arctic region since 1974.

Caribou in the Prudhoe Bay area were first recognized as a distinct subpopulation, or herd, in 1975. At that time, this Central Arctic Herd (CAH) numbered about 5,000, including perhaps 4,000 adult (1+ years old) caribou. Seasonal ranges were confined to the Arctic Slope between the Itkillik and Canning Rivers.

Caribou of the CAH, particularly calves and parturient cows, were found to avoid the Prudhoe oil field and the TAP.

In spite of displacement from portions of its traditional range and some disruption of seasonal movements, the CAH has experienced excellent calf production and survival. The CAH was estimated to number about 6,000, with about 4,800 adults during the most recent census (July 1978). Calf production and overwinter survival, along with presumably low adult mortality typical of a lightly exploited herd, suggest that the CAH is growing at about 12-18 percent per year. At this rate, the herd should have numbered between 6,700 and 7,900 adults prior to calving in 1981.

Population Composition

Composition counts of the CAH have been made on a regular basis since 1976. Counts conducted during different seasons have

different purposes and are therefore directed at specific portions of the herd. Surveys during the calving period are confined to the calving grounds in the immediate coastal area and consist of north-south line transects; these counts measure initial calf production. Post-calving counts of large mixed aggregations are made in midsummer; these counts permit an estimate of early calf survival and are an integral part of censusing procedures, since the entire cow/calf segment of the herd is included. Survey routes during rut and in late spring follow drainage systems throughout the CAH range and are intended to provide composition data representative of the entire herd. Because of uneven distribution of caribou, however, the results are often inconsistent and must be subjectively interpreted. At worst these surveys measure calf survival; at best they provide reasonable estimates of overall herd composition.

Table 1 summarizes the results of composition surveys conducted to date. All counts were conducted by helicopter except the August 1979 survey. Smaller groups (usually fewer than 30 caribou) were counted from the air, whereas larger groups were counted by landing nearby and viewing with a spotting scope. In 1980, both initial calf production and subsequent survival to yearling age were lower than in the previous 2 years. However, productivity was probably still high enough for continued herd growth, perhaps at the low end of the 7-13 percent increase rate.

Mortality

Between late 1976 and early 1980, harvest of CAH caribou was by registration permit only. In spite of mandatory reporting of harvest, take by local Native villagers was largely unrecorded. The permit system is no longer in effect, but caribou harvest tickets are required. The kill by local users within Subunit 26B and along the western boundary of Subunit 26C continues to be unreported but is probably between 50 and 100 caribou per season. Nonlocal hunters have a somewhat better reporting record, but the degree of reporting compliance remains unknown. Fifty-four people reported hunting in Subunit 26B; 47 were successful in taking 65 bulls. About half of the successful hunters flew into the hunting area, and most others used road access. Reported harvest by hunters using road access was slightly higher than by those using air transport (34 vs. 28). One caribou was taken by a hunter using a boat; the mode of transportation was unspecified in two cases.

Most successful hunters (70%) hunted in the fall and took one bull caribou. Only 21 percent of the hunters killed two caribou each, and only 9 percent reached the bag limit of three bulls. Most multiple kills were by snowmobile access in spring or by off-road vehicle transport in fall.

The TAP haul road was open only to industrial traffic and to local miners, hunting guides, or cabin owners who have property or business interests along the road. Access for hunting per se

Table 1. Summary of sex and age composition of the Central Arctic Herd, 1976-80.

Cohort	Season	Cows		Calves			Yearlings			Bulls			Total
		No.	%	No.	%	/100C	No.	%	/100C	No.	%	/100C	
1976	Post-calving (July)	572	41	247	18	43	77	6	13	493	35	86	1386
	Rut (October)	440	36	204	17	46	40[a]	3	9	539	44	125	1223
	Spring (May)	430	48	138	16	32	--[a]	--	--	321	36	75	889
1977	Post-calving (July)	1585	41	886	23	56	227	6	14	1149	30	72	3847
	Rut (October)	198	32	127	20	64	64	10	32	239	38	121	628
	Spring (May)	198	56	80	23	40	--	--	--	73	21	37	351
1978	Calving (June)	424	44	346	36	82	166	17	39	14	1	3	964[b]
	Post-calving (July)	1831	45	997	25	54	302	7	16	913	23	50	4043
	Rut (October)	293	36	187	23	64	56	7	19	280	34	96	816
	Spring (May)	201	40	121	24	60	--	--	--	177	35	88	499
1979	Calving (June)	883	43	710	37[c]	85	216	11	26	56	3[c]	7	1923[b]
	Post-calving (August)	--	--	--	20[c]	--	--	--	--	--	20[c]	--	134
	Spring (April/May)	470	36	242	18	50	--	--	--	597	45	125	1309
1980	Calving (June)	356	45	247	31[c]	69	171	22	48	13	2	4	787
	Post-calving (August)	(167)	(29)	(157)	28[c]	(94)	(32)	(6)	(19)	(124)	22	(74)	570
	Rut (October)	569	33	302	17	53	96	6	17	761	44	134	1728
	Spring (April/May)	371	37	125	13	34	--	--	--	502	50	135	998

[a] "Long" yearlings classified as adult cows or bulls in May surveys.
[b] Total includes some unclassified adults.
[c] Only calves and mature bulls were classified.

was not allowed. Nevertheless, the harvest reports show that some caribou hunters were able to gain access to the road. Big game hunting within 5 miles of the road was permissible by bow and arrow only. There are no specific data on the road-related harvest by archers.

Natural mortality in the CAH remains unknown. Wolves are currently scarce in the area, and their numbers are kept low by airborne hunters and trappers and by shooters from the road.

Management Summary and Recommendations

The CAH is a small population of caribou that has been steadily increasing since the mid-1970's. It is now estimated at 5,900-7,000 adults. Harvest is low relative to herd size, and natural mortality appears to be low. Increased public access along the TAP road could substantially increase the harvest, but restricting the harvest to bulls should prevent at least short-term overutilization. Rapidly expanding petroleum development on calving and summer ranges poses a serious threat to the long-term well-being of the CAH. The Department should continue to conduct studies as necessary to advise industry and other agencies on possible conflicts and to contribute toward the development of mitigative measures.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1A and 1B

GEOGRAPHICAL DESCRIPTION: Southeast Mainland from Cape Fanshaw to the Canadian Border

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limit

Unit 1A and 1B, Stikine River drainages only	Sept. 15 - Oct. 15	One bull
Remainder of Unit 1B	Oct. 1 - Oct. 31	

Population Status and Trend

Moose are expanding their range in portions of Units 1B and 3. In the last twenty-two years, moose have become established at Farragut Bay, where they are occasionally harvested and on Mitkof Island where the population is too low to allow a harvest. The current moose populations in Units 1B and 3 as interpreted from field observations, harvest records, and reports from the public are shown in Fig. 1.

The small population of moose on the Unuk River in Unit 1A, receives little hunting pressure. The very small herd on the Chickamin River is the result of a 1963-64 transplant of 14 moose from the Chickaloon Flats (Unit 15). The transplant is not considered successful. No data were collected on 1A moose population numbers, composition, or mortality during the report period.

Population Composition

Thomas Bay: Reliable composition data are not available for the Thomas Bay area. Aerial observation of moose is very difficult due to extensive forest cover. The maximum count in 1980 was 19 moose. No bulls were seen during the two 1980 surveys.

Teeth from moose harvested at Thomas Bay were collected for aging by the cementum annuli technique. Ages are not available at this time but will be given in subsequent reports.

Stikine River: Survey flights conducted during summer months have been unproductive because of poor visibility due to dense vegetation. Flying conditions during winter months are seldom good, reducing the probability of obtaining accurate survey information. Surveys flown on calm days following a period of wet snow yield the best counts.

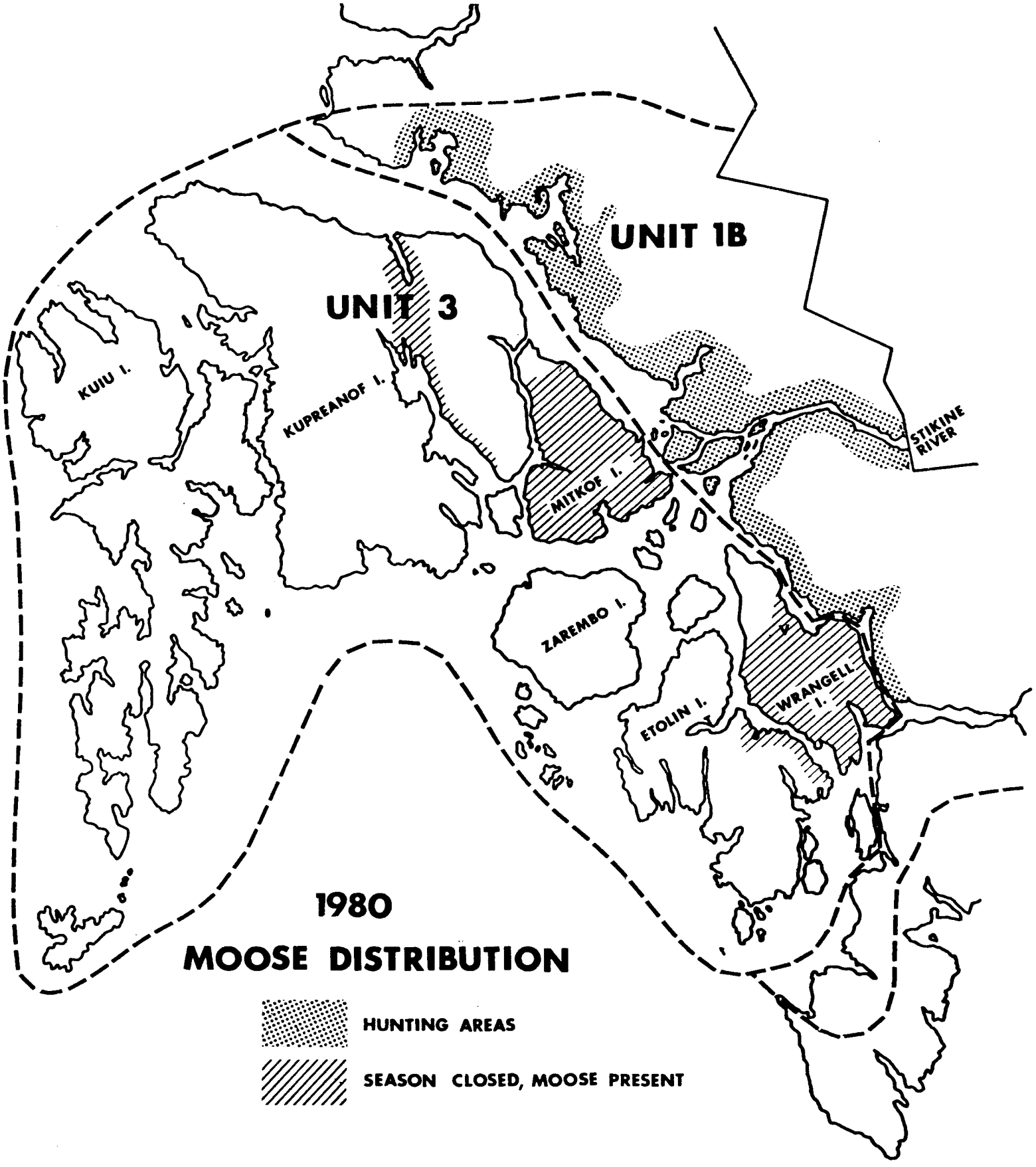
UNIT 1B
UNIT 3
KUIU I.
KUPREANOF I.
MITKOF I.
STIKINE RIVER
ZAREMBO I.
ETOLIN I.
WRANGELL I.
1980
MOOSE DISTRIBUTION
HUNTING AREAS
SEASON CLOSED, MOOSE PRESENT

Figure 1.

Ages of 19 harvested bulls were determined by the wear and replacement method in 1979. Sixty-eight percent were yearlings, 11 percent 2-1/2 years old, 16 percent 3-1/2 years old, and 5 percent young-of-the-year.

Mortality

Moose harvest records have been maintained for the Stikine River portion of Unit 1B since 1952 and for Thomas Bay for most years since 1955. The highest recorded harvest for the Stikine River herd occurred in 1973 when 25 bulls and 22 cows were taken. The only cow seasons in Unit 1B were conducted in 1972 and 1973, with harvest of 18 and 22, respectively. Although harvesting cows is a viable management tool, local opposition is high. The Stikine River moose herd is sustaining an average annual harvest of 23 bulls. This may be attributable to ingress of individuals from the lightly hunted Canadian herd. Annual check stations have been run on the Stikine River since 1970 and in Thomas Bay since 1977 (Table 1). All reports of harvested moose were investigated and verified during the season. In addition, hunting camps were periodically visited by biologists to obtain moose jaws and rumen samples.

Table 1. Unit 1B Moose Harvest Data, 1970-1980

Year	Thomas Bay		Stikine River		Total
	bulls	cows	bulls	cows	
1970	no data		28	0	28
1971	no data		25	0	25
1972	5	0	8	18	31
1973	3	0	25	22	50
1974	4	0	25	1*	30
1975	8	0	16	0	24
1976	16	0	21	0	37
1977	12	1*	19	0	32
1978	9	0	29	0	38
1979	21	0	26	0	47
1980	17	0	34	1*	51
Average	10.6		27.0		35.6

*Illegal take

Besides legal hunting, factors controlling Unit 1B moose herd numbers are habitat limitations, predation by wolves, brown and black bears, and illegal hunting.

The 1979 and 1980 harvest data for Unit 1B as reported on harvest report cards (Table 2) should not be interpreted literally since a reporting bias exists in favor of successful hunters. The reported success rate in 1979 for Thomas Bay was 33 percent and for Stikine River, 19 percent. In 1979, successful hunters in Unit 1B hunted an average of 10 days each, unsuccessful hunters 7 days.

Table 2. Unit 1B Moose Hunter Success, 1979 and 1980.

	Number Reporting	Kill from Harvest Report	Kill from Check Station	Percent Success Reported	Average Days Hunted, Successful	Average Days Hunted, UnSuccessful
1979						
Stikine River	47	9	26	19	13	11
Thomas Bay	24	8	21	13	8	5
Other	3	1	--	33	8	5
Total	74	18	47	24	10	7
1980						
Stikine River	*	24	34	*	8	*
Thomas Bay	*	10	17	*	5	*
Other	*	0	--	*	0	*
Total	220	34	51	15	6	7

* data not available by specific area for 1980.

Transport

The complex system of old logging roads in Thomas Bay was used extensively by hunters. Means of transportation included horse, motorbike, all-terrain-vehicle (ATV), truck and bicycle. Although use of motor vehicles was prohibited for moose hunting in Thomas Bay, they could be used to establish camps and transport game after 12:00 noon of each day. Game regulations currently permit use of vehicles in the Stikine River drainages.

Means of transportation used by hunters in Thomas Bay during the years 1978, 1979 and 1980 were: horse - 1%, motorbike - 1%, A.T.V. - 2%, truck - 14%, bicycle -31%, and foot - 51%.

Athough over half of the hunters (51%) were on foot, almost a third of them (31%) used bicycles. Since the road at Thomas Bay is not connected with any other road, vehicles must be flown or boated into the area.

Chronology of Harvest

Seventy-one percent of the moose harvested in Thomas Bay were taken during the first week and 83 percent were killed during the first half of the season.

Management Summary and Recommendations

Moose populations on Mitkof and Wrangell Islands in Unit 3 appear to be expanding. Pellet group counts in the spring and aerial surveys in winter should be initiated in these locations to establish trend data on the populations. If populations actually are increasing, a limited hunting season should be recommended.

Strong opposition to either-sex hunting of the Stikine River herd was expressed during the experimental cow hunts in the early 1970's. A season ending later than the traditional October 15 is also opposed by the majority of hunters. Changes in the season or bag limit in the Stikine River would be unpopular. The herd seems stable at the present time, however, there is concern that the older age classes of bulls are lacking in the population. While there should be sufficient breeding capability in the 1-1/2 and 2-1/2 year old age classes, a range of age classes would be more desirable. A heavy dependence on yearling bulls for hunting indicates that a severe winter which would eliminate calves could have a catastrophic effect on the herd.

The sex ratio of the Thomas Bay moose herd will be monitored and regulation changes recommended to provide a more favorable bull:cow ratio when necessary. Restriction on bull harvest rather than an either-sex hunt is seen as the most logical course of action considering local sentiments. In 1981, an Emergency Closure when a 10-bull quota is reached will be recommended.

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Regional Management/
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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5A

GEOGRAPHICAL DESCRIPTION: Gulf of Alaska, Yakutat Forelands and Nunatak Benchlands.

PERIOD COVERD: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 5A, except Nunatak Bench	Oct. 15 - Oct. 18	One bull
Unit 5A, Nunatak Bench	Nov. 15 - Dec. 15	One bull by registration permit; up to 10 bulls may be taken.

Population Status and Trend

Only limited data were collected during the report period, but general observations and hunter reports indicate the Nunatak Bench population is stable and the Yakutat Forelands population appears to be stable or increasing slowly.

Population Composition

During this report period, only a partial aerial survey was conducted on the Yakutat Forelands. The area between the Situk and Ahrinklin Rivers was surveyed on December 13, 1980 using a Piper PA-18-125. Survey conditions were considered poor because of poor snow cover and lateness of the survey: 21 percent of the bulls observed had only one antler. Fifty-three moose were observed in 2.25 hours of flying. Herd composition is shown on Table 1.

Table 1. Herd Composition of the Yakutat Forelands Moose Population as Determined by Aerial Surveys on December 13, 1980.

Date	no. Adult	no. Bulls	no. cows w/o calf	no. cows w/1 calf	no. cows w/2 calf	Total
Dec. 13	42	19	15	5	3	53

Winter 1980-81, like the several previous years, was mild with only moderate snow accumulations. Moose did not concentrate on winter range, reducing pressure on the available browse.

Mortality

Yakutat Forelands

The 1980 moose season was not conducted as a special registration hunt like the two preceeding seasons. It was a 4-day, bulls-only, open hunt, with no upper limit on the number of bulls that could be harvested.

Despite this change in procedure, hunting pressure, harvest and distribution of the kill remained about the same as the two previous seasons, with a total of 28 bulls being harvested by about 175 hunters.

No cementum age determination of the harvested animals has been made, but these data should be available for inclusion in next year's report.

One non-sport mortality was documented during the report period. A yearling moose was apparently killed by wolves in February as it crossed a shallow stream on the lower Italio river. A local pilot observed four wolves feeding upon the carcass as it lay on the shore, partially in the water.

Nunatak Benchlands

Twelve persons reported hunting on the Nunatak Bench for a combined effort of 48 man days, averaging 4 days each and ranging from 1 to 18 days of hunting. Only one bull was killed. This low harvest was, once again, attributed to the fact that the moose remained on the high summering grounds until after the season closed.

No non-sport mortality was recorded for the report period.

Management Summary and Recommendations

Yakutat Forelands

The Yakutat Foreland moose population appears to be gradually increasing. Recent winters have been mild and mortality directly attributable to weather was correspondingly low. The population estimate for this area is 600 moose. At the current rate, the sport harvest is only about 5 percent and can be safely increased.

Despite a lessening of hunt restrictions, pressure and harvest remained about the same. If after a reasonable time, the harvest has still not increased to a level of about 8 to 10 percent of the estimated population, further efforts should be made to increase the kill by a season expansion.

Nunatak Benchlands

The Nunatak moose population is considered to be stable. Although the season was extended to take advantage of early winter snow that forces the moose out of the high country into areas more accessible to hunters, these snows did not materialize. Consequently, hunter success remained extremely low. To achieve the desired level of harvest it may be neccessary to further modify season dates, and to adopt a restricted antlerless hunt.

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SUBMITTED BY:

Nathan P. Johnson
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MOOSE
SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5B

GEOGRAPHICAL DESCRIPTION: Malaspina Forelands, Gulf of Alaska

PERIOD COVERED: July 1, 1980-June 31, 1981

Season and Bag Limit

Sept. 15-Oct. 15	One bull by permit only; up to 25 bulls may be taken. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

Based upon a limited winter survey, hunter reports, and interviews, the Malaspina Forelands moose populations appears to be stable.

Population Composition

The winter survey of Unit 5B was conducted on February 24 and 25, 1981, using a Piper PA-18-125. No attempt was made to classify moose according to sex or age class, although calves were recorded when observed.

The first flight covered the area between Bancas Point and Sitkagi Bluffs. Survey conditions were poor to moderate (patchy snow cover) but even so, 79 moose (73 adults, 6 calves) were seen in 2.6 hours of flying for an average of 30.4 moose per hour.

The second count area, from Sitkagi Bluffs to Icy Bay, covered the remainder of Unit 5B. Snow cover was extremely patchy resulting in very poor survey conditions. Seventy-five moose (73 adults, 2 calves) were observed, giving a combined total for the Unit, of 154 moose (146 adults, 8 calves) counted in 5.1 hours of survey time for an average of 30.2 moose observed per hour.

Despite poor survey conditions, the count for Bancas Point to Sitkagi Bluffs area was higher than those in 1978 and 1979 by 41 and 30 percent, respectively (Table 1). The Sitkagi Bluffs to Icy Bay area has not been surveyed in recent years, therefore, the same comparative data are not available but the figures for 5B, as a whole, seem to compare favorably with historic data (Table 2).

Table 1. Moose Composition Counts - Unit 5B, Malaspina Forelands-Sitkagi Bluffs to Bancas Point

Date	Adults w/o	Adults w/1	Adults w/2	Total Adults	Lone Calves	Total Calves	Total Moose	Calf % in Herd	Count Time(hr)	Moose per hour
3/61	-	-	-	-	-	-	40	-	1.7	23.6
2/12/79	-	-	-	-	-	-	47	-	1.8	26.1
2/14/80	-	-	-	49	-	7	56	12.5	1.8	31.1
2/24/81	68	4	1	73	0	6	79	8.2	2.6	30.4

Prepared by: Ronald E. Ball, Game Biologist III and Scott M. Brainerd, Game Technician III

Table 2. Moose Sex and Age Composition - Unit 5B - Malaspina Forelands 1961-1981

Year	Adults w/0	Adults w/1	Adults w/2	Total mm	Total ff	Total Adults	Lone Calves	Total Calves	Unit Sex & Age	Total Sample	Count Time(hr)	Moose per hour
3/61*	-	-	-	-	-	-	-	-	-	40	1.7	23.53
12/10-11/69**	103	14	0	57	60	117	0	14	0	131	4.1	31.95
3/10-11/70	-	-	-	-	-	200	-	97	-	297	8.3	35.78
12/5-6/70**	180	24	15	98	121	219	1	55	2	276	7.3	37.81
11/27-28/71	167	22	8	86	111	197	1	39	0	236	3.7	63.78
11/7-8-9/72	150	4	0	54	100	154	0	3	0	157	6.6	23.79
4/16-18-20/73	-	-	-	-	-	110	-	9	-	119	12.9	9.22
11/16-18-20/73	144	30	4	44	134	178	3	41	0	219	8.4	26.07
3/1-15/74	-	-	-	-	-	141	-	18	-	159	6.2	25.65
11/21/74**	73	14	7	23	71	94	0	28	0	122	4.8	25.42
3/5-6-7/75	-	-	-	-	-	148	-	38	0	186	7.0	26.57
11/77	-	-	-	37	156	193	-	43	-	236	3.6	65.56

Table 2. Moose Sex and Age Composition - Unit 5B - Malaspina Forelands (Continued)
1961-1981

Year	Adults w/0	Adults w/1	Adults w/2	Total mm	Total ff	Total Adults	Lone Calves	Total Calves	Unit Sex & Age	Total Sample	Count Time(hr)	Moose per hour
2/12/79**	-	-	-	-	-	-	-	-	-	47	1.8	26.11
2/14/80*	-	-	-	-	-	49	-	7	-	56	1.8	31.11
2/24-25/81	140	4	2	-	-	146	0	8	0	154	5.1	30.20

* Sitkagi Bluffs to Bancas Point
** Area was not completely surveyed

Prepared by: Ronald E. Ball, Game Biologist III and Scott M. Brainerd, Game Technician III, November 12, 1981

Mortality

The harvest of 15 bulls for this report period was consistent with an 11-year average of 15.1 per year, but lower than the previous year's harvest of 22.

Ninety-eight people registered for the bulls-only hunt, but 30 (30.6%) did not hunt and 9 (9.1%) did not report. The 59 who did hunt, spent a total of 229 man-days in the field. The successful hunters averaged 3.3 days (range 1 to 5) per moose, while unsuccessful hunters averaged 4.09 days (range 1 to 8 days) in the field.

No non-hunting mortality was recorded for this report period.

Management Summary and Recommendations

The moose population in subunit 5B appears to be stable. Hunter success during the report period was consistent with the 11-year average but considerably below the desired 25 bulls. In order to bring the annual kill up to the desired level, changes in season and/or timing may be necessary. Improved access to the area through airstrip maintenance and/or construction should also be considered to help encourage hunters to participate in the hunt.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6A

GEOGRAPHICAL DESCRIPTION: Katalla to Icy Bay

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Dec. 31*	One moose by registration permit; up to 20 antlerless moose may be taken. See 5 AAC 81.055 and separate permit hunt supplement.

*Season subject to closure by emergency order.

The conditions outlined in the 1980-81 Permit Hunt Supplement were:

Moose Hunt 950

1. Permits could be obtained at the Cordova Fish and Game offices from August 1, 1980, throughout the season.

2. Harvest was restricted to 30 bulls and 20 cows.

3. Successful hunters were required to report their kill within 5 days to the Cordova Fish and Game office.

Population Status and Trend

Two herds are present in Subunit 6A. The Bering River-Controller Bay herd has continued to increase and now exceeds the desired herd size of 200 moose by approximately 50 animals. The herd appears to be healthy, but calf production was poor. No data were collected on the Tsiu River herd.

Population Composition

A moose survey was flown on December 23, 1980, in the Bering River-Controller Bay count area. Survey conditions were good, and 224 moose were observed. The bull:cow ratio was satisfactory, but calf production was poor (Appendix I).

The Tsiu River count area was not flown for composition data.

Mortality

The 1980 Subunit 6A moose harvest was 31 (20 bulls and 11 cows). All 31 moose harvested were taken from the Bering River-Controller Bay portion of Subunit 6A. Nonresidents accounted for 26 percent of the harvest. Actual hunting pressure is unknown, but 254 permits were issued.

Management Summary and Recommendations

The 1980 harvest is similar in magnitude and composition to the preceding year.

Hunting effort is unknown, but 56 percent more permits were issued in 1980 than 1979. The Bering River-Controller Bay portion of Subunit 6A continues to become more popular for moose hunting, but the harvest is still not adequate to control herd size. The Tsiu River herd remains untouched by hunters because of poor access and remoteness.

The Subunit 6A season was extended during the 1980 season to include December, with the intention of increasing the harvest. Only two parties hunted during December, both unsuccessfully. The last moose taken during the 1980 season was in mid-October.

Survey data for the Bering River-Controller Bay herd showed a 15 percent increase in herd size over the previous year. The 224 moose is the largest count ever recorded.

No data were collected on the Tsiu River herd during 1980. Hunting effort should be directed towards the Tsiu River portion of Subunit 6A with separate bull and cow quotas.

Liberal either-sex seasons should be maintained in Subunit 6A to encourage utilization of this resource.

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Appendix I. Subunit 6A Sex and Age Composition and Ratio Data, 1980-81 (Bering River-Controller Bay area).

Sex and Age Composition

Date	Large Males	Small Males	Total Males	Females w/0	Females w/1	Females w/2	Total Females	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs)
12/23/80	28	14	42	123	21	5	149	191	2	33	0	224	3.3

Sex and Age Ratios

Date	Total Males Per 100 Females	Small Males Per 100 Females	Small Males Per 100 Large Males	Small Males % in Herd	Calves Per 100 Females	Incidence of Twins Per 100 Females w/Calf	Calf % in Herd	Survey Conditions	Total Sample
12/23/80	28.2	9.4	50.0	6.3	22.2	19.2	14.7	Good	224

PREPARED BY: Julius L. Reynolds
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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6B

GEOGRAPHICAL DESCRIPTION: Martin River

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 20-Nov. 30*	One moose by registration permit; up to 50 antlerless moose may be taken. See 5AAC 81.055 and separate permit hunt supplement.

*Season subject to closure by emergency order.

The conditions outlined in the 1980-81 Permit Hunt Supplement were:

Moose Hunt 951

1. Permits could be obtained at the Cordova Fish and Game offices from August 1, 1980, throughout the season.

2. Harvest was restricted to 50 bulls and 50 cows.

3. Successful hunters were required to report their kill within 5 days to the Cordova Fish and Game office.

Population Status and Trend

The Martin River herd is 25-50 moose larger than the desired herd size of 150-175 animals.

Population Composition

A moose survey was flown on December 18, 1980, in the Martin River count area. Survey conditions were good, and 201 moose were observed. Calf production was poor, but the bull:cow ratio was satisfactory (Appendix I).

Mortality

The 1980 Subunit 6B moose harvest was 100 animals: 51 bulls and 49 cows. The season was closed on September 19, 1980, by emergency order.

Actual hunting pressure was unknown, but 566 permits were issued, 60 percent more than the previous year.

Choronology of the harvest was: August-64 and September-36. Methods of transportation used by successful hunters were: airboat-52, automobile-24, airplane-19, and riverboat/ canoe-5.

Management Summary and Recommendations

Survey data collected in December 1979 revealed a surplus of approximately 100 moose above the 150-175 desired herd size. The 1980 quota of 50 bulls and 50 cows was designed to reduce the Martin River herd. The 1980 harvest of 100 animals partially accomplished this objective and is the largest reported harvest for Subunit 6B.

The 1981 harvest quota should be sufficiently large to remove the remaining surplus of 25-50 animals plus the annual increment. Either-sex hunting will be necessary to keep sex ratios in balance.

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Appendix I. Subunit 6B Sex and Age Composition and Ratio Data, 1980-81.

Sex and Age Composition

Date	Large Males	Small Males	Total Males	Females w/0	Females w/1	Females w/2	Total Females	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs)
12/18/80	28	10	38	116	22	1	139	177	0	24	0	201	3.1

Sex and Age Ratios

Date	Total Males Per 100 Females	Small Males Per 100 Females	Small Males Per 100 Large Males	Small Males % in Herd	Calves Per 100 Females	Incidence of Twins Per 100 Females w/Calf	Calf % in Herd	Survey Conditions	Total Sample
12/18/80	27.3	7.2	35.7	5.0	17.3	4.4	11.9	Good	201

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6C

GEOGRAPHICAL DESCRIPTION: West Copper River Delta

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 6-Sept. 15*	One bull moose by registration permit. See 5AAC 81.055 and separate permit hunt supplement.

*Season subject to closure by emergency order.

The conditions outlined in the 198081 Permit Hunt Supplement were:

Moose Hunt 952

1. Permits were available at the Cordova Fish and Game office beginning August 1, 1980.

2. Hunting was permitted until 12:00 noon on September 6, 1980, and each day thereafter until the desired quota of approximately 20 bulls was taken.

3. Successful hunters had to report their kill by 5 p.m. on the day the kill was made to the Department of Fish and Game in Cordova. Shooting hours for the following day were announced by 6 p.m. via KLAM radio.

4. Boats, airboats or ATV's could not be used to hunt moose, but could be used to retrieve an animal after 10 a.m.

Population Status and Trend

The west Copper River Delta moose herd is approximately 50 animals below the desired herd size. A slight increase in herd size was observed in 1980, probably because of increased production of calves.

Population Composition

A moose survey was flown on December 22, 1980. Survey conditions were good, and 137 moose were observed. Bull:cow and cow:calf ratios were fair. Survey data are shown in Appendix I.

Mortality

Seventeen bull moose were taken in Subunit 6C during the 1980 season. This season was terminated September 6 at noon by emergency order after one-half day of hunting.

Actual hunting pressure is unknown, but 373 permits were issued.

Management Summary and Recommendations

Survey data collected in December 1979 revealed that approximately 75-100 moose had moved from the west Copper River Delta (Subunit 6C) to the Martin River (Subunit 6B) during 1978 or early 1979. Thus, the 1980 season was restricted to the taking of approximately 20 bulls and no cows. Seventeen bulls were actually taken opening morning, and the season closed the same day.

Survey data collected in fall 1980 were encouraging, i.e. a slight increase in herd size, better calf crop, and no sign of further movement out of Subunit 6C.

The management plan for the next few years is to harvest approximately 20 bulls per year. The female segment will not be harvested in order to bring the herd back up to the desired fall herd size of 175-200 moose.

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Appendix I. Subunit 6C Sex and Age Composition and Ratio Data, 1980-81.

Sex and Age Composition

Date	Large Males	Small Males	Total Males	Females w/0	Females w/1	Females w/2	Total Females	Total Adults	Lone Calves	Total Calves	Unid. Sex & Age	Total Sample	Count Time (hrs)
12/22/80	12	6	18	68	21	3	92	110	0	27	0	137	2.8

Sex and Age Ratios

Date	Total Males Per 100 Females	Small Males Per 100 Females	Small Males Per 100 Large Males	Small Males % in Herd	Calves Per 100 Females	Incidence of Twins Per 100 Females w/Calf	Calf % in Herd	Survey Conditions	Total Sample
12/22/80	19.6	6.5	50.0	4.4	29.4	12.5	19.7	Good	137

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Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 7

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 7, that portion drained by Resurrection Creek downstream from Rimrock and Highland Creek (including Palmer Creek).	No open season	
Unit 7, the Placer River drainages and that portion of Placer Creek (Bear Valley) outside the Portage Glacier closed area and Unit 14C within the Twentymile River drainages.	Day after Labor DaySept. 20	One moose by drawing permit only. 10 permits for antlered moose and 20 permits for antlerless moose will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder of Unit 7	Sept. 1-Sept. 10	One bull

Population Status and Trend

Aerial composition surveys conducted in Unit 7 during 1980 suggest that the number of bulls per 100 cows is increasing and the calf:cow ratio has remained moderately high. However, the number of moose observed per hour during 1980 indicated a decrease in the number of moose since 1971, except for that portion in Unit 7 drained by Placer River and Portage Creek.

Sufficient numbers of moose are available throughout the unit to allow for a limited moose hunting season.

Population Composition

Twenty of the 22 count areas in Unit 7 were surveyed during 1980. A total of 714 moose was observed including 475 cows, 142 calves and 97 bulls. Sex and age ratios were 20 bulls:100 cows, 30 calves:100 cows, 5.3 sets of twin calves:100 cows with calves. Calves made up 20 percent of the total number of moose observed. Twenty-one moose were observed per hour of survey time.

Mortality

Harvest reports (including reminder letters) indicated that seven cows and three bulls were killed in the special permit area of Unit 7, and 26 bulls were killed in the remainder of the unit by 192 hunters. Hunter success was 15 percent. Forty-four percent of all bulls taken were yearlings.

The number of hunters in 1980 was the lowest for Unit 7 since 1966. The number of successful hunters using highway vehicles, boats and horses as a means of transportation was closely comparable, and collectively accounted for 82 percent of all successful hunters. Only three successful hunters used aircraft in Unit 7 during 1980.

Management Summary and Recommendations

Results from aerial surveys conducted during 1980 in Unit 7 suggest that the number of bulls per 100 cows has increased and the calf:cow ratio has remained moderately high. However, the number of moose per hour has shown a steady decline since 1971, indicating that moose density is probably decreasing. The 1980 harvest of 28 moose was the lowest ever recorded, which also indicated a reduction in the moose population in this area. Probable cause of this suspected decline is lack of suitable winter habitat during moderate to severe winter and the increased wolf predation since the late 1960's.

The U.S. Forest Service is presently engaged in research with experimental burning to enhance wildlife habitat in Game Management Unit 7. Preliminary results indicated that controlled burning is an effective management tool for retarding plant community succession and if applied properly the moose population will benefit. However, until this management tool is more widely used and wolf numbers are reduced, the ability of the moose population in Unit 7 to increase is limited.

No changes in seasons or bag limits were recommended.

PREPARED BY:

Ted H. Spraker
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SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 9

GEOGRAPHICAL DESCRIPTION: Alaska Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Subunit 9A	Sept. 10-Sept. 30	One bull
Subunit 9B and 9C, except the drainage of the Naknek River.	Sept. 10-Sept. 30 Dec. 1-Dec. 31	One moose, provided that antlerless moose may be taken only between Dec. 1-Dec. 31
Subunit 9C, that portion draining into the Naknek River.	Sept. 10-Sept. 30 Dec. 1-Dec. 31	One moose, provided that antlerless moose may be taken by registration permit only. Permits are valid between Dec. 1-Dec. 31. See 5 AAC 81.055 and separate permit hunt supplement.
Subunit 9D	No open season	
Subunit 9E	Sept. 10-Oct. 10 Dec. 1-Dec. 31	*One moose, provided that antlered moose must have a minimum antler spread of 50 inches or three brow tines on one side of antlers and that antlerless moose may be taken only from Dec. 1-Dec. 31.

Population Status and Trend

No significant changes have been noted from last year's status and trend. The moose population in northern Unit 9 still appears relatively stable while the population in Subunit 9E continues to decline as a result of inadequate recruitment.

Population Composition

Inadequate snowfall throughout Unit 9 prevented completion of aerial surveys with the exception of two areas in Subunit 9C. As a result, no quantified data are available on the composition of the herd in the Lake Iliamna or central peninsula regions. Nevertheless, casual observations and the comments of guides hunting in Subunit 9E indicate that calves and mature bulls remain scarce in that portion of the herd. Several guides reported having to fly many hours in order to find legal bulls.

Appendix I lists the results of the surveys flown in Subunit 9C. The Branch River count revealed that the 1980 calf crop was relatively poor, with only 17.0 calves per 100 cows in the fall. A lack of comparative data make it impossible to determine whether or not this poor production is typical and/or indicative of any trend in the population. The fact that the yearling portion equals the calf portion indicates that either 1979's production was higher than 1980's, or that calf survival was high in 1979-80. A recruitment rate of 11.1 percent is probably adequate to sustain this population under the exisiting mortality rate.

The Katmai survey showed that this population remains one of the more productive on the peninsula, with 24.0 calves:100 cows. The low recruitment level, however, indicates that calf survival is not high, and that the population is not expanding. In addition, the marked reduction in the bull:cow ratio to 39.7 from previous years' ratios in the high 50's to 70's reveals a change in the population. This decline in bulls is most likely the result of illegal hunting activity in the park. Several guides were known to be operating in the park and two were eventually arrested at the site of a moose kill within the count area.

Mortality

Total known hunting mortality in 1980 accounted for removal of 236 moose from the Unit 9 population (Appendix II), down slightly from the previous year's total. Of these moose, 17 were cows, 216 were bulls and 3 were of unknown sex. One hundred and eleven moose were taken in Subunits 9A-9C and 103 were killed in Subunit 9E.

No other data on mortality were available.

Management Summary and Recommendations

The moose population in northern Unit 9 appears to be at a relatively constant level. However, hunter kill is gradually increasing as opportunities in other areas decline and the activities of several unethical guides in the Iliamna-Nondalton area expand. Local complaints of competition and wanton waste are increasing. Efforts to survey the area in 1980 were halted by poor weather thus extending the problem of managing without

adequate information. Funding should be made available and surveys attempted as soon as adequate weather prevails. If harvest continues to increase, minor season reductions should be implemented.

The decline in moose in Subunit 9E has now reached dramatic proportions. Restricting the fall kill to bulls with antlers having a minimum spread of 50 inches or three brow tines during a 30-day season has reduced the rate of decline somewhat. Nevertheless, several of the objectives of the 50 inch "experiment" and alteration of the population trend cannot be accomplished under the existing season dates.

Appendix III reveals the general decline in size and age of bull moose taken over the past 5 years. The exceptionally high kill in 1979 so reduced the adult bull segment of the population that the 1980 kill was 30 percent lower than the previous 4 years' average. This decline would be even more dramatic if those bulls illegally taken within Katmai National Park in 1980 could be positively identified and excluded from the analysis.

Significant reductions must be made in the total bull harvest to increase the bull:cow ratio and adult male proportion in the herd. In addition to providing large antlered bulls for a limited number of hunters, increasing the proportion of adult males may help to reduce the rate of decline by shortening the breeding and calving seasons thereby increasing calf viability and minimizing neonatal predation.

The fall season should be reduced to 10 days in early September, well separated from the brown bear season. While guides could still offer combination hunts for either moose and caribou or bear and caribou, the more popular moose and bear or three species hunts would be eliminated. This would greatly reduce bull moose harvest. Placing the season in early September will also minimize bull vulnerability and the influence of hunting on rut behavior.

The season in Subunit 9E should be shortened to Sept. 10-Sept. 20 with a bag limit of one bull with a minimum antler spread of 50 inches or three brow tines on one side.

No other changes were recommended.

PREPARED BY:

Christian A. Smith
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SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

Appendix I. Sex - age ratios of moose in Unit 9.

Area	MM Per 100 FF	Calves Per 100 FF	Calf % in Herd	Yearling %* in Herd	Sample Size
Branch River	36.2	17.0	11.1	11.1	72
Katmai	39.7	24.0	14.6	10.1	199
Total	38.7	22.0	13.7	10.3	271

* Based on percent small bulls.

PREPARED BY: Christian A. Smith, Game Biologist III

Appendix II. Moose harvest in Unit 9 - 1980.

Subunit	Bulls	Cows	Unknown	Total
9(A)	10	--	--	10
9(B)	58	--	--	58
9(C)	34	9	--	43
9(E)	95	6	2	103
9 ?	19	2	1	22
Total	216	17	3	236

PREPARED BY: Christian A. Smith, Game Biologist III

Appendix III. Moose antler and age statistics, 1976-1980 - Subunit 9(E).

Season	Mean Age	Mean Spread of Residents' Moose	Mean Spread of Nonresidents' Moose	Mean Spread of Guided Hunters' Moose	Mean Spread of Unguided Hunters' Moose	Mean Spread of All Moose	% Over 60"	#Sub Legal	Total Sealed
1976	5.6(82)*	54.3(18)	56.8(66)	57.0(54)	54.9(30)	56.3(84)	22.7	5	94
1977	5.7(76)	55.5(14)	56.5(73)	57.0(54)	54.9(23)	57.4(87)	21.8	3	88
1978	5.3(77)	56.6(24)	58.7(60)	58.7(60)	54.7(24)	58.1(84)	41.6	5	92
1979	5.2(99)	56.7(25)	56.5(116)	56.7(94)	56.3(43)	56.5(141)	27.5	4	147
1980	**	54.8(12)	56.6(60)	57.6(43)	54.4(29)	56.3(72)	22.2	2	74

* Sample size in parentheses.
** Data not available.

PREPARED BY: Christian A. Smith, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

GEOGRAPHICAL DESCRIPTION: Chitina Valley and the eastern half of the Copper River Basin.

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Sept. 20 — One bull

Population Status and Trend

Previous composition counts indicated a low population density for moose in Unit 11. Field observations indicated so significant change in 1980.

Population Composition

No data were available.

Mortality

Forty-two moose were killed during 1980. Nonresident hunters killed five (13%) of these moose. There were 151 hunters that reported hunting in Unit 11. Hunter success was 28 percent.

Winter mortality was not determined. It was, however, probably less than the previous year's mortality because snow depths were much lower than in the severe winter of 1978-79.

Management Summary and Recommendations

The harvest increase reported in 1980 probably reflects an increase in hunting pressure. Some hunters that stayed out of the newly created Wrangell-St. Elias National Monument in 1979 returned in 1980.

The cause for the current low moose density experienced in Unit 11 is unknown. The nutritional condition of moose should be assessed and the condition of the range should be evaluated. Predation rates should also be studied.

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Survey-Inventory Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 12

GEOGRAPHICAL DESCRIPTION: Upper Tanana and White Rivers

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 12, that portion along Nabesna Road east of Unit 11 which includes all drainages of Jack Creek and Jacksina Creek upstream to the head of the north branch of Canyon Creek	No open season		
Remainder of Unit 12	Sept. 5	Sept. 20	One bull

Population Status and Trend

Moose densities in Unit 12 varied from extremely high in the Little Tok River drainage to extremely low in the Nabesna Road area. Moose in Unit 12 represent numerous populations with extreme variability in density, productivity, and, hence, population trends. In the northern Alaska Range, moose are believed to be increasing in number, while in the Tok River drainage, numbers are stable or increasing. Other populations in the Unit are believed to be either stable or declining.

Population Composition

A population estimate survey of Tok River, Little Tok River, and Trail Creek was conducted during November 1980. Although additional statistical modifications still remain to be applied to the data, preliminary calculations indicate that approximately 872 moose were present. Upper and lower limits of the estimate were 905 and 839 moose, respectively, at the 90 percent confidence level. Based on these data, the overall density for the 450-square mile census area was 1.9 moose/square mile. However, the high density portion of the census area (113 sq mi) had more than 4.5 moose/square mile.

Sex and age composition surveys were conducted during late October and early November. In addition, composition was determined for certain areas based upon data collected during census operations. No late winter surveys were flown.

Generally, the results of the fall 1980 surveys (Table 1) are similar to previous recent surveys, and the composition of the moose populations in the various survey areas changed little. Snow conditions during fall 1980 were better for surveying than in 1979, and larger sample sizes were obtained. Only 467 moose were classified in 1979.

Table 1. Fall moose sex and age ratios calculated from survey and census data collected in Unit 12, November 1980.

Area	Total Males per 100 Females	Small Males per 100 Females	Small Male % in Herd	Calves per 100 Females	Calf % in Herd	Moose per Hour	Total Moose
Alaska Range	26	9	4	70	36	30	45
Cheslina-Kalukna River	83	27	13	27	13	25	86
Tok River	27	9	6	20	14	46	174
Tok River*	27	6	--	32	--	--	--
Dry Tok Creek	14	6	4	49	30	80	80
Dry Tok Creek*	14	7	--	41	--	--	--
Little Tok R	26	8	6	11	8	87	268
Little Tok R*	30	13	--	14	--	--	--
Totals**	30	10	7	23	15	53	653

* Ratios calculated from census data.
** Totals reflect composition survey data only.

Calf survival and yearling recruitment in the Little Tok River drainage remained low (Table 1). Calf survival to 6 months of age remained high on the northern side of the Alaska Range for the third consecutive year. Despite this high initial survival rate, yearling recruitment there continued to be extremely poor. Initial calf survival in the Tok River drainage continued to be intermediate between these two extremes.

Mortality

Natural mortality, primarily wolf and bear predation, was responsible for most moose mortality in Unit 12.

Two cow moose were killed by automobiles, 3 moose were reported or discovered to have been poached, and 91 bull moose were reported to have been taken during the fall hunting season. Together, human-caused mortality accounted for at least 96 moose during this reporting period. Approximately 20 moose may be poached annually, particularly in the vicinity of Unit 12 villages.

The 15-day moose season, the same as during 1979, resulted in the harvest of 91 bulls compared to 79 bulls during 1979. This

represents a 15 percent increase in harvest. A total of 285 hunters reported hunting moose in Unit 12 during 1980 for a hunter success rate of 32 percent. Resident hunters took 86 percent of the moose harvested. Hunting pressure in 1980 increased 40 percent from 1979 but was still lower than in 1978 when 350 moose hunters reported hunting in Unit 12.

Using an antler spread of less than 36 inches as a criterion, yearling bulls comprised 27 percent of the 1980 harvest, compared to 22 percent during 1979. Yearling bulls comprised 44 and 54 percent of the 1980 harvest in the Tok and Tanana River drainages, respectively, and in both drainages the harvest was higher than in 1979.

Habitat Conditions

Again, winter 1980-81 was not severe with a maximum snow pack of 14 inches on low elevation winter ranges. Consequently, most moose wintered on higher terrain than usual. Utilization of preferred browse species (*Salix alaxensis, S. arbusculoides,* and *Betula papyrifera*) on winter ranges was moderate to light on the Tok River, light on the Tanana River, and virtually nonexistent on the Tetlin River below Tetlin Lake. Winter ranges have not experienced heavy use since winter 1978-79. Based upon the heavy browse utilization observed during winter 1978-79, however, I believe that winter range in the Tok River drainage is incapable of supporting 800-900 moose during a severe winter.

Management Summary and Recommendations

I recommend that the Tok River Operational Moose Management Plan be approved and implemented so that the standing crop of moose in the Tok and Little Tok River drainages may be reduced to bring the population in line with estimated carrying capacity of the winter range. Efforts to increase carrying capacity through the use of logging and prescribed fires should continue. Measured wolf reductions should occur in other areas of the Unit where moose populations are judged to be significantly below carrying capacity. To guarantee the availability of high quality habitat for moose, Federal and State land management agencies and large private landowners should be encouraged to incorporate prescribed fires into their respective land management plans under the auspices of the Fortymile Interim Fire Management Plan.

No changes in seasons or bag limits are recommended at this time. However, an additional 5 days could be added at the beginning of the season once Unit 20 moose populations have recovered sufficiently to share the increased hunting pressure. Staggered season openings created undesirable hunter concentrations in Unit 12 during fall 1979.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 13

GEOGRAPHICAL DESCRIPTION: Nelchina and Upper Susitna Rivers

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Sept. 20	One bull having an antler spread of at least 36 inches or at least three brow tines on at least one antler.

Population Status and Trend

Annual sex and age composition counts indicated that the Unit 13 moose population may have increased slightly during 1980. With the exception of the 1978-79 decline, which resulted from severe winter conditions, the trend has been one of either slow population expansion or stabilization (Eide 1980).

Population Composition

Sex and age composition counts were conducted during late October and November in nine areas of the unit with the following results:

Bulls/ 100 Cows	Yearling Bulls/ 100 Cows	Calves/ 100 Cows	Moose/ Hour	Total Sample
20.8	10.6	23.4	51	4,857

An increase from 16 bulls:100 cows in 1979 to 20.8 bulls:100 cows in 1980 suggested an increase in the number of bulls. The ratio of yearling bulls increased from 5 bulls:100 cows in 1979 (Eide 1980) to 10.6 in 1980, which suggests that the number of yearling bulls also increased. This increase in ratio of small bulls was found in all individual count areas, some of which doubled their previous number. The ratio of large bulls varied between count areas with no overall trend noted. The calf:cow ratio dropped from 25 calves:100 cows in 1979 to 23.4 calves:100 cows in 1980. These figures, however, were influenced by the data from Count Area 3, the upper Susitna River. The calf:cow ratio in Count Area 3 dropped from 52:100 in 1979, after brown bear and wolf densities were reduced (Ballard et at. 1980), to 31.4:100 in 1980. When the data from Count Area 3 were excluded from the 1979 and 1980 Unit 13 calculations, the respective ratios were highly comparable, with 22.6 and 22.8 calves:100 cows. The comparative ratios were difficult to reconcile with the fact that

winter 1978-79 was relatively severe while winter 1979-80 was relatively mild. Presumably, the mild winter of 1979-80 should have resulted in an increase in the calf:cow ratio. Also of interest was the ratio of 31.4 calves:100 cows for Count Area 3, already mentioned above.

Mortality

A total of 557 moose was reported killed by hunters in Unit 13 during the 1980 hunting season. Nonresident hunters killed 86 (15%) moose. There were 2,859 individuals who reported hunting in Unit 13 and the overall success rate was 19.5 percent. The 1980 harvest figures indicated the first decline in harvest and hunting pressure since 1977 (Eide 1980).

Winter-induced nutritional stress apparently was a relatively minor source of mortality. A survey conducted during April 1980 in Count Area 3, the upper Susitna River, resulted in a ratio of 51.1 calves:100 cows. However, heavier snowfall occurred in the Chugach Mountains in Subunit 13D and winter mortality was probably higher there than in the upper Susitna River area.

Management Summary and Recommendations

The decline noted in the number of hunters and moose killed resulted from the restrictive definition of a legal bull for Unit 13. This was the first season in which a legal bull was one with a minimum antler spread of 36 inches or three brow tines on at least one side. The restrictive definition was an attempt to increase the bull:cow ratio by reducing the total kill and at the same time, allow unlimited hunting opportunity. The regulation appeared to be effective because an increase in the proportion of yearling bulls in the population was seen in every count area. The 36-inch regulation should be maintained for the next hunting season.

Research findings indicated a decline in overall body condition values of moose in Unit 13 (Ballard et al. 1981), apparently because of range deterioration. Both a fire management plan setting up let-burn areas in the case of wild fires, and a controlled burn program are needed. Improvement of range conditions and further investigation of brown bear predation on moose is warranted.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14A

GEOGRAPHICAL DESCRIPTION: Matanuska Valley

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Sept. 20	One moose, provided that antlerless moose may be taken by permit only. 200 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

The moose population in the Matanuska Valley appears to be at a moderate level and stable.

Population Composition

Surveys to determine moose composition were not conducted during this reporting period.

Mortality

One thousand seven hundred and thirty-five hunters reported harvesting 285 bull moose. An additional 76 antlerless moose were harvested by 200 permit holders. An analysis of successful moose hunter residency showed that 95.5 percent were residents, 2.8 percent were nonresidents and 1.7 percent of unknown residency.

A review of records obtained from the Department of Public Safety, indicated that 13 moose were killed by highway vehicles during winter 1980-81.

Management Summary and Recommendations

Attempts to conduct aerial composition surveys were cancelled in early January 1981 due to lack of snow and poor flying conditions. Periodic reconnaissance flights, during the course of winter, showed moose remained on their normal summer range above 2,000 feet. This was the second consecutive year in which poor weather conditions prevented collection of moose composition data. A survey of Subunit 14A will be attempted during late fall 1981 to determine herd composition and overall status.

The bull moose harvest in Subunit 14A increased from 201 in 1979 to 285 in 1980. This harvest is below the 1978 level of 329 bulls. The number of hunters afield during 1980 (1,735) increased 65 percent from 1979 (1,053).

The dramatic increase in the number of hunters may reflect the minimum antler size restrictions imposed upon hunters in Unit 13. Many hunters did not feel capable of judging antler size and chose to hunt other areas rather than risk harvesting a sub-legal bull in neighboring Unit 13.

The harvest of antlerless moose by permit holders declined from 89 in 1979 to 76 in 1980. The cause of this slight decline is unknown.

Winter 1980-81 was mild with only a light snow cover. No winter induced mortality was observed or reported. Reconnaissance flights located many animals on their traditional summer range above 2,000 feet. The winter movements of moose were not restricted by deep snow. This condition may also have been a factor in the low numbers of moose killed or injured on the highway by collisions with automobiles.

No changes in season or bag limits were recommended.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14B

GEOGRAPHICAL DESCRIPTION: Willow to Talkeetna

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 1-Sept. 30	One moose; provided that antlerless moose may be taken by drawing permit only. 100 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
*Dec. 15-Feb. 15	One moose; by drawing permit only. 50 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

* A 2-week season within this period will be held by Commissioner's Announcement.

Population Status and Trend

The moose population in Subunit 14B appears to be expanding.

Population Composition

No composition surveys were conducted during this reporting period. A survey to determine numbers of moose within 1 mile of the highway system was flown December 29, 1980 and 184 moose (21 bulls, 108 cows, and 55 calves) were observed.

Mortality

A total of 122 bulls, 32 cows and 1 sex unknown, was killed by 710 hunters during the 1980-81 season for a success ratio of 21.8 percent. During the fall season, 560 hunters reported harvesting 107 bull moose. An additional 18 moose (4 bulls, 13 cows, and 1 sex unknown) were killed during the fall season by 100 permit holders. A breakdown of the residency of successful bull moose hunters shows 91.7 percent residents, 7.4 percent nonresidents, and 0.9 percent unknown residency.

A permit hunt was held from January 31 to February 13, 1981 for 50 antlerless moose. A total of 30 moose, 11 males and 19 females, was killed. Of the remaining permittees, 17 were

unsuccessful or did not hunt and three failed to return their permits.

The average age (determined by the tooth cementum annuli method) of moose harvested during the winter permit hunt was 7.0 years for males and 9.6 for females, excluding a single calf. These ages compare to 6.1 and 9.0 years for males and females, respectively, harvested the previous winter and indicate that current hunting pressure is not changing the age structure of the population.

Sixteen of the adult females harvested were checked for pregnancy and 15 were found to be pregnant with an in utero ratio of 157 calves:100 cows.

Nine permit holders utilized snow machines for transportation; the remaining 21 successful hunters utilized highway vehicles.

Records obtained from the Department of Public Safety, indicated that 10 moose were killed by highway vehicles during this reporting period. No data were available on the number of moose killed on the Alaska Railroad during winter 1980-81. Observations along the railroad tracks during winter 1979-80 revealed the remains of nine moose killed by trains.

Management Summary and Recommendations

Attempts to conduct composition surveys in Subunit 14B were cancelled in early January 1981. Inclement weather and poor snow cover were factors leading to the cancellation of these surveys.

A survey of selected drainages within Subunit 14B will be attempted during fall 1981 to determine the status of the moose population.

Winter 1979-80 was mild with only a light snow cover. The number of moose killed by trains reflects the mild winter conditions. This condition allowed moose to remain on traditional summer range above 2,000 feet. Few moose moved to traditional winter range along the highway. The lack of moose made hunting difficult during the late winter hunt.

If high reproductive potential shown in the examined females is indicative of the entire population, then the number of moose in 14B should continue to expand. The increasing age of moose harvested during the winter permit hunt indicates hunting is having little influence on the population. This moose population is capable of sustaining an increased harvest, and is presently limited primarily by poor hunter access.

The 96.4 percent increase in number of hunters in the fall is believed to be a response to the minimum antler size restriction imposed in Unit 13. Many hunters may believe they are incapable of determining antler size and therefore may chose to hunt other areas.

No changes in seasons or bag limits were recommended.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14C

GEOGRAPHICAL DESCRIPTION: Anchorage

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 14C Fort Richardson Management Area	Jan. 1-Feb. 28	One antlerless moose by drawing drawing permit 35 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 14C within the Twentymile River drainages	Day after Labor Day-Sept. 20	One moose by drawing permit only. 30 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder of Unit 14C**	Day after Labor Day-Sept. 20	One bull

**See exceptions in 5 AAC 81.250(6), (7), (11) and (12).

Population Status and Trend

Calf production and survival was excellent during the winter of 1979-80 and 1980-81. This high rate of survival has prolonged the moose population increase which was first apparent in late 1979. A continuing increase in population size past 1981 is not expected given the general deteriorating browse conditions and the inevitable return of more severe winters absent in recent years.

Population Composition

A total of 648 moose was observed during aerial surveys conducted in major drainages during fall 1980. Slightly more than 50 percent of these moose were seen in the Fort Richardson-Elmendorf area. Extremely poor survey conditions throughout the easterly portions of the area precluded a higher count. Overall, a ratio of 43 bulls:100 cows was observed, the highest since aerial surveys were initiated in 1966. This high ratio is a reflection of the high calf production in 1979 and their subsequent high rate of survival. A ratio of 39 calves:100 cows was observed, a figure comparable to the 1975-79 mean of 40 calves:100 cows.

The mean age of 24 road-killed cow moose and five hunter-killed cow moose was 6.8 years. Small sample size precluded compilation of meaningful age data on bull moose.

Mortality

During 1980, 47 bull moose and six cow moose were killed by sport hunters throughout the subunit. The cow moose were killed within the Twentymile River drainage during the special permit antlerless hunt. The harvest of 47 bull moose was 44 percent higher than the 1975-79 mean harvest of 32 moose. Two hundred and fifteen persons reported hunting moose for a success ratio of 24.6 percent. An additional 61 moose, 12 bulls, 29 cows and 20 calves were killed by vehicles on Anchorage roadways between 1 June 1980 and 31 May 1981. This compares to a mean of 78 killed on local highways during previous reporting periods from 1977-79. The reduction in vehicle related deaths was attributable to extremely mild winter conditions and the absence of moose wintering in lowland areas adjacent to major roadways. These same factors resulted in the cancellation of the Fort Richardson hunt when it was determined that 35 permittees could take no more than five or six antlerless moose.

Management Summary and Recommendations

High calf production, combined with an extremely mild winter and reduced mortality should result in a moderate population increase. Hunting opportunity should be excellent this year. I recommend continuation of the existing hunting season as well as the permit requirement for the Fort Richardson hunt for 35 moose. Because of excellent calf production and winter survival, I suggest a 3-4 day season extension and an increase from 30 to 50 permits in the Twentymile-Placer River permit hunts.

PREPARED BY:

David B. Harkness
Game Biologist III

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15A

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Sept. 20 One bull

Population Status and Trend

Due to lack of snow cover, a complete aerial composition survey was not conducted in Subunit 15A during 1980. However, a portion of the 1969 burn was surveyed by the U.S. Fish and Wildlife Service. Data from this survey suggested that the 1969 burn is providing suitable habitat for moose. Unfortunately, the area burned in 1969 is only one-third the size of the 1947 burn, which has reached the end of its productive life as a source of quality browse for moose. The net result of these habitat changes has not reversed the overall downward trend of the moose population in Subunit 15A.

Population Composition

An aerial survey, conducted by the U.S. Fish and Wildlife Service during 1980, was carried out after moose were concentrated in winter areas. Consequently, these composition data are not directly comparable to standard fall composition surveys conducted by the Department.

The survey by U.S. Fish and Wildlife personnel was conducted on 23 December 1980, and 252 moose were observed in a selected portion of the 1969 burn. The resultant ratios were 31 bulls:100 cows and 42 calves:100 cows. Yearling bulls comprised 48 percent of the total number of bulls observed, calves comprised 24 percent of the classified moose (243). Moose were located at the rate of 133 per hour, suggesting a dense population for the 1969 burn area.

Mortality

Harvest reports (including reminder letters) indicated 220 bulls and 8 moose of unspecified sex were killed and that 1,230 hunters hunted Subunit 15A during the 1980 season. Hunter success was 19 percent. Alaskan residents accounted for 94 percent of the successful and 97 percent of the unsuccessful hunters.

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15B

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Subunit 15B East, that portion of Subunit 15B east of a straight line from the mouth of Shantatalik Creek, on Tustemena Lake to the head of the western most fork of Funny River; east of Funny River from the head of its westernmost fork to the Kenai National Moose Range boundary, and south of the Kenai National Moose Range boundary eastward from Funny River to the Kenai River.	Sept. 1Sept.30	One antlered moose by drawing permit only; provided that antlered moose must have a minimum antler spread of 50 inches or three brow tines on one side of the antler. 50 permits will be issued. See 5AAC 81.055 and separate permit hunt supplement.
Subunit 15B West, the remainder of Subunit 15B	Sept. 1-Sept. 20	One bull

Population Status and Trend

Operational funds were available to survey only two count areas in Subunit 15B during 1980. Results of these surveys were inadequate to make conclusions concerning the entire area; however, both areas followed the general trend of low recruitment levels observed in the past. This trend suggests a declining population with the majority of the moose in older age classes.

Population Composition

Results of two surveys conducted during 1980 were inadequate to indicate population trend.

Mortality

This was the second consecutive year that the regulation allowing only the taking of bulls with an antler spread of at least 50 inches or the presence of three brow tines was in effect. Fifty permits were issued and 14 bulls were reported killed.

Reported kill locations plotted on a map (not shown) indicated that the majority of the 1980 harvest came from the area burned in 1969. Fifty-five percent of all bulls taken had an antler spread of 30 inches or less (yearlings) and 10 percent had an antler spread of 50 inches or greater.

Management Summary and Recommendations

The harvest of 228 moose by 1,230 hunters during 1980 indicated a significant increase in harvest and hunting effort compared to 1979 (123 moose killed). However, since reminder letters were not sent in 1979, an accurate evaluation can not be made. Increased public awareness of the favorable status of the moose population in the 1969 burn has concentrated hunting effort in this portion of Subunit 15A.

The 1947 burn has reached the end of its life as a productive source of browse for moose. However, moose are beginning to benefit from habitat enhancement resulting from the 1969 burn and the vegetation-crushing program of the U.S. Fish and Wildlife Service. Unfortunately, the crushing program on the Kenai National Moose Range was discontinued during spring 1978.

In light of the overall deteriorating quality of moose habitat and the abundance of wolves and black bears in Subunit 15A, it is unlikely that the moose population will recover without cooperative management of moose habitat between the federal and state agencies. The current level of harvests with bull-only seasons has resulted in an unbalanced ratio of bulls to cows; however, this proportion of bulls has proved adequate in several studies to assure normal pregnancy rates in females.

No changes in seasons or bag limits were recommended.

PREPARED BY:

Ted. H. Spraker
Game Biologist III

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

Antler spread of harvested bulls ranged from 46 to 69 inches with an average spread of 57 inches (n = 14). The average age of bulls taken was 7.5 years of age (range 4 to 14, n = 13).

Reports from several unsuccessful hunters indicated they had difficulty in distinguishing a legal bull.

Harvest reports (including reminder letters) indicated that 48 bulls, 1 cow and 2 moose of unspecified sex were killed by 267 hunters. These data indicate a 19 percent success ratio. Residents comprised 96 percent of the successful and 99 percent of the unsuccessful hunters.

Management Summary and Recommendations

Under the current restricted seasons, the impact of hunting on moose in this area is negligible, especially Subunit 15B East. Hunter effort has been relatively constant over the past 4 years. The permit hunt in 15B East was a success in providing high quality recreation to the permittees and should continue as long as adequate numbers of large bulls remain in the population. However, the antler restriction is not biologically necessary and should be withdrawn.

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SUBMITTED BY:

Leland P. Glenn
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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15C

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1-Sept. 20 One bull

Population Status and Trend

The moose population in Subunit 15C appears to be at a low level. The primary reason may be a lack of adequate winter habitat.

Population Composition

Due to lack of snow cover, moose surveys were not conducted in Subunit 15C during 1980.

Mortality

Harvest reports (including reminder letters) indicated that 160 bulls and 5 moose of unspecified sex were killed by 708 hunters in Subunit 15C during 1980. These data suggest that 23 percent of all hunters were successful. Harvest and hunting effort for 1980 appeared to be slightly higher when compared to 1979. However, since reminder letters were not sent during 1979, an accurate comparison cannot be made. Eight of the 708 hunters (1.1%) who reported hunting in Subunit 15C were nonresidents and three killed moose. Fortyeight percent of the bulls killed had an antler spread of 30 inches or less, and 13 percent had a spread of 50 inches or greater.

Management Summary and Recommendations

The harvest and number of hunters showed a slight increase during 1980 compared to recent years. Favorable weather during the hunting season may have contributed to the increase of harvest.

Efforts to set back plant succession by burning would be desirable in Subunit 15C. Borough, federal, Native and privately owned lands, however, are so interspersed with state lands that largescale burning may not be feasible.

No changes in season or bag limit were recommended.

PREPARED BY:

Ted H. Spraker
Game Biologist III

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 16

GEOGRAPHICAL DESCRIPTION: West side of Cook Inlet

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Subunit 16A	Sept. 1-Sept. 30	One moose, provided that antlerless moose may be taken by drawing permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Subunit 16B except Kalgin Island	Sept. 1-Sept. 30	One moose, provided that antlerless moose may be taken only from Sept. 10-Sept. 16.
Subunit 16B, Kalgin Island	No open season	

Population Status and Trend

The moose population in Subunit 16A appears to be healthy and stable. The moose population in Subunit 16B appears to have recovered from extensive winter kills experienced in the late 1960's and early 1970's.

Population Composition

Composition surveys were flown in early December in the Peters-Dutch Hills area of Subunit 16A, and in the Susitna-Beluga Mountain, Yenlo-Willow Mountain, Kichatna River, Lone Ridge, Redoubt Bay and Kalgin Island areas of Subunit 16B. Survey ratios are shown in Table 1.

Mortality

Subunit 16A - A total of 216 moose (180 males, 32 females and 4 sex unknown) was reported killed by 1,096 hunters. Permit holders (160) accounted for the 32 females. A breakdown of the residency of the successful non-permit hunters shows 96.2 percent were residents, 1.6 percent nonresidents and the remaining 2.2 percent of unknown residency.

Subunit 16B - A total of 1,269 hunters reported harvesting 384 moose (329 males, 46 females and 9 sex unknown) in Subunit 16B for a 30.3 percent success rate. A breakdown of the residency of the successful hunters shows 87.2 percent were residents, 7.8 percent nonresidents and the remaining 4.9 percent of unknown residency. Transportation means reported by Subunit 16B hunters reveal that 72.1 percent used aircraft and 16.4 percent used boats.

Management Summary and Recommendations

Subunit 16A - Composition surveys in Subunit 16A were conducted during a period of poor snow and weather conditions; as a result only five of six count areas were completed. Four hundred and ninety-five moose were classified which was a 52.5 percent decrease from the 1979-80 sample size. Bulls:100 cows ratio of 31.2 and calves:100 cows ratio of 32.6 remained comparable with the 1979-80 ratios of 34.3 and 28.7, respectively. Winter 1979-80 was relatively mild, and sightings of moose indicated that they were in good condition. The moose herd in this Subunit is considered healthy and stable.

No changes in season or bag limits were recommended.

Subunit 16B - Eight count areas were surveyed in Subunit 16B. Three areas, Sunflower Basin, Kichatna River and Kalgin Island, were surveyed under good counting conditions. The remaining five areas were surveyed under fair to poor conditions. No surveys were conducted prior to December 3, 1980. The poor survey conditions and timing of those surveys raise doubts as to their accuracy. It is believed some moose had either emigrated from the count areas or moved to the heavily timbered portions of the count areas where observation was extremely difficult.

The Sunflower Basin area has poor access during the fall hunting period, as shown by a reported harvest of only nine bulls and no cows during the 1980-81 season. General access to the area is possible only by ski-equipped aircraft during the winter months.

Kalgin Island was closed to hunting in 1979 in response to public opinion. The first survey of record was conducted in 1980, and 70 moose were classified. The island encompasses approximately 15 square miles, not all of which is suitable moose habitat. At its nearest point the island is 6 miles from the mainland. Interchange of moose between the island and the mainland is probably insignificant. Predators apparently are not present on Kalgin. These factors make it doubtful that the available habitat can indefinitely sustain the present moose density. It is recommended that the island be surveyed annually and a permit hunt be initiated.

The Subunit 16B harvest increased slightly from the 1979 level of 361 moose, but it is still below the 1978 level of 589 moose. Despite the increased harvest, the hunting pressure continues to

decrease. In 1980, 1,269 persons reported hunting in the area, down from 1,473 in 1979. Hunting pressure will probably continue to decrease because of escalating costs of riverboat and aircraft transportation to this unit.

Winters in the lower Susitna Valley have been very mild for the past 2 years. Minimum snowfall and numerous warm rainy days were recorded over most of the area. This unseasonable weather created very poor survey conditions and delayed surveys until December or early January. By that time many moose had moved from open terrain to dense brushy areas, making them difficult to find. Data obtained from these areas, particularly cow:calf ratios, are inaccurate (Gasaway 1980). The Subunit 16B composition data surveys, therefore, are of limited value and should be interpreted cautiously.

Monies should be allocated to fly all trend areas in Subunit 16A prior to December 1, 1981 if snow cover and other weather conditions permit. Only selected areas should be surveyed after that date.

No changes in seasons or bag limits were recommended.

Literature Cited

Gasaway, W. C. 1980. Interior moose studies, Alaska Dept. of Fish and Game, Fed. Aid in Wildl. Rest., Proj. W-21-1, Juneau. 23pp.

PREPARED BY:

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and

Nicholas C. Steen
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SUBMITTED BY:

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Survey-Inventory Coordinator

Table 1. Game Management Unit 16 moose composition survey results, 1980.

	Bulls: 100 Cows	Calves: 100 Cows	Incidence of Twins: 100 Cows W/Calves	Survey Time	Moose/ Hour	Total Moose Observed
Subunit 16A						
Peters-Dutch Hills	31.2	32.6	10.2	12.7	39	495
Subunit 16B						
Susitna-Beluga	36.7	18.0	1.8	12.5	39	498
Sunflower Basin	34.5	15.2	7.7	5.9	93.4	551
Mt. Yenlo	50.8	25.4	15.4	3.4	63.2	215
Willow Mtn.	31.3	20.8	0.0	0.7	104.3	73
Lone Ridge	46.3	12.6	20.0	2.7	55.9	151
Kichatna	28.6	14.3	0.0	0.6	33.3	20
Redoubt Bay	31.1	17.8	29.2	7.4	36.4	269
Kalgin Island	47.1	58.8	26.7	1.3	53.9	70
Subunit 16B Total	38.0	17.6	7.6	25.8	58.7	1,847

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 17

GEOGRAPHICAL DESCRIPTION: Bristol Bay

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Subunit 17A and 17B	Sept. 10-Sept. 20 Dec. 10-Dec. 31	One bull
Subunit 17C, that portion including the Iowithla drainage and Sunshine Valley.	Sept. 10-Sept. 20	
Remainder of Subunit 17C	Sept. 10-Sept. 20 Dec. 10-Dec. 31	

Population Status and Trend

Moose populations throughout most of Unit 17 continued a slow decline during this reporting period. A lack of moose was most evident in Subunit 17A where only three moose (all yearlings) were observed during 5.5 hours of survey time, on January 20 and 21, 1981.

Moose surveys have been conducted sporadically in portions of Unit 17 since 1971. Moderate concentrations have been observed in Sunshine Valley, Iowithla Drainage, Kemuk Mountain, King Salmon River and along portions of the upper Nushagak and Mulchatna Rivers. Of these, the Sunshine Valley has been surveyed most often and the resulting data indicate a declining moose population (Appendix I).

Population Composition

Fall sex and age composition surveys were flown for the first time in this unit in 1980 (Appendix II). Ratios of calves per 100 females and yearlings per 100 females indicated recruitment in both Subunits 17B and 17C should be sufficient to maintain the moose population. Sex ratios in Subunit 17C, however, reveal an unusually high proportion of bulls indicating that mortality of females must be high.

Mortality

Hunters reported taking 89 moose in Unit 17 during the 1980 season. This is the second highest harvest recorded for this unit and was 68 percent above the annual average of 53 animals per year since 1970.

Although the bag limit for this unit restricts the harvest to bulls only, two females were reported taken. Additionally, Fish and Wildlife Protection personnel investigated five cases involving illegally killed females.

Seventy-five percent of the reported harvest occurred during the September season, 4 percent was reported out of season and the remaining 21 percent was taken during the December season. These figures do not accurately reflect actual harvest chronology. It is suspected that the largest proportion of the unreported moose harvest occurs during or after the December season.

Management Summary and Recommendations

Although season length has varied, Unit 17 has had a one bull bag limit since statehood. Moose populations in areas of the unit readily accessible to local residents have continued to decline. It is apparent from sex and age composition counts and from discussions with villagers that the illegal take of females is primarily responsible for this decline.

Programs to educate village residents toward a stronger conservation ethic have met with limited success. Efforts in this area were increased during this reporting period through increased visits to villages and conservation education presentations at village schools.

Subunit 17A was surveyed extensively for the first time in 1981. Low numbers of moose were observed under excellent sightability conditions, and a recommendation was made to the Board of Game to close the moose season in this subunit until numbers of moose become sufficient to support a harvest.

PREPARED BY:

Kenton P. Taylor
Game Biologist III

SUBMITTED BY:

Leland P. Glenn
Survey-Inventory Coordinator

Appendix I. Winter moose surveys conducted in Sunshine Valley, Alaska's Game Management Unit 17, 1972-1980.

Date	FF With 0 Calves	FF With 1 Calf	FF With 2 Calves	Total FF	Total Calves	Total Adults of Unid. Sex	Calf % In Herd	Total Sample	Count Time (Hrs.)
2/27/72	-	-	-	-	22	31	41.5	53	-
3/11/72	1	8	4	13	16	19	33.3	48	0.67
3/28/80	0	3	2	5	7	33	15.6	45	-
11/26/80	8	3	0	11	3	13*	11.1	27	1.8

* - Males

PREPARED BY: Kenton P. Taylor, Game Biologist III

Appendix II. Moose sex and age ratios in Alaska's Game Management Unit 17, 1980.

Area	Date	MM Per 100 FF	Small MM Per 100 FF	Calves Per 100 FF	Calf % In Herd	Animals Per Hour	Total Sample	Count Time (Hrs.)
17B Mulchatna-Lake Tutna	11/28/80	72.2	38.9	22.2	11.1	18	36	2.0
17B Mosquito River	12/5/80	62.5	6.3	31.3	16.1	24	31	1.3
Total 17B		67.7	23.5	26.5	13.4	20	67	3.3
17C Sunshine Valley	11/26/80	118.2	9.1	27.3	11.1	15	27	1.8
17C Kemuk Mountain	12/2/80	135.3	32.4	23.5	9.1	42	88	2.1
17C Iowithla Drainage	12/1/80	171.4	42.9	71.4	20.8	37	48	1.3
Total 17C		140.7	30.5	35.6	12.9	31	163	5.2

PREPARED BY: Kenton P. Taylor, Game Biologist III

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 18

GEOGRAPHICAL DESCRIPTION: Yukon-Kuskokwin Delta

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 18, that portion north and west of a line from Cape Romanzof to Mountain Village, and west of (but not including) the drainage of the Andreafsky River.	Sept. 1-Sept. 20	One bull
Remainder of Unit 18	Sept. 1-Dec. 31	

Population Status and Trends

Moose populations in Unit 18 continued to reflect trends observed in the 1979-80 reporting period. Limited survey information, harvest data, and reports from local residents indicated moose populations were still at a depressed level with no large-scale increasing or decreasing trends evident.

Population Composition

Aerial surveys were conducted during February 1981 along the Yukon River from Russian Mission to the mouth of Paimiut Slough and along the Kiseralik, Kasigluk and Kanektok drainages near Bethel. Moose were not observed during surveys of the latter three drainages. Results of the Yukon River survey compare closely with a February 1980 survey of the same area (Table 1).

Table 1. Moose composition surveys, Unit 18 (Lower Yukon River - Russian Mission to mouth of Paimiut Slough).

Date	MOOSE without calves	Cows with 1	Cows with 2 calves	Percent Calves	Total Moose	Moose/ Hour
2/25/80	28	9	1	22	49	15
2/18/81	15	12	0	31	39	18

Moose densities were low for both years, but recruitment appeared to be relatively good with 31 percent of the 1981 sample calves. However, the samples from both years are small, and conclusions regarding sex and age composition should be interpreted with caution.

Mortality

The reported unit-wide harvest for the fall 1980 season was 48 bulls. This figure was identical to the 1978 reported harvest, but compares with only 12 moose during the 1979 season. However, these figures may not reflect changes in hunter success. Unit 18 did not have an area biologist during most of the 1979-80 regulatory year, and reminder letters were not sent at the end of the season.

Reminder letters were sent out for the 1980 season, and considerable effort was expended to get harvest tickets returned. The apparent increase in harvest observed for the 1980 season over the previous year probably reflects better compliance with harvest ticket regulations rather than an actual harvest increase.

A total of 145 hunters reported hunting compared with 33 for the 1979 season and 133 for the 1978 season. Thirty-nine of the successful hunters were residents of Unit 18, four were from Anchorage, and four were nonresidents.

Nineteen moose were taken on the lower Yukon drainage, 16 from the lower Kuskokwin drainage, and 11 from unknown areas. Forty moose were harvested during September, 5 during October, 1 during November, and 2 during December.

Six successful hunters reported using airplanes as their principal transportation means, 37 used boats and 2 used snow machines.

Management Summary and Recommendations

Moose populations in Unit 18 are currently at a low level. A major limiting factor, especially along the Yukon River, is the high illegal harvest by hunters using snow machines. Existing harvest data show the legal harvest by hunters using snow machines to be relatively small (2 out of 45 moose). Department personnel should continue efforts to inform hunters of the depressed status of the moose populations.

The level of compliance with harvest ticket regulations has improved considerably from last year and appears to be at, or near, the 1978 level. Unit 18 now has two biologists, one stationed in Bethel and the other in St. Mary's. Their increased efforts in the villages should help improve regulation compliance in the future.

Replicate aerial surveys should be conducted on designated drainages during the winter and spring to determine moose density and seasonal distribution. This data base is needed for management purposes and to help convince local hunters to abide by existing regulations.

PREPARED BY:

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Game Biologist II

SUBMITTED BY:

Robert E. Pegau
Regional Supervisor

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 19

GEOGRAPHICAL DESCRIPTION: Middle and Upper Kuskokwim Drainages

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 19A	Sept. 1 - Sept. 20	One bull
	Nov. 1 - Nov. 30	
Unit 19B	Sept. 1 - Sept. 30	
Unit 19C	Sept. 1 - Oct. 10	
Unit 19D	Sept. 1 - Sept. 30	
	Nov. 1 - Nov. 30	

Population Status and Trend

Moose population trends continue about the same as the last 2 years. Moose in the central and lower portions of the Kuskokwim drainage in Unit 19 appear to be increasing, or at least stable. Populations within Subunit 19D upriver from McGrath are probably declining or stable. Potential population problems were detected in Subunit 19C during fall 1979 composition surveys, but poor survey conditions and other problems precluded surveys in 1980. Hence, moose population problems in Subunit 19C could not be confirmed or more accurately identified.

Surveys in Subunits 19A and 19B indicated increasing populations but low density in some areas, particularly the Aniak River drainage. Most moose surveys in Subunits 19A and 19B have been made in late winter. Moose are usually concentrated along the rivers and streams at this time, and surveys have possibly given false impressions of overall higher moose density.

Population Composition

Fall composition surveys were flown in Subunits 19A, 19B (Table 1), and 19D during November and December 1980. Surveys revealed a high rate of calf survival and an abundance of bulls in the population. Survey data for Subunit 19D are not available at this time but will be presented in the next annual report.

Mortality

The reported harvest for 1980-81 was 369 moose for the entire Unit. The reported take of bulls increased from 283 (1979-80) to 348 (1980-81). The increase was probably due to improved reporting and a real increase in the number of bulls killed.

Seventy-seven bulls were reported taken in Subunit 19A during 1980. This was an increase of 34 over the 43 reported in 1979. Sixty-four percent of the successful hunters used boats, and 25 percent used airplanes for transportation. In 1979, 70 percent used boats. Resident hunters killed 63 moose, or 83 percent, of the reported harvest.

Hunting pressure continued to increase in Subunit 19B. Forty-two moose were reported taken compared with 29 in 1979. Hunters using aircraft for transportation reported taking 30 moose, and hunters using boats reported eight. Nonresident hunters took 25 bulls, or 60 percent, of the moose taken from Subunit 19B. Subunit 19B continued to be a popular area for aliens and nonresident hunters.

The harvest in Subunit 19C declined for the third consecutive year. In 1977, the population was described as heavily hunted when the reported bull harvest was 83. Since then, the kill was 152 in 1978, 132 in 1979, and 117 in 1980. Composition surveys were last made in both fall 1976 and 1977; bull:cow ratios were 111 and 135 bulls:100 cows, respectively. It appears that the high proportion of bulls in the population may be declining. Future composition surveys will determine if significant composition changes have occurred from the number of bulls killed in the past three seasons. Hunters using aircraft for transportation took 101 moose. Nonresident hunters took 58 moose, 50 percent of the Subunit harvest.

In Subunit 19D, the reported harvest rebounded from the decline reported in 1979. The 1980 kill of 103 was an increase of 28 over the 75 reported in 1979. Fifty-two moose (50%) were taken by hunters using boats and 37 (36%) were taken by hunters using aircraft. Nonresidents took 17 (17%) of the reported harvest.

The unreported and illegal kill for Unit 19 is still significant and may be greater than 200 moose. A check station was established at the mouth of the Holitna River, Subunit 19A, to improve reporting and to discourage the illegal harvest of moose. Sixty boats (155 hunters) were checked. Thirty-eight moose were known to be taken on the Holitna River drainage.

Operation of the check station afforded an opportunity to learn of 28 additional moose killed in portions of Subunit 19A other than the Holitna drainage. Information collected from the check station was not compared with moose harvest reports. Therefore, the apparent agreement of the check station kill figure for Subunit 19A (66) with the kill reported through harvest tickets

for the same period (67) is coincidental and not evidence of accuracy of either system.

A subsistence survey of the Nikolai, Medfra, and Telida areas revealed that about 75 percent of the moose taken by residents of the area were not reported through the harvest ticket system.

Management Summary and Recommendations

Moose populations are slowly increasing in Subunits 19A and 19B and that portion of Subunit 19D downriver from McGrath. Even though the evidence is scanty, it appears that moose are declining in the northeastern portion of Subunit 19D and throughout Subunit 19C. Additional moose and wolf population data are needed to define the extent of a predator problem in Subunit 19D above McGrath.

The upper Kuskowkwim Controlled Use Area (Subunit 19D) was established to prevent use of aircraft by hunters during the 1981 moose season. Because few moose are taken by hunters using aircraft in this area, the Controlled Use Area regulations will have little influence on the Subunit 19D moose harvest. Further season restrictions will not alleviate the situation because most moose are already killed out of season or illegally.

PREPARED BY:

Oliver E. Burris
Game Biologist IV

SUBMITTED BY:

Oliver E. Burris
Regional Management Coordinator

Table 1. Moose sex and age ratios calculated from survey data collected in Unit 19, fall 1980.

Area	Date	Males per 100 Females	Males per 100 Females	Male % in Herd	Calves per 100 Females	Calves per 100 Females >2 yr old	Calf % in Herd	Moose per Hour	Total Moose
Subunit 19A Holitna River, Taylor Creek, and Dawn River	November	59	22	11	41	53	21	NA	92
Aniak River Drainage	December 5 to December 8	100	21	8	45	57	18	10	71
Subunit 19B Upper Hoholitna River	November	92	17	7	42	50	18	NA	124

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20A

GEOGRAPHICAL DESCRIPTION: Tanana Flats, Central Alaska Range

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 20A, that portion draining into the south bank of the Tanana River north of the Fairbanks North Star Borough southern boundary (south line of T7S Fairbanks meridian), and between the east bank of the Little Delta River and the west bank of the Wood River	Sept. 5 - Sept. 21	One bull
Unit 20A, the drainage of the Yanert River	No open season	
Remainder of Unit 20A	Sept. 5 - Sept. 15	One bull

Population Status and Trend

Based upon 1978 census data and sex and age composition surveys, an estimated 4,000-5,000 moose occupy Subunit 20A and adjacent 20C east of the Nenana River,

Overall, the moose population is increasing about 7 percent annually. However, the rate of increase is not uniform throughout the Subunit. The population is increasing by about 15 percent in the central Tanana Flats where wolf control has been most effective; but in the foothills of the Alaska Range, the rate is much lower.

The Yanert River population appears to be slowly increasing, although numbers are still low and consist largely of old animals. Unless recruitment improves considerably, population decline is expected as old animals succumb to natural mortality.

Carrying capacity of the Subunit, particularly on the Tanana Flats, is declining. Casual observations of range condition in portions of Subunit 20A indicate that although browse quantity is

adequate, a large proportion is overmature or decadent. Spruce and other nonbrowse species are replacing preferred browse.

Population Composition

Moose survey methods for Subunit 20A were changed in 1980 because conventional composition counts are now considered unsuitable for accurately determining population trends. Age and sex surveys were conducted during November 1980 on many traditional Subunit 20A count areas, but individual survey areas were reduced in size and time spent surveying each count area was doubled. This technique yields more reliable population trend and composition data. Since relatively small areas were counted, sampling areas were carefully selected to assure that various habitat types in the Subunit were adequately represented.

In general, calf survival to 6 months of age was high on the Tanana Flats and the Alaska Range foothills (Table 1). However, yearling recruitment varied from very good on the Tanana Flats to barely adequate in southwestern Subunit 20A. Differences in yearling survival probably reflect the relative wolf densities in the two areas.

Table 1. Moose survey data for Subunit 20A, November 1980.

Area	Bulls/ 100 Cows	Calves/ 100 Cows	Calves/ 100 Cows >2 yrs	Percent Calves	Percent Yrlgs	Sample Size
Tanana Flats	59	49	63	24	20	173
Alaska Range foothills	85	56	67	23	14	332
Yanert drainage	43	30	33	18	10	40

Preparturition surveys were conducted on standard count areas in early May to assess overwinter calf survival. Because of the mild winter of 1980-81 and continued wolf control in Subunit 20A, calf survival continued to be high (Table 2).

Table 2. Results of moose preparturition counts on the Tanana Flats, May 1981.

Yearlings/100 Cows	Yearling Percent in Herd	Total Moose
32	20	348

Mortality

Harvest ticket data indicate 138 moose were taken in Subunit 20A during the 1980 season, a 39 percent increase from 1979. The hunting season was 6 days longer for that portion of Subunit 20A between the Wood and Little Delta Rivers. Analysis of harvest data suggested the longer season did not result in a large increase in hunters. However, it appeared that hunters took advantage of the longer season to hunt later when greater success was likely.

Residents took 90 percent of the harvest and comprised 89 percent of the hunting effort. The success rate was 33 percent for the 423 individuals who reported hunting in Subunit 20A.

Based on antler sizes as reported on harvest tickets, yearlings comprised 14 percent of the harvest. Yearling bulls were assumed to have antler spreads of 30 inches or less. The mean antler size for all moose taken was 42 inches, approximately the same reported in 1979.

Boats were the favored transportation means, followed closely by aircraft. However, hunters using aircraft for access were slightly more successful (40%) than those who hunted by boat (34%). Hunter transportation data are summarized in Table 3.

Table 3. Access modes used by Subunit 20A moose hunters during 1980.

Access Mode	Number Successful Hunters	Number Unsuccessful Hunters
Aircraft	58	88
Horse	7	6
Boat	41	122
Motorbike	0	1
Offroad Vehicle	6	10
Highway Vehicle	3	22
Unspecified	0	59

Management Summary and Recommendations

The moose population in Subunit 20A has increased during the past 5 years. The wolf reduction program begun during spring 1976 is believed to be largely responsible for the increase in moose numbers. A parallel increase in hunter success has occurred in those portions of the Subunit where wolf reduction has been most successful.

The wolf control program should be continued in those portions of the Subunit where moose populations have not shown substantial improvement. On the Tanana Flats where wolf reduction has been

most successful, the moose population appears to be near carrying capacity, and adjustments in the wolf management program may be necessary.

Efforts to liberalize the fire suppression policy in Subunit 20A should be continued to increase the food base for moose. Without browse rehabilitation from wildfires, moose management goals that call for long-term population levels approaching those of the mid-1960's will not be achieved.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20B

GEOGRAPHICAL DESCRIPTION: Fairbanks and Central Tanana Valley

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 20B, that portion north and east of the Trans-Alaska pipeline lying between Nordale Road on the west and Transmitter Site Road-Grange Road on the east, and south of the Chena Hot Springs Road between Mile 6 and Mile 20.5	Sept. 5 - 15	One bull by bow and arrow only
Unit 20B, that portion of Goldstream drainage (see Hunting Regulation Booklet No. 21 for specific description)	No open season	
Unit 20B, that portion within the Minto Management Area	Sept. 5 - 10 Dec. 10 - 15	One bull by registration permit only; 15 bulls may be taken. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder Unit 20B	Sept. 5 15	One bull

Population Status and Trend

Moose density remained low throughout most of Subunit 20B. Moose numbers may have stabilized at this low level due to relatively good calf survival and yearling recruitment of moose that annually move from Subunit 20B to the Tanana Flats for calving.

Population Composition

Fall sex and age composition surveys were flown on Minto Flats and in the Chena River drainage. The sample size from Minto Flats was not large enough to generate valid population indices; however, meaningful data were obtained for the Chena drainage (Table 1).

Table 1. Fall moose survey data for the Chena River drainage, 1980.

Bulls/ 100 Cows	Calves/ 100 Cows	Percent Calves	Percent Yearlings	Moose/ Hour	Sample Size
49	29	16	10	14	146

Mortality

The 665 people who reported hunting moose in Subunit 20B harvested 86 bulls during the 1980 season. This 155 percent increase over the 1979 harvest can be attributed to increased hunter success (13%). Distribution of the known harvest is indicated in Table 2.

Table 2. Distribution of the reported moose harvest for Subunit 20B, 1980-81.

Area	Number of Moose
Chatanika River	27
Chena River	42
Tanana River	6
Goldstream	3
Minto Flats	2
Unknown	6
Total	86

Based on antler sizes reported by hunters on harvest tickets, yearling bulls comprised 31 percent of the harvest and were assumed to have antler spreads of 30 inches or less. Successful hunters spent an average of 4.6 days in the field. Resident hunters constituted 88 and 67 percent of the successful and unsuccessful hunters, respectively.

Since Subunit 20B includes Fairbanks and a sizable network of roads and trails, it was not surprising that most hunters used highway vehicles (64%) and offroad vehicles (19%) for access (Table 3). However, those individuals using highway or offroad vehicles were least successful (14%). Twelve percent of the hunters traveled by boat and 20 percent of these hunters were successful. As expected, hunters who used aircraft for access to less heavily hunted areas were most successful (40%).

Table 3. A comparison of hunter success with mode of access for Subunit 20B, 1980.

Access Mode	Number Successful Hunters	Number Unsuccessful Hunters
Airplane	6	9
Horse	1	5
Boat	13	52
Motorbike	1	3
Offroad vehicle	14	89
Highway vehicle	48	292
Unspecified	5	128

The registration permit hunt held in the Minto Management Area attracted considerable interest, particularly from Fairbanks area residents. However, the Board of Game authorized only 100 permits for the area and further established a quota for Fairbanks, Nenana, and Minto of 25, 25, and 50 permits each, respectively. Only Minto failed to issue its permit quota, while in Fairbanks the demand for permits far exceeded the supply.

Only two moose were harvested in the Minto Management Area, although two other moose were allegedly taken by hunters who did not possess permits. No moose were reported taken in the area during December, due, in part, to the extremely cold temperatures.

Appendix I presents other information regarding the Minto Management Area permit hunt.

Additional mortality resulted from 12 wolf packs (at least 70 wolves) that occupy territories partly or entirely within Subunit 20B. According to Fish and Wildlife Protection Division records, an additional 22 moose were killed by automobiles. Illegal hunting accounted for a significant loss of moose, although most poaching was undetected. Fish and Wildlife Protection estimated at least 26 moose were illegally taken.

Management Summary and Recommendations

The moose population remains low in Subunit 20B. The wolf control program should be continued until a wolf/moose ratio is reached that will allow the moose population to increase to former levels. Although habitat conditions are not presently limiting population growth in Subunit 20B, overall carrying capacity has declined. Increased habitat rehabilitation through controlled burning and reduced wildfire suppression will be necessary to restore populations to their former levels. In light of the excellent bull/cow ratio, an expanded harvest of bulls could be permitted once recruitment of yearlings improves and the population begins to increase.

Fall sex and age composition surveys should be flown in the Chatanika River drainage where a relatively high percentage of the harvest occurs.

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Appendix I. Minto Management Area registration permit moose hunt.

	Number Permits Allocated	Number Permits Issued	Number *Permits Returned
Minto	50	28	19
Nenana	25	25	20
Fairbanks	25	25	20
Total	100	78	59

Harvest

Number	Residency	Transportation Used
2	Fairbanks	aircraft
1**	?	aircraft
2**	?	boat

* One reminder letter sent
** No permits; information based on hearsay.

44% of permittees hunted
55% of permittees did not hunt
1% of permittees did not indicate whether or not they hunted

MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20C

GEOGRAPHICAL DESCRIPTION: Kantishna, Cosna, Beaver, Birch, Salcha, and Goodpaster Drainages

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 20C, those portions within the Minto Management Area	Sept. 5 Dec. 10	Sept. 10 Dec. 15	One bull by registration permit only; 15 bulls may be taken. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 20C, the drainage of the Yanert River	No open season		
Remainder of Unit 20C	Sept. 5	Sept. 15	One bull

Population Status and Trend

Moose numbers in Subunit 20C have declined since the early 1970's because of chronically poor calf survival and yearling recruitment. Moose densities are presently very low, except for localized sites where moose congregate to take advantage of atypical prime habitat conditions (Table 1). Moose are most abundant in the Alaska Range portion of Subunit 20C and least numerous on the Yukon Flats portion, a situation that seems to have existed since survey data have been collected. This probably reflects differences in habitat quality between the two areas.

In the Moody Creek portion of the Alaska Range, moose numbers appear to have finally stabilized at a level considerably below former numbers. In the Tanana Hills, moose numbers are probably stable at low densities or still generally declining. Moose in the lower Salcha River drainage appear to have benefited from wolf control in nearby Subunit 20A and may now be increasing. Moose numbers in the Nome Creek drainage appear to be increasing probably because of larger human harvests of wolves.

Table 1. Estimated moose densities for selected areas within Subunit 20C, November 1980 (unless otherwise noted).

General Area	Specific Locality	Density (moose/mi^2)*
Alaska Range	Moody Creek	5.6
Alaska Range	Windy Creek	1.3
Tanana Hills	(lower) Goodpaster River	0.0
Tanana Hills	(upper) Goodpaster River	1.6
Tanana Hills	Butte Creek	0.3
Tanana Hills	Nome Creek	1.0
Tanana Hills	Tatalina River	0.2
Yukon Flats	Marten Island	0.6
Yukon Flats	Beaver Slough	<0.1**
Yukon Flats	Canvasback Lake	<0.1**

* Corrected by a factor of 1.25 to compensate for an assumed sightability of 80 percent.
** February 1981 survey data.

Population Composition

Trend count areas were established in the Tanana Hills and Alaska Range portions of the Subunit during November 1980. Some trend areas fell within previously surveyed areas, while in some cases, new sites were chosen that included typical, but not necessarily optimum, moose habitat. This practice recognizes the value of an area as moose habitat changing with time due to plant succession, and that the former procedure of surveying only habitats with high moose densities (i.e., regrown burns) yields misleading and biased data. Search intensity was increased in count areas to reduce sightability biases. Because of staff commitments to the Nowitna population estimate survey, some surveys planned for Subunit 20C were not completed.

Calf survival through summer continued to be only fair in the Moody Creek drainage of the Alaska Range (Table 2), although the incidence of twinning increased. Despite low initial calf survival, yearling recruitment (as indicated by proportion of long-yearling males) has steadily increased as shown by the past 3 years' data. Recruitment may now be sufficient to maintain the population; however, an increase in moose numbers is probably unlikely at present recruitment rates.

Moose density in the Moody Creek headwaters during November 1980 was about 5.6 moose/square mile of moose habitat (areas below 3,500 feet elevation). This area of subalpine shrub habitat attracts large numbers of moose during fall and early winter.

Table 2. A comparison of fall moose sex and age ratios from the Moody Creek drainage, 1978-80.

Year	Bulls/ 100 Cows	Calves/ 100 Cows	Incidence of Twins/ 100 Cows w/Calves	Percent Calves	Percent Yrlgs	Sample Size
1978	22	22	0	15	6	163
1979	22	13	20	9	10	137
1980	25	21	27	14	12	98

Calf survival and yearling recruitment have improved considerably in the Nome Creek area of the Tanana Hills since 1975 (Table 3). Although overwinter calf survival was excellent, substantial losses occurred during the first 6 months of life. During the three surveys conducted in this area over the last 5 years, no twins have been observed to survive through summer.

Table 3. A comparison of fall moose sex and age ratios from the Nome Creek drainage, 1975-80.

Year	Bulls/ 100 Cows	Calves/ 100 Cows	Incidence of Twins/ 100 Cows w/Calves	Percent Calves	Percent Yrlgs	Sample Size
1975	66	9	0	5	6	98
1978	134	23	0	9	24	90
1980	79	16	0	8	22	37*

* Represents a change to a small survey area rather than a decline in moose numbers.

An excellent bull/cow ratio exists in the Nome Creek drainage; however, overall moose density is low. The area mostly contains black spruce/feathermoss, an unproductive moose habitat. A burned portion of the drainage was selected as a trend area in 1980 since prior surveys showed moose were attracted by browse conditions in this area during November. Moose density in this burn was about 1.0 moose/ square mile during November 1980.

Two trend areas were flown in the Goodpaster River drainage. No moose were found in the lower count area, but 47 were observed in the count area nearer the headwaters. These data suggest that 1980 cohort survival has been poor (Table 4). Recruitment from the 1979 calf crop appeared to be good, but with the present low numbers of moose, little if any population increase can be expected. A good bull/cow ratio exists.

Table 4. Survey data from the Goodpaster River, November 1980.

Bulls/ 100 Cows	Calves/ 100 Cows	Incidence of Twins/ 100 Cows w/Calves	Percent Calves	Percent Yrlgs	Sample Size
63	11	0	6	18	47

February 1981 surveys on the Yukon Flats by the U.S. Fish and Wildlife Service confirmed extremely low moose density. Only two moose were observed per survey hour during 7 hours of survey on the Yukon Flats portions of Subunit 20C. Further discussion of the Yukon Flats situation can be found in the Unit 25 Moose Survey and Inventory Report.

Mortality

Subunit 20C was open to moose hunting except for the Yanert Fork of the Nenana River. The reported harvest of 247 bulls represented a 66 percent increase over 1979. The 947 people who reported hunting in Subunit 20C during 1980 had a 26 percent success rate. Yearlings comprised 20 percent of the harvest based on reported antler sizes. Bulls with antler spreads of 30 inches or less were assumed to be yearlings.

The distribution of the reported harvest is shown in Table 5. Because many of the moose taken by residents of Tanana, Rampart, Stevens Village, Beaver, Fort Yukon, and Circle are never reported, harvests from these villages are not reflected in the harvest ticket data.

Table 5. Distribution of the known harvest of moose, 1980-81.

Location	Moose Harvested
Goodpaster River	33
Shaw Creek	19
Salcha River	29
Steese Highway	21
White Mountains	16
TAPS Road and Elliott Highway	10
Parks Highway	69
Kantishna River	30

Successful hunters averaged 4.3 days in the field. Resident hunters constituted 91 and 93 percent of the successful and unsuccessful hunters, respectively.

Boats were the most common form of access at 34 percent, followed by highway vehicles (24%), airplanes (18%), and ORV's (15%). Hunters using airplanes had the highest success at 55 percent, while hunters traveling by boat had the lowest success (21%).

The low overwinter survival rate of moose calves suggests that wolf predation continued to be a primary cause of moose mortality in Subunit 20C. Poor snow conditions in the Subunit made the 1980-81 wolf control program ineffective.

The impact of illegal harvest on moose in Subunit 20C far exceeds that of the annual legal kill. The illegal take includes a substantial number of cows and calves, which draws from the reproductive potential of the herd. The Subunit 20C moose population cannot withstand unnecessary loss to the reproductive segment of the population.

Management Summary and Recommendations

Moose densities in Subunit 20C are far below carrying capacity. Moose numbers in the northern portion of the Subunit are particularly depressed. Habitat rehabilitation through controlled burning and reduced suppression of wildfire is necessary to provide for long-term welfare of moose populations.

Wolf control should be continued until the moose/wolf ratio has reached a level which will allow the moose population to increase. Until recruitment of yearling moose improves, hunting seasons should remain short with a bulls-only restriction. More enforcement and educational effort are needed in villages where illegal harvests are contributing to the already depressed condition of moose populations.

Due to hunting pressure along the road and major river systems, more survey emphasis should be directed to these areas.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20D

GEOGRAPHICAL DESCRIPTION: Central Tanana Valley

PERIOD COVERED: July 1, 1980 June 30, 1981

Season and Bag Limit

Subunit 20D* Sept. 5 Sept. 15 One bull

*Refer to regulation booklet for information regarding permit hunt areas and areas closed to moose hunting.

Population Status and Trend

The moose population in Subunit 20D numbers about 1,000 animals (Table 1) and appears to be increasing. Moose in extreme western Subunit 20D may be benefiting from the wolf reduction program in adjacent Subunit 20A.

Table 1. Moose population estimates for Subunit 20D, 1972-80.

Year	Old 20D*	New Section*	New 20D*	Source
1972	629	n/a	n/a	McIlroy
1974	793	n/a	n/a	Larson
1975	744	n/a	n/a	Larson
1976	644	n/a	n/a	Larson
1978	737	205	942	DuBois & Johnson
1980	813	185	998	Johnson

* Old 20D is that section of 20D west of Johnson River; the new section is that part east of Johnson River; and new 20D combines both sections.

Population Composition

Moose composition surveys were conducted in the Granite Mountains, Donnelly, and Gerstle burn count areas during November 1980 (Table 2). Forty-six calves/100 cows were counted, the highest survival of calves through summer since 1970. Fall calf/cow ratios have steadily increased since wolf control began during spring 1976 on the nearby Tanana Flats. Fall composition surveys were not conducted in Subunit 20D during 1979, so comparisons with the past year's data cannot be made.

Table 2. Fall moose survey data for Subunit 20D, November 1980.

Bulls/ 100 Cows	Calves/ 100 Cows	Percent Calves	Percent Yrlgs	Incidence of Twins/ 100 Cows w/Calves	Moose/ hour	Sample Size
40	46	25	18	15	45	174

Yearling recruitment also increased. Long-yearlings comprised 18 percent of the herd during both the 1978 and 1980 surveys compared to the previous 8 years when they never exceeded 10 percent of the Subunit 20D population.

A total of 40 bulls:100 cows was observed--the highest bull/cow ratio on record for this area.

Mortality

Hunters reported a harvest of 37 moose in Subunit 20D during 1980. Seventy-six percent of the moose were taken in 20D West. Nine moose (24%) were reported taken in 20D East (east of the Gerstle River).

As in past years, 20D West was open to moose hunting by registration permit only, and harvest was limited to a predetermined quota of bulls. Within 20D West most of the moose harvested were taken on Fort Greely along the 33 Mile Loop Road. Slightly more than half of the 295, 20D West permittees reported they hunted; their success ratio was 11 percent.

Of the reported harvest of 37, 4 were apparently taken illegally--all after the close of the season and 1 in the closed area. In addition, two bulls and a cow were illegally taken and not reported. Other known mortality consisted of two moose found entangled in barbed wire fences and two road kills.

Management Summary and Recommendations

Based on recent composition counts, the moose harvest can probably be increased. A Subunit-wide census should be conducted in 1981 to determine population size. Further work is also needed to determine the sources and extent of moose mortality.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20E

GEOGRAPHICAL DESCRIPTION: Fortymile, Charley, and Ladue River Drainages

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

No open season

Population Status and Trend

Moose populations in Subunit 20E are still declining from previous low densities. In a few areas, such as the Mosquito Flats and surrounding high country, moose densities are noticeably higher. Persistent heavy predation by grizzly bears and wolves is preventing recovery of this once-dense moose population, currently estimated at less than 1,000.

Population Composition

Eleven hours of aerial moose survey were accomplished on standardized survey areas in Subunit 20E during the period November 3-19, 1980 (Table 1).

Table 1. Moose sex and age ratios calculated from aerial survey data, November 1980, Subunit 20E.

Area	Total Males per 100 Females	Small Males per 100 Females	Small Male % in Herd	Calves per 100 Females	Calf % in Herd	Moose per Hour	Total Moose
Kechumstuk-Mt. Veta	89	0	0	11	5	15	18
Mosquito Flats	95	21	10	21	10	41	41
Sixtymile Butte-W Fk Dennison	120	7	3	20	8	8	36
Mt. Fairplay-Dennison Fk	38	13	8	25	15	7	13
Ladue River		Insufficient Data					3
Total	98	12	5	20	9	10	111

Because of the small sample sizes in recent years, composition data have been extremely variable, but certain trends are apparent. Calf survival and yearling recruitment remain moderate and inadequate to offset total moose mortality. Despite

variability between years, the bull/cow ratio remains good. The number of moose observed per hour of survey is the lowest ever recorded for Subunit 20E.

Mortality

The primary source of mortality in the Subunit continues to be predation by wolves and grizzly bears. Wolf density in southwestern Subunit 20E was approximately 1 wolf/38 square miles during winter 1980-81. Since moose numbers declined more rapidly than wolf numbers after the severe winter of 1970-71, the effects of predation on the moose population have become proportionally greater.

Since legal moose hunting seasons were stopped in 1977, human-caused mortality has been insignificant. Poaching by local residents and seasonal miners probably accounts for less than 20 moose annually in the Subunit. Six moose were known to have been killed illegally during this reporting period.

Management Summary and Recommendations

If the moose population decline in Subunit 20E is to be reversed within a reasonable period of time and legal moose hunting opportunities restored, measured reduction of the wolf population must be initiated immediately. In addition, both moose numbers and yearling recruitment must be increased.

Since a substantial proportion of the Subunit 20E bear harvest used to occur in conjunction with moose hunting activities, a limited, bulls-only moose hunting season should be reinstituted as soon as possible after wolf reductions. In addition, hunters should be encouraged to harvest grizzly bears in those areas still supporting viable subpopulations of moose. However, until wolf reductions occur or moose numbers increase, no change in the present closed season is recommended.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21A

GEOGRAPHICAL DESCRIPTION: Upper Nowitna, Iditarod, and Upper Innoko Drainages

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limit

Sept. 5 - Sept. 20 One bull

Nov. 15 - Nov. 30

Population Status and Trend

A moose population estimate survey using stratified random sampling techniques was conducted in the Nowitna River drainage in November 1980. The moose population in the survey area contained between 1,661 and 2,284 moose (90% confidence interval), with a mean estimate of 1,972. The moose population currently appears stable both in the Nowitna drainage and in the Innoko portion of Subunit 21A.

Population Composition

To reduce overall sampling requirements and concentrate sampling effort in those areas of greatest variability, the 3,796-square mile area selected for the population estimate survey was subdivided into two strata based upon relative moose density. The low-density stratum (consisting of lowland floodplain habitat along the Susulatna, Nowitna, Sulukna, Telsitna, Sethkokna, and Titna Rivers, and upland habitat where spruce forests predominate) comprised 59 percent of the total acreage surveyed. Low-density stratum generally consisted of areas in which very few moose or moose tracks could be located during the superficial stratification flight. Moose density averaged 0.2 moose/square mile.

Upland habitats, containing old burns or timberline situations and placed in a medium-density stratum, showed an average moose density of 0.9 moose/square mile. Moose were widely distributed during the survey, and their estimated numbers were approximately twice that of previous surveys.

Composition data collected during the November 1980 survey are presented in Table 1. Both calf survival and yearling recruitment seemed adequate to sustain the population and to provide for moderate increases if overall mortality is not

exceedingly high. Incidence of twinning was low; however, the bull/cow ratio was high. The number of moose observed per hour (9.5) reflects the increased search intensity and, therefore, is not comparable to previous surveys in this area.

Table 1. Sex and age data obtained during the November 1980 moose census of the upper Nowitna River.

Bulls/ 100 Cows	Calves/ 100 Cows	Calves/ 100 Cows > 2 yrs	Percent Calves	Percent Yrlgs	Incidence of Twins/ 100 Cows w/Calves	Sample Size
71	27	32	14	15	5	434

Moose surveys were also flown in the North Fork and Yetna River portions of the Innoko River drainage (Table 2). Calf survival through summer and yearling recruitment have both increased substantially in the Yetna River uplands because of wolf control efforts. In the North Fork of the Innoko, where wolf control efforts have been few and ineffective, yearling recruitment continues to be poor. Bull/cow ratios are good in both areas.

Table 2. Moose sex and age data from the Innoko River drainage, November 1980.

Area	Bulls/ 100 Cows	Calves/ 100 Cows	Percent Calves	Percent Yrlgs	Sample Size
North Fork	58	32	17	9	112
Yetna	172	86	24	17	155

Mortality

In the upper Nowitna drainage, potential sources of significant mortality include predation by wolves and bears, hunting, and severe winters. An unusually severe winter could drastically increase losses to predation as well as substantial mortality from malnutrition.

Hunter take in the upper Nowitna is small, averaging about 20 animals per year. Moderately abundant black and grizzly bear populations probably contribute to the summer loss of calf and, to a lesser extent, adult moose.

Wolf predation is the largest source of moose mortality in the Subunit. The Nowitna River portion of Subunit 21A currently supports 60-70 wolves in five to eight packs. This represents a wolf:moose ratio between 1:26 and 1:35.

Ratios of this magnitude usually result in a stable moose population, although a slow increase or decrease is possible depending on other mortality factors. Moose are probably the primary prey species for wolves in the Nowitna drainage, although some caribou are also likely taken by wolves in parts of the drainage.

Hunters reported taking 83 moose from the Innoko drainage in fall 1980. The lower Innoko drainage is outside Subunit 21A. Since hunters are often not specific as to where in this drainage moose are taken, the harvest from the Subunit 21A portion of the Innoko drainage may have been only 40-50 moose. Similarly, because of vague harvest reporting and coding for this area, it is not possible to determine actual take of moose from portions of the drainage in which surveys were flown. However, it appears hunting is a minimal source of moose mortality in the survey areas unless moose move substantial distances during the interval between the hunting season and the survey period.

Most hunting occurs along the main river where boat and aircraft access is easiest. Fifty-five percent of the hunters who reported hunting on the Innoko River drainage utilized aircraft for access. An additional 39 percent reported using boats. Overall hunter success, as reported on harvest tickets, was high (78%).

Management Summary and Recommendations

Moose populations in Subunit 21A appear stable. Overall low density (0.5 moose/mi^2) in the Nowitna drainage portion of the Subunit is caused primarily by wolf predation. Ultimately, however, habitat conditions will limit the moose population. Continual suppression of wildfires has reduced habitat quality to the detriment of moose and other herbivores that feed on shrubs dominant in early seral stages. Most burns in the upper Nowitna are past their prime as moose habitat. Whenever possible, it would be desirable to return to the natural fire regime that existed before sophisticated suppression capabilities were developed.

High wolf numbers in the upper Nowitna and the North Fork of the Innoko drainages prevent an increase in moose populations. Because human use of moose in the Nowitna and North Fork drainages is low, wolf control programs in these areas rate low in Regional priorities. We recommend wolf control in the upper Nowitna River be confined to "problem packs" inhabiting the area between Nowitna canyon and the mouth of the Susulatna River. We also recommend traps and snares rather than aerial gunning for taking wolves.

A population estimate survey should be undertaken in the near future to determine the size, distribution, and density of moose

in Subunit 21A. This survey will provide the essential background for comparing population losses due to predation and hunting. In the meantime, moose surveys in the Innoko River drainage must be refined so better quality data are available for management decisions.

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SUBMITTED BY:

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21B

GEOGRAPHICAL DESCRIPTION: Lower Nowitna, Yukon River between Melozitna and Tozitna Rivers

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 21B, the drainage of the Nowitna River excluding that portion and within 10 miles of the Ruby-Poorman Road	Sept. 5 - 20	One bull by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder of Unit 21B	Sept. 5 - 20	One bull

Population Status and Trend

A moose population estimate survey using stratified random sampling techniques was conducted in the Nowitna River drainage in November 1980. The moose population in the censused portion of this Subunit contained between 1,957 and 2,816 moose (90% confidence interval), with a mean estimate of 2,386. Although the Little Mud drainage was not surveyed, the population was estimated at 345 moose, based on extrapolations of data (0.5 moose/sq mi) from similar habitat in the Nowitna drainage.

Prior to the 1980 survey, the information that was available suggested a declining population, but census results indicated that the Subunit 21B moose population was 2-3 times above the previous estimate. Furthermore, a comparison of the estimated yearling recruitment with estimated mortality due to hunting and wolf predation suggested a stable moose population.

Population Composition

The 3,401-square mile area selected for survey was subdivided into three strata based upon relative moose density to reduce overall sampling requirements and concentrate sampling effort in areas of greatest variability. The high-density stratum consisted of lowland floodplain habitat along the Yukon and Nowitna Rivers. This stratum comprised only 12 percent of the total acreage censused and averaged 2.0 moose/square mile.

Most of the upland habitats were judged to be either low- or medium-density strata. In general, the low-density stratum (predominantly black spruce with few browse species) was predictably areas in which very few moose or moose tracks could

be located during the superficial stratification flight. Moose densities averaged 0.5 and 0.9 moose/square mile in the low- and medium-density strata, respectively. Variance within both the low- and medium-strata was quite high, indicating that the preliminary stratification effort lacked adequate precision. Stratification has been difficult in all the moose census efforts, and to reduce within-strata variance to acceptable levels, sampling intensity had to be increased.

Composition data collected during the November 1980 census are presented in Table 1. These data, collected from small sample units throughout Subunit 21B, suggest that, generally, the population was faring well. Both calf survival and yearling recruitment seemed adequate to sustain the population and to provide for moderate increases if overall mortality is not exceedingly high. Incidence of twinning was low; however, the bull:cow ratio was high. The low number of moose observed per hour (11.3) reflects the increased search intensity and, therefore, is not comparable to previous surveys in this area.

Table 1. Moose sex and age data for Subunit 21B, November 1980.

Bulls: 100 Cows	Calves: 100 Cows	Calves: 100 Cows > 2yrs	Percent Calves	Percent Yrlgs	Incidence of Twins: 100 Cows w/Calves	Sample Size
71	34	39	17	14	3	405

A ratio of 40 bulls:100 cows was calculated for the sample units within the more heavily hunted portion of Subunit 21B. Although considerably lower than the sex ratio for this Subunit as a whole, 40 bulls:100 cows is more than sufficient to meet management goals for the area. The relatively low bull:cow ratio probably resulted from the bulls-only hunting seasons in the area during recent years. Bull:cow ratios were higher than those obtained during earlier surveys, but results from the different techniques are not comparable because of differences in search intensities, survey areas, and survey dates.

Based on a population estimate of 2,300 to 3,160 moose, the estimated yearling recruitment was 318-436.

Mortality

About 100 moose, including about 20 cows, are killed annually in the lower Nowitna River drainage. This estimate includes the reported and unreported legal harvest plus an undetermined amount of poaching. An additional 270-360 yearling and adult moose are killed annually by wolves. Total losses, excluding calves, probably average 415 animals.

Hunting on the Nowitna drainage, which comprises most of Subunit 21B, was by registration permit only. Permits were issued at the mouth of the Nowitna River by Department personnel, and the use of aircraft for any aspect of moose hunting was prohibited within the permit hunt area.

Eighty-five permits were issued, compared to 279 the previous year. This decrease can be attributed to the restriction of aircraft, higher fuel costs, inclement weather, and changes in permit issuance procedures. Since moose permits were only issued at the mouth of the Nowitna River in 1980, all permittees hunted. In 1979, when hunters had the option to obtain their permits at Ruby, Tanana, and Fairbanks, only 201 of the 279 permittees hunted.

Hunting pressure declined by 58 percent from 1979 to 1980 (Table 2); however, the reported harvest declined by only 33 percent (Table 3). Hunter success increased from 30 percent in 1979 to 48 percent in 1980, and hunters spent an average of 5.4 days in the field.

Table 2. Residency of moose hunters who participated in the Nowitna River permit hunt, 1979-80.

Residency	1979	1980	% Decrease
Fairbanks	108	49	55
Tanana, Ruby, and Galena	68	26	62
Other Alaskans	14	6	57
Nonresidents	11	4	64
Totals	201	85	58

Table 3. Hunter success during the Nowitna River permit hunt, 1979-80.

Residency	Number Successful 1979	Number Successful 1980	Percent Decrease	Success Rate(%) 1979	Success Rate(%) 1980
Fairbanks	40	33	18	37.0	67.4
Tanana, Ruby, Galena	12	5	58	17.6	19.2
Other Alaskans	5	1	80	35.7	16.7
Nonresidents	4	2	50	36.3	50.0
Totals	61	41	33	30.3	48.2

The decline in hunting effort was similar among all user groups (Table 2). However, the success rate of hunters from Fairbanks nearly doubled, whereas the success rate of Yukon River residents remained about the same as in 1979.

Management Summary and Recommendations

The moose population appears to be sustaining the present losses to predation and hunting. With the favorable bull/cow ratio, an increase in the harvest of bulls can be permitted. The restrictions on aircraft should be lifted and attempts made to distribute hunting pressure over a wider area.

Because the wolf/moose ratio (1:54) is within management guidelines, wolf control measures should be discontinued.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21C

GEOGRAPHICAL DESCRIPTION: Upper Dulbi and Melozitna River Drainage above Grayling Creek

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 5 - Sept. 20 One bull

Population Status and Trend

The Subunit 21C moose population appears to be stable, but only one survey has been conducted in recent years.

Mortality

No data are available on natural mortality, but the Melozitna drainage has a substantial population of grizzly bears which may influence moose populations.

Hunters reported taking 21 moose in the Subunit. Twenty moose were taken in the Melozitna drainage and one from the upper Dulbi drainage. All hunters used aircraft for transportation into the area.

Management Summary and Recommendations

Surveys are needed in this Subunit to determine the population status and trend.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21D

GEOGRAPHICAL DESCRIPTION: Middle Yukon, Eagle Island to Ruby, Koyukuk River below Huslia

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limit

Sept. 5 - Sept. 25 Nov. 15 - Nov. 30	One bull

Population Status and Trend

Subunit 21D has supported high moose densities for many years. However, calf/cow ratios have been declining over the past 3 years, and moose forage species appear heavily browsed. The status of this moose population is uncertain; however, the scant information available indicates that the population may be declining.

Population Composition

Because of budgetary constraints and conflicts with the Nowitna population estimate survey, only one survey was attempted in Subunit 21D. Because of poor survey conditions, data obtained in this survey are of questionable value. A very low calf:cow ratio (6:100) was indicated, but the surveyor felt that poor sightability biased the results and the ratio may have been higher.

Mortality

Hunters reported taking 107 moose in the Subunit during 1980; nine were reported taken during the November season. However, the actual harvest by local residents is estimated to be 3-4 times the reported harvest.

Forty-two moose were taken from the Koyukuk Management Area which has been closed to the use of aircraft for 3 years. Local residents reported taking 16 moose from the Management Area; hunters residing outside the Unit took 24 moose.

Management Summary and Recommendations

The decline in the calf:cow ratio must be closely monitored. A census in the Koyukuk drainage to accurately define the population must be considered high priority.

Enforcement of regulations is inadequate for proper resource management in Unit 21. Compliance with hunting regulations must be improved through education programs, public relations, and law enforcement.

Additional funds are needed for research to better understand the impact of both predators and hunters on moose populations, and to more accurately inventory wildlife populations on a regular basis.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21E

GEOGRAPHICAL DESCRIPTION: Yukon River drainage upstream from the Paimiut-Kalskag portage, including the Lower Innoko downstream from the Iditarod River, to the mouth of Blackburn Creek

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 5 - Sept. 25 One bull

Nov. 15 - Nov. 30

Population Status and Trend

The moose population along the Yukon River in Subunit 21E has experienced excellent calf survival in recent years and probably is increasing.

Population Composition

A late winter moose survey was conducted along the Yukon River between Paimiut Portage and Holy Cross (Table 1). Calf survival continued to be good.

Table 1. Late winter moose survey data for the southern half of Subunit 21E, 1977-81.

Date	Total Adults	Total Calves	Percent Calves	Moose Per Hour	Total Moose
3/9/77	192	75	28.1	178	267
2/27/78	159	26	12.3	105	211
2/25/80	N/A	N/A	27.6	50	221
2/17-18/81	165	92	36.0	89	257

Mortality

The reported harvest for Subunit 21E was 80 moose. Twenty-eight moose came from the Holy Cross-Paimiut area, 13 from the Shageluk area, and 18 from along the Innoko River. Among 128 hunters who reported hunting moose in the Subunit during 1980, 41 were not residents of the area. The total annual unreported harvest is estimated at 2-3 times the reported harvest.

Management Summary and Recommendations

The moose population in the Subunit is healthy and capable of supporting the current level of reported and estimated unreported harvest.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 22

GEOGRAPHICAL DESCRIPTION: Seward Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits:

Unit 22A	Aug. 1-Jan. 31	One bull
Unit 22B	Aug. 1-Jan 31	One moose; antlerless moose may be taken by permit only from Sept. 15-Jan. 31. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 22C	Sept. 1-Sept. 10	One bull
Unit 22D	Aug. 1-Dec 31	One moose; antlerless moose may be taken by registration permit only from Sept. 15-Dec. 31. See 5 AAC 81.055 and separate permit hunt supplement.
Unit 22E	Aug. 1-Mar 31.	One moose; antlerless moose may be taken by registration permit only from Sept. 15-Mar. 31. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

Historical records indicate moose did not occur in Unit 22 prior to 1900. During the mid-1930's a few moose moved onto the Seward Peninsula immigrating westward from Yukon River drainages. Moose numbers gradually increased, most noticeably during the late 1960's. By 1970 moose had expanded into most of the suitable habitat, and sub-populations increased dramatically in a number of drainages. Moose numbers in the central Seward Peninsula exhibited the greatest growth, and appeared to be near or above the carrying capacity of their winter range. In the western and southern portion of Unit 22 densities were much lower, and moose appeared to be stable or were increasing only slightly, even though range was not a limiting factor. Changes in population status from a year ago were minor.

Population Composition

During November, aerial surveys were conducted in Subunits 22B and 22D to determine population composition and productivity. Three major drainages were surveyed; results were as follows:

Drainage	Bulls/ 100 Cows	Yrl M % in Herd	Calves/ 100 Cows	Calf % in Herd	Moose/ Hour	Total Sample
American/ Agiapuk	61	11%	45	22%	19	101
Kuzitrin	30	4%	45	25%	74	243
Niuklouk/ Fish	64	7%	43	21%	40	297

Bull ratios ranged from a low of 30 bulls per 100 cows on the Kuzitrin River to a high of 64 bulls per 100 on the Fish River. These ratios are similar to counts obtained during the last 3 years. The differences between areas were primarily due to hunting pressure and accessibility. The Kuzitrin drainage had the best road access and since it received the most hunters and the highest harvest, the moose population here exhibited the lowest bull ratios. The Fish and Agiapuk drainages are less accessible to hunters, and this situation helped sustain substantially higher bull ratios. Calf production was consistently high in all count areas, averaging 23 percent of the moose population.

For the past 10 years, spring surveys have been conducted on at least three or more drainages in Unit 22 to determine population size and annual recruitment. These counts were not conducted this report period. Although specific count data are not available for 1981, numerous observations of moose were made on their wintering range. In the Kuzitrin and Agiapuk drainages (22D), moose numbers appeared to be similar to the densities observed in the 1979 and 1980 spring counts, during which 1,025 and 1,279 moose were seen, respectively. Based on this information, the unit 22D moose population probably numbered between 1,300 and 1,400 animals during 1981. The population in all of Unit 22 was estimated at 2,000 to 2,500 moose.

From 1973 through 1980 incisor teeth were collected from moose to assess changes in the age structure of the population (Table 1). Because of biases in the sample (hunter selectivity, and others), there are inherent dangers in a strict interpretation of the table. However, the data indicate trends that have important management implications.

From 1973 through 1977, the percentage of yearling bulls in the population slowly declined from a high of 44 percent to a low of 17 percent. Then in the 1978 sample, yearling bulls jumped to 37 percent of the sample.

Table 1. Percentages of moose in various age classes comprising annual harvests, Unit 22.

	AGE IN YEARS								
Year/Sex	1	2	3	4	5	6	7	8+	Sample Size
Bulls 1973	44	4	15	23	7	3	4	0	73
1974 Bulls	33	26	15	8	10	2	4	2	94
1975 Bulls	23	32	10	17	7	5	4	2	87
1976 Bulls	24	37	20	9	3	3	1	3	124
1977 Bulls	17	22	16	14	8	9	5	9	98
1978 Bulls	37	23	15	10	6	3	1	5	100
1979 Bulls	34	21	11	17	7	5	1	3	91
1980 Bulls	37	35	8	5	3	7	1	4	76
Total Bulls 1973 - 1980	30	26	14	12	6	5	2	3	742
1980 Cows	36	31	11	3	3	3	7	6	36
Total Cows 1973 - 1979	23	20	15	11	6	6	5	14	299
Total Sample Bulls and Cows 1973 - 1980	28	24	14	12	6	5	3	7	1041

For three consecutive years (1978-80) the percentage of yearling bulls in the sample remained near this level. The reason for the decline and subsequent return to higher levels is not known, but was thought to be one or a combination of the following three conditions.

1. The samples were too small and not representative of the true age structure of the population.

2. Changes in calf survival were influenced by variable winter conditions.

3. In some years yearlings were more vulnerable to hunters because of different environmental conditions.

The age data indicate bulls older than 6 years were becoming more predominant in the age structure of the population. In 1973, bulls over 8 years of age were absent, but in the 1977 and 1978 sample 5 to 9 percent of the population was in this category.

Moose were rare on the Seward Peninsula 20 years ago. As the population increased in size and expanded into new areas, two trends would be expected:

1. Production of calves and survival of yearlings would decline (due to increased competition).

2. Old age classes would be more prevalent in the population.

The age data suggest that both of these trends have occurred, although perhaps not uniformly throughout Unit 22. As a general statement, however, the age data show the moose population is still relatively young, and is maintaining relatively high rates of production and survival.

Mortality

The major source of mortality in Unit 22 was hunting. The hunting seasons were the longest in the State ranging from 5 to 8 months. The reported take (from the return of harvest reports) was 212 moose, but this was only a portion of the harvest. An additional seven successful hunters took a moose on their antlerless moose permits, but did not report the taking on their harvest report. Also, nine hunters returned harvest reports not included on the statewide computer run. In most cases these moose were taken in the spring season after the cutoff date for tabulating the data. When the data were compiled from all known sources, the minimum harvest was 228 moose; the lowest recorded since 1976. Weather was a major factor in the lower success. Due to a dry summer and fall, moose stayed at higher elevations longer than normal, and were not as accessible to hunters as in previous years. The composition of the harvest was 156 bulls (68%), 71 cows (31%), and 1 of unspecified sex (1%).

Every year a number of hunters fail to report taking moose even though it is a requirement under the game regulations. Reminder letters to hunters who held antlerless moose permits has provided some measure of the nonreporting problem. From two successive mailings during spring 1980, the minimum success rate for antlerless moose hunters who did not initially respond was calculated at 13 percent. The success rate calculated from moose ticket reminder letters mailed in spring 1981 was 9.4 percent. At least 386 hunters who obtained moose tickets in Unit 22, did not respond to this mailing. If it is assumed this group also had a success rate of at least 9.4 percent, they would have taken an additional 36 moose.

Hunters from rural villages probably accounted for another source of unreported moose mortality. Comparing village population figures with the number of moose tickets issued by vendors in the rural areas, it was apparent some hunters entered the field without a moose harvest ticket in their possession. In a few villages less than 10 percent of the adult population acquired harvest tickets. From conversations with village residents, case histories filed by enforcement officers, and other sources of harvest information, it appeared "unlicensed" hunters killed at least 10 to 25 additional moose. Using all sources of data from

reported and unreported harvest, the total kill was estimated to be 275 to 300 moose.

Based on the known harvest, 46 percent of the total kill occurred in Subunit 22D (the central Seward Peninsula), principally in the drainages of the Kuzitrin, Kougarok, and Pilgrim Rivers. A well maintained gravel road traverses most of this area in a north-south direction providing ready access for Nome's 2,500 residents. A high percentage of the area population are avid hunters, and they subjected the immediate area along the road system to heavy hunting pressure during the snow-free months. Nome residents spent hundreds of man-hours driving the roads in search of a legal moose. Road hunters using highway and offroad vehicles accounted for 67 percent of the harvest in Subunits 22B and 22D (the only areas with more than 30 miles of road). Of the remaining successful hunters taking moose in these Subunits, boats were used in 13 percent of the cases, snow machines 8 percent, aircraft 7 percent, and 6 percent was unspecified. Other forms of transportation played a more dominant role in the other Subunits, especially in the latter half of the hunting season when it was feasible to use snow machines.

Access during the snow-free months played a dominant role in the chronology of the harvest. During the first 10 weeks of the regular hunting season when it was feasible to use vehicles and/or boats, hunters took 71 percent of the annual harvest (156 moose). During the next 12 weeks (beginning October 8), 20 percent of the harvest was taken (45 moose). The remaining 9 percent of the harvest occurred during the last 2 months of the spring season (1 February -31 March 1981).

The antlerless moose season opened September 15 in Subunit 22B, 22D, and 22E and depending on the area, remained open as long as March 31. During this 28-week period, 492 antlerless permits were issued; approximately 300 were obtained in the first 4 weeks of the season. The large number of antlerless permits issued (compared to the human population base) was testimony to the demand by the hunting public to participate in a moose hunt. Hunters took a total of 71 cows; (down from 76 during the previous season). However, 37 bulls and 16 antlerless males were also killed by hunters holding valid antlerless permits. The number of permits issued by area of residency and the moose harvest by sex is illustrated in Table 1.

Nonresidents were issued only 4 permits and Alaskans living outside Unit 22 received only 48 permits. These two groups of hunters took a total of 20 moose (either bulls or cows) on their antlerless permits. It is important to point out only 11 percent of the hunters came from places other than Unit 22 and they took less than 20 percent (17 & 3) of the antlerless permit harvest. Nonunit residents regularly used aircraft as an aid to hunting making them highly visible in the field. Recently aircraft hunters have evoked emotionally charged reactions from nonaircraft owners who also wished to take a moose. However, the

Table 1.

	Nome	Other 22 Residents	Alaskan Res.	Non Res.	Total
No. Permits Issued	352	88	48	4	492
Percent by Residency	(71%)	(81%)	(10%)	1%	100%
MOOSE HARVEST					
Harvest Antlered Male	24	4	6	3	37
Percent by Residency	(64%)	(12%)	(16%)	(8%)	(100%)
Harvest Antlerless Male	6	9	1	-	16
Percent by Residency	(40%)	(53%)	(7%)	-	(100%)
Female Harvest	44	17	10	-	71
Percent by Residency	(62%)	(24%)	(14%)	-	(100%)
Total Harvest Male Successful	74	31	17	3	125
Percent by Residency	(59%)	(25%)	(14%)	(2%)	(100%)
Total No. Unsuccessful	278	57	31	1	367
Percent by Residency	(62%)	(14%)	(7%)	(1%)	(100%)

data show the absolute numbers of "outside hunters" was small and competition was not "excessive."

Management Summary and Recommendations

Moose were virtually absent from the Seward Peninsula 50 years ago. A few immigrants from the east probably established the initial colonizing stock 30 to 40 years ago. During the past decade aerial surveys have shown a substantial increase in the moose population. Subunits 22B and 22D experienced the most dramatic growth during the 70's, but tapered off within the last few years. Winter browse is restricted to a narrow belt along the major rivers, and in some locations moose density may be exceeding the long-term carrying capacity of the winter range. Long either-sex seasons have slowed and/or curtailed "excessive" population growth throughout most of the Unit. However, more information is needed to determine the desired density of moose on the winter range.

Moose composition surveys revealed a gradual decline in bull:cow ratios in heavily hunted areas, but relatively stable and high bull ratios in unhunted populations. Bull:cow ratios should be carefully monitored over the next couple of years, especially in Subunit 22D. Corrective measures may be needed if ratios drop below 15 bulls:100 cows.

Analysis of age data over a number of years indicates, a gradual increase in the older age cohorts has occurred, but the population is still represented by a high percentage of young animals. Overall, the moose population is maintaining high rates of production and survival.

At the present time predators are not a major source of mortality, rather the trend has been for hunters to take an increasing number of moose.

Since moose populations are experiencing high annual recruitment, and competition on winter range is often keen, long hunting seasons are desirable in most areas. However, as the harvest escalates and as environmental conditions change, precise harvest information becomes a necessity. Before reminder letters were sent, over 50 percent of the hunters failed to respond voluntarily. Hunters holding moose harvest tickets and antlerless permits should be sent reminder letters to assess the success rate of nonrespondents. An increase in information is also needed, especially in the rural villages where residents are failing to acquire harvest tickets.

The antlerless permit should be retained because it provides a level of positive control not available through harvest tickets. But, it should be implemented only in those areas where cows are sufficiently available to warrant a season. When a desired cow harvest is obtained in a specific drainage, the antlerless season should be terminated by field announcement.

The Seward Peninsula is extremely vulnerable to overhunting due to open terrain and the accessibility by aircraft and snow machines. Seasons and bag limits should be critically reviewed in all Subunits on an annual basis.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 23, that portion on the Seward Peninsula west of and including the Kiwalik drainage.	Aug. 1-Mar.31	One moose, antlerless moose may be taken only from Sept. 15-Mar.31
Unit 23, Buckland River drainage only.	Aug. 1-Dec.31	One bull
Remainder of Unit 23	Aug. 1-Dec.31	One moose, antlerless moose may be taken only from Sept. 15-Oct.31

Population Status and Trend

Moose populations were near optimum levels in many areas with no significant changes since the last reporting period. Calf production and recruitment ranged from 13 to 28 percent during 1980-81 surveys in the Noatak, Kobuk and Selawik River drainages. Hunting pressure and harvest declined for the second consecutive year. The winter was relatively mild with above normal temperatures and normal snow depths in most areas. Portions of the Noatak drainage experienced above normal snow accumulation, but no significant mortality was observed.

Population Composition

Fall moose surveys were not conducted in 1980 due to the lack of adequate snow cover. During February and March, surveys were conducted in the Noatak, Kobuk, and Selawik River drainages (Table 1). The remainder of Unit 23 was not surveyed.

Table 1. Late winter moose composition counts, 1981:

Areas	Dates	% Calf	Moose/Hr.	Total Moose
Lower Noatak	(2-16,17)	22.6	60.7	603
Middle Noatak	(2-18,24)	13.2	91.6	643
Lower Kobuk	(3-20)	27.7	30.1	118
Middle Kobuk	(3-23,27)	28.6	50.5	307
Upper Kobuk	(3-26,27)	24.6	33.6	130
Selawik Drainage	(3-25,26)	19.7	47.5	284

Population composition data for all areas surveyed in 1981 were similar to values observed in 1979 and 1980. As in the past, the middle Noatak characteristically exhibited lower calf percentages than the other survey areas.

By the 25th of March, it was evident from observations made during wolf surveys that moose were already leaving riparian winter range along major river systems and moving to higher elevations or ascending small tributary streams. To determine if segregation within the moose population was occurring and influencing composition data, the usual moose survey on the main Selawik River was extended into upstream tributaries. Then the survey area was divided into two portions; the area normally counted on the lower Selawik (the Selawik River below the confluence of Kiliovilik Creek), and that portion upstream of Kiliovilik Creek (Upper Selawik) (Table 2).

Table 2. Selawik River Survey, 1981:

Area	Adults	Calves	% Calves
Lower Selawik	79	20	20.2
Upper Selawik	53	9	14.8
Total Combined	132	29	18.0

In this instance a survey conducted in the usual count area (Lower Selawik) would have resulted in a calf percentage 2 percent higher than a survey conducted on the entire drainage. Late winter moose surveys are frequently conducted along the lower portion of the major rivers and other surveys may exhibit similar bias.

Harvest

Harvest figures for the 1980-81 moose season were obtained from hunter reports and reminder letters, similar to the procedure followed in the 1976 and 1978 harvest extrapolation. In 1980-81, 67.2 percent of all statewide hunters completed moose harvest reports after reminder letters had been sent out. Hunters reported taking 112 moose in Unit 23 (Table 3) compared to 213 in 1978 and 149 in 1976.

Table 3. Reported Moose Harvest, Unit 23, 1980-81 with reminder letters:

Area	Bull	Cow	Unidentified	Total
Seward Peninsula	4		1	5
Selawik	11		3	14
Kobuk	25	1	2	28
Noatak	30	5	2	37
Wuluk-Kivalina	6		1	7
Other	21			21
Totals	97	6	9	112

The moose harvest declined in Unit 23 for the second consecutive year due to factors other than the availability of moose or opportunity to hunt. The high cost of gasoline limited extended boat trips for Unit residents, and discouraged airplane trips by residents of Anchorage or Fairbanks. A contributing factor was the increased limit and availability of caribou which were the preferred meat animal for many local residents. The general decline in economic activity associated with the oil pipeline and increased availability of moose near Fairbanks may have contributed to the decline in the Unit 23 moose harvest.

As in past years, the Kobuk and Noatak drainages sustained the majority of the hunting pressure and harvest. Only six cow moose were reported harvested compared to 17 in 1979, and 35 (each) in 1977 and 1978. Cow moose permits were not required in 1980. Undoubtedly, more cow moose were killed than were reported or were reported in the unidentified sex category.

Unit residents took 47 percent of the reported harvest (42 moose), other Alaskan residents took 33.9 percent (38 moose) and nonresident hunters took 21.4 percent (24 moose) of the reported harvest. Hunter success for all hunters was 53.3 percent with Unit residents having the lowest success rate (41.6%) and nonresidents enjoying the best success rate (96.0%). Hunters utilizing aircraft as a mode of transportation were considerably more successful (80.8%, n=73) than boat hunters (40.8%), n=93). Only 12 hunters reported utilizing snow machines to hunt moose.

Similar to previous years, the majority of the reported harvest occurred in August and September. Only 11 moose were taken after October 1, and no moose were reported after January 1 from that portion of Unit 23 which remained open until March 31.

Management Summary and Conclusions

Populations of moose remained near optimum levels in many areas of Unit 23. Calf survival and recruitment in the areas surveyed were adequate to support present rates of harvest.

Some bias may exist in late winter moose surveys, especially in years when moose are not concentrated because of deep snow, or when surveys are conducted after moose begin early spring movements. If populations appear to be highly segregated, an attempt should be made to correct composition values.

The moose harvest declined for the second consecutive year due to a variety of factors. It is anticipated that future mineral developments in Unit 23 will reverse this present trend.

Federal legislation creating two National Preserves, two National Parks, a National Monument, and a National Wildlife Refuge was finally enacted in 1980. The Selawik National Wildlife Refuge and the National Preserves will be open to all moose hunters while the National Parks and the Monument will allow for

subsistence moose hunting by many local residents, at least, in the immediate future.

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

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SUBMITTED BY:

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 24

GEOGRAPHICAL DESCRIPTION: Koyukuk River drainage north of Huslia

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 5 - Sept. 25 One bull

Population Status and Trend

The single survey flown in Unit 24 during March 1981 was conducted in an area that precluded comparison of data with past survey information. Hence, it was insufficient to detect any change in status or trend of moose numbers in the Unit. Based on a single survey, calves comprised 27 percent of the moose observed. Assuming this accurately reflects the proportion of calves in the population, moose numbers in Unit 24 can be expected to increase.

Population Composition

An early March survey along the Koyukuk and South Fork Rivers between the villages of Allakaket and Bettles produced 134 moose; 27 percent were calves (Table 1). The number of moose seen per hour of survey reflects moose concentrations along the river and is probably not indicative of moose density throughout the Unit. No other surveys were conducted in Unit 24 due to budgetary problems and conflicts with the Nowitna population survey.

Table 1. Moose survey data from the Koyukuk River drainage between Allakaket and Bettles, March 1981.

Total Adults	Total Calves	Total Moose	Percent Calves	Moose Per Hour
98	36	134	27	85

Mortality

A total of 132 moose was reported taken during the 1980 season. This was almost twice the reported 1979 harvest but may reflect increased compliance with the harvest report system rather than

changes in harvest. Sixty percent of the moose was taken by local residents. The actual harvest is estimated to be double the reported take.

The effect of wolf and bear predation on the moose population has not been assessed. Trappers caught 58 wolves during the 1980-81 season, and it is not known whether this harvest was sufficient to provide long-term benefit to the moose population. However, the high percentage of calves along the Koyukuk River during March 1981 suggests that loss of calves to predation was not a major problem during winter 1980-81.

Management Summary and Recommendations

The Koyukuk Advisory Committee has asked the Department to determine whether there are sufficient numbers of moose to warrant a longer season in the Subunit. Until a moose population estimate can be completed, trend count areas should be established in representative habitat types to determine moose densities and population trends. In addition, fall composition data should be obtained to assess relative calf survival and yearling recruitment.

Additional funds are needed for moose data collection in Unit 24. More surveys and a moose census are needed to ensure that moose management in Unit 24 has a sound, biological basis. The impact of both predators and hunters on moose populations must be better understood.

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SUBMITTED BY:

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 25

GEOGRAPHICAL DESCRIPTION: Yukon Flats; Chandalar, Porcupine and Black River drainages

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 25A, that portion of the Sheenjek River drainage upstream from Last Lake	Sept. 10 - Sept. 20	One bull
Remainder Unit 25A	Sept. 10 - Sept. 30	
Unit 25B	Sept. 10 - Sept. 20 Nov. 1 - Nov. 10	

Population Status and Trend

Moose populations in most upland portions of Unit 25 appear to be declining due to chronically poor calf survival. The upper portion of the Sheenjek drainage is the only area surveyed where available data indicate a decline has not occurred. Previous surveys of the Sheenjek drainage suggested that the population may be increasing; however, no survey was conducted during fall 1980.

Moose densities on the Yukon Flats have remained very low since at least 1975. It is not known whether this population is still declining, but we suspect that calf survival is inadequate to maintain the population.

Population Composition

Survey areas established on the Middle Fork of the Chandalar River in 1978 were flown again in November 1980. Eighty-eight moose were classified in the upper reaches of the drainage, and 89 were classified near the confluence of the Middle and North Forks. Smaller portions of these two areas were flown more intensively to increase numbers of moose observed and to standardize survey procedures. These smaller areas will be reflown periodically to determine population trend.

Moose in the upper portion of the Chandalar drainage continue to

fare poorly (Table 1). Calf survival has been poor for 4 years, and although recruitment has improved, it remains insufficient to maintain the population. Fewer moose could be located in 1980 than in 1978 despite more intensive searching of the area.

Table 1. Moose sex and age ratios for the Middle Fork of the Chandalar River, November 1980.

Area	Bulls: 100 Cows	Calves: 100 Cows	Incidence of Twins: 100 Cows w/Calves	Percent Calves	Percent Yrlgs	Sample Size
upper	61	18	12	10	9	88
lower	82	41	25	18	18	89

The lower number of bulls:100 cows in the upper portion of the Middle Fork (Table 1) probably resulted from bulls-only seasons in this portion of the drainage. However, the proportion of bulls in both areas greatly exceeds the minimum desired for areas where management is directed toward maintaining large bulls in the population.

Moose numbers in the lower portion of the Middle Fork drainage are believed to have declined since 1978 but to a lesser extent than in the upriver area. During 1978 and 1980 surveys, the number of moose observed was similar despite increased search intensity in 1980. This decline in moose numbers may reflect the poor calf survival recorded in 1978. If so, the decline may be offset by high calf and yearling survival observed in 1980.

Most drainages of the Middle Fork of the Chandalar do not appear to contain good moose habitat. Areas below timberline contain mature stands of spruce and very little browse. During the November surveys, moose were found in the shrubby areas at or above tree line, and river bottom areas were essentially devoid of moose. The upriver site contained considerable alpine habitat where shrubs were confined to gully bottoms and south-facing hillsides, whereas the downriver site encompassed several cover types ranging from shrub to mixed spruce/birch forest. Densities in the upriver and downriver trend areas were 0.5 and 1.9 moose/square mile, respectively.

Additional trend count areas were established in representative habitat types on the Yukon Flats between Stevens Village and Beaver. As in the Chandalar drainage, these survey areas are intended to reflect changes in moose abundance rather than age-sex composition of moose populations. Marten Island was selected to represent the riparian habitat along the Yukon River, and the Gushiate Lake area was chosen to represent the undisturbed wetlands away from the river. A third site was selected on Lone Mountain to encompass a portion of the 1978

burn. This site ranges from 1,000-2,000 feet in elevation and includes some areas of both unburned spruce/birch forest and unburned bands of willow along creeks. Moose densities for these three sites were 0.6, 0.2, and 0.6 moose/square mile, respectively.

Forty-eight moose were classified during the November 1980 survey at Mardow Lake in the eastern portion of the Unit (Table 2). Moose density was about one moose/square mile. This area consists of partially burned, low rolling hills of 600-750 feet in elevation. The mosaic of browse species, older forest, and pothole lakes gives the appearance of good moose habitat.

Table 2. Moose sex and age ratios for the eastern portion of Unit 25, November 1980.

Location	Bulls: 100 Cows	Calves: 100 Cows	Incidence of Twins: 100 Cows w/Calves	Percent Calves	Percent Yrlgs	Sample Size
Mardow Lake	80	60	50	25	8	48
Salmon Fork	133	60	13	21	32	44

Calves comprised 25 percent of the sample at Mardow Lake in both 1978 and 1980, and the rate of twinning has remained high (greater than 25%). However, in both 1978 and 1980 long yearlings comprised 8 percent of the herd. This low recruitment would normally result in a population decline if hunting were contributing to an existing substantial loss to predation. The high bull:cow ratio would suggest that the legal harvest of bulls is low, but if cows are being taken from this population, the bull:cow ratio would be useless as an indicator of hunting pressure. Mardow Lake is fairly remote, but moose wintering in the area may disperse during other seasons and, thus, become more available to hunters.

Forty-four moose were classified during trend counts in the Salmon Fork of the Black River during November 1980 (Table 2). Moose densities varied from zero in two areas near the mouth of the Salmon Fork to 1.9 moose/square mile in hilly terrain at the headwaters. Both the 1979 and 1980 cohorts appeared to be surviving very well. In contrast, 1978 surveys in other portions of the Black River drainage indicated that the 1977 cohort comprised only 3.5 percent of herd.

A high bull:cow ratio is usually indicative of an unhunted population. However, the Salmon Fork has long been a hunting area for residents of Chalkyitsik and, increasingly, has attracted fly-in hunters from other areas. Three factors that could account for the unusually high bull:cow ratio are: harvests have been small in recent years, both cows and bulls

were taken, or moose surveyed were not the same moose accessible to hunters during fall.

Both fall and late winter trend counts on the Yukon Flats did not provide sufficient sample sizes for computing population indices. During the late winter count (14 hours) in the area bounded by Stevens Village in the west, Fort Yukon on the north, and Circle to the east, only 55 moose were observed (less than 0.2 moose/mi^2). Sixteen percent of the moose observed was calves.

An additional 1.2 hours of survey were flown in the Grayling Fork of the Black River during February 1981. No moose were located and, judging from the scarcity of tracks, winter moose density in this area was extremely low.

Roger Kaye of the Yukon Flats National Wildlife Refuge (USFWS) assisted with data collection during the 1980-81 survey season. Data supplied by the USFWS are included.

Harvest/Mortality

Very little reliable mortality information is available for Unit 25. The major data source is harvest ticket returns, which are biased because most local take is probably unreported. The magnitudes and sources of nonhunting losses are largely conjecture.

The harvest ticket returns revealed that 74 moose were taken by 147 hunters during the 1980 season. Sixty-eight were reported as bulls, and in six instances sex was unspecified. Only one moose was reported harvested during the late season. Success rate for the entire Unit was 50 percent. In most respects, there was little difference between the 1980 and 1979 seasons, except that in 1980 the number of hunters reporting declined by 22 and hunter success increased by 14 percent.

According to harvest ticket returns, most moose were harvested from the eastern portion of Unit 25 (Table 3). This area yielded 25 moose and included the Porcupine, Black, and Little Black Rivers. Success rate (75%) for hunters in this area was greater than for other portions of the Unit.

Seventy-three percent of the reporting hunters were Alaska residents, and 16 percent were nonresidents. The former had a success rate of 46 percent, while 60 percent of the nonresidents were successful.

Table 3. Unit 25 moose harvest distribution for 1980.

Location	Number of Moose
Tanana to Rampart	6
Rampart to Beaver	9
Circle to Eagle	9
Porcupine, Black, and Little Black Rivers	25
Chandalar River	9
Sheenjek River	5
Coleen River	5
Unspecified Location	6
Total	74

Access to the upland areas was primarily by aircraft. Boats were most important on the Yukon Flats, providing approximately 71 percent of all transport.

The most significant source of nonhunting mortality was probably wolf predation. Specific data on wolf abundance are not available for most of the Unit, but observations made during February 1981 indicated that four packs (21 wolves) frequent the portion of the Yukon Flats between Stevens Village and Beaver. Annual losses to the moose population based on a kill rate of one moose every 6 days would be 244 moose. Extrapolation of moose densities obtained during trend counts indicates that about 1,140 moose may occupy the area; thus, wolf predation may be annually removing 21 percent of the population compared to 16 percent recruitment.

Management Summary and Recommendations

The upland areas surveyed during 1980 in Unit 25 seem to be experiencing a general moose decline. Population trend information is not available for the Yukon Flats, but surveys have documented the moose scarcity. Even if optimal conditions for growth of the population were created, a significant increase in moose numbers would require many years.

Moose harvests were light in most upland portions of the Unit and bull:cow ratios were sufficient to handle the limited legal harvest of bulls. The decline in moose numbers there is probably due to wolf predation on calves.

Demand for moose on the Yukon Flats by local residents far exceeds supply. In many areas, human harvests are contributing to the moose decline, especially when cows are taken. Wolf predation is also contributing to declines. Preliminary assessment of the relative abundance of moose and wolves suggests that predation alone substantially exceeds recruitment.

Several management actions are needed. Public education efforts are necessary to emphasize the need to protect cow and calf moose and to obtain far greater compliance with the harvest ticket system. Either public compliance with the harvest reporting system must be improved, or new ways of obtaining harvest information must be devised. Enforcement emphasis should be directed toward stopping the unwanted harvest of cow moose and, secondly, on reducing the out-of-season take.

Wolf distribution and abundance data are necessary to determine the magnitude of wolf predation on moose populations. Wolf survey efforts should be concentrated on the Yukon Flats.

A moose movement study should be initiated to determine if moose occupying the uplands during fall surveys later move to the Yukon Flats and become available to local hunters. If a substantial influx of moose from the uplands occurs during winter, hunting seasons should be shifted to a time when hunting impact on resident animals is minimized. If such an influx does not occur, management will be more difficult since a relatively small number of resident moose will be involved. In this case, harvest restrictions necessary to allow an increase in moose numbers will probably not be readily accepted by local hunters. Such a situation will require increased emphasis on public education and enforcement.

A moose population estimate survey should be viewed as a prerequisite to intensive management on the Yukon Flats. It is essential to know how many moose inhabit the Flats and the magnitude of various mortality factors. In the interim, trend count areas should be established in the remaining major habitat types. Trend areas established in 1980 should be flown annually until population trends are understood. Baseline information on moose distribution and abundance should be obtained by extending fall composition counts to unsurveyed portions of the Unit. Composition surveys flown during fall 1980 do not need to be repeated until 1982, but the upper Sheenjek drainage should be surveyed during fall 1981 since it was last flown during 1979.

Browse surveys should be initiated to assess the availability and utilization of shrub species by moose. The assumption that habitat conditions are not presently limiting population growth has never been studied. Examination of various age burns will provide insight into habitat improvement through burning. Meanwhile, a fire management plan should be undertaken to provide the vehicle for relaxed fire suppression on the Flats and to set the stage for active habitat manipulation.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 26

GEOGRAPHICAL DESCRIPTION: Arctic Slope

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Sept. 1 - Dec. 31 One moose

Population Status and Trend

Moose are seasonally distributed throughout the Arctic slope. In summer, occasional animals range to the coast in northwestern and northern Alaska. During winter, however, distribution is more restricted with almost all moose occupying riparian shrub habitat in inland areas. The greatest number of moose occurs along the central Colville River and its tributaries, although sizable numbers also occur in the eastern Arctic.

Moose surveys throughout Unit 26 in 1970 and 1977 enumerated moose populations on most major streams south of 70°N latitude. Moose distribution was similar both years with approximately 1,500 moose observed during each survey. However, data from the Colville River drainage, where surveys have been more frequent, indicate that the moose population may have declined slightly and subsequently increased during this interval.

Annual aerial surveys have been continued since 1974 on the Colville River and its tributaries between the Killik and Anaktuvuk Rivers (Table 1). From 1975-77, numbers of adult moose observed during these surveys increased and then stabilized at a high level from 1977-80. Simultaneously, a downward trend in percent calves in the herd occurred from 1975 to 1980, with an additional decline of greater magnitude from 1980 to 1981.

Population Composition

Moose surveys conducted in Unit 26 during April 1981 revealed that calf production or survival was extremely poor throughout the region (Table 2). In the Colville River drainage, the number of calves observed during the April 1981 survey was the lowest since annual aerial surveys were initiated in 1974 (Table 1). The decrease in total moose observed from 1980 to 1981 resulted primarily from a decrease in calf cohort, although fewer adults were also observed.

Table 1. Summary of total calf and adult moose observed during aerial surveys in April on the Anaktuvuk and Tuluga Rivers, the Chandler River drainage, and the Colville River between the Anaktuvuk and Killik Rivers.

Year	Moose	Adults	Calves	% Calves in Herd
1981	639	594	45	7.0
1980	841	676	165	19.6
1979	644	536	108	16.8
1978	767	623	144	18.8
1977	802	632	170	21.2
1976	650	494	156	24.0
1975	556	386	170	30.6
1974	544	458	86	15.8
1970	750	523	227	30.3

Table 2. Results of late winter moose surveys in Unit 26, April 1981.

Drainages Surveyed	Total Adults	Total Calves	Percent Calves	Moose /Hour	Total Moose
Anaktuvuk River including Tuluga River	110	6	5.2	45	116
Chandler River	236	31	11.6	38	267
Colville River (Umiat to Anaktuvuk River)	83	0	0.0	30	83
Colville River (Umiat to Killik River)	165	8	4.6	35	173
Itkillik River	14	0	*	n/a**	14
Kuparuk River including Toolik River	128	2	1.5	n/a	130
Sagavanirktok River including Lupine, Ivishak and Echooka	86	3	3.3	n/a	89
Kavik River, including Shaviovik and Juniper	9	1	*	n/a	10
Total all areas	831	51	5.8		882

* Insufficient sample size.
** Data not available.

Mortality

It is not known when the greatest losses to the 1980 cohort occurred. Parturition surveys are never conducted, and fall sex and age composition surveys were not done in 1980. Therefore, estimates of natality and comparisons of summer and winter survival rates cannot be made. However, based on the consistently high natality rates observed in other Alaskan moose populations, low calf survival rate during summer or winter, rather than low natality rate, is probably responsible for the low percentage of calves in the herd in 1981.

Several factors, including predation, deteriorating range conditions, severe weather conditions, severe insect harassment, and disease could adversely influence calf survival. Predation was probably not a significant source of calf mortality because wolves are scarce in the survey area and grizzly bear predation on moose is probably slight.

Range conditions may be limiting moose populations. Previous browse surveys have indicated a high degree of utilization of the available annual plant growth on preferred food species. Hedging from persistent heavy browsing was common, and the moose population may have been near carrying capacity. A trend reflecting an inverse relationship between total adults and percent calves in the herd was also observed between 1975 and 1980 (Table 1) and suggests browse may be limiting. However, the percent of all calves which were twins or triplets was essentially unchanged during this period (Table 3). Several studies of moose as well as other species have demonstrated that twinning rate (or litter size) declines as population density increases when food becomes limiting. However, this relationship is not supported by observations reported in Table 3.

Table 3. Summary of total adults accompanied by calves and total adults accompanied by more than one calf observed during aerial surveys in April on the Anaktuvuk and Tuluga Rivers, the Chandler River drainage, and the Colville River between the Anaktuvuk and Killik Rivers.

Year	No. Adults Accompanied by Calves	No. Adults Accompanied by Twins or Triplets	Percent Twins or Triplets Among Adults Accompanied by Calves
1981	39	5	13
1980	143	20	14
1979	96	12	13
1978	184	22	12
1977	137	15	11

The low survival rate during summer could result from exceptionally wet and cold weather or from insect harassment. Several Game Division biologists working in Unit 26 stated that summer 1980 was the most severe period of biting fly and mosquito harassment in recent years. Therefore, insects may have contributed to poor calf survival, although to my knowledge no such observations for moose have been documented.

Deep snow can contribute to poor calf survival during winter. Snow depths within the survey area on the Colville drainage were locally deeper than usual. For example, in the northern half of the Anaktuvuk and Chandler Rivers and on some portions of the Colville River, snow depths appeared to be 2 to 3 feet. However, in other drainages such as the southern half of the Anaktuvuk and Chandler Rivers and most areas adjacent to the Trans-Alaska Pipeline, snow depths were likely only 1 to 2 feet. A small calf cohort was evident throughout the survey area and not only in areas of deepest snow. Further, if snow depths anywhere within the area surveyed in April caused malnutrition and death of significant numbers of moose, carcasses would have been evident. Only two carcasses (which may have been hunter kills from fall) were observed on the Colville drainage, and one relatively intact adult carcass was seen adjacent to the pipeline. However, it is possible that moose calves may have died before the midwinter period when most animals move to those larger riparian areas surveyed in April.

Harvest and hunting pressure have increased sharply in Unit 26. One hundred and thirty-two hunters reported shooting 89 moose during 1980. This harvest period compares with 108 hunters reporting 90 moose killed in 1979, 81 hunters reporting 46 moose killed in 1978, and 48 hunters reporting 36 moose killed in 1977. Approximately 75 percent of the reported harvest of 64 males and 25 females in 1980 was taken by Alaskans residing outside Unit 26, while 22 percent of the reported harvest was taken by Unit residents.

Most of the 1980 harvest continued to be from Subunit 26A. Within 26A, approximately 40 moose were reported killed along the Colville River between the mouths of the Killik and Anaktuvuk Rivers, and approximately 17 and 14 were reported killed along the Anaktuvuk and Chandler River drainages, respectively. Improved access has likely increased harvests from the Anaktuvuk drainage over past years. Several hunting parties have recently used an abandoned 6,000 ft. landing strip near the mouth of the Tuluga River on the west side of the Anaktuvuk River. Because suitable gravel bars for landing aircraft are limited on the Anaktuvuk River, this abandoned strip will continue as a location of concentrated hunting in this drainage. Hunting pressure is expected to remain dispersed in the Colville and Chandler drainages because ready access by aircraft exists along the Chandler River below Gunsight Mountain and throughout portions of

the Colville valley commonly used by moose during fall. An unknown number of unreported moose are undoubtedly taken, particularly on the coastal plain during summer.

Hunter access in Unit 26 was provided principally by aircraft. However, 7 successful hunters reportedly used boats, 4 used highway vehicles, and 3 used snow machines. Hunters using highway vehicles reportedly killed four moose along the Dalton Highway, and three of those hunters used bow and arrow. Moose occur at relatively low densities in the drainages adjacent to the Dalton Highway (Table 2) and would therefore be vulnerable to exploitation if the road were opened to public travel unless hunting seasons are carefully adjusted to regulate harvest.

Management Summary and Recommendations

Surveys conducted along the Anaktuvuk and Tuluga Rivers, on the entire Chandler River drainage, and along the Colville River between the Anaktuvuk and Killik Rivers revealed 594 adults and 45 calves. This is the lowest number of calves ever observed in the survey area. Approximately 70 moose were reported killed by hunters in the survey area during 1980, and an equal number will probably be killed in 1981. Therefore, hunting alone in 1981 will exceed recruitment to the total population by a considerable margin, assuming that we observe on the surveys virtually all moose present in the area. If 70 moose are killed by hunters in 1981, and if 50 moose die from natural causes (assume 8% natural mortality acting on the observed population of 639 moose), then 120 moose will be removed from the population, 45 moose will be recruited, and the population in the survey area will decline by approximately 75 animals.

The moose population in Unit 26 consists of hunted and unhunted subpopulations. Previous surveys during falls 1975, 1976, and 1978 as well as casual observations in summer and fall during other years suggest that only half of the moose observed during April surveys are ever accessible to hunters during fall. The fall home range of at least half the total population does not include those riparian areas accessible to hunters. Therefore, most, if not all, legally killed moose are from the accessible subpopulation. Furthermore, recruitment to this hunted subpopulation should be considered 50 percent or less of that to the total population. The extent to which dispersal from the unhunted subpopulation supplements recruitment to the hunted subpopulation is unknown. However, harvests undoubtedly exceed recruitment and dispersal to the hunted subpopulation by a considerable margin.

I recommend that sex and age composition surveys be undertaken during October 1981 on a portion of the Colville River drainage. If recruitment to the population is low in 1982, an investigation should be conducted to identify causes. Particular attention should be given to the relationship between population density and reproduction and survival of calves.

Hunting of adult moose should be continued, since a reduction in herd size would be desirable if low recruitment is related to high moose density and limited browse. A late winter hunting season should be considered in a portion of the survey area in the Colville River drainage to redistribute hunting pressure. Virtually all moose would be accessible to hunters at this time, and harvest would be more evenly distributed than during fall.

The potential for excessive harvest levels along the Dalton Highway exists. Populations and harvests should be assessed annually, and restrictive seasons implemented if population decline occurs.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1A

GEOGRAPHICAL DESCRIPTION: Southern Southeast Mainland

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 1 - Dec. 30 One goat

Population Status and Trend

The goat population continued to increase slowly in most areas of Unit 1A. Winters have generally been mild over the past several years and no significant habitat changes have occurred. Current population levels in most of the area are excellent, and considering the extremely mild winter of 1980-1981, they should increase significantly during the coming year.

Population Composition

Seven survey areas were flown between August 20 and September 12, 1980. Total survey time was 9.63 hours and 832 goats were seen (86 goats/hour). There were 35 kids per 100 adults in the sample. Past years' survey results are shown in Appendix I.

Mortality

The 1980-81 winter was exceptionally mild and winter mortality should have been as low as could be expected. One spring survey conducted in late April 1981, produced a sample of 76 goats that showed 38 yearlings per 100 adults, indicating essentially no losses through the winter. The past mild winter should also result in excellent kid production and survival this spring, hopefully, comparable to the excellent production following the open winter of 1976-77.

The hunter harvest data this year is not comparable with past years' because of the registration permit system initiated in 1980. Permits for Game Management Units 1A and 1B were issued from the Ketchikan-Petersburg-Wrangell offices and for the most part were issued directly to the hunter rather than by mail. Application forms were provided to license vendors only in communities not having a Fish and Game office.

There were 263 permits issued from the Ketchikan office. One hundred and thirty-one permittees indicated they had hunted goats in the Ketchikan area, killing 60 goats (23 males and 37 females) in 338 hunter-days. Hunter success was 46 percent and there were 5.6 hunter-days expended per goat taken.

Table 1 presents both past harvest and hunter success data under the old Harvest Ticket program and the 1980 data under the registration permit system. The increase in harvest is most likely a result of the more stringent reporting requirements of the new system. Of the 263 permittees, 10 did not return their permits. These individuals were cited and paid fines of varying degree.

Table 1. Goat Harvest and Hunter Success, GMU 1A, 1972-1980.

	Goat Harvest				Hunters Taking	Percent Harvest By	Number Successful	Total Number	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
1980**	23	37	0	60	-	7	60	131	46

* Bag limit reduced from 2 to 1 in 1975.
** Start of Registration Permit System - mandatory reporting required.

Eighty-three percent of the harvest was taken in September and October. Ten percent were taken in August and only 6 percent were taken in November and December. The sex ratio of the harvest in August was even, while in September and October, it was one male per two females. The harvest in November - December period (only four goats) was three males to one female.

From 70 to 75 percent of both the successful and unsuccessful hunters flew to their hunting areas, while from 23 to 26 percent used boats. Most November - December hunting is from boats and generally results in a lower success rate than the earlier hunts.

Distribution of the harvest indicated 35 percent came from the area between Yes Bay and Eagle River and 27 percent came from the

area between the Chickamin River and Rudyerd Bay. These have traditionally been the most heavily hunted areas because of the more abundant high elevation lakes suitable for transportation by float plane. The area between the Unuk and Chickamin rivers is usually hunted quite heavily, but this year only 8 percent of the harvest came from there.

Management Summary and Recommendations

The hunting kill is relatively small compared to the overall Unit 1A goat population and is also fairly well distributed over the Unit.

In past years, the reported kill from the Harvest Ticket Program has been well below the actual kill. This year, under the new registration permit system, over 96 percent of the hunter reports were returned and we hope this can be maintained in the future by strict enforcement of the reporting requirements.

Fall surveys will be continued for several years; spring and summer surveys will also be conducted. Plans are to eventually shift to spring and summer surveys which produce better sex and age data.

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APPENDIX I. Mountain Goat - Subunit 1A - Ketchikan Area
Goat Composition Surveys, Subunit 1A, 1968 through 1980.

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. 19	44	16	....	60	36	65 min.	55**
1980	Aug. 27	35	18	....	53	51	42 min.	76*

* Incomplete Survey
** Different Observer than Normal

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

APPENDIX I (cont'd).

Area K-5 (Marten Arm to Portland Canal [cont'd])

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1977	Aug. 31	83	41	....	124	49	101 min.	74
1978	Sept. 8	97	34	....	131	35	90 min.	87
1979	....	...	..	....	...	..	...	..
1980	Sept. 12	116	35	....	151	30	125 min.	72

Area K-9 (Klahini River to Chickamin River)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1975	Aug. 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**
1980	Sept. 9	158	66	0	224	42	110 min.	122

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**
1980	Sept. 10	116	42	0	158	36	88 min.	108

* Incomplete Survey
** Different Observer than normal

APPENDIX I (cont'd).

Area K-7 (Yes Bay to Eagle River)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1975	Aug. 22	37	11	0	48	30	111 min.	26
1980	Aug. 20	128	36	0	164	28	108 min.	91

Area K-11 (Walker Cove to Rudyerd Bay)

Year	Survey Date	Adults	Kids	Unknown	Total	Kids Per 100 Adults	Survey Time	Goats/ Hour
1975	Sept. 10	18	5	0	23	28	14 min.	99
1976	Sept. 9	16	5	0	21	31	17 min.	74
1977	Sept. 6	15	6	0	21	40	15 min.	84
1978	....	..	.	.	..	..	..	..
1979	....	..	.	.	..	..	..	..
1980	Aug. 26	22	7	0	29	32	17 min.	102

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1B

GEOGRAPHICAL DESCRIPTION: Southeast Mainland from Cape Fanshaw to Lemesurier Point

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 1 - Dec. 31 One goat

Population Status and Trend

After a decline in the 1970's, Unit 1B goat populations reflected an upward trend, although they have not attained the levels reached in the 1960's. Excessive snow accumulations resulting in avalanches, and accidental falls are thought to be the cause of high goat mortality (Ballard 1977) in Alaska. In southeast Alaska during severe winters, goats are forced to lower elevations where they are more susceptible to predation by wolves. A series of mild winters in Unit 1B since 1976, have undoubtedly contributed to improved goat survival.

Population Composition

Population surveys, conducted by fixed-wing aircraft during the report period (Table 1), were flown just after sunrise or during the last hours of daylight. Surveys were flown in Cessna 180 or Piper Supercub aircraft. Unpredictable mountain winds sometimes precluded approaching animals closely enough for accurate age determination; in such cases they were categorized as "undetermined."

A total of 8 hours flying time was spent in surveying mainland goat ranges from Cape Fanshaw to Aaron's Creek. The Bradfield Canal, Harding River and Eagle River drainages were not flown because of logistic and weather problems. Snow at lower elevations prevented spring yearling counts, with June the earliest that surveys were conducted. Counts in June 1981 indicated the same kid:adult ratio (36.5:100) as in August 1980.

Table 1. Unit 1B Mountain Goat Aerial Survey Data.

Area	Date Flown	Adults	Kids	Undetermined	Total	Kids/100 Adults	Percent Kids	Count Time
1	6/18/81	9	5	11	25	55.6	35.7	60 min.
1	6/22/81	22	6	1	29	27.3	21.4	58 min.
2	8/21/80	109	38	8	155	34.9	25.9	190 min.
1&3	8/22/80	71	26	15	112	36.6	26.8	170 min.

Area 1 - Cape Fanshaw Ranges
Area 2 - Scenery Cove to Wilkes Range
Area 3 - Stikine River Drainage

Mortality

Thirty mountain goats were harvested by hunters in Unit 1B (Table 2). Beginning in 1980, hunters were required to register for a permit prior to hunting goats, and to submit a report after killing a goat, or within 10 days of the close of the season. A new regulation provided penalties for failure to return permits to the Department of Fish and Game. The system appears to be a very reliable method of obtaining accurate harvest information. The system also allows monitoring the harvest throughout the hunting season, permitting biologists to utilize emergency closure authority in areas receiving excessive hunting pressure.

Permits could be obtained any time between August 1 and December 31 at no charge. There was no limit on the number of permits issued. This registration system replaced the harvest ticket system, in which hunters obtained a harvest ticket and report card from vendors. Although hunters were required to return the report cards, the regulation was not enforceable. Under the old system, hunters often picked up permits merely because they were available. Reporting was poor, even though reminder letters were sent to those failing to submit the reports. Past harvest records are shown in Appendix I.

With the initiation of the registration permit system in 1980, some hunters obtained a permit "just in case" they wanted to hunt goats. Forty-one percent of the goat permit holders did not hunt goats during the 1980 season. After the season, 13 percent failed to return their permits by the January 10 deadline. Since this was the first year of the new system, Unit 1B hunters were sent a reminder letter and granted a 15-day grace period in which to return without penalty. Hunters failing to meet the grace period deadline were referred to the Fish and Wildlife Protection Officer in their community for possible legal action. A number of fines were levied and in one instance a hunter lost goat

hunting privileges for 1 year. One hundred and seventy-eight permits were issued for Unit 1B, and 29 percent of those who hunted killed goats.

Table 2. 1980 Mountain Goat Permit Registration Data - Unit 1B

Permits Issued	No. Persons Hunting	Goats Killed	Percent Males	Percent Females	Percent Successful
178	105	30	67	33	29

Weather conditions affect chronology of mountain goat harvests. Weather in the alpine areas is poor most of the time, with rain frequently falling from August through mid-October, then turning to snow for the remainder of the season. Most goats were killed from September 1 through October 15 (Table 3) when 53 percent of the total was taken. Only one goat was taken in December.

Table 3. Chronology of Unit 1B Mountain Goat Harvest.

	August		September		October		November		December		Date
	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31	Unknown
No. Killed	1	3	6	4	6	3	2	2	0	1	2
% of Total	3	10	20	13	20	10	7	7	0	3	7
% by Month	13		33		30		14		3		7

The 30 successful hunters averaged 2.6 days hunting for each goat killed. Unsuccessful hunters averaged 2.5 days. The chronological distribution of hunting effort by unsuccessful hunters was similar to that of the successful hunters (Table 4).

Table 4. Chronology of Unsuccessful Hunting Effort

	August		September		October		November		December	
	1-15	16-31	1-15	16-30	1-15	16-31	1-15	16-30	1-15	16-31
No. Days	1	0	17	6	8	6	5	1	0	4
% of Total	2	0	35	13	17	13	10	2	0	8
% by Month	2		48		30		12		8	

Only 26 percent of all goat hunters in Unit 1B utilized aircraft during their hunts, while 63 percent used boats, and 11 percent

hiked into hunting areas from mainland logging camps. Over half (57%) of the successful hunters used boats, 13 percent used aircraft, and 13 percent hiked in from permanent camps.

The two areas of Unit 1B yielding the greatest harvest were Thomas Bay and Swan Lake (20% of the Unit 1B total each). The geographic locations of goats killed by percent of total harvest were: Thomas Bay - 20, Swan Lake - 20, Bradfield Canal - 13, Horn Cliffs - 13, Le Conte Bay - 13, Stikine River - 7, Cleveland Peninsula - 3, unreported - 10.

Thomas Bay is accessible by small boat from Petersburg, while Swan Lake is accessible only by airplane. Forest Service public use cabins at Swan Lake and Thomas Bay make them attractive to goat hunters. Although there are no lodging facilities at Horn Cliffs or Le Conte Bay, both are easily accessible by small boat from Petersburg, and goats can often be found at less than 2,000 feet in elevation. The Wilkes Range usually receives considerable hunting pressure, but no goats were reported killed in that area in 1980.

Management Summary and Recommendations

Areas such as Swan Lake and Horn Cliffs will require close monitoring to prevent overhunting of goats. Goats are susceptible to overharvest when accessible to both legal and illegal hunting (Pendergast and Bindernagel 1977).

The permit registration system initiated in 1980 is working well, providing an accurate means of assessing the mountain goat harvest. When conditions permit, both spring surveys (to establish yearling survival), and fall surveys should be conducted.

New road systems planned by the U.S. Forest Service in goat range could have long-term impacts on goat populations in some areas such as Harding River and Cape Fanshaw. Careful planning and coordination will be necessary to ensure that populations are not reduced below an optimal yield level.

Literature Cited

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SUBMITTED BY:

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APPENDIX I

Unit 1B Goat Hunter Harvest, 1973-1980

*Season	Males	Females	Total	Percent Females
1973	20	12	32	38
1974	9	9	18	50
1975	10	5	15	33
1976	13	10	23	44
1977	18	19	37	51
1978	9	6	15	40
1979	7	8	15	53
1980	20	10	30	33

* Seasons 1973 - 1979 data are based on harvest ticket returns, while 1980 is based on mandatory registration permit returns.

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 4

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof, Chichagof, and adjacent Islands

PERIOD COVERED: July 1, 1980 - June 30, 1981

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, Composition, and Trend

A helicopter survey was conducted over the northern portion of the Baranof Island goat range during August 1980. Each survey conducted on Baranof Island since 1973 has shown a higher count than the previous survey. This was thought to be the result of better technique and greater familiarity with the area. However, due to fog the 1980 survey did not cover all the area known to be occupied by goats within the area counted, yet the total of 473 was substantially greater than any previous count. In addition, a modest increase in the adult:kid ratio, plus nannies with twins representing 10.4 percent of all nannies with kids indicates there has been a slow but steady increase in the Unit 4 goat population.

Mortality

Hunter harvest was 25 males, 23 females and 1 sex unknown for a total of 49, about average for recent years.

In 1980, 265 permits were issued for Unit 4, of which 228 were residents of Sitka-Mt. Edgecumbe, 20 from other Alaskan communities and 8 were nonresidents. Even though inclement weather probably reduced hunting pressure, 156 permittees hunted, the highest ever recorded. Of these, 128 were from Sitka-Mt. Edgecumbe, 12 were from other Alaskan communities and 8 were nonresidents. Sitka-Mt. Edgecumbe hunters took 40 goats, other Alaskans took 4 and nonresidents took 5. Transportation for goat hunters in Unit 4 is by boat or aircraft. In 1980, of 147 who gave their means of transport, 52 went by airplane, 4 by boat/aircraft, and 9 by boat. Traditionally, most of the Unit 4 harvest comes from north of the Vodopad River. The 1980 harvest was consistent with 47 of the 49 kills coming from the area. Chronologically, 10 goats (20%) were taken in August, 18 (37%) in September, 10 (20%) in October, 7 (14%) in November and 4 (8%) in December. The mean age of 34 goats sampled was

5 years, the same as 1979. Harvest and survey statistics are given in Appendix I.

Management Summary and Recommendations

The current registration permit regulation system is adequate for responsible management of the Baranof Island goat herd. With a growing population, an increase in the harvest could be allowed. However, under the current liberal seasons the only practical means to increase harvest would be to increase the bag limit.

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Appendix I. Mountain goat survey and harvest data, 1954-1980, Game Management Unit 4.

	Survey Data						Harvest Data				
Data	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	36.1	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
1980****	473	70.9	106	367	28.9	Johnson-ADF&G (Alouette II-Helicopter)	49	25	23 (1 Unk)	156	Regist. Permit

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

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5

GEOGRAPHICAL DESCRIPTION: Gulf of Alaska, Yakutat Bay

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Aug. 1 - Dec. 31 One goat

Population Status and Trend

Based on recent aerial surveys, the Unit 5A goat population appears to be stable and kid production is good. No new data are available for Unit 5B for this report period, but the populations are assumed to be stable.

Population Composition

A complete aerial survey of Unit 5A was conducted during the report period using a Hiller 12E helicopter. The surveys were conducted during 5 flights (Appendix I) between August 5 and August 25, 1980. Survey conditions varied from fair to good with an overall rating of fair.

A total of 194 goats (57 kids:132 adults) was observed, with a kid:adult ratio of 43:100. The total number of goats observed was the second highest recorded for the Brabazon range (283 were observed in 1971), and the adult:kid ratio observed was the highest ever recorded. It is possible that the production rate or survival of kids has increased, but it is more likely that the difference observed is a result of using a helicopter rather than the fixed-wing aircraft usually used for surveys.

Mortality

The 1980 mountain goat season was the first in which a special registration permit system was implemented. Unit-wide, 90 permits were issued. Thirty-seven of the permits were not used. Twenty-three hunters hunted in Unit 5A for an average of 5.4 days each and harvested seven goats for a 30.4 percent success rate. An additional 30 hunters hunted in Unit 5B for an average of 4.2 days each, harvesting a total of 17 goats for a success rate of 56.6 percent. Due to an error on the hunter report form, data on the sex of harvested goats are incomplete.

Management Summary and Recommendations

The new registration permit system provided much more accurate data on hunting pressure and probably a more accurate accounting of goat harvest. In the long run, this system, coupled with regular aerial surveys, should provide sufficient information to manage mountain goat populations on a herd by herd or drainage by drainage basis.

Despite a few problems during the first season of operation, the procedure seemed to work fairly well in Unit 5 and was generally well accepted by most hunters.

No change in season or bag limit is recommended.

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Appendix I. Results of Aerial Survey (Helicoptor) of Mountain Goats in Game Management Unit 5A, between August 5, 1980 and August 25, 1980.

Date	No. Adults	No. Kids	No. Yrls.	Total Goats	Kid:100 Adults	Count Time(HR)	Goats/HR Obs.	Survey Area
8-5-80	38	19	0	57	50:100	4.4	13.0	Gateway Knob to Harlequin Lake
8-15-80	43	21	0	64	50:100	2.1	30.5	Harlequin Lake to Italio Lake
8-22-80	38	12	2	52	32:100	3.2	16.3	Harlequin Lake to Nunatak Fjord
8-23-80	13	5	3	21	39:100	2.2	9.6	Nunatak Fjord to Disenchantment Bay
8-25-80	0	0	0	0	0	3.2	0	Disenchantment Bay, Chicago Harbor, So. Side Russell Fjord
TOTALS	132	57	5	194	43:100	15.1	12.8	

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 6

GEOGRAPHICAL DESCRIPTION: Prince William Sound-North Gulf Coast

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Mountain Goat Hunt 830 Unit 6D, that portion of the mainland between Cape Fairfield and Tiger Glacier.	Aug. 10-Nov. 30	One goat by drawing permit only. 20 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Mountain Goat Hunt 878 Unit 6B and that portion of Unit 6A lying west of Seal River and Bering Glacier.	Sept. 1-Dec. 31	One goat by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Mountain Goat Hunt 879 Remainder of Unit 6	Aug. 1-Dec. 31	

Conditions outlined in the 1980-81 Permit Hunt Supplement were:

Mountain Goat Hunt 830

1. Application deadline was June 27 for 20 permits that were drawn by July 18, 1980.

2. Successful hunters were required to report their kill and present the horns for measurements within 10 days to a Fish and Game office in Anchorage, Palmer, Soldotna, Homer, Seward, or Cordova.

3. Unsuccessful hunters were required to return their completed permit reports within 15 days after the close of the season.

Mountain Goat Hunt 878

1. Hunters were required to obtain a registration permit at the Cordova Fish and Game office. Permits were available July 25,1980, and throughout the season.

2. Successful hunters were required to report their kill and present the horns for measurement within 5 days to the Cordova Fish and Game office.

3. Unsuccessful hunters were required to return their completed permit reports within 15 days after the close of the season.

Mountain Goat Hunt 879

1. Hunters were required to obtain a registration permit at a Fish and Game office in Seward, Anchorage, Valdez, Glennallen, Cordova, or Yakutat. Permits were available July 25, 1980, and throughout the season.

2. Successful hunters were required to report their kill and present the horns for measurement within 10 days to a Fish and Game office in Seward, Anchorage, Valdez, Glennallen, or Yakutat. .

3. Unsuccessful hunters were not required to return their permit reports.

Population Status and Trend

The mountain goat population in Unit 6 has been stable during the 1976-1981 period. Goats occur in favorable numbers from Columbia Glacier to Icy Bay except in the Copper River to Bering Glacier area, where isolated goat herds are small compared to the early 1970's.

Population Composition

Surveys flown in 1980 were concentrated in the Copper River-Bering Glacier area where it was thought that the abundance of goats might be inadequate to support continued hunting. Five goat populations were surveyed. Two hundred and eighteen goats were observed, of which 25.7 percent were kids. Survey data are shown in Appendix I and support the conclusion that the population is presently too small to allow hunting.

Mortality

During the 1980 season 213 hunters reported harvesting 120 animals: 71 males and 49 females (Appendix II). The 1980 harvest compares favorably with the 5-year average of 124 goats (Appendix III). Hunter success was 56 percent during 1980, and residents accounted for 64 percent of the harvest.

Mountain Goat Hunt 830, which was a drawing permit hunt in the Tiger Glacier to Cape Fairfield portion of Unit 6, produced only one goat from the 20 permits issued. Twelve permittees did not hunt, 7 were unsuccessful, and only 1 permittee was successful.

Hunt 878 was a registration hunt for the area between the Copper River and Bering Glacier. Five goats (3 females and 2 males) were taken by 133 permittees. The Don Miller Hills and Mount Hamilton portion of this hunt area was closed by Emergency Order on September 20, 1980, when goat surveys indicated populations too small to allow continued hunting.

Hunt 879, the remaining portion of Unit 6, was also a registration permit hunt area; 735 permits were issued. The harvest for this area was 114 goats; 68 males and 46 females.

The Rude River to Columbia Glacier portion of Unit 6 received the greatest hunting pressure (98 hunters) and produced the largest kill (58 goats). The Icy Bay Subunit also received considerable pressure with a relatively large harvest (Appendix IV). Distribution of the 1980 harvest compares favorably with previous years (Appendix V).

Chronology of the 1980 harvest was: August--38, September--37, October--19, November--16, December--9, and Unknown--1.

Data on horn length, horn base, and age were collected from Unit 6 goats during 1980. Age data on 113 goats were obtained from horn growth rings. The average age of 77 males was 4.6 years, whereas the 43 female goats averaged 4.7 years. Circumference of horn base, taken from the longest horn, revealed all males older than yearlings had bases exceeding 5 inches, whereas not one female had a basal measurement exceeding 5 inches. Horn length (longest horn) data are summarized as follows:

Male			Female		
Age	Average Horn Length	Sample	Age	Average Horn Length	Sample
Kid	2.0	1	Kid	-	0
1	6.1	4	1-2	6.0- 6.5	8
2-6	8.1-8.9	48	3	7.2	6
7+	9.2-9.4	15	4-7	8.1- 8.5	19
			8+	9.0-10.5	7

Management Summary and Recommendations

The 1980 mountain goat harvest was similar to the annual harvests during the previous 5 years in terms of numbers of animals taken, composition, and distribution of harvest.

Analysis of Unit 6 harvest data by subunit for 1976-81 shows annual fluctuations with the exception of the Ragged Mountain area, which reveals a steady decline in animals harvested. The Copper River to Bering Glacier portion of Unit 6, which includes Ragged Mountain, will be closed to goat hunting during the 1981 season. This closure is necessary because several small goat

populations appeared to be declining, probably as a result of wolf predation, not hunting pressure.

The 1980 harvest data when analyzed by subunit and sex revealed a high proportion of females (75%) taken from the Valdez Arm subunit. This area will require close monitoring in the future.

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Appendix I. Unit 6 1980 mountain goat survey data.

Area	Date	Adults	Kids	Total	Kids/100 Adults	% Kids In Pop.
Ragged Mountain	9/11/80	38	12	50	31.6	24.0
Mount Hamilton Ridge	9/11/80	12	7	19	58.3	36.8
Don Miller Hills	9/11/80	8	4	12	50.0	66.7
Burg Lake	9/17/80	81	24	105	29.6	22.9
Suckling Hills	9/19/80	23	9	32	39.1	28.1
1980 Totals		162	56	218	34.6	25.7

PREPARED BY: Julius L. Reynolds, Game Biologist III

Appendix II. Unit 6 1980 mountain goat harvest by subunit and sex.

Unit/ Subunit	Area	Male	Female	Unk.	Total	Percent
6-01	East of Suckling Hills to Icy Bay	10	9	0	19	15.8
6-02	Bering Lake - Burg Lake Area	1	2	0	3	2.5
6-03	Suckling Hills	1	0	0	1	0.8
6-04	Ragged Mountain	0	1	0	1	0.8
6-05*	Goat Mountain	-	-	-	-	-
6-06	Rude River to Copper River	6	3	0	9	7.5
6-07	Valdez Arm to Rude River	29	12	0	41	34.2
6-08	Valdez Area	6	11	0	17	14.2
6-09	Port Wells to Columbia Glacier	5	3	0	8	6.7
6-10	Unit 6 - Unknown	0	0	0	0	0.0
6-11	Whittier - Port Wells	3	0	0	3	2.5
6-12	Kings Bay to Cape Fairfield	8	6	0	14	11.7
6-13	Prince William Sound - Unknown	2	2	0	4	3.3
Unit 6 Totals		71	49	0	120	100.0

* No open hunting season.

PREPARED BY: Julius L. Reynolds, Game Biologist III

Appendix III. Unit 6 mountain goat harvest by year and sex, 1976-80.

Year	Males		Females		Unknown		Total	
	No.	%	No.	%	No.	%	No.	%
1976	74	60.2	49	39.8	0	0.0	123	100.0
1977	66	60.6	41	37.6	2	1.8	109	100.0
1978	87	64.4	45	33.3	3	2.2	135	99.9
1979	91	68.4	41	30.8	1	0.8	133	100.0
1980	71	59.2	49	40.8	0	0.0	120	100.0
5 Year Average	78	62.6	45	36.5	1	1.0	124	100.1

PREPARED BY: Julius L. Reynolds, Game Biologist III

Appendix IV. Unit 6 1980 mountain goat hunter success by subunit.

Unit/ Subunit	Area	Successful Hunters	Un-successful Hunters	Total Hunters	Percent Success
6-01	East of Suckling Hills to Icy Bay	19	4	23	82.6
6-02	Bering Lake - Burg Lake Area	3	0	3	100.0
6-03	Suckling Hills	1	0	1	100.0
6-04	Ragged Mountain	1	0	1	100.0
6-05*	Goat Mountain	-	-	-	-
6-06	Rude River to Copper River	9	11	20	45.0
6-07	Valdez Arm to Rude River	41	18	59	64.5
6-08	Valdez Area	17	22	39	43.6
6-09	Port Wells to Columbia Glacier	8	5	13	61.5
6-10	Unit 6 - Unknown	0	13	13	0.0
6-11	Whittier - Port Wells	3	5	8	37.5
6-12	Kings Bay to Cape Fairfield	14	8	22	63.6
6-13	Prince William Sound - Unknown	4	7	11	36.4
Unit 6 Totals		120	93	213	56.3

* Not open to hunting.

PREPARED BY: Julius L. Reynolds, Game Biologist III

Appendix V. Unit 6 mountain goat harvest by year and subunit, 1976-80.

Unit/ Subunit	Area	1976	1977	1978	1979	1980	Avg.
6-01	East of Suckling Hills to Icy Bay	6	6	17	18	19	13
6-02	Bering Lake - Burg Lake Area	11	7	5	12	3	8
6-03	Suckling Hills	0	3	4	3	1	2
6-04	Ragged Mountain	9	7	6	5	1	6
6-05*	Goat Mountain	-	-	-	-	-	-
6-06	Rude River to Copper River	10	10	10	9	9	10
6-07	Valdez Arm to Rude River	28	30	34	24	41	31
6-08	Valdez Area	6	10	20	23	17	15
6-09	Port Wells to Columbia Glacier	11	9	8	6	8	8
6-10	Unit 6 - Unknown	11	5	5	8	0	6
6-11	Whittier - Port Wells	6	0	0	2	3	2
6-12	Kings Bay to Cape Fairfield	24	14	23	20	14**	19
6-13	Prince William Sount - Unknown	1	8	3	3	4	4
Totals		123	109	135	133	120	124

* Not open to hunting.
** Cape Fairfield to Tiger Glacier was restricted to drawing permit holders in 1980, and only one goat was taken in this portion of 6-12.

PREPARED BY: Julius L. Reynolds, Game Biologist III

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 7 and 15

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

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	Aug. 10-Nov. 30	One goat by drawing permit only. 185 permits will be issued. 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 in much of Units 7 and 15, particularly where goat and Dall sheep distribution overlap. In light of this trend, seasons and bag limits were reduced. Areas east of Seward in Unit 7 and Bradley Lake and Halibut Cove in Unit 15, however, have shown an increase in numbers of goats in recent years.

Population Composition

Aerial surveys were flown in selected goat permit areas during 1980, and 1,067 goats were observed. Composition data from this count are as follows: 819 adults, 240 kids and 8 goats of undetermined age. Mean kids:100 adults was 29 and kids made up 23 percent of the total observed. Historical survey data for the Kenai Peninsula has been published by Spraker (1979) and Cornelius (1980).

Mortality

Twenty-eight goats were killed in Units 7 and 15 during 1980. Composition of the harvest was 17 males (61%) and 11 females (39%). Eight hundred and nineteen applications were received for goat permits in Unit 7 and 15 during 1980. One hundred and eighty-five permits were offered by drawing, however, only 176 were issued since several areas in the proposed Kenai Fjords National Park were undersubscribed. Forty-one percent (73) of the successful applicants reported hunting and 38 percent were successful in harvesting a goat.

Boats, highway vehicles and aircraft were closely comparable (34.3%, 32.8% and 31.3%, respectively) as means of transportation used by all hunters. Horses were used by only 1.5 percent of the hunters as a means of transportation and motorbikes and snow machines were not used during 1980.

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

Management Summary and Recommendations

Goat hunting by drawing permit was initiated in 1980 by the Board of Game to distribute hunting pressure more evenly over the known goat habitat. The method used to allocate permits was to issue permits for each area equal in number to 10 percent of the highest count of goats. Although, hunter interest was high (455 registration permits issued in 1979 compared to 819 applications for drawing permits in 1980) the majority of the harvest still came from areas with easy access. The 1980 harvest was 30 percent of the desired harvest level.

Since permits can no longer be issued for goat hunting in Kenai Fjords National Park, those permits (34) should be reallocated to suitable areas.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

PERIOD COVERED: July 1, 1980 - June 30, 1981

Season and Bag Limit

Sept. 1 - Oct. 31	One goat by drawing permit only; 36 permits will be issued.

Population Status and Trend

The Unit 8 goat population is slowly increasing in size and in area of distribution.

Population Composition

Aerial composition counts were conducted in June and again in August 1980. The June surveys were done cooperatively with the Arctic Environmental Information and Data Center, which was conducting a study of the environmental impacts of the proposed Terror Lake hydroelectric project. The June surveys were intended to document the location of areas used for kidding, and were conducted from a helicoptor. The August surveys were conducted from fixed-wing aircraft. Results of these surveys are compared below:

Date	Adults	Kids	Total	Kids/ 100 Adults	Percent Kids
6/11, 6/13/80	93	26	119	28	22%
8/11, 8/22/80	115	34	149	30	23%

The August surveys resulted in the highest total count (149 goats) on record. The highest previous total was 132 goats counted in 1978. The total number of goats counted annually since 1976 indicates an increasing population trend.

The 1980 ratio of 30 kids:100 adults was the same as the mean ratio of kids to adults for the 5-year period 1976-80 (range 21:100-34:100).

Mortality

Eleven goats, 4 males and 7 females, were killed by hunters in 1980. Sixteen permittees reported hunting and hunter success was

69 percent. The four males ranged from age 2 to 6 years with a mean age of 3.7 years. The seven females ranged from age 1 to 8 years with a mean age of 4.2 years.

Distribution of the 1980 harvest was:

Hunt No.	Location	No. Males	No. Females	Total
871	Wild Creek-Center Mtn	2	3	5
872	Crown Mtn.	0	1	1
873	Hidden Basin-Terror Lake	0	3	3
874	West Ugak Bay	2	0	2
		4	7	11

During the 1976-80 period 49 goats were reported killed by hunters and the mean annual harvest was 9.8 goats. Sex composition was 24 males (49%), 24 females (49%) and 1 (2%) goat of unknown sex. Hunter success averaged 48 percent each year and ranged from 11 percent in 1976 to 69 percent in 1980.

Ages of 47 goats killed between 1976-80 were determined by horn ring counts. Mean age of 26 males was 4.5 years and mean age of 21 females was 4.2 years. All but three of the 21 females killed were 3 years old or older and presumably of breeding age.

Management Summary and Recommendations

Increasing total counts from annual composition surveys indicate that the goat population has increased in the past 5 years. The 1980 count of 149 goats was the highest annual count on record. Although the goat population appeared to have reached a peak in the early 1970's (Smith 1977), the recent annual surveys indicated a continued upward trend in the herds occupying the Ugak Bay, Terror Bay, and Kizhuyak Bay drainages.

The population increase may be a result of reduced hunter harvest and lower winter mortality in recent years. The Crown Mountains area was closed to hunting during the 1976 and 1977 seasons after excessive harvest of mature females during several previous seasons was suspected to have depressed kid production (Smith 1977). The area was reopened to hunting in 1978 with permit numbers limited to five per year. The harvest averaged only two goats per year for the past three seasons. During this same period comparatively mild winters with low snow accumulations at lower elevations have prevailed and overwinter survival has probably been above average.

The frequency of goat sightings in areas outside the major goat range has increased in the past 5 years. Goats are slowly becoming established farther south and west of the original Ugak Bay transplant site. A herd of at least 15 goats has become established in the Ugak Bay drainage. During 1981, a herd of 6 goats was observed in Kaiugnak Bay and another herd of 11 goats was observed in Deadman Bay.

The potential for hunters to overharvest accessible goat herds was demonstrated in the Crown Mountain area, prompting a closure in 1976. Closing of this popular and most accessible hunting area forced hunters into less familiar areas and only three goats were killed during the 1976 season. In 1977, hunting pressure shifted to the Terror Lake-Kizhuyak Bay area, where hunters took nine females, eight of which were adults. The practice of issuing unlimited numbers of hunting permits was clearly inadequate for preventing excessive female harvest.

A permit drawing hunt was implemented in 1978. Ranges with the highest density of goats were divided into four hunting areas. These hunting areas roughly follow the summer/fall ranges of goat herds identified by several years of summer composition surveys. Permits were allocated based on population size and expected hunter success. The areas where goats were not present or were present only in low densities were closed to hunting.

Three hunting seasons under the permit drawing hunt have resulted in a better distribution of the kill and have reduced the potential for overharvesting females (Table 1).

Table 1. Total number of goats harvested by hunt area and sex for years 1978-80.

Hunt No.	No. Males	% Males	No. Females	% Females	No. Unk.	% Unk.	Total	Mean Annual Harvest
871	7	57%	5	42%	0	0	12	4.0
872	2	33%	4	67%	0	0	6	2.0
873	4	44%	4	44%	1	11%	9	3.0
874	3	75%	1	25%	0	0	4	1.3
	16	52%	14	45%	1	3%	31	

Overall, the male kill slightly exceeded the female kill. Only in Hunt No. 872, the Crown Mountain area, did the female kill exceed the male kill.

In an attempt to improve the accuracy of sex and age composition counts, surveys were conducted on foot during summers 1978 and 1979 after observers were flown in by helicopter (1978) and fixed-wing aircraft. The helicopter was used to locate goats and place observers near, but out of sight. Access by fixed-wing aircraft and then by foot was much less successful, due to considerably more time and effort required to approach goats.

Composition surveys done by helicopter, in March 1980, also allowed for classification of yearling goats. Comparing these data to data from August 1979 permitted making an estimate of kid survival (Smith 1981). The early spring composition surveys by helicopter provided faster, more thorough coverage than the summer foot surveys; however, the foot surveys provided better opportunity to further classify adult goats by sex and age.

The present permit hunting system provides a high quality hunting experience and has stabilized harvests within each major goat range. The permit system should be continued with annual adjustments in permit numbers which reflect population changes.

Aerial surveys should be done in areas where new goat herds are becoming established. Additional areas should be opened to hunting if these herds are sufficiently productive to support a limited harvest.

Aerial surveys conducted during the summer should be continued annually to assess kid production and to provide long-term trend information.

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MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 11

GEOGRAPHICAL DESCRIPTION: Wrangell Mountains

PERIOD COVERED: July 1, 1976 - June 30, 1981

Season and Bag Limit

Sept. 1-Dec. 31 One goat

Population Status and Trend

The goat population in the MacColl Ridge trend count area appears to be stable. Total counts have fluctuated each year (Appendix I), but no upward or downward trends are evident.

Population Composition

The number of kids:100 adults varied from year to year (Appendix I), however, no trend was evident.

Mortality

Hunting pressure on goats decreased from 65 hunters in 1972 to 20 in 1980 (Appendix II). The harvest decreased proportionately, except in 1979 when 22 hunters harvested 18 goats (82% success). The mean number of days hunted by both successful and unsuccessful hunters remained fairly constant, so the decreased harvest was related to the decline in the number of hunters rather than an increased difficulty in finding animals to shoot.

The obvious explanations for the decline in hunting pressure were the change in the land classification status of the Wrangell Mountain area as a result of Presidential Executive action in 1978 and the addition of the registration permit hunt requirement in 1980. In December 1978, the Wrangell Mountains were classified as a National Mounument. The area as of December 1980, was classified a National Park or a Park Preserve. The National Park is open to resident, subsistence hunting only. The Preserve is open to sport and subsistence hunting. However, for a time, the land status and hunting regulations of the area were uncertain, so hunters were probably apprehensive about hunting there until land classification and use restrictions were defined.

Management Summary and Recommendations

The goat harvest and hunting pressure in Unit 11 decreased between 1976 and 1980. The decline was apparently caused by

uncertainty of the land classification status of the Wrangell Mountains. Now that the National Park boundaries are defined, hunting pressure may stabilize or increase.

Total counts and age composition of the goat population in the trend count area have fluctuated each year, but no trends indicating change were evident. The population is believed to be stable. Efforts should be made to standardize and improve the accuracy of the goat counts so population increases or decreases will be evident if they occur. The number of counts and trend areas monitored should be increased.

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Appendix I. Goat population counts and composition of the MacColl Ridge trend count area, 1976-1980.

Date	Adult	Kid	Total	Kid/100 Adult	Percent Kids
6/29/76	12	1	13	8.3	7.7
8/3/77	39	14	53	35.9	26.4
8/9/78	26	9	35	34.6	25.7
7/9/79	43	10	53	23.0	19.0
7/24/80	37	10	47	27.0	21.0

PREPARED BY: Patricia Martin, Game Biologist II

Appendix II. Summary of harvest and hunters from Unit 11 goat hunt, 1976-1980.

	HUNTERS				HARVEST			
	Numbers		Mean Number of Days Hunted					
Year	Successful (%)	Total	Successful $\bar{x}$ (n)	Unsuccessful $\bar{x}$ (n)	Male n (%)	Female n (%)	Unknown n (%)	Total
1976	27 (42)	65	3.8 (26)	4.3 (34)	16 (62)	10 (38)	1 (4)	27
1977	32 (51)	63	5.0 (29)	3.8 (30)	19 (63)	11 (37)	2 (6)	32
1978	21 (46)	46	3.6 (21)	5.0 (25)	9 (43)	12 (57)	-0-	21
1979	18 (82)	22	--	--	10 (56)	8 (44)	-0-	18
1980	6 (30)	20	3.5 (6)	4.3 (14)	4 (67)	2 (33)	-0-	6

PREPARED BY: Patricia Martin, Game Biologist II

MOUNTAIN GOAT

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 13 and 14

GEOGRAPHICAL DESCRIPTION: Nelchina and Upper Cook Inlet

PERIOD COVERED: July 1, 1980 - June 30, 1981

Seasons and Bag Limits

Unit 13 Nelchina area	No open season	
Unit 14A north of the Matanuska River		
Remainder of Unit 14A and Unit 14B	Aug. 10-Nov. 30	One goat by permit only
14C within Chugach State Park	No open season	
Remainder of 14C	Aug. 10-Nov. 30	One goat by permit only.

Population Status and Trend

Inclement weather and priority work on other species prevented extensive aerial surveys throughout most of Units 13 and 14 during 1980. Extensive surveys were last flown in these Units in 1976 when 361 goats were observed. Partial surveys in Unit 13 during August 1980 resulted in the observation of 23 goats. Only one goat was observed in Unit 14A; however, prime goat habitat was not surveyed. No surveys were flown in Subunit 14B. Within Subunit 14C, 167 goats were observed.

Subunit 14C data represent a 27 percent decline from the 230 goats observed in 1976. I suspect that similar declines may have occurred throughout the remainder of Units 13 and 14 over the past several years as a result of severe winter conditions. Winter 1980-81, however, was mild and survival of goats was believed to be much higher.

Population Composition

During the 1980 surveys, 38 kids (20%) and 153 adults (80%) were observed. No other meaningful composition data were obtained.

Management Summary and Recommendations

Complete closures to hunting exist in areas where past surveys indicated that population levels were unable to support any

harvest. These areas include Unit 13, the northern portion of Subunit 14A, and that portion of 14C within Chugach State Park. However, 5 years have elapsed since thorough surveys were flown throughout both Units and such an effort seems appropriate this year. Data obtained could be used to verify declines which are suspected to have occurred since 1976, and to readjust permit allocations where necessary. Under existing regulations, 50 permits are issued for Subunits 14A, 14B and 14C. Adequate surveys may indicate that a limited permit hunt in Unit 13, which has been entirely closed since 1978, is justified.

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