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JUNEAU, ALASKA

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ANNUAL REPORT OF SURVEY-INVENTORY ACTIVITIES

PART II. DEER, ELK AND MOOSE

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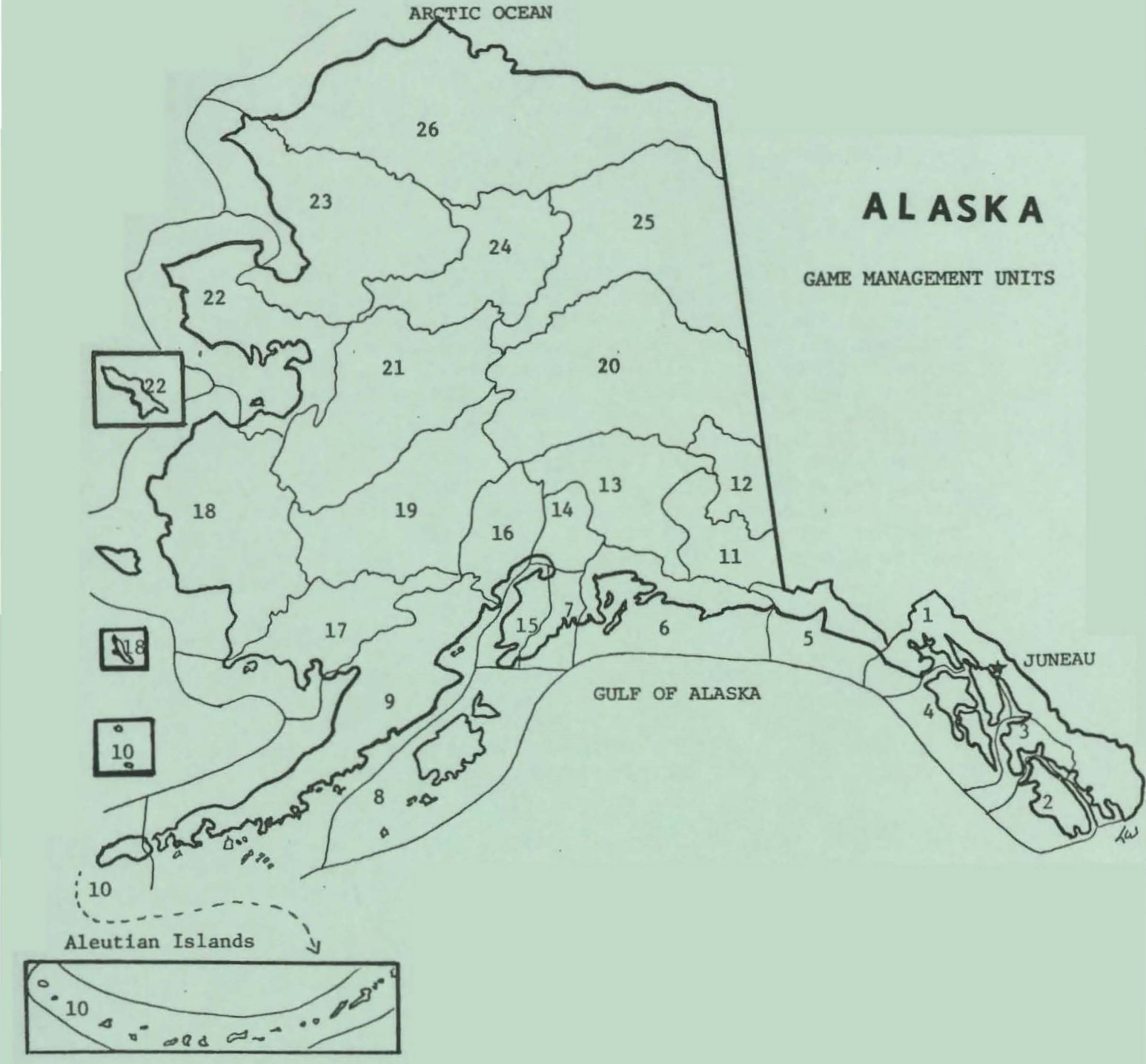
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Statewide Harvest and Population Status

Sitka Black-tailed Deer

A generally "normal" winter throughout southeastern Alaska and on Kodiak Island allowed continued improvement in deer populations. Concern was noted for possible declines in portions of Unit 4, declines that had not been detected last year. Populations in other areas of Southeastern were generally low but increasing slowly. Deer on Kodiak Island contined to increase, and are now at historic highs.

Harvest records are sketchy due to difficulties with the harvest report system. Harvest on Kodiak was estimated at 3500 deer, the highest on record while the Unit 4 harvest declined to about 950 deer, and the Unit 6 harvest was estimated at 452 deer.

Elk

During the 1979-80 season, hunters took a total of 68 elk, the highest since 1970 and a fifty-one percent increase over last year. Mild winters have apparently contributed to the continued growth of all herds on Afognak and Raspberry Islands, and the total estimated populations of 750-800 animals is the highest since 1970.

Moose

The statewide reported moose harvest was 4174, down from 4785 in 1978-79. However, this figure is quite obviously low, being based, in most units, on harvest reports. In 1979-80, budgetary restraints prevented the use of reminder letters, so harvest figures largely reflect only voluntary returns without reminders. Reporting by harvest reports is particularly deficient in rural areas of Unit 17, 18, 19, 20E, 21, 24 and 25. In some of these units, actual harvests may be 2 or 3 times that reported.

Conservative seasons and bag limits and a generally mild winter combined to provide for stable or increasing moose populations in many units although those in Units 12, 19, 20 (except 20A), 21, 24 and 25 appear to be very low and perhaps still declining; the apparent cause for these declines is excessive predation, largely by wolves.

Moose harvest (from harvest reports) by unit or subunit is summarized below:

Unit	Harvest		
	Bull	Cow	Unknown
5A	20		
5B	22		
6A	23	9	
6B	22	21	
6C	29	22	
7	38		
9	241	16	2
11	21		
12	79		
13	848		
14A	201	89	
14B	73	42	
14C	25		
15A	120	2	1
15B	43		1
15C	130		
16A	133	30	4
16B	255	99	7
17	32		1
18	12		
19	183		
20A	99		
20B	59		
20C	143		
20D	19		
20E	0		
21	221		
22	193	75	2
23	122	17	
24	77		
25	61		
26	70		
Total	3714	442	18

CONTENTS

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNITS 1A AND 2

GEOGRAPHICAL DESCRIPTION: Ketchikan area and Prince of Wales Island

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

Season and Bag Limit

Aug. 1 - Nov. 30	Three antlered deer.

Population Status and Trend

Based on harvest and hunting data obtained from harvest reports, the deer population in the Ketchikan area remained similar to that of 1978-1979. Data from Unit 2 (Prince of Wales Island) indicated a substantial rise in hunter success, possibly as a result of increased deer numbers, but more likely because additional areas now have road access and more people are using the area.

In general, observations in Unit 1A indicated stable but low deer populations on Revilla Island and a moderately high population on Gravina Island. In Unit 2, reports indicated moderately high deer levels in certain areas, but low populations over most of Prince of Wales Island.

Population Composition

No survey data were available, but general field observations indicated little if any mortality occurred due to winter conditions. Deer populations are low, range conditions in the old-growth forest are excellent and only the severest of winters should cause any significant winter losses.

Mortality

Harvest and hunting data for the 1979 season were obtained from a hand tabulation of the harvest ticket report cards. Reminder leters were not sent to non-responding harvest ticket holders in either 1978 or 1979 as they were in previous years, so only 1978 and 1979 data are comparable.

In Unit 1A, 79 bucks were killed by 164 hunters during the 1979 season and in Unit 2, 80 bucks were taken by 86 hunters. The 164 hunters in Unit 1A spent an average of 3.7 days hunting and averaged 0.48 deer per hunter. In Unit 2,

the hunters also averaged 3.7 days of hunting but reported taking an average of 0.93 deer per hunter. Effort and success in Unit 1A were essentially the same as 1978, but in Unit 2 the days spent hunting by each hunter declined while the deer taken per hunters rose from 0.74 to 0.93.

Chronology of the harvest in both Units 1A and 2 showed November was the most popular month to hunt deer. In Unit 1A, 32 percent of the harvest occurred in August, 4 percent in September, 21 percent in October and 43 percent in November. The high August harvest probably indicates the interest in alpine hunting on Gravina Island. Fourteen percent of the deer were taken in August, 11 percent in September, 29 percent in October and 46 percent in November in Unit 2.

Winter mortality beach transects were not surveyed in 1979 but few, if any, winter losses were found during normal winter observations.

Management Summary and Recommendations

Deer populations in the Ketchikan area have been at a low level since the mid-1970's and have changed very little since that time. Range conditions have appeared excellent except for areas of extensive clear cutting and winters have generally been mild. Hunter harvest has been very low and most deer taken come from Gravina Island where deer numbers have remained at a fairly high level. The only reason for the continued low deer numbers in areas of good habitat is excessive predation by wolves and black bears. Good populations of both are present in these areas.

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SUBMITTED BY:

Nathan P. Johnson
Regional Research/
Management Coordinator

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1B

GEOGRAPHICAL DESCRIPTION: Mainland of Southeast Alaska from Cape Fanshaw to Cleveland Peninsula

PERIOD COVERED: July 1, 1978 - June 30, 1980

Seasons and Bag Limits

Sept. 1 - Nov. 30	One antlered deer

Population Status and Trend

The deer decline of the late 1960's and early 1970's which affected most of Unit 3 was less severe in Unit 1B. Bag limits were reduced in Unit 1B from 4 to 3 deer of either sex in 1971. In 1972 the bag limit was further reduced to 2 antlered deer, and in 1973 it was reduced to one antlered deer. The bag limit has remained at one antlered deer since 1973, and the season length has remained at 91 days.

The factors controlling the population are suspected to be severe winter weather and predation by wolves. While the bag limit has been restrictive, hunting has been continuing in the vicinity of Petersburg and Wrangell. Thomas Bay and Point Aggasiz have received most of the deer hunting pressure in Unit 1B.

Population Composition

No data were collected.

Mortality

Table 1 shows deer harvest tickets issued by Petersburg and Wrangell license vendors and the number of hunters returning report cards. Data for Petersburg and Wrangell residents hunting in other units were not available.

In 1978 few hunters returned harvest report cards. No hunting or harvest was reported on the cards although deer were known to have been taken during the season in Unit 1B.

In 1979, 69 percent of the hunters returning cards said that they did not hunt. A total of 31 percent (30 hunters) said they hunted in Unit 1B and 17 percent of these were successful. Successful hunters were probably more inclined to report than unsuccessful hunters.

Table 1. Deer Harvest Ticket Data

Season	Number Issued Petersburg	Number Issued Wrangell	Total	Returns from Petersburg/Wrangell
1976	467	300	767	unavailable
1977	768	338	1106	unavailable
1978	241	388	629	17
1979	557	401	958	99

Management Summary and Recommendations

Deer numbers have declined from the high populations of the mid-1960's. A combination of wolf predation and severe winter weather was likely responsible for the decline. Seasons and bag limits have been adjusted accordingly and populations appear to have stabilized at a moderate level. Vegetation transects and pellet group counts should provide better information on relative deer densities. Deer harvest tickets are a poor indication of hunting pressure, deer harvest, and hunter success. Alternative methods of data collection should be devised.

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Nathan P. Johnson
Regional Management/Research Coordinator

DEER

SURVEY INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 1C

GEOGRAPHICAL DESCRIPTION: Mainland Portion of Southeastern Alaska - Cape Fanshaw to the Latitude of Eldred Rock

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

Season and Bag Limit

Aug. 1-Dec. 31	Four deer, provided that anterless deer may be taken only from Sept. 1 - Dec. 31.

Population Status and Trend

No data were collected. However, because of mild winter conditions, deer survival was expected to be good through winter 1979-80. Populations were probably below optimum levels in areas near human population centers. No significant population changes have been noted for deer since 1978.

Population Composition

No data were collected.

Mortality

Harvest ticket returns in 1979 indicated that 145 hunters bagged 62 deer for a hunter success rate of 27 percent (n=39). In 1978, 135 hunters bagged 62 deer.

Chronology of the harvest showed that 2 deer (3%) were taken in August, 8 (13%) in September, 9 (14%) in October, 19 (31%) in November, and 24 (39%) in December. Distribution of the harvest was 5 (8%) for the mainland, 32 (54%) for Douglas Island, and 23 (38%) for the Lynn Canal islands. Distribution of days hunted was 86 (21%) for the mainland, 246 (59%) for Douglas Island, 67 (16%) for the Lynn Canal islands, and 17 (4%) for other areas in Unit 1C. For 1979, the number of days hunted per deer taken was 17.2 days/deer for the mainland, 7.7 days/deer for Douglas Island, and 2.9 days/deer for the Lynn Canal islands. These rates were up 67 percent, 51 percent, and 32 percent, respectively, over those for 1978, indicating a substantial increase in effort expanded per deer harvested. Hunter success on the mainland was 3.0 percent in 1979 as compared to 12.8 percent in 1978.

In 1979, 59 percent (n=23) of the 39 successful hunters in Unit 1C took 1 deer, 28 percent (n=11) took 2, 8 percent (n=3) took 3, and 5 percent (n=2) took 4 deer. In 1978, 9 hunters bagged 1 deer, 10 bagged 2 deer, 5 bagged 3 deer, and 2 bagged 4 deer. This information was erroneously reported in the 1978 Survey Inventory-Progress Report.

Of the 32 hunters who indicated they hunted the mainland area, 2 were successful, 1 took 4 deer, the other took 1.

Twenty-one hunters who were unsuccessful in Unit 1C were successful in Unit 4. Fifteen hunters who were successful in Unit 1C were also successful in taking at least one deer in Unit 4.

Management Summary and Recommendations

Because of the low numbers of hunter harvest reports returned, it was difficult to ascertain the effects of hunting pressure on deer population levels in Unit 1C. As reported in 1978, the developed road system in the Juneau area has experienced increased hunting pressure over the past years. Since the area currently has low deer population levels (which are common to mainland habitats), hunter pressure could limit deer numbers below desirable levels. Harvest data indicate that fewer deer were taken on the mainland in 1979 than in 1978 and hunter success in 1979 was considerably lower than on the mainland in 1978 or the other heavily hunted areas in Unit 1C. The unit-wide success rate in 1979 was 27 percent.

Based on these data and those concerns reported in 1978, it is recommended that the season and bag limit for the Juneau mainland area be reduced. The bag limit should be more in line with the current status and low potential of the deer population in the Juneau Mainland area. The problem of low productivity is componded by the loss of winter range due to the increasing urbanization of the Juneau area.

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DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 3

GEOGRAPHICAL DESCRIPTION: Islands of the Petersburg-Kake-Wrangell Area

PERIOD COVERED: July 1, 1978 - June 30, 1980

Seasons and Bag Limits

No Open Season

Population Status and Trend

Vank Island Group

Deer populations on Vank, Level, Sokolof, and Zarembo Islands appear to be increasing. Observations of deer numbers, pellet groups, and vegetation use indicate that Level and Sokolof Islands support significant number of deer. The absence of predators and possibly warmer temperatures during winter months contribute to this increase. Public sentiment favors an open season during 1980. Definitive information on the composition and productivity of the herd on these small islands. Over a third of Sokolof and Level Islands have been logged, eliminating much of the winter habitat and setting the stage for a drastic reduction in numbers. The extent of emigration and immigration is unknown.

Kupreanof Island

The Alaska Legislature, in 1978, authorized the expenditure of funds to transplant Sitka black-tailed deer from Admiralty Island to islands in the vicinity of Petersburg. The following description is adapted from an unpublished report by Harry Merriam (1979).

The low deer populations resulted from extreme deer losses during the winter of 1967-68 and 1971-72. Wolf predation further reduced the populations, and in the absence of wolf control, deer were drastically reduced on Mitkof, Kuiu, and Kupreanof Islands. By 1978, wolf predation had dropped, probably in response to the low deer numbers.

In February 1979, capturing of deer in Pybus and Gambier Bays on Admiralty Island began. Various traps and tranquilizing drugs were evaluated during the project. Although the physical condition of deer was poor, reaction

to drugs was very slow, seldom less than 15 minutes. Deer had to be tracked and carried long distances to the beach. Most of the deer were captured in March utilizing two crews of two persons each. Succinylcholine Cholride and "Sucostrin" (Squibb and Sons, Princeton, N.J.) was utilized in a Palmer Cap Chur gun.

A total of 24 deer, 16 bucks and nine does was captured. All nine does and three of the bucks were fitted with radio collars. All deer were transported by boat to Portage Bay on Kupreanof Island in holding cages constructed of wood and netting. By July 1979, two of the bucks and three of the does were dead. Predation was suspected in two instances, while malnutrition was the likely cause in three instances. Another deer succombed to unknown causes in November 1979.

Population Composition

No data were collected.

Mortality

No data were collected.

Management Summary and Conclusions

A successful deer transplant from Admiralty Island to Kupreanof Island was conducted at a cost of $433.33 per animal (excluding salaries and some equipment costs). Fifty percent of the radio-collared animals were known to be dead by November 1979. Transplanting deer is expensive and should only be considered when no local populations exist in good deer habitat. There are problems associated with the use of long-range tranquilizing guns, and more effective means of capturing deer should be sought to reduce mortality, and make projects more cost-effective. Boats proved to be a logical means of transporting deer, although weather poses difficulties.

PREPARED BY:

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DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 4

GEOGRAPHICAL DESCRIPTION: Admiralty, Baranof and Chichagof Islands

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

Season and Bag Limit

Aug. 1-Dec. 31	Four deer, provided that antlerless deer may be taken only from Sept. 15-Dec. 31, and provided further that the daily bag limit from Dec. 1-Dec. 31 is one deer.

This regulation was altered by Emergency Order No. 1-06-79 effective December 13, 1979, which closed all drainages on the northern portion of Baranof Island between Necker Bay and Point Moses, all drainages on the southern portion of Chichagof Island from Khaz Head to Point Hayes, and all the adjacent islands within this area including Kruzof; and all drainages into Stephens Passage and Frederick Sound on the southern portion of Admiralty Island between Point Gardner and Pleasant Bay, including Pleasant Bay.

Population Status and Trend

Casual observations and hunter reports indicated that the Unit 4 deer population underwent a significant reduction during winter 1978-1979 (much more severe than was reported last year). With few exceptions, hunters reported extremely poor results. These poor results occurred throughout the season and throughout the Unit. A typical example was a party of hunters which spent 30 man-days in Pybus and Gambier bays in late November and early December when there was a snow cover. They saw seven deer, compared to previous years when deer were plentiful enough for these same hunters to take their limits of four, and they took only bucks.

In the Sitka area, hunters generally reported very poor success, especially on the northern portion of Baranof Island.

The only reports of hunters seeing "normal" numbers of deer came from persons who hunted on the northern portion of Admiralty Island including Seymour Canal and on Chichagof Island. However, there were also many others who hunted these areas and saw few deer.

Mild weather prevailed during the early part of the season. That is a condition which usually results in a reduced harvest. However, hunting was much less productive in 1979 than during previous mild falls.

Region I Game Division personnel spent considerable time in the field during the late winter-early spring period, attempting to evaluate the Unit 4 deer population. While no quantitative data were gathered, indications were that deer populations did appear to be lower than former observations indicated. Exceptions were areas free of the influence of habitat alteration, namely clear-cut logging, or of especially high quality habitat. Upper Hoonah Sound was a good example of both.

Population Composition

No data were collected.

Mortality

Winter mortality observations were made over established 1-mile transects in April 1980. Seventeen transects were examined, and no instances of mortality were observed. In addition, observations of deer winter use signs were low. Observations were made of browse utilization on Vaccinium, pellet group densities, freshness of deer trails, use of emerging skunk cabbage (Lysichitum americanum), and Cornus canadensis abundance. Sign indicating use by "normal" deer wintering populations were seen only in Tenakee Inlet (Long Bay), Mole Harbor, and King Salmon Bay. The number of "buck-rubs" on alders (Alnus sp.) was also noticeably less than in previous years.

Lower than normal winter use only tells us that fewer deer were on the winter range either because of a reduced population or because of a mild winter. The fact that the winter of 1979-1980 was "normal" would suggest the former to be the most appropriate reason.

The sport kill, as measured through hand-compilation of harvest reports, was the lowest on record. Harvest report returns indicated a total Unit 4 harvest of about 950 animals. However, only 1,108 harvest reports were returned. How many were issued is unknown. In addition to the suspected population reduction, there were two additional factors which might contribute to the reported low harvest; the emergency order which closed the season 17 days early and a continuing decrease in compliance with the harvest ticket program (also noted in the 1978-1979 report).

Days spent hunting per deer harvested, a fair reflection of hunting conditions, was 4.5. Bucks made up about 70 percent of the harvest. Of the 1,108 reports returned, 964 persons actually hunted, for an average of about one deer per hunter. Historical harvest records are shown in Appendix I.

As usual, three general hunting areas (Peril Strait, the immediate Sitka area, and northern Admiralty) produced the bulk (45%) of the kill, though the contribution from Peril Strait was less than normal. These areas are also closest to the Unit's major population centers of Juneau and Sitka. Tenakee Inlet contributed a greater portion of the kill than normal. That increase was the result of three occupied logging camps close to Tenakee Inlet and a growing interest in Tenakee Inlet as a recreational area by Juneau residents.

A potential deer mortality factor in Unit 4 is brown bear predation on newborn fawns. The magnitude of predation is unknown, but the fact that it probably occurs was evidenced by observation of a deposit of brown bear excrement containing a large amount of fawn deer hair and bones in Hood Bay in June 1980.

Management Summary and Conclusions

A suspected population reduction necessitated an emergency closure for the heavily hunted portions of Unit 4 when snowfall could have made the remaining deer too vulnerable to hunting. The closure was popular with the hunting public. Based on extensive public testimony, the Alaska Board of Game, during its Spring 1980 meeting, adopted a more restrictive set of regulations which will be effective for the fall 1980 season. These restrictive regulations substantially shorten the doe season and eliminate the December season. In those areas where the deer population reductions appear to have been most severe and also in areas coinciding with the most concentrated hunting effort. This more conservative management approach does not reflect a change in philosophy in deer management in Southeast Alaska. It is still the opinion of the Department that winter severity, sometimes in conjunction with other natural phenonema such as lungworm infestations, and habitat reduction are the factors controlling deer populations. The current population reduction due to weather was substantial enough that population recovery might be unduly delayed in these areas if hunting were allowed. Late winter hunting occurs when deer are concentrated on beaches and become extremely vulnerable to hunters operating in small, fast boats. However, the most serious problem of deer management in Unit 4 is the permanent loss of deer habitat through clear-cut logging.

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Nathan P. Johnson
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Appendix I. Deer harvest data, Game Management Unit 4.

Year	Total* Kill	% Males	Days Effort per Deer	Deer per Hunter	Winter Mortality per Mile	% Kill November & December
1969	1,756	45	8.0	0.8	0.00	NA
1970	4,040	56	NA	2.1	1.61	68
1971	3,040	NA	3.3	1.7	1.11	79
1972	2,500	54	4.9	1.4	0.64	67
1973	7,000	67	3.5	2.5	0.78	67**
1974	7,118	57	3.1	2.3	0.41	67
1975	4,247***	57	2.2**	2.1**	0.96	77
1976	1,475	67	7.5	0.7	0.00	69
1977	2,945	NA	1.6	1.2	0.00	79
1978	2,024	70	2.5	1.1	0.72	73
1979	950	70	4.5	1.0	0.00	

*Harvest ticket/report data 1975-1979; hunter interview through 1974.
**Data for Sitka hunters only to this year.
***Hunter interview data calculated harvest of 14,700.

PREPARED BY: Loyal Johnson, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5A

GEOGRAPHICAL DESCRIPTION: Yakutat Forelands

PERIOD COVERED: 1 July 1979 to 30 June 1980

Season and Bag Limit

Aug. 1 - Dec. 31	Four deer; provided that anterless deer may be taken only from Sept. 15 - Dec. 31.

Population Status and Trend

The deer population in Unit 5 was extremely low following a major decline in the early 1970's related to severe winter conditions. Although recent winters have been mild and the range has been in good condition, the deer population has not responded. Small populations are present along the mainland on the east side of Yakutat Bay and on the islands adjacent to the shore. All areas harboring populations are easily accessible by boat, making them highly susceptible to hunting. No populations are known to exist in Subunit 5B.

Population Composition

No data were collected.

Mortality

Voluntary hunter reports indicated that only two persons hunted deer in Unit 5A during the 1979-80 season and that no deer were harvested. However, local sources said that at least one deer (sex unknown) was taken from one of the islands. The reported sport harvest from 1974 to 1979 is shown in Appendix I.

Predators, including coyotes, wolves, and feral dogs are numerous and may take a large number of deer, particularly on the islands on the south side of Yakutat Bay.

Mortality directly associated with severe weather was assumed to be minimal because of recent mild winters, leading to the conjecture that hunting and natural predation were the major suppressing factors.

Management Summary and Recommendations

The deer population in Unit 5 is extremely low. Although reported sport harvest is low, predators are numerous and are thought to take a large number of deer, particularly on the islands on the south side of Yakutat Bay. At this point, the population is so low that any sport harvest of deer is detrimental. For the population to recover, and to prevent possible elimination of deer from the Yakutat area, the deer season should be closed until a harvestable surplus once again exists.

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SUBMITTED BY:

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Appendix I. Reported sport harvest of deer in Unit 5A from 1974 to 1979.

Year	Number of Hunters	Known Deer Harvest			Total Harvest
		Males	Females	Unknown	
1974-75	8	-	-	3	3
1975-76	17	8	2	-	10
1976-77	4	-	-	-	-
1977-78	12	3	1	-	4
1978-79	4	0	2	0	2
1979-80	3	-	-	1	1

Prepared by: Ronald E. Ball, Game Biologist II

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 6

GEOGRAPHICAL DESCRIPTION: Prince William Sound

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

Season and Bag Limit

Aug. 1 - Dec. 31	Four deer, provided that antlerless deer may be taken only from Sept. 15-Dec. 31.

Population Status and Trend

Prince William Sound deer populations have been at a moderate level for the past several years. Population size fluctuates with winter severity. Winter 1979-80 was mild and deer mortality was considered low.

Population Composition

The age structure of the deer harvest indicated a normal distribution. The following age data were obtained from a sample of 89 deer jaws from Cordova hunters:

*Age**	*F*	*1*	*2*	*3*	*4*	*5+*	*Total*
Number	*13*	*30*	*6*	*13*	*11*	*16*	*89*
Percent	*15*	*34*	*7*	*15*	*12*	*18*	*101*

** Age was determined by tooth eruption and wear.*

Mortality

Deer hunting effort, success, chronology and distribution of harvest are shown in Appendix I.

Management Summary and Recommendations

The 1979 harvest of 452 deer for Prince William Sound was an average harvest. Snow depth did not move deer into timbered beach fringe areas until mid-December, thus most of the kill occurred in December.

Winter 1979-80 was characterized by deep snow from mid-December through mid-January. Mild wet weather in January allowed the deer to retreat from the beach fringe

for the remaining portion of the winter, and mortality during the winter was estimated to be low.

PREPARED BY:

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Game Biologist III

SUBMITTED BY:

James B. Faro
Regional Management Coordinator

Appendix I. Unit 6 deer harvest data - 1979*

		Number	Percent
Hunters Afield		368	
Successful Hunters		204	55.4
Deer Harvested		452	
Males Harvested		273	60.4
Deer per Hunter Afield		1.2	
Harvested:	1 Deer	79	38.7
	2 Deer	51	25.0
	3 Deer	25	12.3
	4 Deer	49	24.0
Chronology:	August	4	.9
	September	25	5.5
	October	65	14.4
	November	105	23.2
	December	242	53.5
	Unknown	11	2.4
Location:	Montague Island	248	54.9
	Hawkins Island	55	12.2
	Hinchinbrook Island	49	10.8
	Knight Island	46	10.2
	Naked Island	14	3.1
	Mainland	9	2.0
	Other Islands	26	5.8
	Unknown	5	1.1

* Hand compiled harvest report data.

Prepared by: Julius Reynolds, Game Biologist III

DEER

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

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

Seasons and Bag Limits

Unit 8, that portion of Kodiak Island draining into Ugak Bay east of a line from the mouth of Saltery Creek to Crag Point and west of Pasagshak River.	Aug. 1 - Nov. 30	One deer, provided that antlerless deer may be taken only from 1 Oct.-31 Oct.
Unit 8, remainder of Kodiak Island east of the Saltery Creek-Crag Point line.	Aug. 1 - Oct. 31	
Remainder of Unit 8	Aug. 1 - Jan. 15	Four deer, provided that antlerless deer may be taken only from Sept. 15 - Jan. 15

Population Status and Trend

The deer population continues to increase throughout Unit 8 and is currently at the highest level since deer were introduced in 1924.

Population Composition

Deer observations were tallied incidental to elk composition surveys on Afognak and Raspberry Islands on 1 and 2 August 1979. Three hundred and forty-nine deer were observed, mostly in alpine habitat, during 7.5 survey hours. Although previous years' observations were not recorded, the incidence of deer sightings during elk surveys has increased noticeably in the last 2 years.

Several hunters reported observing groups of up to 75 deer along beaches in the Spiridon and Zachar Bay areas of Kodiak Island during early October 1979. Those groups were comprised mostly of yearlings and 2-year-old bucks with lesser numbers of does.

Numerous hunters commented on the number of bucks observed during the 1979 season. Bucks comprised approximately 75 percent of the harvest, reflecting both a high deer population and high hunter selectivity.

Mortality

The Unit 8 deer harvest was estimated at 3,500 animals. The number of hunters participating was estimated between 1,800 and 2,000. This was the highest deer kill on record as indicated by results from both the harvest report returns and the telephone questionnaire survey. Harvest data for each technique are shown in Appendix I.

Approximately 75 percent of the hunters took more than one deer and 40 percent took their limit of four deer.

Distribution of the harvest differed between the telephone interviews and the harvest reports. Afognak and Shuyak Islands accounted for 24 percent and 38 percent of the harvest by the telephone interview and hunter report methods, respectively. The Sharatin Bay-Kupreanof Peninsula area, including Whale Island, accounted for 23 percent and 17 percent of the harvest by telephone interviews and hunter reports, respectively. Both methods indicated that 6 percent of the harvest was taken in the northeastern Kodiak Island drainages accessible by road.

According to the telephone survey, 32 percent of the harvest was taken during October. Eighty percent of the kill was taken during October, November and December.

Natural mortality during winter 1979-80 was apparently low. Snow cover was light at lower elevations during most of the winter. Logging crews on Afognak Island reported finding only a few dead fawns during January. No beach surveys for winter mortalities were conducted.

Numerous observations of does with single or twin fawns were made on Shuyak Island during April and early May, and all appeared to be in good condition.

Management Summary and Recommendations

A trend toward rainy winters with light snow cover continues to promote good overwinter survival. The deer population is undoubtedly at the highest level in history. The 1979 estimated harvest of 3,500 deer was the highest ever recorded in Unit 8. Although the number of hunters continues to increase, and approximately 40 percent of the successful hunters took the full bag of four deer, harvest still lags well behind the increase in the deer population.

No changes in season or bag limits were recommended.

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ELK

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 8

GEOGRAPHICAL DESCRIPTION: Kodiak and Adjacent Islands

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

Seasons and Bag Limits

Unit 8, Raspberry Island and that portion of Afognak Island west and south of a line from the head of Malina Bay to the of Back Bay	Oct. 1 - Oct. 31	One elk by permit only. 125 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder of Unit 8	Aug. 1 - Dec. 31	One elk by permit only.

Population Status and Trend

The elk herds on Afognak and Raspberry Islands are steadily increasing and are now estimated at 750-800 animals.

Population Composition

Sex and age composition surveys were flown during August and September, 1979. Six hundred and seventy-eight elk were classified in 19.5 hours of aerial surveys. The calf:cow ratio of 37 calves:100 cows was the same as that recorded in 1978, however 157 calves provided the highest calf count since 1970. Bull elk comprised 14 percent of the elk classified, representing a bull/cow ratio of 21:100.

One hundred and seven elk (34 bulls, 49 cows and 24 calves) were classified during three surveys of the Raspberry Island herd. This herd is estimated to number between 95 and 125 animals.

The Afognak Lake herd continues to increase, with 138 elk classified in 1979. Thirteen bulls, 93 cows, and 32 calves were classified during a flight 6 September 1979. This herd is estimated at over 150 animals.

Four hundred and thirty-three elk (45 bulls, 287 cows and 101 calves) were classified on the remainder of Afognak Island. Large groups of elk were observed near Tonki Bay, Paramanof Bay, Paramanof Mountain, and Saposa Bay. Two additional groups were observed by local pilots near Duck Mountain and Seal Bay, but could not be located during our surveys.

Mortality

Hunters took 68 elk from Afognak and Raspberry Islands in 1979. Composition of the harvest was 50 males (73%), 17 females (25%) and one of unknown sex (2%). Three hundred seventy-five permittees reported hunting in 1979 and overall hunter success was 18 percent.

Thirty-nine elk, including 24 males (62%), 14 females (36%), and 1 of unknown sex (2%), were killed in the Afognak Island registration hunt. Two hundred and eighty-six permittees reported hunting and 14 percent were successful. Distribution of the harvest was: Tonki Bay/Peninsula 10, Duck Mountain-Discoverer Bay 12, Izhut Bay 9, Paramanof Bay 3, Waterfall Lake 4, and 1 unknown location.

Fifty-four hunters participated in the Southwest Afognak permit drawing hunt. Fourteen elk, 11 males and 3 females were killed for 26 percent hunter success. One hundred and fifty permits were available for this hunt.

Fifty permits were available for the Raspberry Island permit drawing hunt. Thirty-five permittees reported hunting and 15 elk, all males, were killed. Hunter success was 43 percent.

No winter mortality was recorded during 1978-79. The 1978-79 winter was considered mild compared to previous years.

Management Summary and Recommendations

Continuing mild winters have allowed elk herds to increase to the highest levels recorded since 1970. The 1979 reported harvest of 68 animals represents less than 10 percent of the estimated elk populations of Afognak and Raspberry Islands. Hunters continue to be selective for males, with 76 percent of the harvest comprised of bull elk. Only 11 females were reported killed, less than 3 percent of the 429 cows classified in 1979.

The 1979 harvest of 68 elk was the highest recorded since 1969, when 68 elk were also reported killed. Hunter participation was the highest on record since elk hunting was opened in 1955. A total of 375 permittees reported hunting in 1979 compared to the previous record of 345 hunters in 1958 and 1960. Overall hunter success was 18 percent.

Raspberry Island hunters took 15 bulls in 1979, about half the bulls observed in that herd. Although continuation of a drawing hunt is recommended, the number of permits for that hunt should be increased to 65 in 1980. If high hunter selectivity for bulls continues, it may become necessary in the future to issue permits for females.

It is recommended that the southwest Afognak drawing hunt be changed to a registration hunt in 1980. One hundred and fifty permits were issued for this hunt in 1979, but only 54 permittees reported hunting. Only 48 more applications were received than the number of available permits. The reported 1979 harvest of 14 elk (11 males and 3 females) represented less than 10 percent of the estimated population. A 1 October-20 November season with a maximum harvest of 35 elk, not to exceed 20 females, is recommended for 1980.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5A

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

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

Season and Bag Limit

Oct. 15 - Nov. 15	One bull by permit; up to 35 bulls may be taken.

Population Status and Trend

Recent aerial surveys and general observations indicated that both the Yakutat Forelands and the Nunatak Benchlands populations are stable and that the Yakutat Forelands population has been increasing slightly in recent years.

Population Composition

Yakutat Forelands - Only a partial fall composition count was conducted on the Yakutat Forelands during the report period. The area between the Situk and Dangerous Rivers was surveyed on December 9, 1979, using a Cessna 180. Survey conditions were moderately good with scattered cloud cover and about 2 inches of fresh snow over a layer of old crusty snow. Many of the moose observed were lying down and/or in heavy brush, making observation difficult. A total of 98 moose was observed. Herd composition is shown in Table 1.

Table 1. Herd composition of the Yakutat Forelands moose population as determined by aerial surveys on December 9, 1979 and March 19, 1980.

Date	No. Adults	No. Bulls	No. Cows w/0 Calf	No. Cows w/1 Calf	No. Cows w/2 Calves	Lone Calves	Sex/Age Unk	Total
Dec. 9	-	20	50	12	1	1	-	98
Mar. 19	73	-	-	15	5	-	2	180

The observed production was 22.2 calves:100 cows. Although the sample size was small, the ratio compared favorably with the prior year's ratio of 24 calves:100 cows.

A late winter survey was flown on March 19, 1980 covering the same area as before but also included the area between the Dangerous and the Akwe Rivers. This survey included only areas of known moose concentration. Survey conditions were good, with good light and about 8 to 12 inches of new snow. Despite these favorable conditions, some moose were observed only after making three or four passes while trying to read collar numbers on marked animals. This indicated that the overall observability was probably about 40 percent, at best, in areas with dense cover.

One hundred and twenty moose were observed in 2.8 hours of survey time for a rate of 42.8 moose per hour. The observed young per 100 adults ratio was 26.8. Fourteen visual-collared moose were seen, eight with blue and six with orange collars.

Overall, the winter was fairly mild. Snow depth was moderate and by early February much of the snow on the Forelands had melted away and many of the moose had begun to move off the wintering grounds, particularly in the Italio River area.

With additional new snow in late February and early March, some moose moved back to the wintering grounds but many did not, taking some of the normal load off the available browse.

Nunatak Benchlands - No data were collected.

Mortality

Yakutat Forelands - The 1979 special registration hunt was the second legal sport harvest on the Yakutat Forelands since the 1974 closure. One hundred and eighty-five persons registered for the hunt and 167 actually entered the field. They killed 20 bulls in about 1.75 days of hunting for a success rate of 12 percent. Both hunting pressure and harvest were fairly well distributed, although no moose were killed by road hunters compared to three shot last year from the road.

The average age of 18 sport-killed moose, determined by cementum aging, was 3.3 years (range 1 to 7 years), compared to the average of 4.7 years for 26 bulls killed in 1978.

One bull was killed in defense of life and property just prior to moose season. It had charged two brown bear hunters when they attempted to force it up a narrow draw in heavy brush. Examination of the carcass showed the moose was blind in one eye and that its vision was reduced to about a 30° to 40° arc in the other by a malformed antler browtine that was growing downward in front of the eye. It also had

heavy scars and fresh wounds on its flanks and hocks, indicating harrassment and/or attempted predation by wolves or dogs from local fish camps.

The killing of a cow by a large brown bear on June 13, 1980 was witnessed by a Department of Fish and Game Commercial Fish Technician. The bear chased the moose into the Situk River, then jumped on it from the shore, biting its head and neck and finally riding it down and holding it under the water. The bear fled from the kill when approached. A necropsy of the carcass showed that the cow had recently calved and appeared to be in good physical condition. A search of the general area was made but no calves nor calf remains were located.

The remains of a yearling moose were found in January 1980, 3 miles east of Yakutat near the FAA/RCAG site. The cause of death was unknown but the site was heavily marked with wolf sign and many wolf scats containing moose hair were observed nearby.

Nunatak Benchlands - Ten persons reported hunting on the Nunatak Bench for a combined effort of 45 man-days, averaging 4.5 days each and ranging from 1 to 21 days of hunting. Only two bulls were killed even though the season was extended an additional 30 days. This low harvest was attributed primarily to the fact that the moose remained on the high summering grounds until after the season closed. Due to the steep climb required and the dense alder cover on the slope, this area is extremely difficult to hunt and harvest will probably remain low.

Management Summary and Recommendations

Yakutat Forelands - The Yakutat Forelands moose population is gradually increasing. Recent winters have been mild and mortality directly attributable to weather has been correspondingly low. The population estimate for this area is about 600 moose. At the current rate, the sport harvest is only about 4 percent and can be safely increased.

Sport kill has averaged about eight moose per day over the last 2 years (47 moose in 6 days of hunting). By converting the special registration hunt with a designated number of animals to be killed to an open hunt of short duration, the harvest can be increased slightly while controlling the kill and decreasing logistical problems of both the hunters and the game manager.

Nunatak Benchlands - The Nunatak moose population is considered to be stable. Although the season was extended, the desired harvest was not achieved. The hunting season should be conducted late enough to take advantage of early winter snow that forces the moose out of the high country into

areas more accessible to hunters, and, if necessary, the season should be extended to obtain the desired level of harvest.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 5B

GEOGRAPHICAL DESCRIPTION: Malaspina Forelands, Gulf of Alaska

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

Seasons and Bag Limit

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

Population Status and Trend

No data were collected, however, the moose population on the Malaspina Forelands appears to be stable. Generally, the winters are less severe than on the Yakutat side of the Bay. Wolf densities are still low, although there has been an increase in the number of wolf and/or wolf sign in recent years.

Population Composition

A partial winter survey of subunit 5B was conducted from Point Bancas to Sitkagi Bluffs on February 14, 1980, using a PA-18-150 aircraft. A total of 56 moose (49 adults, 7 calves) were observed with a calf:adult ratio of 14.3:100. The number of moose observed (56) per unit of time (1.8 hours) compares favorably with recent years and has remained fairly consistent.

Mortality

Sixty-two hunters registered for the 1979 bulls only special registration hunt in Subunit 5B and 50 actually hunted, killing 22 bulls. This harvest was about 50 percent above the 10-year average of 14.4 moose per year.

Successful hunters averaged 3.3 days of hunting time in the field with a range of 1 to 14 days. Unsuccessful hunters averaged 3.5 days of hunting with a range of 1 to 10 days.

Cementum ages were determined for 19 of the 22 moose harvested. The average age was 3.2 years with a range of 1.5 to 9.5 years.

Management Summary and Recommendations

The moose population in Subunit 5B appears to be stable. Hunter success during the report period was about 50 percent above the recent 10-year average but was still below the desired level of harvest of 25 bulls. If the harvest continues to be lower than the desired level, the season should be extended until the desired harvest is achieved.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6A

GEOGRAPHICAL DESCRIPTION: Katalla to Icy Bay

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

Season and Bag Limit

Sept. 1 - Nov. 30*	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 field announcement.

The conditions outlined in the 1979-80 Permit Hunt Supplement were:

Moose Hunt 950

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

2. Harvest was restricted to 20 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 moose herds are present in Subunit 6A. They represent an expansion to the east from the original Copper River moose transplant. Both herds are increasing and appear to be healthy. The Bering River - Controller Bay herd has attained the desired herd size of 200 moose, whereas the Tsiu River herd is rapidly approaching a desired level of 150 moose.

Population Composition

A moose survey was flown December 31, 1979, in the Bering River - Controller Bay count area. Survey conditions were excellent, and 191 moose were observed. Calf production was excellent and the bull:cow ratio was good considering that the survey was conducted late in the year.

The Tsiu River count area was flown January 4, 1980, with good counting conditions. The survey revealed 109 moose, an excellent bull:cow ratio, and good calf production.

Survey data for both areas are shown in Appendix I.

Mortality

The 1979 Subunit 6A moose harvest was 32 animals: 23 bulls and 9 cows. The bull season was closed October 10, 1979, by Emergency Order. The cow season remained open the full 3 month season.

Actual hunting pressure is unknown, but 142 permits were issued.

All moose taken during the 1979 season were taken from the Bering River - Controller Bay portion of Subunit 6A. Eight of the bulls were taken by nonresident (German) hunters.

Management Summary and Recommendations

The 1979 harvest of 32 moose is the largest harvest recorded in Subunit 6A. It is 44 percent larger than the 1978 harvest with a 30 percent increase in permits issued.

The Bering River - Controller Bay portion of Subunit 6A is becoming more popular for moose hunting, and hunters are learning how to hunt it. The Tsiu River area remains untouched by hunters because of poor access and remoteness.

Survey data for both areas showed an increase over the last (1977) surveys flown. The Bering River - Controller Bay herd increased 18 percent while the Tsiu River herd increased 29 percent. Both counts are the highest ever recorded.

Hunting effort should be directed towards the Tsiu River portion of Subunit 6A. In the near future, separate quotas of bulls and cows should be established annually. Liberal, either-sex seasons should be maintained to encourage moose hunters to use this untouched resource.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6B

GEOGRAPHICAL DESCRIPTION: Martin River Area

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

Season and Bag Limit

Aug. 20 - Nov. 30*	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 1979-80 Permit Hunt Supplement were:

Moose Hunt 951

1. Permits could be obtained at the Cordova Fish and Game office from 1 August 1979, throughout the season.

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

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

Population Status and Trend

The Martin River herd is approximately 100 animals larger than the desired size of 150-175 moose. The sudden increase may be the result of moose shifting from the west side of the Copper River to the east side.

Population Composition

A moose survey was flown on 22 December 1979 in the Martin River count area. Survey conditions were excellent and 278 moose were observed. Calf production appeared to be poor, but the bull:cow ratio was good (Appendix I).

Mortality

The 1979 Subunit 6B moose harvest was 43 animals: 22 bulls and 21 cows. The season was closed 23 August 1979 by Emergency Order.

Actual hunting pressure was unknown, but 229 permits were issued. Judging by the number of permits issued, moose hunting pressure did not increase from 1978.

Chronology of the harvest was: August 20, 32; August 21, 6; August 22, 3; and August 23, 2 moose. Methods of transportation used by successful hunters were: airboats 63 percent, riverboats 16 percent, airplanes 7 percent, foot 9 percent, and unknown 5 percent.

Management Summary and Recommendations

The 1979 harvest of 43 moose is typical for an either-sex season in Subunit 6B; however, the season was closed after 4 days of hunting because of high hunter success. High success was a direct result of ideal airboating conditions, caused by heavy rain and high water which substantially improved access to hunting areas.

The large number of moose seen in the Martin River count area during December probably represents a shift of moose from Subunit 6C to Subunit 6B. This herd should be reduced to the desired size of 150-175 moose in fall 1980.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 6C

GEOGRAPHICAL DESCRIPTION: West Copper River Delta

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

Seasons and Bag Limits

Sept. 9 - Sept. 15*	One bull moose by registration permit; see 5 AAC 81.055 and separate permit hunt supplement.
Sept. 16 - Sept. 30	One antlerless moose by drawing permit; 30 permits will be issued. (Hunting regulation book incorrectly stated 35 permits.) See 5 AAC 81.055 and separate permit hunt supplement.

*Season subject to closure by Emergency Order.

The conditions outlined in the 1979-80 Permit Hunt Supplement were:

Moose Hunt 952 - Subunit 6C for antlered moose

1. Permits were available at the Cordova Fish and Game office beginning 1 August 1979.

2. Hunting was permitted until 12:00 noon on 9 September 1979, and each day thereafter until the desired quota of approximately 30 bulls was taken.

3. Successful hunters had to report their kill by 5 p.m. on the same 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.

Moose Hunt 901 - Subunit 6C for antlerless moose

1. Applications for a permit had to be received in Anchorage by 29 June or postmarked on or before that date.

2. Permit drawing was held 20 July 1979.

3. Thirty antlerless permits were issued.

4. Successful hunters had to report their kill within 5 days to the Cordova Fish and Game office. Unsuccessful hunters had to return a completed report within 15 days of the close of the season.

Population Status and Trend

The west Copper River Delta moose herd is 50-75 animals below the desired fall size of 175-200. A shift in distribution of moose from the west side of the Delta to the east side probably caused this sudden decline.

Population Composition

A moose survey was flown on 24 December 1979. Survey conditions were good and 124 moose were observed. The bull:cow and calf:cow ratios were poor. Survey data are shown in Appendix I.

Mortality

Fifty-one moose were taken in Subunit 6C during the 1979 season: 29 bulls and 22 cows. The bull season was terminated 13 September at noon by Emergency Order.

Actual hunting pressure during the bull season is unknown, but 357 permits were issued. For the antlerless hunt, 22 of the 30 permittees were successful (73%).

Chronology of the bull harvest in consecutive order for 9-13 September was 19, 2, 3, 4, and 1 moose.

Chronology of the cow harvest was:

September	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Moose	4	1	0	1	1	0	4	0	2	4	0	1	0	4	0

Management Summary and Recommendations

The magnitude of the cow harvest and the chronology of the bull harvest reflect a reduced moose population. Normally, the cow permittee success is nearly 90 percent, and the bull season lasts only 1 day.

The reason for the suspected shift of 50-75 moose from Subunit 6C to Subunit 6B is unknown. Surveys that were flown monthly for collared moose from March 1974 through June 1976 did not reveal a significant interchange of moose between the two management subunits. The Copper River is not impassable for moose. Perhaps a weather or range-related

condition caused an abnormal movement of moose from the west to east side of the Copper River.

A reduction in moose harvest is recommended to determine if the Subunit 6C moose herd will build back to the desired fall size of 175-200 moose.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 7

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

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

Seasons and Bag Limit

Unit 7, Placer River drainages only.	No open season	
Remainder of Unit 7	Sept. 1 - Sept. 15	One bull

Population Status and Trend

Due to lack of operational funds aerial composition surveys were not conducted in Unit 7 during 1979. Historical data, reported by Spraker (1980), indicate the moose population has shown a downward trend since 1970.

Population Composition

Data from 1962 through 1978 indicate the bull:cow ratio has remained low in most of Unit 7. However, data from other areas of the State indicate such ratios will adequately assure a normal rate of pregnancy and allow for limited bull-only hunting.

Mortality

Harvest reports indicated that 38 bulls were killed by 214 hunters in Unit 7 during the 1979 season. Hunter success was 18 percent. Thirty-four percent of bulls taken were yearlings.

The number of hunters in 1979 was the lowest recorded for Unit 7 since 1966. The number of successful hunters using aircraft, horses, or highway vehicles as means of transportation were closely comparable and collectively accounted for 76 percent of all successful hunters.

Management Summary and Recommendations

Data from harvest reports indicate a steady decline in hunter success from 1968 to 1974, then a slight upward trend in 1979. Although this trend appears to indicate more favorable conditions in the moose population, the number of moose observed per hour of aerial survey suggests a downward trend in population size. Probable cause of this suspected

decline is lack of suitable winter habitat during moderate to severe winters and the increase in predation by wolves 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 indicate that controlled burning is an effective management tool for retarding plant community succession. 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 Game Management Unit 7 to increase is limited.

No changes in seasons or bag limits are recommended at this time.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 9

GEOGRAPHICAL DESCRIPTION: Alaska Peninsula

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

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.

*See 5 AAC 81.176. Sealing of Moose Antlers and Surrendering of Moose Jaws.

Population Status and Trend

Systematic aerial surveys have not been conducted consistently in Subunits 9A-9C, but casual observations and harvest reports indicate that the population is sustaining itself in most areas under relatively constant hunting pressure. No large-scale trend toward increasing or decreasing numbers is evident.

Throughout most of Subunit 9E the population is continuing to decline as a result of inadequate recruitment. Hunting pressure is relatively heavy on adult males, but virtually nonexistent on young bulls or cows. Until calf survival improves, the trend toward lower numbers of moose will continue to sweep southwest along the peninsula.

Population Composition

No data are available for populations in Subunits 9A and 9B. The population in the Naknek drainage in 9C appears to be highly productive with an unbiased age structure in both sexes. An aerial survey of the King Salmon Creek portion of this area produced a count of 114 moose with ratios of 33.9 calves:100 cows and 59.3 bulls:100 cows (Appendix I).

The population composition of the central peninsula reflects a decade of poor calf survival and relatively heavy hunting pressure. Four central peninsula count areas were covered during this period and 541 moose were classified. Ratios of calves:100 cows ranged from 8.6 to 23.7 and averaged 11.2 calves:100 cows (Appendix I).

This low calf ratio matches those of the previous 10 years and leads to the conclusion that the age structure of the females continues to be heavily skewed toward older age classes. The age structure of the male component of the population would also be shifted toward the older classes, but hunting is removing many of the bulls from 5 through 7 years old. Of the 78 bulls classified during surveys, 48.7 percent were yearlings and only 14.0 percent were estimated to be over 5 years old. Surveys also revealed that bulls make up only 14.5 percent of the total population, and that ratios of bulls:100 cows range from 12.3 to 36.2 in the central peninsula count areas (Appendix I). Overall, there were only 18.9 bulls:100 cows.

Mortality

Fall composition surveys confirm that extensive neonatal mortality continues to plague the central peninsula moose population. The ultimate factors involved remain largely unknown, but the proximate cause of many losses appears to be brown bear predation.

Based on data obtained from harvest ticket returns and sealing certificates (Appendix II), hunting accounted for 259 adult moose. Of these, 2 were of unknown sex, 16 were cows, and 241 were bulls. Ninety-two of the moose were taken in Subunits 9A-9C and 165 moose were taken in 9E.

Because harvest ticket reminder letters were not sent this year, the reported harvest is probably a lower than average estimate of the actual take. In Subunit 9E, 72.6 percent of

the bull moose sealed were also reported on harvest tickets. Using this reporting rate as an estimator of reporting rate for other sexes and areas gives an overall estimate of 301 moose killed by hunters. This estimate is also conservative, inasmuch as the reporting rate for 9E was higher than in other areas (Smith 1979).

Management Summary and Recommendations

Hunter kill and natural losses appear to be balanced with production in most of northern Unit 9. However, recent shifts in hunting pressure due to establishment of Lake Clark National Monument could lead to over-harvest in other areas. Of particular concern are the Kijik, Koksetna, and Chulitna River drainages. These systems are regularly hunted by the local populations in Nondalton, Newhalen, and Iliamna. Regular trend count areas should be established and surveyed annually to monitor population status.

Neither the sex ratio, age structure, nor calf ratio indicate that hunting is adversely affecting the population in the Naknek area. The potential for local overharvest remains and antlerless permits should continue to be used for monitoring this area.

The harvest of bulls in Subunit 9E was one and one half times higher this year than during the first 3 years of the management "experiment" limiting take to bulls with antlers of 50 inches or greater spread or three brow tines on one side (Appendix III). This increase was due to a near doubling of nonresident take. Only a portion of this increase can be attributed to nonresidents taking advantage of a combination moose and bear hunt (bear season is only open in alternate fall periods) inasmuch as the guided hunter kill increased by a much smaller margin. Thus, non-guided, nonresident hunter success and/or numbers increased markedly in Subunit 9E in 1979. This situation may reflect displacement of hunters from areas affected by Federal land withdrawals.

Despite the 50-inch minimum law, large antlered bulls are not increasing in the population and the average spread for bulls taken now is no greater than in 1976 (Appendix III). Mean antler spread declined this year, relative to 1978, reflecting an increased harvest of marginally legal bulls. This year's harvest contained nearly the same number of bulls over 60 inches in spread as last year's kill, but many more 45- to 55-inch bulls were taken. The slight decline in mean age reflects the reduction in older bulls and concentration of harvest on 4-, 5-, and 6-year-old animals.

Given the limited recruitment in Subunit 9E and current high hunting pressure, it is unlikely that the 50-inch minimum law will result in an increase in large antlered bulls in the population or higher bull:cow ratio. Very few legal

bulls remain in heavily hunted areas following the season. The existing regulation, however, restricts harvest to bulls that are 4 or 5 years or older and is, therefore, worth retaining as a safeguard against overharvest in this declining population.

Antlerless kill in Subunit 9E remains biologically insignificant and can be retained to provide for local domestic use.

Recommendations

No changes in seasons or bag limits are recommended at this time.

Literature Cited

Smith, C. A. 1979. Moose Survey-Inventory Progress Report. *In* R. A. Hinman, ed. Annual report of survey-inventory activities. Part I. Alaska Dept. Fish and Game, Juneau.

PREPARED BY:

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APPENDIX I. Sex/Age Ratios of Moose in Unit 9.

Area	Bulls per 100 Cows	Calves per 100 Cows	Calf % in herd	Sample Size
9C, King Salmon Creek	59.3	33.9	17.5	114
9E				
Flats A	36.2	12.1	8.1	86
Flats B	12.3	10.8	8.8	160
Mother Goose	16.7	8.6	6.8	235
Dog Salmon	26.3	23.7	15.0	60
Combined 9E	18.9	11.2	8.5	541

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APPENDIX II. Moose Harvest in Unit 9.

Subunit	Bulls	Cows	Unknown	Total
9A	6	-	-	6
9B	45	7	1	53
9C	26	7	-	33
9E	162	2	1	165
9?	2	-	-	2
Total	241	16	2	259

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APPENDIX III

Moose Antler and Age Statistics, 1976-1979 - 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

* Sample size in parentheses

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, 1979 - June 30, 1980

Season and Bag Limit

Sept. 1 - Sept. 20 One bull

Population Status and Trend

Moose populations in Unit 11 declined during the early 1970's, and no population changes have been noted in recent years. However, there are indications that a population decline may have occurred during 1979. Hunter reports, field observations, and count data indicate low moose density over much of Unit 11.

Population Composition

Forty-three moose (12 bulls, 20 cows, and 11 calves) were counted during November 1979 in the Mt. Sanford-Mt. Drum count area. The resulting herd ratios were 60 bulls:100 cows and 55 calves:100 cows. Count conditions in 1979 were only fair due to adverse weather. Ninety-six moose (25 bulls:100 cows and 29 calves:100 cows) were counted during the last survey, conducted in 1977 (Spraker 1979).

Mortality

Twenty-one bull moose were killed during 1979. A total of 72 hunters (65 residents and 7 nonresidents) reported hunting moose. All nonresident hunters reported taking a moose.

The overall hunter success was 29 percent. Since harvest data were not adjusted to account for absence of reminder letters, this figure is probably high. Unsuccessful hunters are more likely to forget reporting than successful hunters if not reminded.

During winter 1978-79 there were deep snow conditions and extreme cold temperatures. Field observations and public comments indicate increased winter mortality of moose.

Management Summary and Recommendations

The number of moose hunters and number of moose harvested in Unit 11 were the lowest on record. This decline was primarily due to the creation of Wrangell-St. Elias National Monument and the subsequent Federal regulations prohibiting sport hunting. Many hunters, air taxi operators, and guides ceased or reduced their activities to avoid violations of Federal regulations.

Population changes are difficult to demonstrate because of the small sample size. The decline in total moose counted in 1979 compared to 1977 may indicate a possible decline. Increased winter mortality was expected, and would result in an overall reduction of moose. However, the number of bulls in the population remains high. A small harvest and a good bull:cow ratio indicate hunting impact on the population is probably minimal. Based on adequate bull:cow ratios and low hunting pressure, no changes in season dates or bag limit are recommended.

Literature Cited

Spraker, T. H. 1979. Moose Survey-Inventory Progress Report. *In* D. McKnight, ed. Annual Report of Survey-Inventory Activities. Alaska Dept. Fish and Game, Fed. Aid in Wildl. Rest. Proj. W-17-10, Jobs. No. 1.0, 13.0, 2.0 and 22.0.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 12

GEOGRAPHICAL DESCRIPTION: Upper Tanana and White Rivers

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

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 density in Unit 12 is low to moderate and populations are stable or slowly declining. The most dense populations occur in the Tok, Little Tok, and upper Tetlin River drainages with low population density in the Mentasta and Nutzotin Mountains. Moose density in the main Tanana Valley and in the northern foothills of the Alaska Range is also low.

Population Composition

Sex and age composition surveys were conducted during late October and mid-November. The results are summarized in Table 1.

Table 1. Moose sex and age ratios calculated from survey data collected in Unit 12, fall 1979.

Area	Date	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	11/14	47	0	0	67	31	25	32
Tok River	10/29	26	8	5	30	19	55	175
Dry Tok Creek	10/29	27	6	4	25	16	66	73
Little Tok River	10/24	24	6	4	15	11	52	187
Totals		26	6	4	25	16	53	467

Calf survival was generally higher in those portions of the Unit surveyed during 1979 than it has been since 1974. The Little Tok River drainage continued to display chronically poor calf survival. No further decrease in the bull:cow ratio for the Unit was noted since the last reporting period. Calf survival appeared to be lowest in the eastern portion of the Unit and highest in the western portion. Two cursory late winter surveys also reflected this trend. Although sample sizes were small, calves comprised 20 percent of 30 moose observed on the lower Tok River during February, but only 7 percent of 100 moose observed in the Mentasta Mountains during March.

Mortality

Natural factors are responsible for most moose mortality in the Unit. I believe that predation by bears and wolves is the most important natural cause of mortality. However, depleted browse may also be indirectly responsible for much natural mortality. Many moose carcasses were found during moose, wolf, and browse surveys, all of which appeared to be the result of wolf predation.

Three moose were killed by automobiles, 3 were reported to have been poached, as many as 6 were taken for use in funeral potlatches, and 79 were reported taken during the fall hunting season, resulting in a human-induced mortality of 91 moose. Poaching may account for the taking of up to 20 moose annually in remote portions of the Unit.

The 1979 September 5-20 moose season was 5 days shorter than the 1978 September 1-20 season. The 79 bulls taken during 1979 represent a 19 percent decrease in harvest from the 98 bulls taken during the previous year. A total of 203 hunters reported hunting moose in Unit 12 during 1979 compared to 350 during 1978. Assuming that the rate of nonreporting remained the same, this represented a 42 percent decrease in hunting pressure. Hunter success was 39 percent in 1979 compared to 28 percent during 1978. Residents took 73 percent of the Unit 12 harvest. Airplanes were the mode of transportation used by most successful hunters followed by ORV's, highway vehicles, horses, and boats.

Observed decreases in hunting pressure and harvest may have resulted from both the hunting closure in the Wrangell National Monument and the shortened season elsewhere in the Unit. The harvest was well distributed throughout the Unit with the exception of the Nabesna Road area which remained closed to moose hunting.

Habitat Conditions

Because winter conditions were mild and maximum average snow depth was approximately 18 inches on the Tok River winter range, most moose wintered at higher elevations. All preferred willow species examined on the winter range had been heavily browsed. However, the intensity of browsing on the Tok River winter range appeared less than during the previous winter.

An extensive browse survey of the Little Tok River in May revealed persistent overbrowsing of all available willows. In addition, *Alnus crispa* and *Betula glandulosa*, which are species normally not consumed in large quantities by moose in Unit 12, were heavily used. The poor condition of browse in this drainage may be partly responsible for the low recruitment observed during the past several years.

Recommendations

I propose to reduce the number of moose in the Tok and Little Tok River after reducing the number of wolves in accordance with the Tok River Operational Moose Management Plan. To prevent aggravating the presently high wolf:moose ratio, wolves must be reduced before reducing the number of moose. No changes in moose seasons or bag limits are recommended until wolf reductions are accomplished in these two drainages. Although part of different management strategies, immediate reductions in wolf numbers are desired in all parts of the Unit with the possible exception of the White River drainage where supporting data are lacking.

A higher level of habitat disturbance through natural and prescribed fires and logging operations is needed to increase the extent of browse species and to rejuvenate existing browse stands throughout the Unit.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 13

GEOGRAPHICAL DESCRIPTION: Nelchina Upper Susitna Rivers

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

Season and Bag Limit

Sept. 1 - Sept. 20 One bull

Population Status and Trend

The moose population in Unit 13 declined during winter 1979-80. The reduction occurred after 3 consecutive years of apparent population increase shown by fall sex and age composition counts.

Population Composition

Sex and age composition counts for nine count areas resulted in a sample of 3,653 moose in fall 1979. The calf:cow ratio was 25 calves:100 cows, an increase from the 22 calves:100 cows observed the previous year. The bull:cow ratio was 16 bulls:100 cows, a reduction from the 19 bulls:100 cows observed the previous year. Small bulls:100 cows dropped from 8 to 5 bulls:100 cows when compared to 1978 values.

All count areas indicated similar trends. For instance, the important Little Nelchina-Little Oshetna count area dropped to a new low of 5 bulls and 17 calves:100 cows and the Upper Susitna count area improved to 18 bulls and 52 calves:100 cows. The differences in composition trends between these two count areas may be attributable to the experimental removal of wolves and brown bears in the upper Susitna count area.

Mortality

Predation studies on moose in Unit 13 have indicated that approximately half of the moose calves were killed by brown bears during their first 6 weeks of life. Wolf predation accounted for additional, but less dramatic, losses of calves and adults (Ballard et al. 1980).

Winter mortality, monitored by relocating radio-collared calves in March, accounted for approximately 33 percent of the calves. This mortality, primarily from starvation, may not be representative of most years since snow depths at the

Gulkana air field during winter 1978-79 were the second highest on record.

In addition to natural mortality, the male segment of the population had been subjected to continued high hunting pressure. The 1979 reported harvest was 848 moose. However, since reminder letters were not sent to harvest ticket holders, the actual harvest was probably near 1,000 moose. This figure reflects an increasing bull harvest each year since 1975.

Management Summary and Recommendations

Bulls-only hunting has contributed to lower bull:cow ratios in many areas of Unit 13. Additionally, the overall population level may have been reduced by poor survival through winter 1978-79 as well as losses to predators.

To prevent further decline in the bull:cow ratio, additional bull hunting reservations are recommended. Additional information is needed concerning the relationship of the moose population and their range.

Literature Cited

Ballard, W. B., S. D. Miller, and T. H. Spraker. 1980. Moose calf mortality study, Game Management Unit 13. Alaska Dept. Fish and Game, Fed. Aid Wildl. Rest. Rept. Juneau (in press).

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14A

GEOGRAPHICAL DESCRIPTION: Matanuska Valley

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

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 increasing.

Population Composition

Composition surveys were flown in early December 1979 in three survey areas (1, 5, and 8) of the Matanuska Valley. The results of those surveys were as follows:

	Bulls: 100 cows	Calves: 100 cows	Incidence of twins: 100 cows w/calves	Moose :hour	Total moose observed
Subunit 14A	15.5	40.7	10.0	43	804

Mortality

One thousand and fifty-three hunters reported harvesting 201 bull moose. An additional 89 antlerless moose were harvested by 200 permit holders. An analysis of the residency of the successful bull hunters shows 94.5 percent were residents, 0.5 percent nonresidents with the remaining 5 percent of unknown residency. Transportation means reported by the successful bull hunters showed 58.2 percent used highway vehicles, 20 percent off-road vehicles, 6 percent aircraft, 5 percent boats, 3 percent horses, and 0.5 percent motorbikes with the remaining 7 percent not specifying their mode of transportation.

The Palmer office of the Department of Public Safety, Fish and Wildlife Protection records showed 29 moose were killed by highway vehicles in Subunit 14A during winter 1979-80. The mortality caused by the Alaska Railroad is unknown at this time.

Management Summary and Recommendations

Composition surveys of three areas in the Matanuska Valley included a sample of 804 moose. This is a 31.5 percent decline in sample size from the 1978 surveys when 1,174 moose were observed. The surveys were conducted in 18.9 hours of flying time for an observation rate of 43 moose per hour, the lowest recorded since 38 moose per hour were observed in 1974. The ratios of 15.5 bulls and 40.1 calves: 100 cows observed during the 1979 surveys varied only slightly from the 15 bulls and 42 calves:100 cows recorded in 1978. Surveys were delayed while waiting for proper snow conditions, and personnel involved in the 1979 surveys thought the moose had emigrated from the count areas prior to the surveys. The ratios obtained are probably representative of the population, but the sample size cannot be compared to the 1978 sample. Extensive surveys need to be conducted in fall 1980 to establish the validity of the ratios and determine the true status of the population.

The harvest of bull moose in Subunit 14A during fall 1979 declined to 201 bulls from the 1978 level of 329 bulls. The number of hunters afield in Subunit 14A also declined in 1979 from 1,547 in 1978 to 1,053 in 1979. The success ratio of the hunters remained approximately the same for the two seasons, 20.9 percent in 1978, 19.1 percent in 1979. The antlerless moose harvest only increased from 53 in 1978 to 89 in 1979 despite doubling the number of permits issued in 1979. The majority of the antlerless moose harvested probably were taken from the valley floor population accessible by highway. This harvest level of antlerless moose is believed to have little impact on the overall moose population in this subunit.

The Subunit 14A moose population could sustain an increased antlerless harvest if it were evenly distributed, but increasing the harvest of the valley floor population is not desirable. Therefore, it is not recommended the antlerless harvest be increased at this time.

Winter 1979-80 was mild with only a slight amount of snow. The light snow cover did not restrict the movements of moose to the highway corridors and resulted in an approximate 75 percent reduction of the highway mortalities, from 108 in 1978 to 29 in 1979.

No changes in seasons or bag limits are recommended at this time.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14B

GEOGRAPHICAL DESCRIPTION: Willow to Talkeetna

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

Seasons and Bag Limits

Sept. 1 - Sept. 20	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; provided that antlerless moose may be taken 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.

The bag limit for the Dec. 15 - Feb. 15 hunt was changed by emergency announcement to read:

One antlerless moose by permit only. 50 permits will be issued. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

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

Population Composition

Composition surveys were flown throughout the Subunit in early December. Results from that survey were as follows:

	Bulls: 100 cows	Calves: 100 cows	Incidence of twins: 100 cows w/calves	Moose :hour	Survey time	Total moose observed
Subunit 14B	40.0	30.4	11.6	51.4	24.3	1,250

Mortality

A total of 73 bulls and 42 cows was harvested by 435 hunters during the 1979-80 season for a success ratio of 26.3 percent.

During the fall season 285 hunters reported harvesting 52 bull moose. An additional 20 antlerless moose were harvested by 100 permit holders. A breakdown of the residency of successful bull moose hunters shows 82.7 percent were residents, 7.7 percent nonresidents, and the remaining 9.6 percent of unknown residency. The means of transportation reported by successful bull moose hunters shows 34.6 percent used highway vehicles, 32.7 percent off-road vehicles, 23.1 percent aircraft, 5.8 percent boats, 1.9 percent horses, and 1.9 percent motor bikes.

The chronology of the bull harvest was as follows:

Date	No. of bulls harvested
Sept. 1-7	24
Sept. 8-15	15
Sept. 16-23	13

No chronology data for the fall antlerless moose harvest are available at this time.

A permit hunt was held from 23 January to 6 February 1980 to allow the take of 50 antlerless moose. The total harvest was 21 bulls and 22 cows; all permit hunters utilized highway vehicles for transportation.

The records of the Department of Public Safety, Fish and Wildlife Protection revealed that 15 moose were killed by highway vehicles in Subunit 14B during this reporting period. No data are available on moose killed by the Alaska Railroad.

Management Summary and Recommendations

Composition surveys conducted in early December located 1,250 moose, the highest sample observed in this Subunit since 1971. The ratio of 40 bulls:100 cows is only slightly less than the record 43 bulls:100 cows observed in 1978.

Subunit 14B affords difficult access for hunters. One road traverses the western boundary and there are few trails.

The subunit is heavily covered with spruce timber, limiting areas suitable for landing aircraft. The high proportion of hunters reporting highway vehicles as their mode of transportation attests to the poor access.

Interest in the special antlerless winter permit hunt was high with 6,011 individuals applying for 50 permits. Of those obtaining permits, 43 harvested a moose, 5 were unsuccessful or did not hunt, and 2 failed to return their permits. All permit holders who reported used highway vehicles for transportation and all moose were harvested within a quarter mile of the highway. Conditions of the permit restricted hunting to the morning and mechanized equipment could be used for retrieval of the meat only from noon to midnight. Deep, soft snow made the use of snow machines difficult and nearly all meat was recovered by backpacking.

Hunters were required to bring in the lower jaw of harvested moose and provide the Department with an accurate description of the kill location. Thirty-six kill sites were visited by biologists. Hair, rumen, and bone marrow samples were collected and the reproductive status of the females was determined. Of the 36 kill sites checked, 17 were identified as those of female moose. Sixteen of these females were pregnant. The average age (determined by tooth cementum annuli method) was 6.1 years for males and 9.0 years for females.

The large number of moose observed during surveys in December, and the resulting high bull and calf:cow ratios, indicates Subunit 14B could support a larger harvest. The high interest and success of the late winter permit hunt suggests it should be retained and possibly expanded.

If the present permit system is expanded, the additional permits should be restricted to a distance greater than 3 miles from the road system. This would distribute the harvest throughout the subunit and avoid overexploitation of the moose population along the highway.

No changes in seasons or bag limits are recommended at this time.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 14C

GEOGRAPHICAL DESCRIPTION: Anchorage

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

Seasons and Bag Limit

Subunit 14C within the drainage of the Twentymile River.	No open season	
Remainder of Subunit 14C*	Day after Labor Day - Sept. 20	One bull

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

Population Status and Trend

High calf production and survival through winter 1978-79 has increased the size of the moose population within this Subunit. Given the extensive loss of winter habitat within the Anchorage area, and the likelihood of additional loss in future years, it is doubtful that the population will continue to increase. A decline to levels of the mid-1970's is anticipated.

Population Composition

Composition data were obtained from aerial surveys conducted in major Subunit drainages during fall 1979. A total of 680 moose, approximately 50-60 percent of the Subunit population, was counted. The surveys reported ratios of 32 bulls and 55 calves, respectively, per 100 cows and were the highest obtained since extensive aerial surveys were initiated in 1966. Within areas open to hunting, the ratio of bulls to cows was only slightly less than the Subunit total.

No age data were collected from hunter-killed moose. However, the mean age of 22 road-killed cows was 7.4 years.

Mortality

During 1979, 25 bull moose were harvested by sport hunters throughout the Subunit. Corrected for the absence of reminder letters, the harvest totaled 33 moose. This compares to a 1974-78 mean harvest of 35. Approximately 160 persons reported hunting moose for a success ratio of 21

percent. An additional 74 moose (16 bulls, 28 cows and 30 calves) were killed by vehicles on Anchorage area roadways between 1 June 1979 and 31 May 1980. This compares to 93 killed on local highways during the previous reporting period. Moose were killed during every month; however, the greatest mortality occurred during October and January.

No significant winter mortality was reported.

Management Summary and Recommendations

Despite significant mortality and diminishing winter habitat, numbers of moose within Subunit 14C increased slightly during the past year. The increase was almost entirely attributable to record calf production and survival, an occurrence for which we have no sound explanation. Given the production increase and a history of high road-kill mortality in the Fort Richardson vicinity, we recommend a hunt for 35 antlerless moose be held on military lands during January or February 1981. The hunt will be contingent on data obtained during fall 1980 composition counts.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15A

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

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

Season and Bag Limit

Sept. 1 - Sept. 20 One bull

Population Status and Trend

Due to the limited FY 80 budget, aerial composition surveys were not conducted in Subunit 15A during 1979. However, a portion of the area (1969 burn) was surveyed by the U.S. Fish and Wildlife Service. Data from this survey suggest that the 1969 burn is providing suitable habitat for moose, resulting in an upswing in the moose population for this area. Unfortunately, the area burned in 1969 is approximately one-third the size of the 1947 burn, which has reached the end of its productive life as a source of browse for moose. The net result of these habitat changes has not reversed the downward trend of the moose population in Subunit 15A.

Population Composition

Survey data collected during 1979 by the U.S. Fish and Wildlife Service were not recorded by count areas designed by the Department. Consequently, annual changes in population composition cannot be directly evaluated for the entire Subunit since surveys were conducted only in the area burned in 1969.

The survey was conducted over a 2-day period (20-21 December 1979) and 348 moose were observed in 4 hours. The resultant ratios were 51 bulls:100 cows, 49 calves:100 cows, and 13 twin calves:100 cows with calves. The small bull percentage was 9.5 percent and the calf percentage was 24 percent, suggesting a growing population.

Mortality

Harvest reports indicated that 120 bulls, 2 cows, and 1 moose of unreported sex were killed and 686 hunters hunted Subunit 15A during the 1979 season. Hunter success was 18 percent. The total number of hunters was the lowest recorded

for Subunit 15A since 1967; however, reminder letters were not sent during 1979.

Nine nonresidents (1.3%) reported hunting in Subunit 15A, and three killed bulls. Forty-four percent of all bulls taken had an antler spread 30 inches or less (yearlings) and 13 percent had antlers 50 inches wide or greater.

Historical harvest data were reported by Spraker (1980).

Management Summary and Recommendations

The 123 moose reported harvested by 686 hunters during 1979 represents a 25 percent decline in harvest and an 18 percent decline in hunting effort when compared to 1978 figures. Increased public awareness of the low probability of success in Subunit 15A may have caused some of the decline in effort.

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 crushing program of the U.S. Fish and Wildlife Service. Unfortunately, the crushing program was discontinued on the Kenai National Moose Range during spring 1978.

In light of the 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 between the Federal and State agencies. The current level of harvests with bulls-only seasons has resulted in an unbalanced ratio of bulls to cows; however, this proportion of bulls has proven adequate in several studies to assure normal pregnancy rates in females.

No changes in seasons or bag limits are recommended at this time.

Literature Cited

Spraker, T. H. 1980. Moose Survey-Inventory Progress Report. *In* R. A. Hinman, ed. Annual Report of Survey-Inventory Activities. Alaska Dept. Fish and Game, Fed. Aid in Wildl. Rest. Juneau.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15B

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

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

Seasons and Bag Limits

Subunit 15B east, that portion of Subunit 15B east of a straight line from the mouth of the Shantatalik Creek, on Tustumena Lake, to the head of the westernmost 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. 1 - Sept. 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 5 AAC 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 1979. 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 surveys conducted during 1979 were inadequate to indicate population trend. Historical survey data were published by Spraker (1980).

Mortality

A regulation allowing only the taking of bulls with an antler spread of at least 50 inches or three brow tines was initiated for the 1979 season in Subunit 15B (east). Fifty permits were issued and 16 bulls were reported harvested; 41

permit holders actually hunted. Reports from several unsuccessful hunters indicated they had difficulty in distinguishing a legal bull. Antler spread of harvested bulls ranged from 42 to 62 inches with an average spread of 55 inches. The average age of bulls taken was 8 years old (range 5 to 11, sample size 11).

Harvest reports indicated that 27 bulls and 1 moose of unreported sex were killed by 148 hunters in Subunit 15B (west) during 1979. These data indicate a 19 percent success ratio. Historical harvest data were published by Spraker (1980).

Management Summary and Recommendations

Data from aerial surveys suggest a critically low level of recruitment in Subunit 15B moose populations. If low recruitment levels are found in 1980 surveys, remedial efforts involving habitat improvement and predator control should be pursued. Such efforts would require cooperation between the Department and the U.S. Fish and Wildlife Service. Current trends in management policy for the U.S. Fish and Wildlife Service suggest that agreement concerning joint efforts to set back succession or control predators will be difficult to achieve.

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 3 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.

Literature Cited

Spraker, T. H. 1980. Moose Survey-Inventory Progress Report. *In* R. A. Hinman, ed. Annual Survey-Inventory Activities. Alaska Dept. Fish and Game, Fed. Aid in Wildl. Rest. Juneau.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT SUBUNIT 15C

GEOGRAPHICAL DESCRIPTION: Kenai Peninsula

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

Season and Bag Limit

Sept. 1 - Sept. 20	One bull

Population Status and Trend

The moose population in Subunit 15C is at a low level. The primary reasons appear to be a lack of adequate winter habitat and predation by wolves and black bears. This is supported by data indicating continued low recruitment into the population.

Population Composition

Due to the tight FY 80 budget, surveys were not conducted in Subunit 15C during 1979. Historical survey data were published by Spraker (1980).

Mortality

Harvest reports indicated that 130 bulls were killed by 471 hunters in Subunit 15C during 1979. These data suggest that 28 percent of all hunters were successful. Harvest and hunting pressure for 1979 was similar to 1978 data; however, it was a significant increase compared to 1976 and 1977.

Seven of the 471 hunters (1.5%) who reported hunting in 15C were nonresidents and three killed moose. Forty-four percent of the bulls reported killed had antler spreads 30 in or less (yearlings) and 17 percent had antler spreads 50 in or greater.

Historical harvest data were published by Spraker (1980).

Management Summary and Recommendations

The harvest and percentage of successful hunters showed a slight increase during 1979 when compared to recent years. Favorable weather during the hunting season may have caused the increase in harvest. A moderate harvest of wolves the previous winter may have also increased the number of bulls available to hunters.

Efforts to set back plant succession by burning would be desirable in Subunit 15C. Borough, Federal, Native, and privately owned lands are so interspersed with State lands that large-scale burning may not be feasible. Since current levels of hunter harvest are not preventing this population from growing, predator control (wolves and black bears) offers the only other tool available to help the 15C moose population recover.

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

Literature Cited

Spraker, T. H. 1980. Moose Survey-Inventory Progress Report. *In* R. A. Hinman, ed. Annual Survey-Inventory Activities. Part I. Alaska Dept. Fish and Game, Fed. Aid Wildl. Rest. Juneau.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 16

GEOGRAPHICAL DESCRIPTION: West side of Cook Inlet

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

Seasons and Bag Limits

Subunit 16A	Sept. 1 - Sept. 30	One moose, provided that antlerless moose may be taken by drawing permit only. 150 permits will be issued. 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. 1 - Sept. 20
Subunit 16B, Kalgin Island	No open season	

Population Status and Trend

The moose population in Subunit 16A appears to be healthy and expanding.

The moose population in Subunit 16B appears to have recovered from extensive winter kills experienced in the late 1960's and early 1970's. It appears to have stabilized at a level slightly below that observed in the late 1960's.

Population Composition

Composition surveys were flown in early December in the Peters-Dutch Hills area of Subunit 16A. Surveys were also flown in early December in the Susitna-Beluga Mountain and Yenlo-Willow Mountain count areas of Subunit 16B. Results from those surveys are as follows:

	Bulls: 100 cows	Calves: 100 cows	Incidence of twins: 100 cows w/calves	Survey time	Moose :hour	Total moose observed
Peters-Dutch Hills (16A)	34.4	28.7	7.8	11.3 hrs.	92	1,040
Susitna-Beluga	34.3	7.1	0	9.7 hrs.	46	446
Yenlo-Willow	12.5	12.5	50.0	.9 hrs.	33	30
16B Total	32.6	14.6	4.4	10.6 hrs.	45	476

Mortality

One hundred and sixty-seven moose (133 males, 30 females, and 4 sex unknown) were reported harvested by 585 hunters in Subunit 16A. The 30 females were harvested by 150 permit holders. A breakdown of the residency of the successful non-permit hunters shows 93.4 percent were residents, 2.9 percent nonresidents, with the remaining 3.6 percent of unknown residency. Transportation means reported by those hunters show 36 percent used highway vehicles, 25 percent off-road vehicles, 19 percent boats, 15.3 percent aircraft, 1 percent horses, 1 percent motorbikes, 1 percent snow machines, and 3 percent unknown means.

Chronology of the harvest for the males in Subunit 16A is as follows:

September				October	Total
1-7	8-15	15-23	24-30		
28	19	37	46	3	133

The antlerless moose harvested in this Subunit were taken under a drawing permit. The chronology of that harvest is not available at this time.

Eight hundred and eighty-eight hunters reported harvesting 361 moose (255 males, 99 females, and 7 sex unknown) in Subunit 16B for a success rate of 40.7 percent. Residency of the successful hunters shows that 80.6 percent were residents, 12.7 percent nonresidents, with the remaining 6.6 percent of unknown residency. Transportation means reported by those hunters show 76 percent used aircraft, 15.5 percent boats, 3.3 percent highway vehicles, 1.4 percent off-road vehicles, 0.8 percent horses, and 3.0 percent unknown means.

Chronology of the harvest for Subunit 16B was as follows:

	Aug.	September				Oct.	Unknown	Total
		1-7	8-15	16-23	24-30			
Males	1	69	50	62	68	3	3	255
Females	1	55	24	26			2	99
Sex unknown	0	3	1	1	1	_	1	7
Total	2	127	75	79	69	3	6	361

In addition to the moose known to have been harvested in Subunits 16A and 16B, 18 moose (17 males, 1 sex unknown) were harvested in Unit 16 and no Subunit was specified. The total Unit 16 harvest was 546 moose (405 males, 129 females, and 12 sex unknown).

Management Summary and Recommendations

Composition surveys of the Peters and Dutch Hills revealed a sample of 1,040 moose. This is the largest sample size in this area since 1967 when 1,121 moose were observed. This survey was conducted in 11.3 hours for a density of 92 moose per hour, an indication of a high moose population.

The ratios of bulls (34.3) and calves (28.7) per 100 cows each declined by approximately three points from the 1978 levels. Fluctuations of this magnitude are statistically insignificant. The bull ratio, however, is the second highest on record since these surveys were initiated in 1976; the highest was the 1978 ratio of 37.5 bulls:100 cows.

One road bisects the Subunit allowing hunter access, but the taking of antlerless moose within 3 miles of the road was prohibited. The low harvest levels of bulls and cows is an indication of the limited access and hunting restrictions in 16B. Despite these limitations, hunters utilizing land transportation accounted for 61 percent of the bull harvest.

Chronology of the harvest shows 63.8 percent of the known bull harvest occurred during the second half of the season. This portion of the season occurred during the rut, a time when the bulls are less cautious and traveling extensively, increasing their visibility and vulnerability.

Two trend areas, Beluga-Susitna Mountains and Yenlo-Willow Mountains, were surveyed in December under poor conditions. In the Beluga-Susitna count area we believe the small sample size and low bull and calf:cow ratios are due to poor survey conditions combined with the late timing of these surveys. The data were biased because many moose had apparently moved out of the survey area. Most moose had migrated to timberline or below, a situation which makes sex and age determination from aircraft difficult.

The Mt. Yenlo-Willow Mountain survey was flown on 11 December 1979. At that time, the snow was deep and the animals had emigrated. Numerous trails were noted indicating moose had moved from the count area into the surrounding river valleys and dense timber. We do not believe the sample size of 30 moose, or their composition, is representative of the population in that area.

Budget limitations restricted aerial composition surveys to only three areas in Unit 16. The surveys in Subunit 16B are considered poor, raising questions on the status of the population in this Subunit. Sufficient monies must be allocated in 1980 for surveys of additional areas in order to gain an accurate assessment of the population.

The Subunit 16B moose harvest declined from 589 moose in 1978 to 361 moose in 1979. Unit-wide hunting pressure declined from 2,538 reported hunters in 1978 to 1,473 in 1979. This is a 41.9 percent decline in hunting pressure. Causes of the decline are unknown but adverse climatic conditions throughout the month of September are suspected. Climatological records show rain and/or fog occurred during 20 days of September and winds with gusts exceeding 10 mph occurred during 24 days of the month. It is believed this adverse weather discouraged or prohibited many hunters from going afield.

No changes in seasons or bag limits are recommended at this time.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 17

GEOGRAPHICAL DESCRIPTION: Bristol Bay

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

Season and Bag Limit

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	One bull
Remainder Subunit 17C	Sept. 10 - Sept. 20 Dec. 10 - Dec. 31	One bull

Population Status and Trend

Few data are available for evaluating the status of the moose population in Unit 17. Incidental observations obtained during flights within the Unit indicate moose are extremely scarce throughout the year in both Subunit 17A and in the lower portions of Subunit 17C. Large winter concentrations similar to those found in many other areas of Southcentral Alaska have never been reported in Unit 17. Reports from Unit residents indicate this moose population slowly declined for many years and stabilized at a low density during the late 1970's.

Population Composition

No fall sex and age composition surveys were flown in Unit 17 during 1979. One late winter survey was flown in Sunshine Valley. Composition data from this count are as follows: 33 adults of unknown sex, 5 females, and 7 calves. Two sets of twin calves were observed on this survey.

Mortality

Thirty-three moose (32 bulls and 1 unknown sex) were reported killed during the 1979 season. A figure of 48.5 percent for moose hunter success was based upon the number of hunters reporting. No reminder letters were sent to hunters failing to report.

The reported moose kill since 1970 has averaged 53 animals per year; however, harvest ticket information has never adequately reflected the actual moose harvest in Unit 17. An estimated 150 to 200 moose are taken annually, many of which are females. Moose are often more accessible to villagers during the winter months than during the September season. Females are generally selected as they are usually fatter and considered more palatable than bulls at this time of year.

Management Summary and Recommendations

Since statehood, management of the Unit 17 moose population has relied entirely on restrictive seasons and bag limits. In 1978, further restrictions were instituted when the Iowithla and Sunshine drainages, both important wintering areas, were closed during the December season. Although many local residents ignore the general season dates and the one-bull bag limit, the closures in the Iowithla and Sunshine Valley drainages appear to be respected.

Because of the low moose densities in Unit 17, fall sex and age surveys are not practical in many places. Fall surveys should be flown where feasible to supplement data from late winter surveys conducted in selected areas of the Unit.

Increased effort to reduce the illegal harvest of females should be made through public contact and information programs in the villages.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 18

GEOGRAPHICAL DESCRIPTION: Yukon-Kuskokwim Delta

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

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 Unit 18	Sept. 1 - Dec. 31	One bull

Population Status and Trends

It was reported in the 1977-78 Unit 18 Moose S&I report that general observations indicated the moose population was increasing. Aerial surveys to determine distribution and population sizes were flown in late February 1980 on the Yukon River from Pilot Station upstream to the Unit 21 boundary and along the Atchuelinguk River. While moose browse and cover were found to be excellent, very few moose were observed below Russian Mission on the Yukon or on the Atchuelinguk River. Available data to evaluate population trends are sketchy, but it is apparent that in the lower Yukon drainage moose numbers are well below the carrying capacity of the habitat.

Population Composition

During aerial surveys in February we failed to find enough moose in Unit 18 to develop estimates of sex and age composition or population size. One cow with one calf was seen on the Atchuelinguk River in 1.25 hours of survey time; while nine adults and seven calves were observed from the Devil's Elbow area downstream to Pilot Station on the main Yukon during 2.3 hours of surveys. Based on the number of tracks seen and survey results it appears there were fewer than 50 moose in the area, and yet the excellent browse in the area should be able to support 1,000 more moose. On the Yukon River between Russian Mission to the Unit 21 boundary, 38 adults and 11 calves were counted during 3.3 hours of survey

time; most were located on islands in the river. Moose were also found along the main river bank in this area, but few were seen in areas dominated by spruce or at a distance of more than 2 miles from the main river. It was estimated that the area supported a maximum of 100 moose. Highest densities in Unit 18 were found near Paimuit, but a dramatic change was noticed about half way between Holy Cross and Russian Mission. Moose were virtually absent below Russian Mission.

Surveys on the Yukon River from the Unit 21 boundary to Holy Cross revealed 221 moose, with 28 percent calves; and from Holy Cross to Anvik 392 moose with 21 percent calves were counted. It was estimated that there were 900 to 1,000 moose in this area.

Mortality

Reminder letters were not mailed to hunters who did not return their harvest tickets this year. Also, the area biologist position in Unit 18 was vacant the entire year so there was considerably less effort by the Department to get hunters to return their harvest tickets. Consequently, only 33 hunters reported hunting in the Unit compared to 133 last year. Twelve bulls were reported taken; however, the actual harvest was probably two or three times larger. Nine moose were reported taken in September, 2 in late October, and 1 in late December. Timing of the harvest was similar in fall 1978, when 38 moose were taken in September and seven between late October and late December.

The Eek River and Russian Mission areas contributed relatively more moose to the harvest than other portions of the Unit, with three and four animals being reported from these areas, respectively. The following table summarizes the reported 1979 harvest.

Transportation Means	Successful Hunters	Unsuccessful Hunters
(# of hunters using)		
not specified	0	5
airplane	4	1
boat	7	15
snow machine	1	0
Total	12	21
# of Days Hunted		
mean	5	10
range	1 - 21	1 - 30
Residency		
# Unit residents	8	19
# non-Unit residents	0	1
# nonresidents	3	1
# unknown	1	0
Total	12	21

Unreported (by means of harvest reports) and out-of-season harvest of moose remains a problem in Unit 18. The illegal taking of moose has been estimated to be between 3 and 40 times the reported harvest in recent years. Wolf predation is not thought to contribute significantly to moose mortality in the Unit, as indicated by the low numbers of wolves being sealed by trappers (a maximum of four per year have been sealed since 1971).

Management Summary and Recommendations

Compliance by local residents with harvest ticket systems apparently will require continued efforts by Department personnel to obtain a reasonable degree of accuracy in reporting. Although over 1,500 harvest tickets were issued in the Unit, only 27 Unit residents returned their reports. Continued effort must be made to inform hunters how harvest report data can be to their advantage if valid harvest trends are to be developed.

Surveys of moose abundance and distribution on the Yukon River drainage from Anvik to Pilot Station clearly show the marked downstream reduction of moose in similar habitat. Based on observations and snow machine tracks, it appears that most of the moose moving into the lower Yukon are taken, often outside of the legal hunting season; thus a viable breeding stock has been unable to become established. The result of hunting out of season on a potentially growing moose population should be related to residents on the Yukon-Kuskokwim Delta. Increased public awareness of the currently depressed status of Unit 18 moose populations could be promoted by village meetings, slide presentations, television and radio announcements, and other educational efforts.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 19

GEOGRAPHICAL DESCRIPTION: Middle and Upper Kuskokwim Drainages

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

Seasons and Bag Limits

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

Population Status and Trend

Moose populations in Unit 19 continued to reflect trends observed in the past reporting period. Moose in Subunits 19A and 19B appear to be increasing and are at moderate levels. Deep snow and severe cold during late winter 1979 may have contributed to mortality in Subunit 19D. However, with the exception of the North Fork of the Kuskokwim, density in Subunit 19D is stable or slightly increasing. Moose populations residing largely within the boundaries of Subunit 19C appear to be decreasing in some areas but stable in others. Moose in most areas of this Subunit cannot currently support an increased harvest without a decrease in bull density and trophy quality.

Population Composition

Fall composition surveys were flown in Subunits 19C and 19D during November and December 1979 (Tables 1 and 2). The data from 19C indicate that production and/or survival of calves was low during 1979 but that survival to yearling age was moderate. Data from 19D indicate slightly better production and/or survival of calves during 1979 and fair survival of yearlings.

The effects of heavy hunting pressure on large bulls are indicated by comparing the number of large bulls from Farewell with that from the less accessible Tonsona River.

Surveys conducted in late winter over portions of Subunit 19D are presented in Table 3.

Table 1. Moose composition surveys, Subunit 19C.

Date	Area	No. Large Bulls	No. Small Bulls	Cows with 1	Cows with 2	Cows with 3 Calves	No. Calves	Percent Calves in Herd	Total Moose	Moose/ Hour
11/20/79	Farewell	14	9	20	2	0	2	4.2	47	31
12/7/79	Tonsona R. to S. Fork Kuskokwim	33	3	24	8	2	12	14.6	82	25
Total		47	12	44	10	2	12	10.8	129	26

Table 2. Moose composition surveys, Subunit 19D.

Date	Area	No. Large Bulls	No. Small Bulls	Cows with 1	Cows with 2	Cows with 3 Calves	No. Calves	Percent Calves in Herd	Total Moose	Moose/ Hour
11/21/79	Black R.	19	11	53	16	1	18	15.2	118	60
12/16/79	Wilson Sl.	3	5	18	6	1	8	19.5	41	41
Total		22	16	71	22	2	26	16.3	159	54

Table 3. Late winter moose composition surveys, Subunit 19D.

Date	Area	Moose without Calves	Cows with 1	Cows with 2 Calves	Percent Calves	Total Moose	Moose/ Hour
1/25/80	Nixon Fork	63	23	0	21.1	109	93
2/19/80	Kuskokwim R.	74	22	1	19.8	121	96
2/19/80	Takotna R.	52	12	0	15.7	76	76
Total		189	57	1	18.6	306	86

Data from the 1978 and 1980 counts are comparable and suggest continued increases in calf production and survival within this portion of Subunit 19D. However, results of both fall and late winter surveys of the North Fork area of the Kuskokwim revealed a declining population and poor calf survival. On November 24, 1979 a 3 hour and 25 minute survey of the Middle Fork, Slow Fork, Tonsona, and part of the North Fork produced a count of only 13 moose. On January 29, 1980

(Table 4), under good snow and survey conditions and with normal winter moose concentrations along the North Fork River, only 71 moose were found in 3 hours of survey time. Calves composed 11 percent of the sample, again indicating poor initial production or calf survival in this population.

Table 4. Moose composition surveys, North Fork River, Subunit 19D.

Date	Area	Adults without Calves	Cows with 1	Cows with 2 Calves	Calves	Percent Calves	Total	Moose/ Hour
11/29/80	North Fork	56	6	1	8	11.2	71	24

Mortality

The unit-wide reported harvest for 1979-80 was 283 bulls. This represents a slight decrease over the 1978-79 season. The unreported and illegal kill for Unit 19 is estimated to be approximately 200 to 250 moose.

Hunters took 43 bulls during the 1979 season in Subunit 19A. Thirty moose were taken by hunters using boats for transportation. A very late freezeup allowed hunters using boats to harvest moose as late as November 10. In addition, several guides took advantage of the November bulls-only season to harvest six bulls. An additional 75 moose were probably taken in 1979 but not reported. Wolf predation appeared to have decreased in Subunit 19A, but several large wolf packs remained in the area during 1979-80. Moose mortality due to drowning may have been significant along the Hoholitna and Holitna Rivers during late winter 1980.

Hunting pressure increased significantly in Subunit 19B during 1979, particularly in the vicinity of Whitefish Lake. Many hunters were aliens flown to the area by Anchorage air taxi operators. Airborne hunters harvested 24 moose, whereas boat hunters took 5 moose on the upper Hoholitna portion of the Subunit.

Harvest levels during the September 1-October 10 season in Subunit 19C decreased slightly from 1978. All but six of the 132 moose harvested in 1979 were taken by hunters using aircraft for transportation. A number of bison hunters took advantage of the late moose season and harvested 15-20 moose along the South Fork of the Kuskokwim in early October. Heavy hunting pressure in Subunit 19C resulted in high harvests in the Farewell and upper Stony River areas.

The moose harvest decreased in Subunit 19D, despite a trend toward early November bull hunting by guides and some residents. Seventy-five moose were taken during the September 1-30 and November 1-30 seasons. Hunters utilizing aircraft took 22 moose, which supports comments by residents regarding an increased incidence of hunters using airplanes. Mortality resulting from wolf predation was most significant in the North Fork drainage. An estimated 28 wolves in three packs contributed to the apparent decline of the resident moose population. Elsewhere in the Subunit wolf numbers have declined. Mild weather and light snowfall in 1979-80 provided excellent conditions for overwintering moose.

Management Summary and Recommendations

Moose populations in Unit 19 are increasing slowly because of improved recruitment. Favorable population status in Subunits 19A and 19B should insure that a slight increase in harvest in these areas will not adversely affect moose. Harvests in Subunit 19C should be monitored closely, despite a decrease in the 1979 harvest. The following management steps are recommended for the Upper Kuskokwim from Big River upstream: 1) open the Kuskokwim drainage in Subunit 19D above the mouth of the Big River to aerial wolf control; 2) reduce the 1980 fall season in this area to a 10-day period in September; 3) consider designating this area a controlled use zone to prevent the use of aircraft for hunting; and 4) close the season in this area if subsequent survyes suggest further declines in the moose population.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20A

GEOGRAPHICAL DESCRIPTION: Tanana Flats, Central Alaska Range

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

Seasons and Bag Limits

Unit 20A, in the Yanert River drainage	No open season	
Remainder of Unit 20A	Sept. 5 - Sept. 15	One bull

Population Status and Trend

The moose population in Subunit 20A and adjacent 20C (east of the Nenana River) is estimated at 3,700 animals. Moose numbers in Subunit 20A are continuing to increase at an annual rate of approximately 7 percent. Available data indicate the increase is not uniform throughout the Subunit, but is highest in the areas where wolf numbers have been reduced. For example, moose are increasing at an annual rate of approximately 15 percent in the Tanana Flats, while in portions of the foothills the increase is much lower. In the Yanert drainage, and perhaps in other areas, moose numbers are probably still declining.

Recent browse surveys in portions of Subunit 20A indicate browse quantity and quality are adequate, however a large proportion of available browse is old and decadent. Preferred browse species in old burns are being replaced by spruce and other nonbrowse plants. As a result, carrying capacity of the Subunit, particularly on the Flats, continues to decline.

Population Composition

Although sex and age surveys in Subunit 20A were limited during 1979 because of budgetary constraints, an attempt was made to sample three areas: the Tanana Flats, where moose numbers are increasing at an estimated 15 percent annually; the foothills, where moose numbers are increasing at a lower rate than on the Flats; and Subunit 20C east of the Nenana River, where moose numbers are probably declining. These areas encompass the Tanana Flats between Blair Lakes and Clear Creek Buttes (east of the Blair Lakes trail in count areas 2 and 6), the foothills between Tatlanika Creek and the Wood River, including the Japan Hills, and Subunit 20C within the drainage of Moody Creek.

Both calf and yearling survival rates continued to be high in the areas sampled in Subunit 20A (Table 1). Although calf survival in the Flats and foothills was similar, yearling survival was significantly higher in the Flats. Calf and yearling survival in Moody Creek was low. The differential survival rates of calves and yearlings between the Flats, foothills, and Moody Creek are probably a reflection of the number of wolves remaining in each area.

Table 1. Moose composition counts, Subunit 20A, fall 1980.

Subunit 20A (overall)				
Bulls per 100 cows	Calves per 100 cows	Percent calves in herd	Percent yrlg bulls in herd	Percent lge bulls in herd
60	45	22	9	19

Subunit 20A (by area)		
Area	Calves/100 cows greater than 2 yrs	Yearlings/100 cows greater than 2 yrs
Flats	62	69
Foothills	54	40
Moody Creek	14	15

Preparturition surveys were conducted in standard count areas on the Tanana Flats during mid-May (Table 2) to assess overwinter calf survival. The mild winter of 1979-80 combined with continued wolf control in Subunit 20A resulted in high moose calf survival.

Table 2. Moose parturition counts, Subunit 20A, May 1980.

Yearlings per 100 cows	% Yearlings in Herd	Bulls per 100 Cows	% Bulls in Herd	Total Moose
42	22.5	44.6	23.9	280

Mortality

Reminder letters were not mailed to moose hunters during 1979, but extrapolation of harvest ticket data indicates that 99 moose were taken by hunters in Subunit 20A during

the September 5-15 season. This is a 90 percent increase from the 52 moose reported harvested during 1978 and a 183 percent increase from the 35 moose reported taken during both 1977 and 1976. In recent years the moose season has been adjusted to reduce harvests. Harvest data are presented by area in Table 3. Based on antler size reported by hunters on harvest tickets, yearlings constituted 20 percent of the harvest. This assumes that yearling moose have antler spreads of 30 inches or less. The mean antler size for all moose taken was 44 inches (n=87). Aircraft was the most popular means of access, followed by boats and off-road vehicles. Data regarding hunter transportation are summarized in Table 4.

Table 3. Major areas of Subunit 20A moose harvest, 1979.*

Drainage	Moose Harvest	Percent of Harvest
Tanana Flats	46	52
Wood River	17	19
Delta River to Little Delta River	21	24
Gold King-Japan Hills		2

* Data derived from harvest ticket returns. Reminder letters were not mailed during 1979.

Table 4. Modes of access utilized by Subunit 20A moose hunters, 1979.*

Access Mode	Number Successful Hunters	Number Unsuccessful Hunters
Aircraft	55	14
Horse	2	1
Boat	27	18
Offroad vehicle	3	0
Highway vehicle	1	2
Unspecified	0	13

* Data derived from harvest ticket returns. Reminder letters were not mailed during 1979.

One hundred and thirty-six people reported hunting in Subunit 20A during the 1979 season. However, because reminder

letters were not mailed to individuals failing to return harvest ticket questionnaires, the actual number of hunters probably was considerably higher than reported. Because hunter success in Subunit 20A has varied from 20 to 30 percent in recent years, a success ratio of 25 percent would provide an estimated hunting effort of 352 individuals. According to harvest ticket returns, residents accounted for 84 percent of the harvest and constituted 98 percent of the unsuccessful hunters. Poaching is not believed to be a significant source of mortality in Subunit 20A.

Management Summary and Recommendations

The moose population in most of Subunit 20A is increasing, primarily as a result of the current wolf reduction program. Moose in adjacent units are declining or have stabilized at low density.

Public desire is for higher moose abundance in Subunit 20A. As stated in the management plan, the Department should continue programs that will allow moose numbers to increase until a density similar to that of the mid-1960's is achieved. Browse surveys indicate that the winter food base in some areas of Subunit 20A, particularly the Tanana Flats, has declined and the area is incapable of supporting a high density of moose. Without browse rehabilitation through prescribed burns or wildfires, the full potential of current management efforts and the public demand for increased moose numbers cannot be realized. Therefore, ongoing efforts to liberalize the fire suppression policy in Subunit 20A should be continued.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20B

GEOGRAPHICAL DESCRIPTION: Fairbanks and Central Tanana Valley

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

Seasons and Bag Limits

Unit 20B, that portion surrounding the greater Fairbanks area (see Hunting Regulation booklet No. 20 for specific description).	No open season	
Unit 20B, that portion within the Minto Management Area	Sept. 5 - Sept. 15	One bull by registration permit only. See 5 AAC 81.055 and separate permit hunt supplement.
Remainder Unit 20B	Sept. 5 - Sept. 15	One bull

Population Status and Trend

Moose density was low and probably declined throughout most of Subunit 20B. However, moose numbers increased in portions of Subunit 20B adjacent to the Tanana Flats. This was presumably due to increased calf survival and yearling recruitment of moose that annually move from Subunit 20B to the Tanana Flats for calving. Calf survival on the Tanana Flats is relatively high, apparently because of the low number of wolves in the area.

Population Composition

Most of Subunit 20B was not surveyed during this reporting period because of insufficient funds and poor survey conditions. A late winter survey of Minto Flats revealed a very low moose density--only 15 moose per hour of survey. Survival of calves to late winter was good in the Minto Flats. For the second consecutive year calves comprised a high proportion (38%) of the moose observed.

Mortality

Harvest ticket returns indicated that 55 bull moose were taken in Subunit 20B (exclusive of Minto Flats) by 168 hunters during the 1979 season. An additional four moose were killed on that portion of the Minto Flats within Subunit 20B during a registration hunt in which 188 people participated. Hunter success was good (33%) for those not hunting on the Minto Flats. Only 3 percent of the permit holders in the Minto hunt reported killing a moose. Distribution of the known harvest is as follows:

Area	Number of Moose
Chatanika River	10
Chena River	29
Tanana-Goldstream	10
Tatalina	3
Minto Flats	4
Unknown	2

Most of the permits for the Minto Flats registration hunt were issued to residents of Minto (48), Nenana (4), and Fairbanks (116). Four were issued to out-of-state hunters. Fairbanks residents killed 4 and Minto residents killed 2 of the 6 moose reported during the hunt.

Modes of access reported by hunters in Subunit 20B are compared below:

Transportation Type	Minto Flats	Remainder of Subunit
Aircraft	22%	1%
Boat	39%	11%
Highway vehicle	37%	45%
Off-road vehicle	2%	21%

According to records kept by the Fish and Wildlife Protection Division, an additional 26 moose were killed by automobiles during the period July 1979 to March 1980. Illegal hunting also accounted for a significant loss of moose, although most poaching was undetected. At least 15 moose are probably killed illegally in the Fairbanks area each year.

Additional mortality resulted from wolf predation, although the magnitude of this loss is unknown. At least 14 packs of wolves, numbering a minimum of 69 animals, occupied territories that were partially or entirely within the Subunit. Chronically poor moose calf survival, low moose density, and a relatively large number of calves in the area suggest that predation was a major source of mortality.

Management Summary and Recommendations

Despite increases in calf survival and yearling recruitment in some portions of Subunit 20B, the moose population is probably still declining except in the area immediately adjacent to the Tanana Flats. Wolf predation appears to be the largest single source of mortality. However, excluding wolf predation, losses due to poaching, road kills, predation by bears, legal hunting, and accidents probably exceed recruitment. Permits to shoot wolves from aircraft were issued to the public during late winter 1980 in an attempt to temporarily reduce wolf density, but poor snow conditions made this program largely ineffective. Wolf control and restrictive moose hunting seasons should be continued until the ratio of wolves to moose is reduced. Habitat rehabilitation is necessary throughout most of the subunit and should be vigorously promoted in cooperation with the appropriate land management agencies.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20C

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

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

Seasons and Bag Limits

Unit 20C, the drainage of the Yanert River	No open season	
Unit 20C, that portion within the Minto Management Area	Sept. 5 - Sept. 15	One bull by registration permit only (see permit hunt supplement)
Remainder Unit 20C	Sept. 5 - Sept. 15	One bull

Population Status and Trend

Moose numbers in Subunit 20C have been declining since the early 1970's and are presently at the lowest level in decades. Chronically poor recruitment assures that moose density will not increase. At best, moose numbers may have stabilized at a low level in some portions of the Subunit.

Population Composition

Moose surveys were not conducted in most of the established trend count areas during this reporting period due to lack of funds and poor survey conditions. Only the Manley area was surveyed. The Manley count area is in an old burn where browse conditions have been steadily improving. However, moose observed per hour of survey and on-the-ground assessments of browse utilization suggest that use of this area by moose is low and probably declining. Moose per hour figures have decreased from 17 in 1977, when surveys were initiated, to 14 in 1979. The latter figure should be viewed as a maximum, since in 1979 only the most likely areas for locating moose were surveyed. Sample sizes have been too low in the past 3 years to permit assessment of calf survival or yearling recruitment in the Manley area.

A reconnaissance flight was flown to the headwaters of the Cosna and Zitziana Rivers during November 1979 to locate

possible areas of moose concentration and to determine relative abundance. Moose were extremely scarce, with only three observations made during approximately 1 hour of flying.

Mortality

Except for the Yanert Fork of the Nenana River, most of Subunit 20C was open to moose hunting. According to harvest ticket returns, 334 hunters killed 143 bull moose for a success ratio of 43 percent. Hunter success increased substantially over that reported for 1978 (15%) and resulted in approximately a 10 percent increase in total harvest. However, most moose taken by residents of Tanana, Rampart, Stevens Village, Beaver, Fort Yukon, and Circle are probably not reflected in the harvest ticket data. Illegal harvest is a significant source of mortality, particularly because it consists of a substantial number of cows. The harvest of moose increased in all areas of the Subunit except those included in the recently created National Monuments (Table 1). This suggests that many hunters either avoided Monuments or reported that moose killed in Monuments were taken elsewhere.

Table 1. Distribution of the 1978 moose harvest in Subunit 20C.

Location	Number Harvested
Healy River, Volkmar River, George Creek	16
Salcha River, Shaw Creek, Goodpaster River	40
Birch Creek, Steese Highway, Central, Circle	13
Beaver Creek, Nome Creek	2
Manley, Livengood	14
Totatlanika River, Nenana River	31
Stampede Trail	5
Kantishna River, Kantishna	6
Minchumina, Muddy River	7
Zitziana River, Wien Lake	3

The largest proportion of hunters (31%) used boats for access, followed by highway vehicles (25%), off-road vehicles (16%), and aircraft (10%). In previous years, hunters using aircraft or ORV's had the highest success, although in 1978 no relationship between means of transportation and hunter success was evident.

Wolves are numerous in Subunit 20C (approximately 1 wolf per 40 mi^2), and wolf predation was probably a primary cause of low calf survival. Until the current wolf to moose ratio (1:10) decreases, moose are not expected to increase.

Aerial wolf shooting permits were issued to the public in late winter 1979-80 for the eastern portion of Subunit 20C, but poor tracking conditions made the program ineffective. Efforts to temporarily reduce wolf numbers will resume next winter.

Management Summary and Recommendations

Moose populations in Subunit 20C are far below carrying capacity, and numbers could increase several-fold before habitat would become a limiting factor. However, less browse is currently available than existed before moose numbers declined in the early 1970's. Habitat management for a more natural fire regime (i.e. less fire suppression) will be necessary before moose numbers can increase to their former levels.

Moose numbers are low throughout most of Subunit 20C and will remain low if recruitment does not improve. Legal harvests have been greatly reduced, and wolf predation is probably the largest source of mortality to moose. Predation appears to be the most important factor contributing to poor calf survival and recruitment.

The current wolf control program in Subunit 20C should be continued until a more favorable moose/wolf ratio is obtained. A reduction in wolf numbers will facilitate an increase in moose density, and aerial wolf hunting permits should be issued to the public to supplement Departmental control efforts.

Short seasons for bulls should be continued in Subunit 20C until calf survival improves and moose numbers increase.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 20D

GEOGRAPHICAL DESCRIPTION: Central Tanana Drainage

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

Seasons and Bag Limits

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 appears to be low but increasing in western Subunit 20D. In eastern portions of the Subunit moose numbers are low and stable.

Population Composition

Surveys in Subunit 20D showed 19 percent short yearlings in April 1980. This suggests good survival of moose during winter 1979-80.

Mortality

The moose harvest in Subunit 20D during the 1979 season consisted of 19 bulls. Fifteen bulls were killed west of the Gerstle River in the registration hunting area. One hundred and seventy-six of 313 permittees hunted this area, and 9 percent of the permittees who hunted were successful. Elsewhere in Subunit 20D, 39 hunters took a total of four moose. Yearlings comprised 47 percent of the 1979 moose harvest in Subunit 20D.

Known mortality from causes other than legal sport hunting totaled 14 moose. This included seven moose killed on roads and seven shot illegally.

Overwinter loss of moose appeared to be low in Subunit 20D. The winter 1979-80 was relatively mild, and snowfall was slightly below average on moose winter ranges. Maximum snow depth at three sites averaged 14 inches from January through March--the 10-year average snow depth during this period is 15.7 inches.

Even though moose populations in Subunit 20D may be stable or increasing, predation by wolves is considered a significant factor limiting the increase in moose numbers, particularly in eastern portions of the Subunit. Wolf control in Subunit 20A was probably responsible for the slight increase of moose abundance in western Subunit 20D. Although the number of moose killed by wolves is unknown, ranges of approximately 40 wolves occur partially in the Subunit, and in April 1980 the wolf to moose ratio was estimated at 1:17.

Management Summary and Recommendations

The Subunit 20D moose population has undergone a long-term decline primarily because of habitat deterioration. Predation by wolves has in recent years further reduced moose numbers. An effective wolf control program should be carried out in Subunit 20D and the Department should continue attempts to work out arrangements with other resource management agencies that will eventually lead to enhancement of moose habitat. This must involve changing attitudes of State and Federal agencies with regard to fire suppression.

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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, 1979 - June 30, 1980

Seasons and Bag Limits

No open season

Population Status and Trend

Moose densities in Subunit 20E continued to be extremely low and appear to be declining. The moose population in this area of approximately 15,000 mi^2 is probably less than 1,000.

Population Composition

Sex and age composition surveys were conducted in selected southern portions of the Subunit on November 15 and 19. Only 75 moose were observed in 4.1 hours of survey (18 moose per hour).

Results of these surveys are probably not representative of the population because expected moose movements were delayed; consequently, the sample size was approximately two-thirds smaller than in past years. It is noteworthy that the calf/cow ratio of 21:100 was the highest recorded since 1970 and represented the third straight year of constantly increasing survival of calves to 6 months of age. Incidence of twins was also high. Calves comprised 15 percent of this sample and 19 percent of 63 moose observed during March wolf surveys.

Mortality

The primary source of mortality is predation by wolves and bears. Wolf surveys indicate a minimum population of 120 wolves in 17 packs. Wolves have declined significantly since the mid-1970's but still contribute to considerable mortality of this moose population. The moose season has been closed in Subunit 20E since 1977. Ten to 15 moose have probably been poached each year in the northern portion of the Subunit (Yukon River drainage), but man-caused mortality in the survey areas has been negligible.

Recommendations

Wolf control should be initiated as soon as possible to prevent further moose population declines and to facilitate population growth. Increased harvests of black and grizzly bears should be encouraged as populations of both species are essentially unhunted. The moose hunting closure should be continued until population growth is well underway. The extent of wildfires in the area should be increased to guarantee habitat conditions conducive to herd expansion in the future.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 21

GEOGRAPHICAL DESCRIPTION: Middle Yukon

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

Seasons and Bag Limits

Unit 21, the drainage of the Innoko River upstream from the mouth of the Iditarod River and including the Iditarod River drainage.	Sept. 1 - Sept. 10	One bull
Unit 21, the drainages into the south side of the Yukon River upstream from Ruby and east of the Ruby-Poorman Road.	Sept. 10 - Sept. 20	One bull by registration permit only. See 5 AAC 81.055 and permit hunt supplement.
Remainder Unit 21	Sept. 10 - Sept. 30	One bull

Population Status and Trend

Very few moose surveys were conducted in 1979-80 due to poor weather conditions during November and budgetary constraints. Moose populations are stable in most of the Unit although populations in the Nowitna, Koyukuk, and Melozitna River drainages appeared to be declining and populations along the Yukon River downstream from Ruby and along the lower Innoko River appeared to be increasing.

Population Composition

Fall surveys along the Koyukuk River (Table 1) revealed population composition similar to that during the previous 2 years. Although moose were relatively abundant in this area, density was probably declining because of low recruitment rates. Moose populations have been high in this area for many years and shrubs are heavily browsed.

The Nowitna flats from Ruby to the Nowitna River, the lower Nowitna River, and the Sulatna River were surveyed in December (Table 1). The observed bull/cow ratio along the lower Nowitna dropped from 32.4:100 in 1978 to 22.4:100 in 1979. A few bulls may have shed their antlers before the survey

which may have slightly altered survey data. Nevertheless, the reduced bull/cow ratio probably resulted primarily from a substantial harvest along the Nowitna during September 1979.

A partial survey of the Melozitna River was conducted on March 12, 1980 (Table 1). Most of the moose had left the main river and were dispersed along tributaries and on hillsides at and below timberline. Only 21 moose were observed in 2 hours of flight time (9.7 moose/hr). Moose observed per hour would have been higher if less survey time had been spent searching at various elevations and in different habitat types to determine distribution. No comprehensive survey of the Melozitna River drainage has been made.

The moose population within the Innoko River drainage appeared to be stable or increasing slightly. Late winter surveys along the Yukon River near the lower Innoko revealed good calf survival for the past 2 years (Table 1 and 1978-79 Moose S&I Report). Additionally, the herd has benefited from wolf control and short hunting seasons which have reduced the harvest.

Mortality

Hunters reported taking 221 bulls in Unit 21 during 1979 compared to 353 in 1978. Residency of 212 hunters revealed that Fairbanks residents harvested 54 moose, Anchorage residents 29 moose, other Alaskan residents 31 moose, nonresidents 31 moose, and local residents 67 moose. I estimate that local Unit residents annually take 400-500 moose throughout the year. The total annual take of moose from Unit 21 is probably 600-800 or 3-4 times the reported harvest.

Hunting on the Nowitna River drainage during September 1979 was by registration permit only. Permits were issued and collected at Fairbanks, Tanana, Ruby, and at a check station located near the mouth of the Nowitna River. The majority (88.2%) of all permittees checked out of the hunt as stipulated on the permit. Sixty-one bull moose were taken during the Nowitna hunt. The majority of the successful hunters (65.6%) resided in the Fairbanks area. This was expected since the Nowitna has been a popular moose hunting area for Fairbanks residents for many years. Local residents from Tanana and Ruby accounted for 19.6 percent of the take (12 moose).

Forty moose were reported taken from the Koyukuk River drainage in Unit 21. This drainage includes the Koyukuk Management Area, which has been closed to the use of aircraft for 2 years and during that time has been a controversial subject. Seventeen moose were taken from the Koyukuk Management Area by boat hunters who resided outside Unit 21 and 9 were taken by hunters utilizing aircraft from an area adjacent to the Koyukuk Management Area.

Table 1. Moose surveys in Unit 21, fall 1979 and winter 1980.

Area	Date	Bulls/ 100 cows	Calves/ 100 cows	Percent in herd: Calves	Percent in herd: Yrlg bulls	Moose/ hour	Total moose
Koyukuk River - Dulbi River to Gisasa River	11/25-26/79	28.9	17.6	12.0	3.6	156	416
Nowitna River - mouth to Sulatna River	12/5/79	25.8	36.4	22.4	5.6	80.2	107
Sulatna River - trib. of Nowitna River	12/5/79	50.0	0.0	0.0	0.0	14.4	12
Nowitna River - Pilot Creek to mouth of Susulatna River	12/5/79	80.0	53.3	22.8	5.7	70.0	35
Innoko River - Ophir to Cripple Landing	1/9/80	NA	NA	43.5	NA	23.0	23
Melozitna River	3/12/80	NA	NA	4.7	NA	9.7	21
Yukon River - Anvik to Holy Cross*	2/27/80	NA	NA	20.9	NA	87.1	392
Yukon River - Holy Cross to Paimiut	2/25/80	NA	NA	27.6	NA	50.2	221

* Surveys conducted by Region V personnel.

Wolves are a significant source of mortality to moose throughout Unit 21. Aerial wolf control continued for the second winter in the Nowitna and Innoko drainages. More wolves were taken during winter 1979-80 than the previous year.

Management Summary and Recommendations

Unit 21 is an extremely large area with considerable variation in moose abundance, hunter access, and user groups. I recommend that the unit be subdivided for management purposes.

Predator control programs should be continued in the Nowitna and Innoko areas. Additional programs in other portions of Unit 21 may be necessary to insure a sustainable moose population capable of sustaining harvests equal to that of 1979.

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

Additional funds are needed 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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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 22

GEOGRAPHICAL DESCRIPTION: Seward Peninsula

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

Seasons and Bag Limits

Unit 22, all drainages into Norton Sound from the Solomon River and its tributaries to Cape Douglas and from milepost 50 on the Nome-Teller Road.	Sept. 1 - Sept. 15	One bull
Unit 22, all drainages Kotzebue Sound and the Chukchi Sea west of, but not including, the Goodhope River.	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.
Unit 22, all drainages into Port Clarence-Imuruk Basin, and Bering Sea west of Cape Douglas and a line to milepost 50 on the Nome-Teller Road.	Aug. 1 - Dec. 31	One moose; antlerless moose may be taken by permit only from Sept. 15 - Dec. 31 See 5 AAC 81.055 and separate permit hunt supplement.
Unit 22, all drainages into Norton Sound east of but not including the Solomon River, to and including the Inglutalik River.	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.
Remainder Unit 22, all drainages flowing into Norton Sound south of the Inglutalik River.	Aug. 1 - Jan. 31	One bull

Population Status and Trend

The moose population on the central Seward Peninsula appeared to be near, or above, the carrying capacity of its winter range. In the western and southern portions of Unit 22 the density was much lower, and moose appeared to be stable or increasing slightly, even though range did not seem to be a limiting factor. With minor exceptions, there were no apparent changes in population status from a year ago.

Population Composition

Aerial surveys were conducted in March 1980 when moose were concentrated along the major river valleys. All the major drainages in Unit 22 were surveyed except the southeastern portion of the Unit (south of the Koyuk River).

During 29.7 hours of survey time, a total of 1,587 moose was observed (53 moose per hour). Similar counts in March 1979 revealed a total of 1,362 moose (69 moose per hour) indicating an increase of 255 moose (14%) during the year. An increase probably occurred, but not of this magnitude. The 1980 survey covered a larger area and required an additional 19 hours of flight time. Considering the area covered and the excellent survey conditions (bright light and solid snow cover), it was estimated that 70 percent or more of the moose present were observed. I estimate that 2,250 moose inhabit that portion of Unit 22 surveyed.

Short yearlings comprised 21 percent of the population in the 1980 spring survey. This compares favorably to data from 1979 (20%) and 1974 (19%). Unit-wide, survival of yearlings remained relatively stable during the last 6 years throughout Unit 22. Yearling survival in 1980 ranged from a low of 14 percent in the Fish River drainage to a high of 37 percent in a relatively unhunted area around Nome.

The most consistent population data from which trends may be interpreted come from the Kuzitrin drainage where spring aerial surveys have been conducted annually since 1972 (Table 1).

These data indicate short yearling survival increased during the early 1970's, peaking at 30 percent in 1975 and then tapering off to approximately 19 percent of the population, where it has remained for the past few years. It is possible that this trend could have been presumed, more than real; survival during 1975 and 1976 could have been "abnormally" high and/or there may have been a significant sampling error.

Table 1. Moose population composition counts from the Kuzitrin drainage.

Year	Total Adults	Total Calves	Percent Calves	Total Moose
1972	180	37	17.1	216
1973	297	72	19.5	369
1974	341	92	21.2	433
1975	370	156	30.0	526
1976	326	87	27.7	313
1977	310	83	21.0	393
1978	484	110	18.5	595
1979	380	107	21.9	571
1980	454	108	19.2	562

In the Kuzitrin drainage, the percentage of calves was markedly different between the fall counts (30%) and spring counts (19%) (Table 2). This indicates there was an 11 percent mortality factor in the calf segment during the winter. However, the numerical decrease in calves was only 14 animals (126 versus 180), but the sample size increased from 418 in the fall to 562 in the spring. During the fall bulls and nonparturient cows tend to remain at higher elevations in areas where the surveys are not normally conducted. If we assume the Kuzitrin population in the fall contained 562 animals rather than 418 observed, then the 126 calves observed in the fall would be computed as 22 percent of the population, a decrease in the percentage of calves from fall to spring of only 3 percent.

Table 2. Comparison of fall and spring surveys on major drainages.

Drainage	Total Adults	Total Calves	Percent Calves	Total Sample
Kuzitrin, fall 1979	292	126	30%	418
Kuzitrin, spring 1980	454	108	19%	562
Agiapuk R., fall 1979	248	70	22%	318
Agiapuk R., spring 1980	287	95	25%	382
Fish River, fall 1979	273	37	12%	310
Fish River, spring 1980	244	41	14%	285

The Agiapuk and Fish River drainages were easier to survey, and the distribution of moose by sex and age was probably more random. The apparent increase in percentage of calves from fall to spring counts indicated seasonal sampling problems, but it also indicated high calf survival through the winter period. The percentage of calves observed in the spring on the Kuzitrin drainages has been 17 percent or more of the population from 1972 through 1980 (Table 1).

Aerial surveys in the spring confirmed a marked difference in moose density than what had been noted in prior years. The central Seward Peninsula (Imuruk Basin) contained the highest number of animals; in fact, 63 percent (994 moose) were counted in this area alone. The lowest density was observed in the Kwiniuk-Tubutulik River systems where only 20 moose were observed in 1.5 hours of survey time (13 moose per hour). Moose density was low in the extreme eastern and southeastern portions of the Unit, and gradually increased in a westerly direction until the highest numbers per square mile were attained in the American River (western Imuruk Basin). West of this drainage there was a marked decrease in moose numbers. Moose were virtually absent on the extreme western tip of the Seward Peninsula, a reflection of lack of suitable winter habitat.

Composition counts were conducted in fall 1979 in three major drainages. A summary of these data follows:

Drainage	Bulls/ 100 Cows	Percent Yearling Bulls in herd	Calves/ 100 Cows	Percent Calves in herd	Incidence Twins/100♀♀ Calves	Sample Size
Kuzitrin R.	32	5	57	30%	21	418
Fish R.	31	13	18	12%	13	310
American R.	63	10	46	22%	23	318
Serpentine R.	38	12	35	20%	9	119

Bulls per 100 cows were lowest in the Kuzitrin and Fish River drainages (32 and 31, respectively), and highest in the American River (63). This difference was expected since the Kuzitrin and the adjacent Fish River received the heaviest hunting pressure, and the American River was the least accessible of the four areas surveyed. Calves per 100 cows ranged from a low of 18 in the Fish River to a high of 57 in the Kuzitrin. The reason for these great discrepancies is unknown, but it is probably a combination of one or more of the following:

1. Sampling error induced in part by nonrandom distribution of sex and age classes.

2. Differences in calf production and survival brought on by variable range conditions or habitat.

3. Predation, primarily by wolves and bears in the Fish River drainage.

The relatively high rate of twinning on the Fish River (as well as the other drainages) indicates that initial fecundity was excellent. Winter range on the Fish River drainage showed signs of overbrowsing but did not appear to adversely affect fecundity rates or survival of yearlings.

From 1973 through 1979 incisor teeth were collected from moose to assess changes in the age structure of the population (Table 3). Because of biases in the sample (hunter selectivity, age determination, and others), there are inherent dangers in a strict interpretation of the table. However, these data may indicate trends that have important management implications.

Table 3. 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
1973 bulls	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
Total bulls 1973 - 1979	29	25	15	13	7	4	3	4	666
1979 Cows	20	30	15	10	5	3	5	12	40
Total Cows 1973 - 1979	22	18	15	12	6	6	5	16	263
Total Sample Bulls & Cows 1973 - 1979	27	22	15	13	6	5	3	7	929

From 1973 through 1977 the data show that the percentage of yearling bulls in the population slowly declined from a high of 44 percent to a low of 17 percent. However, in 1978 yearling bulls increased to 37 percent of the sample and remained relatively high at 31 percent the following year. Initially, we thought the increase in yearling bulls was primarily a result of higher calf survival due to previous mild winters, or that production may have been stimulated by increased harvest which reduced competition on the winter range.

During the period 1975 through 1977 the number of bulls harvested was 2 to 3 times the annual harvest during the early 1970's. Aerial surveys indicated the moose population began to peak about 1975 (Table 1). Harvesting an increasing number of bulls from a "stable" population base would eventually decrease the number of bulls over the age of 1 year. Thus, the yearling cohort would be represented as a larger percentage of the population without an actual increase in number. If this occurred, the bull/cow ratio should decrease. The bull/cow ratio in the Kuzitrin (where most of the age sample was obtained) declined from 60:100 in 1974 to 32:100 in 1979. Thus, it appeared a number of factors were involved in the apparent increased yearling survival noted in the last 2 years.

The age data also indicate that bulls older than 6 years were becoming more predominant in the age structure of the population. In 1973 no bulls were judged to be over 8 years of age, but in the 1977 and 1978 samples 5 to 9 percent were in this category.

Mortality

The major source of moose mortality in Unit 22 was from hunting. The hunting seasons were the longest in the state, ranging from 5 to 8 months. The reported take, from the return of harvest tickets, was only a portion of the harvest. An additional 25 successful hunters took moose on antlerless moose permits but did not report their harvest. Nine moose were also reported on harvest reports which were not included on the statewide computer run (the moose were taken in the spring season after the cut-off date for tabulating the data). Therefore, the minimum known harvest was 270 moose, down from the 297 moose taken the previous season, but the second highest kill recorded. The composition of the harvest was 193 bulls (71%), 75 cows (28%) and 2 animals of unspecified sex (1%).

Every year a number of hunters fail to report even though reporting is a legal requirement. Experience with antlerless moose permitees provided some insight into the nonreporting problem. Upon receiving an antlerless permit, the permittee agreed to voluntarily return the permit by a

specified date regardless of success; if successful, the completed permit together with appropriate specimens was to be returned within 5 days of taking the moose. These instructions were clearly explained to each applicant and were plainly legible on the permit itself. Yet, of the 492 antlerless permits issued, only 242 were initially returned. Approximately 2 weeks after the due date, 250 reminder letters were sent to those who were delinquent. From this mailing we determined that 12 people were deceased or left no forwarding address. Of the remaining 174 respondents, 152 were unsuccessful and 22 indicated they had taken a moose (13% success rate). After the second deadline date, certified letters were issued which warned the remaining 64 nonrespondents that they would be issued a citation if they did not report. Subsequently, an addition of 46 completed permits were turned in; seven of these indicated they had killed a moose (15% success rate). Using the data obtained from the two mailings, we calculated that the overall minimum success rate was 13 percent (22/174 + 7/46).

Because hunters holding antlerless permits usually had a great degree of personal contact with Department employees, they were more aware of their reporting responsibilities than were other hunters. Thus, a success ratio of 13 percent is probably minimal for harvest ticket holders who failed to report. At least 1,116 moose tickets were issued in Game Management Unit 22. There were 415 harvest tickets reported on the computer run, and another 345 were turned in after the cut-off date for a total return of 760 tickets, leaving 356 hunters not reporting. If a minimum success ratio of 13 percent is applied, an additional 46 moose were taken but unreported.

Another source of unreported moose mortality involved the failure of hunters in rural communities to obtain hunting licenses and/or moose harvest tickets. For example, the license vendors at Stebbins and St. Michael issued only two moose tickets. From conversations with village residents, case histories filed by enforcement officers, and other sources of information it was estimated that 10 to 25 moose were taken by "unlicensed" hunters. Using all sources of data from reported and unreported harvest, the total kill was estimated to be 325-340 moose.

Based on the known harvest, 40 percent of the total kill occurred on the central Seward Peninsula, principally in the Kuzitrin, Kougarok, and Pilgrim drainages. A well-maintained gravel road traverses most of this area in a north-south direction and provides ready access from Nome. The hunting pressure along the road system was intense, particularly during the snow-free months. In the past 4 years, Nome residents spent thousands of man-hours during each hunting season driving the roads in search of a legal moose.

In the Kuzitrin area, hunters using highway and off-road vehicles accounted for 58 percent of the harvest. Of the remaining successful hunters, boats were used in 24 percent of the cases, snow machines 11 percent, aircraft 3 percent, and 4 percent was unspecified. Road vehicles provided the principal means of access to the Kuzitrin for a vast majority of the hunters and as soon as snow conditions closed the road system to vehicle traffic few hunters bothered to travel to the area by other means.

In other portions of the Unit other forms of transportation were important, especially in the latter half of the hunting season. In the Unit as a whole, road hunters accounted for 30 percent of the harvest, followed by hunters using boats (31%) and snow machines (16%).

Subsistence hunting has been a dynamic issue with many of the local residents. Allegations have been made that competition from aircraft hunters adversely affected the success of hunters using forms of transportation that were "less efficient." The reported data, however, do not bear out the validity of this claim. Only 17 percent of the harvest, or 40 moose, taken with the aid of an aircraft. Most hunters using aircraft killed moose in the early fall, usually in the areas not readily accessible to other forms of transportation. Hunters using aircraft were more likely to comply with the reporting regulations than rural hunters who usually used other forms of transportation, so this figure may be unrealistically high. It appears that competition from aircraft hunters was more of a perceived problem than a real one.

Harvest chronology largely reflected access. During the first 10 weeks of the regular hunting season (when it was feasible to use vehicles and/or boats) hunters took 70 percent of the annual harvest (181 moose). During the next 12 weeks (beginning October 8) 28 percent of the harvest was taken (72 moose). The remaining 2 percent of the harvest occurred during the last 2 months of the "spring" season.

The antlerless moose season opened September 15 (except for a small closed area around Nome) and remained open in some areas as late as March 31. During this 28-week period, 492 antlerless permits were issued; approximately 400 were issued in the first 4 weeks of the season. The large number of antlerless permits issued (compared to the human population base) reflected the high local demand for moose. Hunters took 76 cows (compared to 96 in 1978-79); in addition, 52 bulls (15 antlerless) were killed by hunters holding valid antlerless permits (Table 4).

Table 4. Unit 22 antlerless moose harvest by residency.

	Nome	Other Areas within Unit 22	Alaska Residents Outside Unit 22	Nonresidents	Total
Permits issued*	372(76%)	74 (15%)	40 (8%)	6 (1%)	492(100%)
Harvest					
Antlered ♂♂	28	5	4	1	38
Antlerless ♂♂	9	5	0	1	15
Cows	54	16	4	1	75
Successful hunters	91(24%)**	26(35%)	8(20%)	3(50%)	128(26%)
Unsuccessful hunters	281(76%)**	48(65%)	32(80%)	3(50%)	364(74%)

* Reading across gives percentage of permits issued to each area.
** Reading down gives percentage success ratio within each area.

Only six permits were issued to nonresidents of the state and only 40 to Alaskan residents residing outside Unit 22. These two groups took a total of 11 moose (either bulls or cows) on their antlerless permits. These data indicate that non-Unit 22 hunters obtained only percent 9 of the antlerless permits and took only 9 percent of the antlerless harvest (including bulls reported on their antlerless permits).

In terms of absolute numbers, "outside hunters" did not significantly compete with local residents for antlered or antlerless moose. Comparing hunter statistics from harvest tickets, nonresidents took only 5 percent and unspecified residents took 3 percent or a total combined harvest of 19 moose between the two groups. The remaining 92 percent of the harvest (217 moose) was taken by Unit residents. Of 415 people reporting hunting in Unit 22 (both successful and unsuccessful), only 4 percent of the total were non-Unit residents.

Only one case of natural mortality was documented during the report period; an adult bull moose was found on the upper Kuzitrin River in March. Considering the number of hours flown over prime moose habitat, the sighting of only one carcass indicated low mortality. Most moose observed during aerial surveys appeared to be in good physical condition.

I saw evidence of at least three packs of wolves, one each on the Koyuk, Kuzitrin, and Fish Rivers. Considering wolf abundance (average packs of six or more) and available big game prey in these drainages, a number of moose were probably killed by wolves through the course of the winter. The extent of this mortality is unknown, but probably did not exceed 100 moose per year.

Three cases of grizzly bears feeding on moose carcasses were noted during April and May. It was unknown whether the bears killed the moose or were feeding on winter kills. When bears first emerged from their dens in April, snow cover was nearly continuous over most of the Unit, and food for grizzlies was probably limited to carrion and live prey. A few moose were probably taken by grizzly bears, but the magnitude of this mortality was unknown. Grizzly bear predation probably did not exceed 50 moose and may have been considerably less.

Management Summary and Recommendations

During the past 9 years, spring aerial surveys have shown a substantial increase in the moose population. In the central Seward Peninsula the population grew very rapidly in the early 1970's, but began to level off in the last few years. Winter browse is restricted primarily to narrow belts along the major rivers; in some locations it appeared the density of moose exceeded the long-term carrying capacity of the winter range, and a high percentage of willows showed signs of over browsing in some drainages.

Moose composition surveys revealed a gradual decline in bull/cow ratios in heavily hunted areas, but relatively stable and high bull ratios in lightly hunted areas. Bull/cow ratios should be carefully monitored in the future, especially in the Kuzitrin drainage. Corrective measures may be needed if ratios drop below 15 bulls:100 cows.

In some areas surveys revealed considerable differences between fall and spring calf ratios. Sampling error, differences in predation rates, and differences in production may contribute to these data. Wolf predation may significantly influence yearling survival rates in a few drainages.

Age data indicate a gradual increase in the older age cohorts, but the population in general still contains a high percentage of young animals. The moose population is maintaining relatively high rates of production and survival.

Considering the high annual recruitment and competition on winter range, increased harvests are desirable in most areas. However, as harvests increase and as environmental conditions change, precise harvest information becomes more

critical. An analysis of moose tickets and antlerless permits indicates nearly 50 percent of the hunters failed to respond voluntarily. Reminder letters to harvest ticket and antlerless permit holders should be sent to assess the success rate of nonrespondents.

The antlerless permit should be retained because it provides better control than harvest tickets. Permits should be implemented only in areas where a surplus of cows warrant a season.

The moose population on the Seward Peninsula is vulnerable to overhunting due to open terrain and the accessibility by aircraft and snow machine. Therefore, seasons and bag limits should be critically reviewed in all areas on an annual basis.

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MOOSE

SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 23

GEOGRAPHICAL DESCRIPTION: Kotzebue Sound

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

Seasons and Bag Limits

Unit 23, that the Seward Peninsula west of and including the Buckland drainage.	Aug. 1 - Dec. 31	One bull portion on
Remainder of Unit 23.	Aug. 1 - Dec. 31	One moose; antlerless moose may be taken by registration permit only from Sept. 15 - Oct. 15. See 5 AAC 81.055 and separate permit hunt supplement.

Population Status and Trend

In many areas of Unit 23 moose populations are approaching optimum numbers. Population estimates for the drainages of the Noatak, Kobuk, and Selawik were 1500, 1500, and 800, respectively. In late winter, calves on these major drainages range from 13 to 26 percent, and recruitment was probably close to these figures. The estimated harvest from these drainages ranged from 4 to 9 percent of the population. On the Kugururok River portion of the Noatak drainage moose numbers were high (363 moose). Close monitoring of this population will be required to guard against habitat deterioration.

Moose densities were low (8 moose) on the lower Selawik in comparison to available browse and they were high (199 moose) on the upper Selawik. Hunter access was readily available by boat, float equipped airplane, and snow machine.

On the Buckland drainage densities were low (9 moose) in relation to available browse except for the Bear Creek portion (79 moose) of the West Fork. The West Fork of the Buckland offers limited hunter access by boat during high water, very restricted airplane access and moderate snow machine access.

The Seward Peninsula west of the Buckland drainage had moderate moose densities and an estimated population of 800 moose, 26 percent calves in the herd, and a 3 percent harvest level.

Moose densities on the Wulik-Kivalina drainage system were estimated at 150 moose with a harvest level approximating herd recruitment.

Population Composition

The lower Noatak drainage was surveyed in 1976 through 1978 by intensively covering all habitats by transects from the riparian lowlands to the adjoining slopes of the Mulgrave Hills. During fall 1979, the survey technique was changed and the lower Noatak was lightly covered. The survey encompassed the immediate riparian areas on each side of the Noatak and a bisecting flight through the lower eastern slopes of the Mulgrave Hills. The only other drainage on which the uplands were surveyed in the fall of 1979 was the Kiwalik drainage.

The remainder of the surveys were extensive in nature in that survey flights were restricted to the immediate riparian areas abutting the main river channel. Good survey conditions prevailed on all surveys. Early spring thawing probably caused some animals to move away from riparian areas which may have been responsible for the low moose count on the Selawik drainage.

Fall surveys were conducted on the Kiwalik, Buckland and lower Noatak drainages. The Kiwalik drainage continues to have a high percentage of males in the herd (79♂♂ per 100♀♀) the Buckland herd had 65♂♂ per 100♀♀ and the lower Noatak had 31♂♂ per 100♀♀ in 1979; this may have been the result of the different survey technique rather than an actual reduction of males in the herd. Productivity for these herds was as follows:

Kiwalik - 68 calves per 100 cows
Buckland - 26 calves per 100 cows
Lower Noatak - 46 calves per 100 cows

Spring surveys were conducted on the Kugruk, Pinnell, Goodhope, Selawik, Kobuk, Noatak, Wulik, and Kivalina drainages. Table 1 shows the results of the spring 1980 surveys plus the corresponding information from the fall 1979 surveys.

Table 1. Density and productivity of moose by drainage in Unit 23.

Drainage	Incidence of twins per 100♀ with calves	Calf % in herd	Moose per hour	Total Moose
Goodhope	14	28	81	97
Kugruk-Pinnell	19	26	97	136
Kiwalik*	27	28	18	69
Buckland*	20	14	16	88
Selawik	9	17	42	207
Kobuk				
(Delta to Kiana)	25	26	25	114
(Squirrel River)	18	29	45	166
(Kiana to Kobuk Village)	12	23	70	274
(Kobuk V. to headwaters)	0	20	16	49
Noatak				
(Kelly & Kugururok R.)	16	13	139	398
(Agashashok to Kelly R.)*	17	26	36	159
Wulik	0	12	58	68
Kivalina	0	25	10	4

*Surveyed in fall of 1979.

Productivity measured by percent of calves in the herd ranged from 12 to 29 percent. Moose herds on the Buckland, Selawik, Kelly, Kugururok, and Wulik drainages all displayed low productivity values. Low productivity in the Buckland, Kelly, and Wulik Rivers warrants monitoring: if these trends continue a more intensive management program may have to be implemented. Moose in the Selawik drainage had low productivity but a high density population. Low herd productivity found in the Kugururok drainages may be advantageous in preventing overutilization of the browse.

Mortality

Harvest figures for the fall 1979 moose season were obtained from hunters voluntarily returning hunter report cards. Statewide, only 37.2 percent of the hunters returned their harvest reports. In 1978 moose harvest data were obtained from hunters voluntarily returning harvest reports and, in addition, reminder letters were sent to hunters not voluntarily returning reports. Statewide, 67.9 percent of the hunters returned harvest information in 1978 with reminder letters.

The following table outlines the current historical moose harvest for Unit 23.

Table 2. Moose harvest from harvest reports Unit 23.

Area	1979 No reminder letter	1978 Reminder letter	1977 No reminder letter	1976 Reminder letter
Seward Peninsula	15	14	15	11
Selawik	12	22	10	16
Kobuk	40	63	72	50
Noatak	51	94	74	57
Wulik-Kivalina	15	5	6	8
Other	6	15	3	7
Totals	139	213	180	149

Harvest data were obtained under similar conditions for the harvest years of 1979 and 1977. For the following discussion of harvest information, only data from the years 1979 and 1977 will be used for comparison. In 1979 the harvest was lower on Kobuk drainages than in 1977, but on the Wulik and Kivalina drainages it was greater in 1979 than in 1977. These changes in distribution of harvests correspond to federal action designating the majority of the Kobuk and Noatak drainages as National Park Monuments. Under Monument regulations sport hunting and use of aircraft by subsistence hunters were illegal.

Permits were required prior to hunting antlerless moose in Unit 23. Two hundred and thirty-seven permits were issued and 210 permits were returned. Based on data from these permits, 17 antlerless moose (cows) were taken compared to 10 reported on harvest reports (Table 3).

Table 3. Antlerless moose harvest using permit data Unit 23.

Year	Number of permits issued	Number of permits returned	Number of antlerless (cows) taken
1977	296	296	35
1978	260	260	35
1979	237	210	17

The reported number of hunters afield in Unit 23 was 239 in 1979 compared to 285 hunters in 1977. This lower number of hunters may be the result of the loss of preferred hunting areas due to the creation of National Park Monuments on roughly one-third of Unit 23. There was an increase in the nonresident hunter component from 11 hunters in 1977 to 32 hunters in 1979. Hunter success was 58 percent in 1979 compared to 68 percent in 1977.

Management Summary and Recommendations

The reported harvest in 1979 dropped to 139 animals. The actual harvest figure is estimated to range from 300 to 370 animals

The Buckland drainages moose herd has not demonstrated significant growth and riparian areas on the lower Buckland were underutilized. The Seward Peninsula west of the Buckland drainage had moderate moose densities. These herds were underutilized.

Changes in hunter distribution will continue to develop because of federal actions creating National Park Monuments. The upper Selawik and the Seward Peninsula are likely to be discovered by hunters residing outside of Unit 23. Big game guides have been taking increasing numbers of nonresident hunters into the Seward Peninsula and Wulik drainages.

Hunter distribution should be monitored closely on those areas outside of park monuments.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 24

GEOGRAPHICAL DESCRIPTION: Koyukuk River Drainage

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

Seasons and Bag Limits

Sept. 5 - Sept. 20 One bull

Population Status and Trend

Only one late winter survey was conducted during the reporting period, and it was insufficient to detect any change in status or trend of the Unit 24 moose population.

Population Composition

One survey was conducted on March 11 along the Koyukuk River between the villages of Huslia and Hughes. Of the 276 moose observed, 15.4 percent were calves. The percentage of calves in the population may not have been as high as suggested by this survey because moose had already begun moving away from the river prior to the survey. The number of moose along this portion of the Koyukuk River varied considerably. Between Huslia and the Hogatza River 224 moose were observed but only 51 moose were seen between the Hogatza River and Hughes.

Mortality

A total of 77 bull moose was reported taken during the 1979 season. During the previous season the reported harvest was 97 moose. The lower 1979 harvest is attributed to a shortened and earlier season and a later than normal rut. In general, local Unit residents were disappointed with the season and many requested the season to be open later next year.

Considering the unreported and illegally taken moose, the reported harvest of 77 moose is estimated to be less than half the actual take. Most of the illegal harvest occurs in the southern half of the Unit.

No wolf surveys were conducted in 1979-80. The previous year's harvest of 89 wolves was probably high enough to prevent an increase in wolf numbers. This certainly benefited some moose populations. Nevertheless, wolves continue

to be a major factor influencing moose populations in most of Unit 24.

Management Summary and Recommendations

A reduced operating budget has resulted in a serious lack of data necessary to manage moose and other species in Unit 24 and throughout the state. This is a particularly serious problem in Unit 24 where baseline information and historical moose survey data are unavailable. One survey is insufficient to obtain meaningful data on status, trend, composition, productivity, and mortality of moose populations.

The shortened September season and closure of the November season was unpopular among local residents. It is essential that adequate funds be made available for moose surveys if future management decisions are to be based on sound biological data.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 25

GEOGRAPHICAL DESCRIPTION: Chandalar and Eastern Yukon Drainages

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

Seasons and Bag Limits

Subdivision of Unit 25 into three areas resulted in a season length of 11-21 days during September, depending on the area, with an additional 10 days in November on the Yukon Flats. Refer to regulations for more specific information. The bag limit was one bull.

Population Status and Trend

Data are insufficient at present to indicate a population trend for moose in Unit 25. A previous survey in 1978 indicated that calf survival and yearling recruitment were poor in the Chandalar River drainage and that relative density was low, suggesting the population may be declining. Moose surveyed in the headwaters of the Hodzana and Hadwenzic Rivers revealed relatively high calf survival and yearling recruitment. Moose populations in the uplands along the Black and Little Black Rivers experienced good calf survival but poor yearling recruitment. Moose were very scarce in the lowlands along both the Yukon and Porcupine Rivers during October 1978. No surveys were attempted in 1979.

Population Composition

Moose surveys were not flown in Unit 25 during 1979 because of insufficient funds. Thus, no new data are available.

Mortality

According to harvest ticket returns, 170 hunters took 61 bull moose in Unit 25 during the 1979 season. Reported hunter success was 36 percent compared to 49 percent the previous year. Nonresident hunters, most of whom were guided, had a 69 percent success rate. Distribution of the known harvest is shown in Table 1. Hunter residency is shown in Table 2. Most of the local harvest probably was unreported. The present reporting system is inadequate, especially for residents of the Unit, and a more accurate method of collecting harvest data is needed to make management decisions.

Table 1. Distribution of the reported 1979 moose harvest for Unit 25.

Location	Number of Moose
Yukon Flats:	
Tanana to Rampart (plus Tozitna River)	6
Rampart to Beaver	6
Beaver to Circle	2
Circle to Eagle	10
Porcupine, Black, and Little Black Rivers	18
	42
Brooks Range:	
Chandalar River	10
Sheenjek River	1
Coleen River	1
	12

Table 2. Residency of moose hunters in Unit 25 (derived from 1979 harvest ticket reports).

Location	Number of Successful Hunters	Number of Unsuccessful Hunters	Total Hunters Reporting
Residents of Unit 25			
Fort Yukon	6	2	8
Tanana	2	2	4
Chalkyitsik	0	0	0
Beaver	0	0	0
Arctic Village	0	0	0
Venetie	0	0	0
Stevens Village	0	0	0
	8	4	12
Other Interior Residents			
Fairbanks area	22	25	47
Eagle	6	3	9
Rampart	0	0	0
Bettles	0	1	1
Central/Circle	6	0	6
Clear	0	1	1
Tok	2	1	3
Anaktuvuk Pass	0	1	1
Total	36	32	68
Other Alaska Residents	3	3	6
Nonresidents of Alaska	4	5	9
Foreign	6	0	6

In the Brooks Range the only feasible form of access for nonlocal hunters is by aircraft. On the Yukon Flats 82 percent of the reporting hunters utilized boats for access.

The magnitude of the loss to moose populations from other mortality factors is largely unknown. Losses due to disease and accidents are considered insignificant. However, predation by wolves is probably the primary reason for the poor overwinter survival of calf moose. Specific data on wolf abundance are not available, but observations incidental to moose survey flights, plus comments from hunters and trappers in the area, suggest that wolves are numerous in many portions of Unit 25.

Management Summary and Recommendations

The limited information available on the status of the moose population and the probable magnitude of the unreported take precludes a meaningful assessment of total harvest. Nonlocal use seems light at present in most areas south of the Brooks Range. However, this harvest may be significant in view of other sources of mortality such as local take and predation by wolves.

Moose surveys should be repeated in the future to monitor recruitment and population trends. An adequate assessment of the local harvest must be obtained. Land management agencies should be encouraged to return to a more natural fire regime. This would improve habitat in the western Yukon Flats and maintain the existing fire-caused shrub communities in the eastern portion. Guiding and nonlocal hunting activities are increasing in the Brooks Range and should be closely monitored. An area of particular concern is the upper Chandalar drainage where moose are particularly vulnerable because of the open terrain and where moose numbers appear to be declining. Wolf surveys should be conducted in areas where recruitment is low and the human demand for moose is great.

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SURVEY-INVENTORY PROGRESS REPORT

GAME MANAGEMENT UNIT 26

GEOGRAPHICAL DESCRIPTION: Arctic Slope

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

Seasons and Bag Limits

Sept. 1 - Dec. 31 One moose

Population Status and Trend

The status of the moose population in this unit is not well known, but annual aerial surveys have been conducted in April on the central portion of the Colville River drainage for the past 7 years. Linear regression analyses on data from these surveys show an average upward trend in the total number of moose seen. Most (91% of the mean annual increase of 42.3 animals) of this upward trend is attributable to an increase in the number of adults; short yearlings account for the remainder (9%) of the increase.

Population Composition

The last fall composition survey was conducted in November 1978 when we found 61 bulls per 100 cows and 34 calves per 100 cows in the central Colville system. However, the sample size was small (144) and might not reflect the true composition of the population.

Annual aerial surveys, conducted in April since 1974, provide a better overview of the population but do not give precise information on composition since bulls cannot be reliably distinguished from cows. Results of the most recent survey (1980) are shown in Table 1. Short yearlings represented 20 percent of the herd, slightly higher than in 1979 (17%) and similar to the 7 year mean of 21 percent. Survey conditions in 1980 were better than in 1979, when very light snow cover made it possible for moose to feed on low-growing willows found on small tributaries of the main rivers, thus fewer animals were on the main branches of the drainage. Snow cover was more normal in 1980 and the count of 841 was the highest number of moose during a spring survey of the central Colville drainage.

Overall, moose appear to be increasing in Unit 26, especially within the Colville drainage. Based on the number of short yearlings observed during spring surveys, overwinter calf survival is good.

Table 1. Summary of Colville System, April, 1980 Moose composition counts

Area	Date	Adults W/0	Adults W/1	Adults W/2	Adults W/3	Total Adults	Lone Calves	Total Calves*	Total Moose	Calf % in Herd	Count Time (hr.)	Moose Per Hr.
Anaktuvuk R.	4/24	128	28	8	0	164	0	44	208	21.2	2.2	76
Chandler R. drainage	4/23,24	185	52	8	1	246	0	71	317	22.4	4.8	67
Colville R.: Umiat to Anaktuvuk	4/23	51	15	2	0	68	0	19	87	21.8	1.6	54
Colville R.: Umiat to Killik	4/25	168	29	1	0	198	0	31	229	13.5	5.03	46
						676		165	841	$\bar{x}$ = 19.6		

*Short yearlings

Mortality

Reported harvest in the Unit during 1979 was 90 moose: 70 bulls and 20 cows. Total reported kill was more than double the number killed in 1978 (46), however, much of the increased take is attributable to a sharp rise in the reported take from Subunit 26B. In 1978, only four bulls were taken in this subunit, in 1979, 20 moose were taken, a 400 percent increase. The reported harvest in Subunit 26A (68) was also higher than in past years (38% above 1978) but only two more were taken in 1979 than the previous high of 66 moose in 1976.

Of the 90 moose reported being taken, 10 were taken by Unit 26 residents, 60 by Alaska residents who were not residents of the unit and 20 by nonresidents and aliens. In addition to the reported harvest, an estimated six to 10 moose were probably taken but not reported.

During our April aerial survey, three carcasses, one definitely identified as a moose, were seen in the central Colville River system. A brown/grizzly bear was feeding on one of them, but none of the carcasses appeared to be fresh kills.

Management Summary and Recommendations

Review of data collected during April aerial surveys of the central Colville River system over the past 7 years revealed between 86 and 170 short yearlings (mean = 143) per year. The known harvest within this same geographic area over this period has varied between 35 and 68 animals (mean = 51) per year, well below the average annual short yearling production. This relatively low harvest coupled with an apparent low level of predation could explain the apparent upward trend in population over the past 7 years.

As long as the level of predation remains low and weather conditions remain similar to or, at least not more severe than they have been over the past several years, the current seasons and bag limits should produce an overall harvest within acceptable limits. However, since the total population of moose is small (estimated at 1500 to 1800 for GMU 26), annual aerial surveys should be continued, preferably one in the fall to obtain information on composition and one in April to obtain the best estimate of total population size and percent of short yearlings in the herd.

In view of the sharp increase in the number of moose harvested from Subunit 26B, and increased activity along the pipeline haul road due to expansion of the North Slope oil

fields, annual aerial surveys should be expanded geographically to include drainages east and west of the road. In addition, haul road related hunting activity should be monitored more carefully to insure that hunting with firearms is not occurring in the 5 mile closed area on either side of the Trans-Alaska Pipeline.

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